Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and other Technical Amendments

Response to Comments

United States Environmental Protection Agency

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Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

United States Environmental Protection Agency

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Introduction

EPA published a Notice of Proposed Rulemaking (NPRM) on May 12, 2020 (85 FR 28153) to propose changes to the test procedures for heavy-duty engines and vehicles to improve accuracy and reduce testing burden. The proposal also included other regulatory amendments concerning light-duty vehicles, heavy-duty vehicles, highway motorcycles, locomotives, marine engines, other nonroad engines and vehicles, stationary engines which affected the certification procedures for exhaust emission standards, and related requirements. EPA also proposed amendments for evaporative emission standards for nonroad equipment and portable fuel containers.

These amendments are intended to increase compliance flexibility, harmonize with other requirements, add clarity, correct errors, and streamline the regulations. Many comments were generally supportive of the changes proposed in the NPRM, with many industry stakeholders expressing support for provisions that provide flexibility in the certification procedures, and other stakeholders expressing support for limiting certain flexibilities or at least limiting the number of model years when they could be applied.

This Response to Comments contains a detailed summary of the comments we received on the NPRM as well as our analysis and response to the comments. The final rulemaking notice ("FRM") published in the Federal Register includes the final regulations resulting from this rulemaking, along with further description and rationale for our conclusions. Most of the proposed revisions from that notice are addressed in this final rule. EPA is also issuing a supplemental notice of proposed rulemaking ("SNPRM") to that proposed rule, which is published in the same issue of the Federal Register as the FRM. In the SNPRM, EPA proposes supplemental amendments concerning only certain specific aspects of GEM, see Section II of that preamble for more details on these proposals.

List of Commenters

Commenter	Abbreviation	Docket ID Number EPA-HQ-OAR-2019-0307
American Council for an Energy-Efficient Economy	ACEEE	-0067
Association of American Railroads	AAR	-0045
Allison Transmission		-0043
Anonymous1		-0025
American Petroleum Institute	API	-0029
Alliance for Automotive Innovation	Auto Innovators	-0049
California Air Resources Board	CARB	-0030
CARB appendix		-0030
Class of '85 Regulatory Response Group	Class of '85	-0053
Cummins, Inc.		-0036, -0066
Dana, Inc.		-0032
Eaton-Cummins	ECJV	-0027
Truck and Engine Manufacturers Association	EMA	-0044, -0060, -0072
Ford Motor Company	Ford	-0050, -0070
GILLIG LLC and New Flyer of America Inc.		-0023
GPA Midstream Association		-0051
International Council on Clean Transportation	ICCT	-0042
Interstate Natural Gas Association of America	INGAA	-0047
Kohler Co.		-0033
Manufacturers of Emissions Controls Association	MECA	-0046
Marine & Hazardous Engines, Ltd.		-0061
Motor and Equipment Manufacturers Association	MEMA	-0038
Motorcycle Industry Council, Inc.	MIC	-0052
Miretti Group		-0037
MTU		-0071
National Association of Clean Air Agencies	NACAA	-0041
New Flyer of America Inc		-0026
National Marine Manufacturers Association	NMMA	-0031
Outdoor Power Equipment Institute	OPEI	-0040
PACCAR		-0062
Polaris Inc.		-0048
Progress Rail		-0054
Pyroban Group Ltd		-0028
Tesla, Inc.		-0034
Volvo Group		-0035
Volkswagen Group of America	VW	-0039

List of Acronyms

Acronym	Definition
CFR	Code of Federal Regulations
CI	Compression Ignition (i.e., diesel engines)
DPF	Diesel Particulate Filter
EPA	Environmental Protection Agency
FR	Federal Register
GHG	Greenhouse Gas
kW	Kilowatt
L/cyl	Liters Per Cylinder
SCR	Selective Catalytic Reduction
ULSD	Ultra Low Sulfur Diesel fuel

Chapter 1: General Comments and Procedural Issues

1.1 General Support or Opposition

What Commenters Said	Response
EMA (0044) EMA and its members have been active participants in identifying and developing the multiple proposed Technical Amendments, and EMA greatly appreciates the open and collaborative process that has led to this NPRM. As a general matter, EMA supports and endorses EPA's efforts to improve and streamline the numerous test procedures relating to the certification of heavy-duty engines and vehicles. EMA also agrees that the proposed Technical Amendments will "increase compliance flexibility, harmonize with other requirements, add clarity, correct errors, and streamline the regulations" at issue. (85 FR at 28140.) Accordingly, EMA generally supports the vast majority of the proposed Technical Amendments. EMA greatly appreciates the opportunity to submit these comments on the proposed Technical Amendments, and we further appreciate the collaborative process that has led to this NPRM. Generally speaking, EMA fully supports and endorses the vast majority of the proposed Technical Amendments. To the extent that any proposed Technical Amendments are not specifically called out below, EPA can and should assume that EMA endorses and supports those proposed amendments.	The comment generally affirms the proposed rule.
Allison 0043: Allison is supportive of various modifications that EPA is proposing in 40 C.F.R. Parts 1065, 1036 and 1037. In general, EPA's direct engagement on these issues has served to resolve many lingering questions that followed finalization of the Phase 1 and Phase 2 GHG rules. Additionally, the collaboration of agency and industry aided in streamlining progress and in the interchange of concepts leading to successful results.	The comment affirms the proposed rule.
CARB (0030): CARB stated that they agree with many of the specific proposed provisions, and they shared the observation that many of the proposed amendments would not adversely affect California's implementation of their own emission control programs.	The comment generally affirms the proposed rule. CARB's individual statements of agreement are not repeated in the rest of this document
NMMA (0031) The purpose of the NMMA comments is to support the EPA's efforts to improve procedures for certifying marine engine exhaust emission, marine evaporative emission and portable fuel tank standards, and related requirements. As proposed these amendments will increase compliance flexibility, harmonize with other requirements, add clarity, correct errors, and streamline the regulations. NMMA supports the comments of the Engine Manufacturers Association. NMMA strongly supports these technical amendments and offers the following recommendations that will provide clarity and improve the final rule.	The comment generally affirms the proposed rule.

What Commenters Said	Response
VW (0039) We appreciate the cooperative spirit of EPA to streamline and improve various provisions of the emissions testing and certification process. Thank you for allowing us to provide comments to improve the modifications to several sections with relevance to light duty vehicles. Volkswagen appreciates the opportunity to provide our feedback on these proposed modifications. We understand the need for continuous improvement in the methods used to demonstrate compliance with various standards. We look forward to continuing to work together toward the development of clear and concise vehicle testing procedures.	The comment affirms the proposed rule.
Progress Rail (0054) In general, we support the changes proposed by EPA. EMD also supports development and implementation of feasible and cost-effective emission solutions for locomotive and marine compression ignition engines, to help make marine and rail transportation industry more environmentally friendly than they already are. The EPA locomotive and marine regulations require several modifications and amendments to address the uniqueness of such engines, to achieve emission reductions using feasible and available technology, to avoid excessive costs for certification and production line compliance programs, and to achieve its outstanding potential for a cost-effective emission control program.	The comment generally affirms the proposed rule. Progress Rail's individual statements of agreement are not repeated in the rest of this document
CARB (0030) CARB staff supports the migration of Part 86, Subpart A to Parts 1036, 1037, and 1068, as noted in the supplementary memorandum (https://www.regulations.gov/document?D=EPA-HQ-OAR-2019-0307-0003). As the draft regulatory text for this migration is refined and proposed as part of a future NPRM, CARB staff will, at that time, provide specific comments concerning the proposed language to accomplish the migration.	The comment generally affirms EPA's direction to migrate regulatory provisions to 40 CFR part 1036.

1.2 Authority

What Commenters Said	Response
Allison 0043: In general, Allison believes that the proposed rule is consistent with the President's May 19, 2020 Executive Order 13924, Regulatory Relief to Support Economic Recovery. Specifically, parts of the proposed rule rescind and modify regulations that either have or have the potential to "inhibit economic recovery" and alterations can be accomplished in accordance with "applicable law and the protection of public health and safety."	The comment affirms the proposed rule.

1.3 Timing of the Rulemaking

What Commenters Said	Response
Allison 0043: As presented in more detail below, Allison believes the HD Amendments should move forward to finalization this year and encourages EPA to have the regulatory changes in place to address the upcoming model year. ... While EPA may need to consider additional areas affecting Phase 2 implementation in the years ahead as well as address broader challenges concerning areas where the control of criteria and greenhouse gas ("GHG") emissions require different approaches (such as useful life and warranty provisions) this should not prevent the Agency from adopting needed revisions in the near-term. Rather, Allison encourages EPA to continue its process of stakeholder consultation and engagement so that future regulatory actions can be supported by technical and cost-effective analysis that is informed by real-world experience in implementing existing requirements and procedures. ... Allison appreciates the ability to provide comments on EPA's proposed rule and the Agency's willingness to both monitor implementation of Phase 2 regulations and to consider and advance mid-course corrections to the rule. As indicated above, Allison supports finalization of the proposed rule in 2020. At the same time, EPA should incorporate the alterations and adjustments outlined above as well as put in place a process by which additional review and modifications to Phase 2 requirements may take place. The Phase 2 rule covers engines and vehicles through 2027. And while the 10 year period covered by the rule promotes regulatory stability, it is also true that both changes in technology and ongoing experience in implementing various phases of the rule can serve to highlight areas for revision. We appreciate the adjustments that EPA has proposed and stand ready to assist the Agency in considering and advancing additional improvements.	The comment generally affirms the proposed rule. We have made great efforts for a timely final rule.

1.4 Publishing Errors

What Commenters Said	Response
CARB (0030): **FR description of 1037.530—**There is a typo in the federal register concerning 40 CFR § 1037.530. The federal register text says that U.S. EPA is changing the title of 40 CFR § 1037.540, whereas U.S. EPA actually intends to change the title of 40 CFR § 1037.530. 40 CFR § 1037.540 is for "Special procedures for testing vehicles with hybrid power take-off." Therefore, the item Number 148 should read as follows: "§1037.530 Wind-tunnel procedures for calculating drag area (CdA). 148. Amend §1037.530 (rather than § 1037.540) by revising the section heading as set forth above."	We agree that the proposed rule included this typographical error in the amendatory instructions for revising §1037.530. We have corrected the error in the revision we are finalizing.

1.5 Comments Received Outside the Comment Period

We received several comments after the published deadline of June 26, 2020, for submitting comments on the proposed rule. We were able to consider and respond to the following comments received after the published deadline (with the last one received on September 29, 2020):

- Progress Rail (July 23, 2020)
- PACCAR (July 28, 2020)
- EMA (August 21, 2020)
- American Council for an Energy Efficient Economy (ACEEE) (August 25, 2020)
- MTU (September 2, 2020)
- Ford (September 21, 2020)
- EMA (September 29, 2020)

Chapter 2: Heavy-Duty Highway Amendments

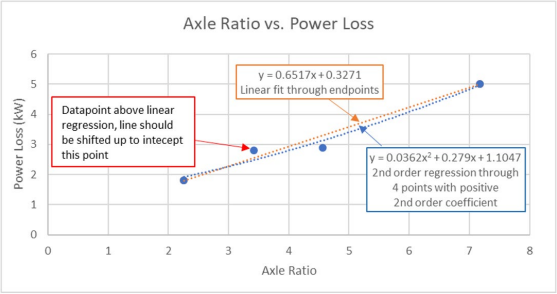
2.1 Test Procedure Amendments

2.1.1 Powertrain Testing (40 CFR 1037.550)

What Commenters Said	Response
Allison 0043: **Consider Further Changes to Powertrain Testing** One area where EPA could make an additional change in the context of this proposed rule, however, is with respect to powertrain testing. 40 C.F.R. §1037.235(a) currently provides that, in the case of powertrain testing, a test engine and test transmission are to be selected by "considering the whole range of vehicle models covered by the powertrain family and the mix of duty cycles specified in §1037.510." While this approach allows for additional flexibility as opposed to testing of vehicle families containing multiple vehicles or components (where selection of the "worst-case emission data vehicles or components" is required) as currently expressed in regulation, it is not clear how the range of vehicle models in a powertrain family may be represented. A straightforward method to represent the range of vehicle models in a powertrain family would be to explicitly require an averaging of the "best case" and "worst case" configuration. Not only would this include the full range of vehicle models covered, it would also create incentives for powertrain testing of "like kind" vehicle families. Specifically, there would be an incentive to group vehicle families so that the range of variability in emission performance was not extreme, thereby unduly reducing the regulatory performance of better performing configurations. This would also promote a more reasonable regulatory construct where manufacturers would have incentive to pay additional attention to defining similar vehicle families prior to testing. Current requirements – that manufacturers conducting powertrain testing simply consider the "whole range of vehicle models covered" -- does not provide sufficient direction or an incentive to consider how various groupings could be utilized to produce relatively better-performing vehicle families. To correct this, EPA should specify that an averaging of results within a powertrain family identified by the manufacturer occur. This would be similar to the approach EPA has taken in the light duty sector where "best case"/"worst case" averaging is utilized with respect to select-shift transmissions ("SSTs") and multimode transmissions ("MMTs"). Regulatory language on how this could be accomplished is provided below. We believe that this change would constitute a logical outgrowth of the proposed rule and EPA's request for comment on same:	1037.235 targets the worst-case transmission calibration, considering the range of vehicles that the transmission would go into. We are not looking for the average of the range of performance of the transmission, we are looking for the worst-case hardware. Thus, the request to allow averaging of the worst-case and best-case performance is a departure from how engine families are certified and what 40 CFR part 1037 currently requires for transmissions, while that weighting based on the actual use of these calibrations in the field will give the most representative use of these calibrations and their impact on CO_2 emissions. We understand the commenter's concern regarding the range of transmission calibrations that are available for powertrains. As for the proposed changes when manufacturers use the powertrain test option in 1037.550 for transmission calibrations, we are finalizing revisions in 40 CFR 1037.235(a) to address this issue, specifically allowing the available transmission calibrations to be weighted by the percentage of vehicles by prior model year, determined through the use of survey data or sales volume, that are using a given calibration in the field. The 40 CFR 1037.235(a) revisions are as follows: (a) Select emission-data vehicles that represent production vehicles and components for the vehicle family consistent with the specifications in §1037.205(o), 1037.515, and 1037.520. Where the test results will represent multiple vehicles or components with different emission performance, use good engineering judgment to select worst-case

§1037.235 Amending applications for certification. (a)* * * In the case of powertrain testing under §1037.550, select a test engine and test transmission by considering the whole range of vehicle models covered by the powertrain family that, using good engineering judgment, are likely to share similar emission characteristics given the mix of duty cycles specified in §1037.510. Within this family of grouped engines and transmissions, emission data for the family shall be determined, based on the use of good engineering judgment, through averaging of the best- and worst-case emission data for the powertrain family selected. While EPA's proposed revisions are making inroads and are wide-ranging, it is also clear that additional changes may be necessary in future years as the HD industry moves further into implementation of Phase 2 requirements. This may necessitate additional revisions based on the real-world implementation of Phase 2 and the alterations to the requirements contained in this proposed rule in the future.	emission data vehicles or components. In the case of powertrain testing under §1037.550, select a test engine and test transmission by considering the whole range of vehicle models covered by the powertrain family and the mix of duty cycles specified in §1037.510. If the powertrain has more than one transmission calibration, for example economy vs. performance, you may weight the results from the powertrain testing in §1037.550 by the percentage of vehicles in the family by prior model year for each configuration. This can be done, for example, through the use of survey data or based on the previous model year's sales volume. Weight the results of $M_{\text{fuel[cycle]}}$, $\frac{f_{\text{npowertrain}}}{v_{\text{powertrain}}}$, and $W_{\text{[cycle]}}$ from Table 2 of §1037.550 according to the percentage of vehicles in the family that use each transmission calibration.
EMA (0044): **1037.550(i)** Additional clarification is needed in this section regarding the selection of axle ratios and tire sizes. For example, when building the 8 configurations from section 1036.540(c)(3), should the lowest axle ratio go with Test 1 and the highest with Test 8? What about tire sizes? EPA needs to address these questions.	Tire size and axle ratio are not selected independently of each other. They are selected as pairs. Each pair of axle ratios and tire sizes (N/v) will need to be combined with each of the respective road loads (CDA, Crr, and mass). For example, in the 2X4 matrix, you will have four pairs of N/v and two separate road loads. The changes we are finalizing as proposed to 40 CFR §1037.550 have clarified this point.

2.1.2 Axle Testing (40 CFR 1037.560)

What Commenters Said	Response
Dana (0032): **Axle efficiency test: §1037.560(h)** *[85 FR 28267-8]* Dana is concerned that the method presented in §1037.560 (h) for analytically deriving untested axle power loss maps leaves a possible condition in which a tested map result is above the regression line. If four or more ratios are tested, there is a possibility that a second-order polynomial could have a positive second-order coefficient (so the end points are not adjusted) but still leave a middle data point that sits above the linear regression line between the maximum and minimum ratios. This leaves open the possibility that other (untested) ratios are also above the regression line. Below is an example of this scenario:  To mitigate this risk, the difference between the datapoint in question and the regression line could be added to the intercept values of the regression line. This would ensure that regression values do not understate power loss. Dana suggests adding language to the proposed rule to address this issue by ensuring the delta between the datapoint that is furthest above the regression line and the regression line is added to the intercept value of the regression line.	We agree that the method for analytically deriving untested axle power loss maps can lead to a condition where an attested map result is above the regression line, which can lead to the regression line understating power loss. We are finalizing the proposed changes to §1037.560(h) regarding power loss with a slight modification to address this issue. Specifically, the additional modification specifies that if four or more ratios are tested and one of the test points is above the linear regression line, you then add the difference between the datapoint and the regression line to the intercept values of the regression line, and that in such instances you then use the regression from that paragraph to determine the power loss of untested axles for each test point.
Volvo (0035): **1037.560 Axle Test Accuracy and Repeatability** In recent axle efficiency testing the Volvo Group has noted that the torque transducer accuracy of +/- 0.2% of the maximum axle input or output torque as specified in 1037.560(c) can provide up to +/- 30% impacts on the low-load points, and potentially provide more error in the results than the total axle efficiency improvement expected. Given the time and associated cost with switching out torque transducers to more appropriately scaled transducers for the low-load points and, more importantly, whether the Agency would follow suit in switching out transducers during confirmatory or SEA testing not performed by the manufacturer, the Volvo Group is very concerned with the current procedure. As such, we propose to work with EPA to find a suitable solution to mitigate the influence on the resultant axle efficiency map and FELs determined under audit and confirmatory testing.	EPA appreciates Volvo's comment and will work with them in the future to try to resolve this potential issue.

2.1.3 Transmission Testing (40 CFR 1037.565)

What Commenters Said	Response
MEMA (0038): **HDV Transmission Testing** Motor vehicle suppliers support the proposed changes to the transmission testing and calibration. These proposed changes to transmission testing and calibration allow greater alignment with data generated in the European Union and will reduce the overall compliance burden.	This comment generally affirms the proposed rule.

What Commenters Said	Response
Allison 0043: EPA Should Revise Provisions Regarding Confidence Levels for Testing EPA's current regulations regarding transmission efficiency testing require that transmission torque loss be calculated using specific procedures. EPA has proposed to maintain most of these procedures as originally promulgated, with the exception of revisions to 40 C.F.R. §1037.565(e)(6)-(8) and the addition of a new requirement to calculate mean input shaft torque (§1037.565(e)(10)). Allison does not object to these proposed changes and clarifications. Through a detailed review of 40 CFR §1037.565 (e)(9), however, Allison has identified what we believe may be an unintended consequence. Specifically, it appears that there may be no option other than achieving a 95% confidence level through additional testing. As currently in place, "[i]f the confidence level is greater than 0.10% for loaded tests or greater than 0.05% for unloaded tests" there is a requirement to repeat the measurements and "recalculate the repeatability for the whole set of test results [and] [c]ontinue testing until the repeatability is at or below the specified values for all operating conditions." The regulations further direct the "[c]alculat[ion of] a confidence limit representing the repeatability in establishing a 95% confidence level using the following equation . . ." This regulatory language could be interpreted to, in effect, create an endless "do loop" that may not be able to be satisfied unless a 95% confidence level is achieved. As an alternative to current regulatory requirements, Allison would recommend that EPA incorporate an option that allows for the selection of the maximum loss value for a minimum of the three test points required under the transmission efficiency test. This option would maintain the integrity of the emission testing results while offering an alternative where achieving a 95% confidence level may not be reasonably achievable. §1037.565 Transmission efficiency test. * * * (e)(9) * * * Continue testing until the repeatability is at or below the specified values for all operating conditions or if such values cannot be achieved following a repeat of the initial test, use the maximum loss value achieved for the three required test points to calculate transmission efficiency. * * *	We agree that the test procedure should be revised as there was no intent to require testing in perpetuity. We are finalizing changes by revising §1037.565(e)(9) accordingly, adding a new §1037.565(e)(11), and modifying §1037.565(g) by adding two subparagraphs and moving some of the existing text to a new paragraph (h) to clarify this and prevent the burden associated with potentially requiring testing in perpetuity. If the repeatability requirement is not met after conducting three or more tests, we are allowing the use of the maximum loss value, or you can continue to test until you pass the repeatability requirement. Allowing the use of the maximum loss value after three tests in lieu of continuing to test until the repeatability requirement is passed ensures that there is no adverse effect on stringency.

What Commenters Said *(EPA's response follows the comment below)*

ECJV (0027):
Transmission Calibrations

Under the current regulations for powertrain testing, OEM's must certify a powertrain family with the worst-case combination of engine and transmission hardware, as well as the worst-case calibrations that are covered within the family. ECJV provides various transmission calibrations and modifiable parameters (ACN's) which provide the end user with the flexibility required to further customize the transmission to meet the truck's specific needs.

For example, a vocational dump application may require a performance option for non-highway driving one day, and the next day it may opt for the more fuel efficient economy calibration for regional highway driving. Another example is if a tractor with an economy calibration typically hauls a standard box trailer, but needs to haul an un-baffled tanker, the driver could switch from the economy to un-baffled tanker calibration for improved safety and driveability. In order to maintain end-user flexibility of the transmission, OEM's would be required to certify to the worst-case transmission calibration, which in most cases would be the performance calibration, negating any benefit to offering the efficiency calibration. Depending on the vehicle sub-category, this can result in a significant GHG penalty to the OEM.

Based on service tool data, we have found that there is a very low rate of migration from fuel economy calibrations to performance calibrations. Note that these upgrades are offered free of charge through the service tool contract. Over the course of 2018, less than 6% of end users upgraded a fuel economy calibration to a performance calibration. Under the current regulations, OEM's would be required to powertrain certify with a calibration that is only used on 6% of the trucks sold within the family.

ECJV is proposing the option for OEM's to collect powertrain data with the various transmission calibrations, and apply a final weighting based on prior model years' actual usage rates. Usage rates can be determined through service data, or other approved methods. Usage rates would be evaluated on an annual basis. This could also apply to multi-mode options which are available through a dash switch, or button.

In the example mentioned above, OEM's would provide certification data for both the performance and economy calibrations. The proposed weighting would be applied using the following calculation:
Proposed Composite GHG Score =
(Composite Economy Result x 0.94) + (Composite Performance Result x 0.06)

This would not only allow the OEM's to provide more representative data, but also allows the end-user to maintain the flexibility that is currently offered today.

Alternately, the agency could adopt guidance set forth by the light-duty industry where instead of a weighted score based on real-world usage rates, OEM's identify a predominant mode of operation for certification. This information can be found in guidance letter CISD-09-10LDV/LDT which was issued on December 3, 2009. This guidance was issued in response to an increasing number models offered with features available to the driver which allowed for manual shifting of an automatic transmission, sport/performance modes, standard drive modes, economy modes, etc.

There are several provisions offered to the LDV/LDT OEM's that could be adopted for the HD/MD OEM's:
- Guidance for multi-mode and select-shift transmissions
- Reduced testing burden for OEM's
- Predominant mode determination
- Multi-mode testing and harmonic averaging
- Survey requirements
- Default mode after key-off provisions

- Low-volume provisions
- Family and model-year carryover
- Alternative testing provisions
- Overdrive lockout provisions

Response

We understand the commenter's concern regarding the range of transmission calibrations that are available for powertrains. As for the proposed changes when manufacturers use the powertrain test option in §1037.550 for transmission calibrations, we are finalizing revisions in 40 CFR 1037.235(a) to address this issue, specifically allowing the available transmission calibrations to be weighted by the percentage of vehicles by prior model year determined through the use of survey data or sales volume, that are using a given calibration in the field.

What Commenters Said *(EPA's response follows the comment below)*

ECJV (0027):

Request for amendment to the language in 40 CFR §1037.565 (d)(2) "Transmission Efficiency Test"

ECJV has found that the current language makes it prohibitive to certify lower gears (high numerical ratio) where the output torque produced at the transmission's rated input torque may exceed the capability of the test cell. In our case, transmission output torque to the dyno is limited at 10,000 Nm. Ideally the output torque should not exceed 90% of the dyno's rated limit. As seen in Figure 1, this would require the exclusion of the first four gears from the lowest torque rated model, and exclusion of the first five gears from the highest torque rated model within the Endurant 12-speed family.

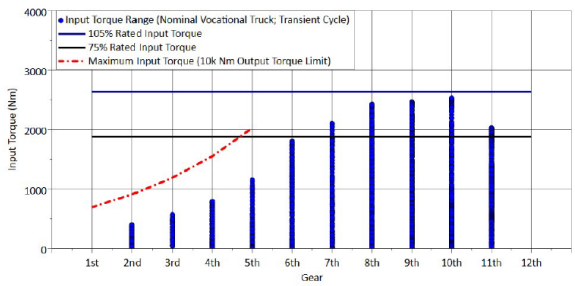
Figure 1: Endurant 12-Speed Output Torque

Endurant-12 Gear	Endurant-12 Gear Ratio	Output Torque at 75% of Lowest Rated Torque (Nm)	Output Torque at 75% of Highest Rated Torque (Nm)
1	14.42	21268	27131
2	11.04	16282	20771
3	8.44	12441	15871
4	6.46	9525	12150
5	4.95	7302	9315
6	3.79	5588	7128
7	2.91	4297	5481
8	2.23	3290	4197
9	1.71	2514	3207
10	1.30	1924	2455
11	1	1475	1881
12	0.77	1129	1440

Excluding the lower gear range can have a negative impact on the OEM's effort to meet the Phase 2 standards. Fleets are migrating from legacy automated and manual transmissions to leverage the efficiency benefits found with newer AMT's. With these newer products, the efficiency gains are not isolated to the cruise gears. The new architecture provides improved efficiency well into the lower gear ranges which are predominantly used through the transient cycle. With actual input torque rarely exceeding 50% of rated input torque in the lower gear range during a given drivecycle, the current language places additional burden on the ability to certify these gears. Figure 2 is an illustration which shows the input torque distribution for all gears, along with the 75% and 105% rated torque thresholds set forth by the current language. As you can see, for gears 7th through 11th, GEM would be required to extrapolate power-loss if the transmission were to be certified at 75% of rated torque, which is currently permitted in the regulatory language. It can also be seen that the input torque range narrows significantly as you move down from 6th gear to 2nd gear (launch gear).

The dashed curve represents the max input torque measurement curve to show where our lab is capable of measuring, relative to the max input torque seen throughout the transient cycle. In this case, GEM would not be required to perform any extrapolation if the lower range was certified at part-load, as all input torque points would be captured by the measurement points.

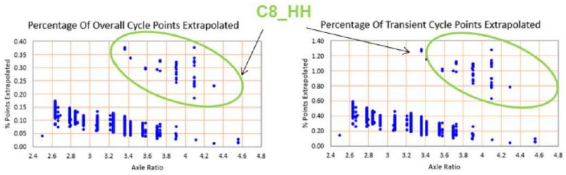
Figure 2: Input Torque Range: Transient Cycle, Nominal Vocational Truck 12-Speed Endurant AMT



In February of 2020, the ECJV submitted a request for a Special Test Procedure to permit part-load measurement where output torque is a concern. The EPA has approved this request with the provision that the total GEM extrapolation time of gears measured at part-load cannot exceed 10% for any given cycle.

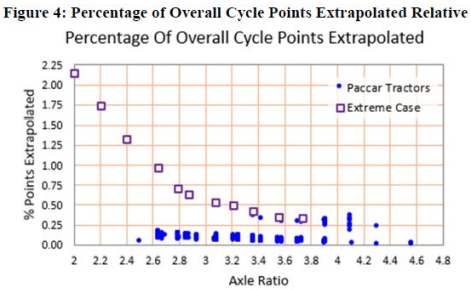
In response to the agency's approval of this special test procedure, PACCAR, with the support of the ECJV, conducted an analysis to understand which applications might be at risk of exceeding the 10% threshold set forth by the EPA. In a study of 900 AMT Tractor configurations, using actual GEM inputs for the engines, axles, transmissions, aero, and tires, it was found that the max extrapolation time for all three combined cycles is less than 0.5%. Looking at only the transient cycle, extrapolation time is less than 1.5%. Class 8 Heavy-Haul showed the highest percentages relative to Class 8 Tractor. See Figure 3 below:

Figure 3: Total Extrapolation Time of Part-Load Certified Gears



In addition to analysis of production intent applications, worst-case configurations were also evaluated. In this case a down-sped, inefficient tractor (non-production) showed less than 2.25% extrapolation across all cycles, and less than 7% extrapolation in the transient cycle. It was found that axle ratio had the greatest impact on the amount of extrapolation required. See Figure 4 below:

Figure 4: Percentage of Overall Cycle Points Extrapolated Relative to Axle Ratio



Given the information above, the ECJV would respectively like to request a more permanent solution by proposing an amendment to the language: "(2) Include one loaded torque setpoint between 75 % and 105 % of the maximum

transmission input torque and one unloaded (zero-torque) setpoint. Optionally, in lower gear ratios where output torque may exceed dynamometer torque limits, you may use good engineering judgement to measure loaded test points at input torque values lower than specified above. In this case GEM may need to extrapolate values outside of the measured map. Extrapolation time may not exceed 10% for any given cycle. You may test at any number of additional torque setpoints to improve accuracy. Note that GEM calculates power loss between tested or default values by linear interpolation."

Response

We agree with the comment that, as currently written, the language in §1037.565(d)(2) makes it prohibitive to certify lower gears (high numerical ratio) where the output torque produced at the transmission's rated input torque may exceed the capability of the test cell. Based on consideration of this and EPA's previous granting of a request for a Special Test Procedure to permit part-load measurement where output torque is a concern, we are finalizing a change to 40 CFR 1037.565(d)(2) to address this in the regulation.

The modification to 40 CFR 1037.565(d)(2) optionally allows that in higher gear ratios where output torque may exceed dynamometer torque limits, you may use good engineering judgment to measure loaded test points at lower input torque values. In this case GEM may need to extrapolate values outside of the measured map. Extrapolation time may not exceed 10% for any given cycle and you must describe in the application for certification on how you measured these loaded test point at lower input torque values.

What Commenters Said	Response
EMA (0044): **1037.565(d)(2)** EMA requests the following additional language in §1037.565(d)(2) so that it reads as follows: (2) Include one loaded torque setpoint between 75 % and 105 % of the maximum transmission input torque and one unloaded (zero-torque) setpoint. Optionally, in lower gear ratios where output torque may exceed dynamometer torque limits, you may use good engineering judgement to measure loaded test points at input torque values lower than specified above. In this case GEM may need to extrapolate values outside of the measured map. Extrapolation time may not exceed 10% for any given cycle. You may test at any number of additional torque setpoints to improve accuracy. Note that GEM calculates power loss between tested or default values by linear interpolation.	See response to ECJV comment (0027): Request for amendment to the language in 40CFR 1037.565 (d)(2) "Transmission Efficiency Test".

2.1.4 Hybrid Powertrain Testing

What Commenters Said	Response
CARB (0030) **Ramped-Modal Testing Procedures (§ 1036.505)**—The use of the phrase "hybrid powertrain testing" should be consistent throughout the document. The labeling for the expanded table 1 in this section only refers to powertrain testing.	We agree with the concern expressed in the comment and have revised the regulation to consistently refer to "hybrid powertrain testing". Note that not all of the powertrain provisions in 40 CFR part 1036 are limited to hybrid powertrains. Some also apply to any powertrain as the procedures in 40 CFR part 1037 reference sections in 40 CFR part 1036.
Cummins (0036): § **1036.503(b) Engine data and info for vehicle cert** EPA proposes to add an entire new section §1036.503, "Engine data and information for vehicle certification." (See 85 FR 28194.) Within that section, paragraph §1036.503(b) describes three different methods for generating fuel maps, including those methods' applicability. EPA should clarify in §1036.503(b), that the powertrain test method is applicable for generating fuel maps for any hybrid and that a simulated transmission is allowed as an option for generating fuel maps for pre-transmission hybrids. Cummins believes all that already is allowed under EPA's current regulations, but EPA should clarify that in the new section §1036.503.	It was not our intention in the proposal to change the availability of that option, and we are modifying how we are finalizing the proposed 1036.503 paragraph (b) to ensure that we are not changing the availability of that option. Further, to address industry concern regarding the lack of an explicit mild hybrid test procedure in 40 CFR part 1036 and the complexity of certifying these types of hybrid engines using the hybrid powertrain test procedure, EPA is finalizing changes to 40 CFR parts 1036.503, 1036.505, 1036.510, 1036.527, and 1037.550 that explicitly describe how to perform testing of pre-transmission mild hybrids without having to perform a powertrain test. This includes the addition of a transmission model to GEM and options in GEM to test without the transmission present, using the model in its place.
C**ummins (0036):** **Cummins recommends clarifications of EPA's hybrid test procedures.** In NPRM Section II.D.5., "Mild Hybrid Certification", EPA requested comment on, "alternative means of evaluating mild hybrids." (See 85 FR 28152.) EPA's examples included the application of analytically derived scaling factors to broaden the applicability of testing; international test procedures; and decreased recognition of a mild hybrid's benefit, in exchange for requiring less testing—or even for allowing the use of a computer spreadsheet in lieu of testing. All those options potentially could be viable, but EPA should clarify that any alternative means would apply only to fuel efficiency and CO2 emissions and not to other emissions, such as NOx, which are less predictable via analytical derivations or computer simulation. EPA also should specify a single reference method to reconcile discrepancies, should any arise from the application of alternative means. Cummins presumes that the single reference method is the powertrain test method, per 40 CFR §1037.550, but EPA should make that clear.	At this point EPA does not have a test procedure to generate analytically derived powertrain results and the comments received did not provide a suggested procedure or information on how to perform this. EPA did not propose and is not taking final action on any such process at this time. EPA appreciates the input on this area of comment. We may consider the suggested changes in an appropriate future action. We are finalizing changes to 40 CFR parts 1036.503, 1036.505, 1036.510, 1036.527, and 1037.550 that explicitly describe how to perform testing of pre-transmission mild hybrids without having to perform a powertrain test. This includes the addition of a transmission model to GEM and options in GEM to test without the transmission present, using the model in its place.

What Commenters Said	Response
EMA (0044): **Rated power for hybrid powertrains (new 1036.527)** EMA has supported the ongoing constructive dialogue with EPA on the development of this section, which has been facilitated primarily through EMA's Emissions Measurement and Testing Committee (EMTC). While we are submitting some comments on this section at this time, EMA requests that EPA also continue to work with our EMTC to further refine this section 1036.527 and its related sections, including but not limited to 1036.505, 1036.510, and 1037.550. More clarification is needed regarding the procedure to use for non-hybrid powertrains. The section title includes both conventional and hybrid powertrains, and it is unclear which sections apply to which systems. Rated power determination has been added, but it is not clear whether or not it is peak or continuous power.	We agree with EMA and will continue to work with them through the EMTC process to further develop the hybrid and non-hybrid powertrain test procedures as needed. We agree with the comment regarding the need for additional clarification on hybrid and non-hybrid powertrain testing and the regulatory language we are finalizing in this action reflects additional revisions to those proposed to ensure that the powertrain test procedures are complete. An overview of the updates we are finalizing can be found in Section II.A.7 of the preamble. We have done this by making updates to 40 CFR 1036.503, 1036.505, 1036.510, 1036.527, and 1037.550.

What Commenters Said *(EPA's response follows the comment below)*
MEMA (0038): **HD Hybrid Certification and Test Procedures** The agency proposes changes to the HD hybrid test procedures, certification, and model certification. These changes include adding a new section regarding transient testing of engines and hybrids to facilitate hybrid certification for both GHG and criteria pollutants. The agency also proposes a new section that provides a means to determine the rated power of hybrid powertrain systems in order to support hybrid powertrain testing. MEMA supports the proposed changes to the certification and testing for mild and conventional HD hybrids included in the NPRM. MEMA also provides the following recommendations for improvements to the proposed updates. The EPA proposes to revise HD hybrid testing by amending § 1065.170 by allowing for entities to "stop sampling … when the engine is off and allow exclusion of the sampling off portions of the test from the proportional sampling verification."4 This proposed change is an important update for HD hybrid testing as the current engine dynamometer test does not capture the advantages HD hybrids can provide. It is critical that the HD hybrid tests accurately measure the decreased emissions benefits from HD hybrid vehicles. Consequently, MEMA supports the proposed update to the powertrain test procedures for HD hybrids. However, motor vehicle suppliers may need to demonstrate these hybrid technologies through testing. As a result, these test procedures need to be repeatable by suppliers. MEMA encourages the agency to publish these specific procedures and calculation methods for increased transparency for the whole industry. The EPA also proposes to add a new section § 1036.527 that provides a means to determine the rated power of the hybrid powertrain systems to facilitate the additional hybrid powertrain testing option. The agency explains that the manufacturer declares conditions of all hybrid system components are within their normal operating range.6 Therefore, it could be difficult for suppliers or other entities to assess the systems if they do not have direct knowledge or documentation of the normal operating range. Additionally, the state-of-charge of the rechargeable energy storage system (RESS) could be difficult for suppliers to determine without manufacturer guidance and therefore difficult for suppliers to replicate the test. These values and the processes taken need to be of the official record to provide consistency and to allow suppliers to replicate the testing using the same initial conditions.

Response

Note that the procedures EPA proposed and is finalizing regarding hybrid powertrain testing as described in Chapter II.A of the preamble only apply to GHG certification at this time.

The amendments to 40 CFR1065.170 are not just for hybrid engines and powertrain, but also for conventional engines that utilize start/stop technology. MEMA requests that the agency publish these specific procedures and calculation methods for increased transparency. These methods are varied and typically specific to the analytical bench sampling and analysis processes that are installed in emission labs and provided by instrument manufacturers. There are multiple approaches that can be taken to account for the stoppage of emission sampling and the regulation contains sufficient information and requirements to ensure that this process will be done properly and performed with accountability during engine certification. We do not believe additional actions by EPA are necessary at this time.

In regard to the changes to §1036.527, we recommend that suppliers work with manufacturers to ensure that they can determine or are provided with the information they need to carry out the test procedure.

2.1.5 Fuel Maps for Confirmatory Testing

What Commenters Said	Response
CARB 0030: **Re: § 1036.535** In the new § 1036.535(b)(1)(ii), the manufacturer should be required to provide engineering justification for not including *T*max at a given speed set point. In addition, the sentence, "For example, when linear interpolation between the defined points is not a reasonable assumption for determining fuel consumption from the engine." appears to be an incomplete sentence. In the event of an equipment or engine malfunction in U.S. EPA's newly proposed § 1036.535(b)(8)(iv), the lab "may" validate any test intervals prior to the most recent reentry point. Instead, it should read, "in the event of an equipment or engine malfunction, the lab must validate any test intervals prior to the most recent reentry point."	The manufacturer is not required to measure at T_{max} because it is optional. When this option is selected the regulation requires that good engineering judgment be used, and EPA may require that such engineering justification be submitted upon our written request. In regard to the second sentence in §1036.535(b)(1)(ii), we agree with the comment that the sentence was incomplete as proposed and have further clarified to reflect our intent so that the finalized sentence states: "For example you may select additional points when linear interpolation between the defined points is not a reasonable assumption for determining fuel consumption from the engine." In regard to §1036.535(b)(7)(iv) (numbering corrected from proposal in this final action), the paragraph additionally specifies that if some failure occurs during a test interval, the entire test interval will need to be repeated. Completing the post-test interval activities to validate test intervals prior to the most recent reentry point is beneficial and we agree should occur because one would assume that they are going to use those test intervals for the test of record and retest the interval where the failure occurred. Therefore, we have made the requested change.

What Commenters Said *(EPA's response follows the five comments listed below)*

NACAA (0041):
Confirmatory testing of fuel maps

NACAA supports EPA's intent to improve the accuracy and reduce the testing burden of heavy-duty test procedures but only to the extent that the protection of public health and the environment are not compromised.

Therefore, NACAA is compelled to oppose EPA's proposed amendment to revise its confirmatory testing protocols so that the agency would "not replace a manufacturer's fuel maps during confirmatory testing if the EPA-measured fuel maps were within 2.0 percent of the manufacturer's maps." EPA says, "We are proposing this as an interim provision but are not including an end date at this time. We would intend to reevaluate this provision as we learn more about the impact of measurement variability during fuel mapping, including the full impact of the proposed test procedure improvements that are intended to reduce measurement variability." (See Section II(B)(2) of the preamble (85 Fed. Reg. 28,146) and Section 1036.150(q) of the regulatory text (85 Fed. Reg. 28,192), Confirmatory Testing of Engines and Measurement Variability)

The current Phase 2 engine standards provide a 5-percent CO2 benefit. Under this proposal, a manufacturer could exceed the standards by 40 percent and still be considered to comply, thereby sacrificing much of the 5-percent CO2 benefit and seriously weakening the stringency of the standards for an indeterminant amount of time. This is a significant degradation of stringency and clearly contrary to EPA's stated intent. NACAA opposes this proposed amendment and EPA should remove it before finalizing this rulemaking.

CARB 0030:
Re: § 1036.150
U.S. EPA is proposing revisions to 40 CFR 1036.150, under which U.S. EPA would not replace a manufacturer's fuel maps during confirmatory testing if the U.S. EPA measured fuel maps were within 2 percent of the manufacturer's maps. This means manufacturers could exceed the standards by 2 percent and still technically be in compliance. CARB staff has serious concerns regarding effectively giving away 2 percent of a 5 percent CO2 benefit from the Phase 2 engine standards, thereby allowing a dataset from a manufacturer's lab to be used to essentially weaken the stringency of the Phase 2 engine standards by 40 percent. This clearly represents a significant erosion of stringency, and CARB staff recommends U.S. EPA rethink the proposal. U.S. EPA states in the Federal Register that the changes to 1036.150 are "interim," but they do not propose an end-date for the changes. We suggest U.S. EPA could include an end-date such as 2023, which would give manufacturers a few years to perfect their fuel mapping measurements without sacrificing the stringency of the Phase 2 program. Should U.S. EPA go forward with the proposal unchanged, CARB staff does not anticipate recommending that California align with it, which would cause a significant area of non-harmonization of the California vs. federal Phase 2 standards.

(continued in Appendix)
CARB staff has serious concerns regarding the proposed amendments to § 1036.150, which would effectively give away 2 percent of a 5 percent CO2 benefit from the Phase 2 engine standards. This clearly represents a significant erosion of stringency, and CARB staff recommends U.S. EPA rethink the proposal. Should U.S. EPA go forward with the proposal, CARB staff does not anticipate recommending that California align with it, which would cause a significant area of non-harmonization of the California vs. federal Phase 2 standards.

The Phase 2 standard stringency itself already has a 1 percent margin included in it, and when U.S. EPA adopted Phase 2, U.S. EPA stated that they factored testing variability into the setting of the Phase 2 GHG standards (Federal Register 73571, Vol. 81, No. 206, Oct. 25, 2016). Hence, CARB staff believes testing variability is already included in the standard, and there is no need for an additional add-on allowance on top of the standard.

Since we are already seeing engines that meet the 2027 Phase 2 standards without Waste Heat Recovery or Hybridization or other advanced technologies that Phase 2 GHG factored into the stringency, CARB staff does not

think the proposed confirmatory testing amendments in § 1036.150 are merited by either a hardship argument or an argument centered on the technical difficulty of achieving a sufficient compliance margin.

The fuel mapping variability study U.S. EPA staff cites does not indicate that GHG is inherently more variable than more familiar criteria emissions certification testing. CARB staff does not see a reason why GHG testing is inherently different from criteria emissions testing, and hence does not believe the proposed large allowance for GHG testing is warranted.

In addition, CARB staff is concerned that U.S. EPA's proposed allowance would allow a dataset from a manufacturer's lab to be used to effectively reduce the stringency of the Phase 2 engine standards by 40 percent (i.e., 2 percent allowance vs. a ~5 percent standard improvement). CARB staff is concerned regarding over reliance on manufacturer data and recommends instead that compliance be determinable based on agency testing, which would help address regulator concerns regarding potential conflict of interest.

All in all, under U.S. EPA's proposal, instead of having all or the vast preponderance of engines meet the standard, U.S. EPA's proposed amendment to § 1036.150 would effectively allow half of the engines to be above the standard. The fuel mapping variability study cited to support U.S. EPA's proposed amendment showed variability ~1 percent, which is similar to variability in criteria FTP & RMC testing. Overall, CARB staff does not see a reason why manufacturers should be allowed to center their GHG variability distribution on the standard rather than on the certification level as manufacturers have traditionally done when demonstrating compliance with criteria standards.

(reiterated comment on pg 17)
As previously mentioned, CARB staff has serious concerns regarding the proposed amendments to § 1036.150, which would effectively give away 2 percent of a 5 percent CO2 benefit from the Phase 2 engine standards. This clearly represents a significant erosion of stringency, and CARB staff recommends U.S. EPA rethink the proposal. If U.S. EPA is committed to making this change, we suggest that at a minimum U.S. EPA could include an end-date such as 2023, which would give manufacturers a few years to perfect their fuel mapping measurements without sacrificing the stringency of the Phase 2 program. Should U.S. EPA go forward with the proposal, CARB staff does not anticipate recommending that California align with it, which would cause a significant area of non-harmonization of the California vs. federal Phase 2 standards.

EMA (0044):
1036.150(q) fuel maps, confirmatory testing

First, EMA requests that EPA clarify how the interim provision would apply to powertrain confirmatory testing.

Second, more clarity is needed regarding the specific vehicle categories used in the EPA-proposed Eq. 1036.150-1. Specifically, EPA should use the same categories that the manufacturer uses to generate its maps because that approach would most directly confirm the declared maps. EMA would like to discuss with EPA some provisions to ensure that manufacturers declare vehicle categories in a uniform manner.

Third, there is no advantage to rounding the intermediate values of the summation in Eq. 1036.150-1, as EPA has proposed. In fact, such rounding only increases uncertainty and is inconsistent with EPA's own rounding procedures, which are set forth in §1065.20(e).

Fourth, the percent difference threshold below which EPA would not replace the manufacturer's maps should be consistent with the results and conclusions of the EPA co-funded Southwest Research Institute Fuel Mapping Variability Report; specifically, Tables 62, 63, and 74 of EPA Contract Report EP-C-15-006, December 2019. That is, rather than the EPA-proposed single threshold of 2.0%, which is reflects only one of the seven unique weighting factor categories, a composite threshold should be calculated for the specific combination of vehicle categories used to generate the percent difference value in Eq. 1036.150-1.

Fifth, §1036.150(q) should apply to SEA testing, and the current text of §1036.301 should be deleted. §1036.301 was drafted very early in the Phase 2 GHG deliberative process; likely in the 2015 timeframe. Since then, EPA and EMA have spent significant time and effort researching fuel mapping test procedures and fuel mapping variability. Much has been learned in that interim period, and the key research documented in the aforementioned December 2019 Fuel Mapping Variability Report is the basis for EPA's proposed §1036.150(q). That makes §1036.150(q) a much more scientifically grounded and enforceable procedure than §1036.301. Because §1036.150(q) results in an unambiguous engine-by-engine pass/fail determination, it is as clear as any other engine SEA test procedure that uses an FTP and/or RMC-SET test cycle result in comparison to a manufacturer's corresponding FEL. Therefore, EMA requests the following edits to EPA's proposed §1036.150(q), and we request that the modified text, inclusive of EMA's edits, be applicable to MY 2021:

§1036.150(q) Confirmatory and SEA testing of fuel maps. We will replace fuel maps as a result of our confirmatory testing if we determine our test results to be not equivalent to the manufacturer's declared fuel maps as specified in this paragraph (q). Selective enforcement audits apply for engines as specified in 40 CFR part 1068, subpart E. We will consider one individual engine to have failed an SEA test if it is determined that its fuel map test result is not equivalent to the result using the manufacturer declared fuel maps, as specified in this paragraph (q).

(1) ~~We will weight our~~ Weight individual duty cycle results using the ~~appropriate~~ manufacturer-declared vehicle categories~~y~~ and respective weighting factors in Table 1 of §1037.510 to determine a composite CO2 emission value for ~~that~~ each vehicle configuration; then repeat the process for all the unique vehicle configurations used to generate the manufacturer's fuel maps.

(2) The average percent difference between fuel maps is calculated as:

$$difference = \left(\frac{\sum_{i=1}^{N} \frac{e_{CO2compEPAi} - e_{CO2compManui}}{e_{CO2compManui}}}{N} \right) \cdot 100\ \%$$

Eq. 1036.150-1

Where:

i = an indexing variable that represents one individual weighted duty cycle result for a vehicle configuration.

N = total number of unique vehicle configurations.

*e*CO2compEPAi = ~~total~~ unrounded composite mass of CO2 emissions in g/ton-mile for vehicle configuration *i* for the EPA confirmatory test or SEA test~~, rounded to the nearest whole number for vocational vehicles and to the first decimal place for tractors~~.

*e*CO2compManui = ~~total~~ unrounded composite mass of CO2 emissions in g/ton-mile for vehicle configuration *i* for the manufacturer-declared maps~~test, rounded to the nearest whole number for vocational vehicles and to the first decimal place for tractors.~~

(3) Where the unrounded average percent difference ~~between our composite weighted fuel map and the manufacturer's~~ is less than or equal to the unrounded +*Uncert*wtd %, we will not replace the manufacturer's maps, and we will consider an individual engine to have passed a fuel map SEA.

(4) *Uncert*wtd % is calculated as:

*Uncert*wtd % = Sqrt[□(*Uncert*i 2)]

Eq. 1036.150-2

Where:

i = an indexing variable that represents one individual weighted duty cycle result for a vehicle configuration.

N = total number of unique vehicle configurations.

*Uncert*i = Uncertainty of GEM Vehicle Category corresponding to vehicle configuration *i*

GEM Vehicle Category	$Uncert_i$ %
Sleeper Cabs	1.68%
Day Cabs and Class 8 Heavy-Haul	1.80%
Vocational Regional	2.00%
Vocational Multipurpose HHD	2.46%
Vocational Multipurpose non-HHD	2.62%
Vocational Urban HHD	2.66%
Vocational Urban non-HHD	2.79%

ICCT (0042):
Confirmatory testing / 2% Measurement Variability

The ICCT's comments are limited in scope and only address one specific topic that is raised in the NPRM. Note that our lack of comment on the other technical issues does not necessarily imply consent. ICCT recommends that EPA reconsiders its proposed interim provisions in Section 1036.150 that would provide a 2% allowance for measurement variability in the engine fuel mapping test procedure. This proposal represents a significant potential erosion in stringency of the regulation that could compromise a sizable portion of the fuel and emissions reductions of the Phase 2 greenhouse gas (GHG) standards for HDVs.

The ICCT is very concerned that these interim provisions to allow for up to 2% testing variability represent a significant erosion in stringency of the Phase 2 standards to reduce GHGs from heavy-duty vehicles in engines. Below, we present three reasons why we believe that these interims provisions are not justifiable.

1. **The EPA does not present evidence that engine fuel map testing is inherently more variable than other engine emissions testing**. In the NPRM, the EPA cites a study conducted by the Southwest Research Institute, but the agency does not point to results from that research that suggests engine fuel mapping is more variable than more familiar fuel consumption and CO2 testing, or criteria pollutant certification testing. To that point, the agency states, "…the similarity between the variability of measuring fuel maps and the variability of measuring CO2 and fuel consumption over the FTP and RMC cycles … suggests that manufacturers should ultimately be able to comply without any special provisions." Thus, it is unclear as to why the EPA is proposing an interim provision with no definitive time horizon that would allow for additional testing variability beyond what is provided in other heavy-duty engine emissions certification protocols.

2. **The proposed methodology in Section 1036.150 (q) is not able to evaluate a systematic underreporting of CO2 emissions versus the EPA's confirmatory testing.** We assume that manufacturers know their product portfolio well and are able to identify the vehicle configurations that make up the bulk of their GHG averaging set. If the declared engine map exploits the new proposed tolerance in a narrow area targeted to those vehicle configurations with high sales volumes, the proposed methodology would not identify this, as all vehicle configurations are given equal weight in the calculation. Furthermore, if all fuel consumption points in a manufacturer's declared engine map are below the values measured in confirmatory testing, this would be a clear indication of the tolerance being purposefully exploited, and not of natural experimental variability.

The interim provisions could lead to a significant erosion in stringency in the Phase 2 standards. The tables and figures below provide some analysis to illustrate why these proposed interim provisions could potentially erode the required efficiency improvements from tractor trucks and vocational vehicles and lead to a sizeable loss in emissions benefits over time.

Table 1 summarizes the existing standards (grams of CO2 per brake horsepower-hour, g CO2 / bhp-hr) for heavy-duty engines in the Phase 2 regulation by regulatory subcategory and also shows the percent reduction compared to the model year 2017 baseline. Table 2 then presents the resulting stringency in MY 2021, 2024, and 2027 if we examine the edge case scenario and assume that the interim provisions reduce stringency by 2 percentage points. While we

understand that the proposed interim provisions are not directed at the g CO2/bhp-hr engine standards, this is merely meant to highlight that allowing for 2% variability in the engine mapping test procedure represents a significant percentage of the overall CO2 reduction requirements for engines.

Table 1: Engine-based CO_2 standards of the Phase 2 regulation and percentage reductions compared to the model year 2017 baseline

	Baseline: Phase 1	Phase 2			Change vs. 2017		
	2017	2021	2024	2027	2021	2024	2027
	g CO2 / bhp-hr	g CO2 / bhp-hr			%		
Tractor (MD)	481	473	461	457	-1.7%	-4.2%	-5.0%
Tractor (HD)	455	447	436	432	-1.8%	-4.2%	-5.1%
Vocational (LD)	576	563	555	552	-2.3%	-3.6%	-4.2%
Vocational (MD)	558	545	538	535	-2.3%	-3.6%	-4.1%
Vocational (HD)	525	513	506	503	-2.3%	-3.6%	-4.2%

Table 2: Illustrative engine CO_2 requirements, assuming a 2 percentage point reduction in stringency

	Change vs. 2017 - NPRM		
	2021	2024	2027
	%		
Tractor (MD)	0.0%	-2.2%	-3.0%
Tractor (HD)	0.0%	-2.2%	-3.1%
Vocational (LD)	-0.3%	-1.6%	-2.2%
Vocational (MD)	-0.3%	-1.6%	-2.1%
Vocational (HD)	-0.3%	-1.6%	-2.2%

Figure 1 puts the Phase 2 engine improvements in 2021, 2024, and 2027 in the context of the overall requirements for tractor-trailers and vocational vehicles. The blue portion of each bar chart represents the estimated contribution of the engine to total efficiency improvements in the existing regulation. The red portions of the righthand bar charts show the reductions resulting from the proposed interim provisions, assuming a 2 percentage point increase in engine CO2 levels. Figure 2 shows the estimated reduction in overall stringency from a 2 percentage point loss in engine efficiency. As shown, on a per-vehicle basis, the proposal represents losses at the vehicle level of up to 5% to 9% for tractor-trailers and 10% to 25% for vocational vehicles. Finally, extending these per-vehicle impacts to the entire fleet of HDVs impacted under the Phase 2 regulation, the potential losses in terms of cumulative CO2 emissions are summarized in Figure 3. By 2030, we estimate that the proposed interim provisions could result in up to roughly 60 million metric tons (MMT) of cumulative additional CO2 emissions, which is a 12% loss versus the current regulation. By 2040 and 2050, increased cumulative emissions grow to nearly 190 MMT (9% increase) and 340 MMT (8% increase), respectively.

Figure 1: Engine contributions to overall vehicle efficiency improvements in the current Phase 2 regulation and assuming a 2 percentage point loss in engine CO_2 reductions

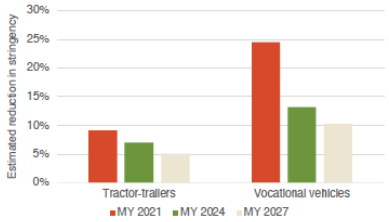


Figure 2: Potential reductions in overall vehicle improvements, assuming a 2 percentage point loss in engine CO_2 reductions

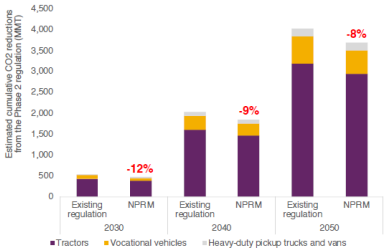


Figure 3: Potential impacts to cumulative CO_2 emission reductions

ACEEE (0069):

ACEEE recommends that the EPA drop the proposed interim engine map replacement provision to 40 CFR 1036.150. This proposed provision would amount to a highly significant decrease in the stringency of the standards, actually allowing for an unacceptable increase in engine emissions for Model Year 2021.

Additionally, the EPA proposed "*an interim provision in 40 CFR 1036.150, under which EPA will not replace a manufacturer's fuel maps during confirmatory testing if the EPA measured fuel maps were within 2.0 percent of the manufacturer's maps.*" This 2% absolute difference in CO2 measurement is effectively a highly significant reduction in rule stringency. As Table 1 shows, this allowance, if used, would amount to a complete removal of all Phase 2 engine benefits for tractor-trailers in Model Year (MY) 2021, and nearly 90% reduction in benefits for vocational vehicles. In fact, it would actually allow for an increase in CO2 tractor-trailer engine emissions compared to current Phase 1 MY 2017 requirement. Under no circumstances is it justifiable to create a testing allowance that, if used, would increase emissions, relative to previous regulations. This is especially problematic because tractor- trailers are responsible for more CO2 emissions than all of the other vehicles regulated in these rules combined. Even in MY 2027 year of the regulations, half of the CO2 benefit could be lost for vocational vehicle engines and nearly 40% lost for tractor-trailer engines. This is especially significant because, as ACEEE

et al noted in its comments[ii], the original rule is less stringent than technologically and economically feasible. The Southwest Research Institute report cited in the rule shows a potential tractor engine fuel efficiency improvement of 8%, twice that of the final rule[iii].

Table 1: Phase 2 Engine Based CO_2 Emissions Reductions and Proposed Change in Phase 2 Stringency

Model Year	Phase 2 engine CO_2 benefits, Relative to Phase 1 MY 2017 (Tractors)	Phase 2 engine CO_2 benefits, Relative to Phase 1 MY 2017 (Vocational)	Proposed CO_2 engine benefit reduction, Relative to Phase 1 MY 2017 (Tractors)	Proposed CO_2 engine benefit reduction, Relative to Phase 1 MY 2017 (Vocational)
2021	1.7%-1.8%	2.3%	>100%	87%
2024	4.2%	3.6%	48%	56%
2027	5%-5.1%	4.1%-4.2%	39%-40%	48%-49%

Additionally, worrisome is that while the proposed allowance is described as an "*interim provision*", the EPA does not give a phase out time period. The EPA does say that they expect to review the provision based on future evidence but gives no timeline for said review. This is problematic because, as already described, these allowances are a highly significant weakening of the Phase 2 rules and, if made final, would lead to a loss of nearly half the rule's engine standard's intended benefits. Additionally, the proposed technical amendment would create a damaging precedent by replacing EPA confirmatory testing, with manufacturer results taken as the official emission results in some instances. This should not be allowed.

Furthermore, the EPA fails to adequately justify the need for the proposed allowance in engine map test results. The EPA justifies the proposed allowance by writing that they stated in the Phase 2 final rule '*'If we determine in the future . . . that the +1.0 percent we factored into our stringency analysis was inappropriately low or high, we will promulgate technical amendments… to address any inappropriate impact*". The EPA then cites research from the Southwest Research Institute, pointing to engine map variability of greater than 1% in justifying the appropriateness of this provisional allowance. However, the EPA also found "*the fuel map uncertainty to be equivalent to the uncertainty associated…[with] the FTP and RMC cycles*". The EPA further states that this variability should not hinder manufacturers' ability to comply with the rule without the proposed allowance, writing, "*the similarity between the variability of measuring fuel maps and the variability of measuring CO2 and fuel consumption over the FTP and RMC cycles (measurements for which EPA has already determined in both Phase 1 and Phase 2 that no such allowances are needed) suggests that manufacturers should ultimately be able to comply without any special provisions.*" This supports the conclusion that the previous 1% assumed variability was not inappropriately low and that no technical amendment is justified.

The proposed provision also creates an incentive for systematic underreporting and gives no way to monitor or discourage this. The EPA states that "*manufacturers could not know how the variability would affect an individual test result, which would preclude them from relying upon this margin for compliance in current engine designs or in any potential engine redesign.*" This, however, assumes that manufacturers report what they believe to be accurate results to the EPA. Yet as long as manufacturers are within 2% of EPA confirmatory testing results their fuel map will be kept in place, whether a higher or lower result. If manufacturers routinely underreport results by 2% they may be rewarded with credits, or the ability to purchase fewer credits. This, notably, is more profitable than reporting accurate results, as the consequence for inaccurate results is only EPA's replacement of the manufacturer's fuel map. This proposed system would directly encourage the systematic under-reporting of engine fuel maps.

Even setting aside the above objections, the proposed technical amendment overcorrects for the alleged problem. First, the stringency of the engine standards was already decreased by 1% under the original Phase 2 Final Rule, due to expected uncertainty[iv]. Hence the difference allowed between the two maps should be at most 1% less than the expected uncertainty, not 2%. Second, the EPA also found "*the fuel map uncertainty to be… about one percent"* suggesting any further reduction in stringency should be below the round-off range of 1%; i.e. less than 0.5%.

For these reasons ACEEE recommends that the EPA drop the proposed interim provision to 40 CFR 1036.150. As stated, this proposed provision would create a bad precedent regarding EPA test results and would amount to a highly significant decrease in the stringency of the standards, actually allowing an *increase* in engine emissions for Model Year 2021. The EPA's own research finds this provision to be unjustified and unnecessary to allow manufacturers to

comply with the regulations. The proposed measure also fails to account for measures already taken in the final Phase 2 rule itself. Additionally, these effects would be in addition to the proposed undeserved extension of MY 2020 vocational vehicle engine emission credits and would potentially allow an unacceptable increase in emissions across all engine types for MY 2021, compared to MY 2017. This provision would be an unjustified and open- ended reduction in the Phase 2 emission standards and should not be promulgated.

If the EPA determines that it is unable to drop the proposed provision, then the EPA, at a minimum, should provide a hard time line for ending the interim provision. This would allow manufacturers a limited time to perfect their fuel maps, without indefinitely sacrificing the stringency of the Phase 2 engine emissions standards. In this case, ACEEE also recommends that the EPA include a method to capture systematic underreporting of CO_2 emissions and an enforcement mechanism to prevent this. The EPA should also publish the differences between EPA and manufacturer engine map testing results to ensure transparency regarding the effects of this interim provision. This will help ensure that the testing allowance does not become a blanket reduction in the stringency of the Phase 2 engine emissions standards.

[i] https://www.regulations.gov/document?D=EPA-HQ-OAR-2019-0307-0036

[ii] https://www.regulations.gov/document?D=EPA-HQ-OAR-2014-0827-1896

[iii] EPA-HQ-OAR-2014-0827-1623/NHTSA-2014-0132-0185

[iv] Phase 2 rule 81 FR 73571: "…we have included a +1 percent compliance margin into our stringency analysis of the engine standards…In other words we set Phase 2 engine and vehicle standards 1 percent less stringent than if we had not considered this test procedure uncertainty."

Response

We received comment on this issue from CARB, EMA, ICCT, ACEEE, and NACAA as noted above. After considering the comments received, we are adopting the limited transitional approach aimed at addressing the manufacturers' variability concerns, please see Section II.B.3. of the preamble that clarifies our intent for this interim provision. With regard to making it clear that the interim confirmatory testing provisions apply to powertrain testing, we intended our proposal for these provisions to include powertrains and agree that it is appropriate to do so, as the current and proposed 40 CFR 1036.235(c) clearly provides that confirmatory testing applies to powertrains. The revisions to the regulations we are finalizing accordingly include additional clarifying changes to 40 CFR 1036.150(q) and 1036.235(c)(5) to further specify that these interim confirmatory testing provisions apply to powertrains as well.

With regard to defining what specific vehicle categories apply to the equation §1036.150-1 which is now equation §1036.235-1, we don't agree that the same categories that the manufacturer uses to generate its maps should be used by EPA because the fuel maps are created to cover the range of all vehicles the engine will go into and do not necessarily represent the highest volume vehicle(s) the engine will go into. To provide more clarity as to how EPA would choose which vehicles would be used for comparing fuel maps, we have added §1036.235(c)(5)(i) that states: "We will perform this comparison using the weighted results from GEM, using vehicles that are appropriate for the engine under test. For example, we may select vehicles that the engine went into for the previous model year." By using vehicles that are most appropriate for this comparison, we ensure that manufactures don't systematically under report emissions as stated by ICCT and ACEEE. It should be noted that EPA has addressed this in §1036.235(c) as part of a migration of the equation from §1036.150 to §1036.235.

With regard to making information regarding manufacturer and EPA confirmatory fuel maps transparent, in accordance with Federal statutes, EPA does not release information from certification applications (or other compliance reports) that we determine to be CBI under 40 CFR part 2. However, consistent with section 114 and 208 of the CAA, emissions data shall be publicly available. EPA has not made

final determination(s) for Phase 2 fuel maps or other GEM inputs but continues to consider it likely that test results, other GEM inputs, and similar information would not be entitled to treatment as CBI.

With regard to the rounding provisions in equation §1036.150-1 (now equation §1036.235-1), we agree that including rounding for intermediate steps is inappropriate and was included in the proposal through an oversight and have revised the regulation accordingly to follow the rounding provisions in 40 CFR part 1065.

With regard to SEA testing, the changes suggested by the commenter are out of scope as this rule did not propose any changes or request comment on changes to the SEA portion of the program, however these may be considered in an appropriate future action.

2.1.6 General Engine Fuel Mapping Testing (40 CFR 1036.535 and 1036.540)

What Commenters Said *(EPA's response follows the comment below)*

EMA (0044):

Engine and powertrain fuel map in-use testing

While EMA's comments above address our concerns about fuel map confirmatory tests and fuel map SEA tests, EMA also recommends changes to engine and powertrain fuel map in-use testing. Specifically, EMA urges EPA to delete those portions of the regulatory text of 40 CFR Part 1036 that state that declared engine and powertrain fuel maps serve as standards. Instead, EPA should rely upon the vehicle-level audit procedures in 40 CFR Part 1037 to ensure in-use compliance of engine and powertrain fuel maps throughout regulatory useful life. Under EMA's recommended changes, EPA would continue to conduct fuel map confirmatory tests according to §1036.150(q), and fuel map SEAs would continue to be conducted according to §1036.150(q) and 40 CFR Part 1068, Subpart E. But engines or powertrains would not be held to stand-alone fuel map in-use testing. Standalone in-use testing of those would be limited to FTP and RMC-SET test cycles or their equivalent vehicle-level cycles, as applicable. In-use testing of fuel maps could be conducted as part of a broader overall vehicle-level in-use audit, but those tests would be conducted in conjunction with audits of that vehicle configuration's other GEM inputs (e.g., tires, aero, transmissions, axles, etc.). EMA's rationale for this recommendation is that in-use, engine and powertrain fuel maps are no different than any other GEM inputs. They are nearly identical to transmission and axle power loss maps. Engine and powertrain fuel maps only impact vehicle-level FELs, not engine-level FELs, which are only applicable on the FTP and RMCSET. Remedial action for an in-use fuel map exceedance, therefore, should be taken only at the vehicle level as well. Section 1037.645 provides an option to declare higher vehicle FELs, in lieu of recall, for a GEM-related exceedance associated with a fuel map. Without the flexibility that EMA is recommending for fuel maps, EPA's current "maps-as-standards" regulatory language forces EPA to issue a recall, even when it is not in the public interest. For the FTP and RMC-SET engine test cycles, EPA contemplated this potential situation in §1036.625, where EPA allows for post-model year FEL increases, stating, "This section, which describes how you may ask us to increase an engine family's FEL after the end of the model year, **is intended to address circumstances in which it is in the public interest to apply a higher in-use FEL based on forfeiting an appropriate number of emission credits. For example, this may be appropriate where we determine that recalling vehicles would not significantly reduce in-use emissions.**" [emphasis added]. EPA's current "maps as standards" language precludes any possibility of forfeiting engine credits to remediate an in-use fuel map exceedance because there is no possibility of generating credits to forfeit. EMA believes the "maps as standards" regulatory language was developed by EPA prior to EPA's development of its cycle average maps and its transmission and axle power loss maps for GEM. If EPA had had more time to further reconsider its engine and powertrain fuel map regulatory language in the context of the more recent development of its cycle-average maps and axle and transmission maps as GEM inputs, we believe EPA would have removed the problematic maps-as-standards language, as EMA is requesting now.

Specifically, EMA requests 40 CFR Part 1036 revisions, as follows:

Delete last sentence of **§1036.108(e)**: ~~Note that engine fuel maps and powertrain test results also serve as standards as described in §1036.535, §1036.540, §1036.630 and 40 CFR 1037.550.~~

2. Revise first sentence of **§1036.230(e)**: Delete "~~certify~~" and replace with "declare".

3. Delete phrase in penultimate sentence of **§1036.535(e)**: These declared fuel-consumption rates~~, which serve as emission standards under §1036.108,~~ are the values that vehicle manufacturers will use for certification under 40 CFR part 1037.

4. Delete or revise a number of words and phrases in **§1036.630**:
§1036.630 Certification of engine GHG emissions for powertrain testing.
For engines included in powertrain families under 40 CFR part 1037, you may choose to include the corresponding engine emissions in your engine families under this part 1036 instead of (or in addition to) the otherwise applicable engine fuel maps.
(a) If you choose to ~~certify~~ declare powertrain fuel maps in an engine family, the declared powertrain emission levels ~~become standards that~~ apply for selective enforcement audits ~~and in-use testing~~. We may require that you provide to us the engine test cycle (not normalized) corresponding to a given powertrain for each of the specified duty cycles.
(b) If you choose to ~~certify~~ declare only fuel map emissions for an engine family and to not ~~certify~~ declare emissions over powertrain test cycles under 40 CFR 1037.550, we will not presume you are responsible for emissions over the powertrain cycles. However, where we determine that you are responsible in whole or in part for the emission exceedance in such cases, we may require that you participate in any recall of the affected vehicles. Note that this provision to limit your responsibility does not apply if you also hold the certificate of conformity for the vehicle.
(c) If you split an engine family into subfamilies based on different fuel-mapping procedures as described in §1036.230(e), the fuel-mapping procedures you identify for ~~certifying~~ each subfamily also apply for selective enforcement audits ~~and in-use testing~~.

Response

This comment is outside of the scope of this rule as this rule did not propose any changes or request comment on the existing regulatory provision concerning declared engine and powertrain fuel maps serving as standards.

What Commenters Said	Response
EMA (0044): **1036.535** "xccombdry" and other chemical balance parameters need to be calculated with no DEF flow. Labs would have to run replicate chemical balances in order to do this correctly.	40 CFR 1036.535 refers to 40 CFR 1065.655(c) for this calculation, which states that inclusion of DEF in the chemical balance is optional for the determination of fuel properties. We are finalizing clarifications in §1065.655(a) and (c) to denote that you can use either fuel only or fuel plus DEF, and the values can either be determined or you may use the default values in §1065.655(e).
EMA (0044): **1036.540 cycle average fuel map** EPA needs to provide clarifications regarding transition time, pre-condition time, and soak times.	A review of §1036.540 by EPA did not denote any deficiencies in regard to transition time, preconditioning, or soak times and it is unclear what specific clarifications commenter is requesting.

What Commenters Said	Response
EMA (0044): **1037.520(h) Idle speed** We support EPA's approach in general because EPA never intended to penalize engines that must be operated at idle speeds greater than those EPA used for its Phase 2 GHG stringency analysis. For that same reason, EMA requests the addition of §1037.520(h)(1)(iv) to address cases in which an engine is physically not mappable down to EPA's speeds. Such cases can, and do, exist when engines have resonant frequencies of vibration at or near EPA's speeds. Unstable combustion potentially could be another reason why an engine is not mappable down to EPA's speeds. Therefore, in those cases EMA recommends that manufacturers determine unmappable fuel rates as "analytically derived GEM inputs", consistent with §1037.235(h). In practice, EMA would expect that manufacturers might use a variety of approaches to analytically derive appropriate GEM inputs, including but not limited to extrapolation of physically mapped values or computer simulation. Because EPA would not be able to physically test those analytically derived GEM inputs, EMA recommends including the clause, "good engineering judgment," as a reference to §1068.5, which prescribes the process by which EPA may effectively audit those analytically derived GEM inputs and take remedial action, if needed. EMA believes its recommended additions to §1037.520(h)(1) both adhere to EPA's stringency-setting process and ensure clear and enforceable implementation of the Phase 2 GHG standards.	We are not adopting the suggested language in §1037.520(h)(1)(iv) because it does not provide mappable speeds, rather it derives them. Instead, we are finalizing the proposed changes to §1037.520(h)(1) with an additional footnote to the table that was finalized in this paragraph (replacing paragraphs (h)(i) – (iv)) to reflect all of the options available. This addresses EMA's concern where the minimum adjustable idle speed is higher than the default idle speed. This new footnote states that if your engine cannot be operated at the applicable idle speed given in the table in §1037.520(h)(1), then you must set the idle speed to the vehicle's minimum adjustable idle speed.

2.1.7 Aerodynamic Testing (40 CFR 1037.525 through 1037.534)

What Commenters Said	Response
CARB (0030): **Re: § 1037.515 typo in Table 2** CARB staff agrees with the proposed revisions for § 1037.515. In addition, CARB staff recommends U.S. EPA staff to correct § 1037.515(c) Table 2's typographical error. The mathematical "greater than" symbol should be a "greater than or equal" symbol for a trailer's measured change in aerodynamic drag area (delta CdA) of 1.80 in Table 2.	We agree with the concern expressed in the comment and have revised the regulation accordingly to correct this typographical error.

What Commenters Said	Response
EMA (0044): **1037.525(b)** EMA supports most of the proposed revisions to §1037.525(b), but some of the changes appear to be in error. We request the following modifications to the proposed revisions, for the reasons stated: • (b) *Adjustments to correlate with coastdown testing*. Adjust aerodynamic drag values from alternate methods to be equivalent to the corresponding values from coastdown measurements as follows: (1) Determine the functional relationship between your alternate method and coastdown testing. Specify this functional relationship as *F*alt-aero for a given alternate drag measurement method using the following equation, where the effective yaw angle, *ψ*eff, is assumed to be zero degrees for Phase 1 and is determined from coastdown test results for Phase 2: $F_{alt-aero} = \frac{C_d A_{coastdown(\psi eff)}}{C_d A_{alt(\psi eff)}}$ Eq. 1037.525-1 *Reason: The proposed definition of Falt-aero was not derived from first principles, since a coastdown test under valid wind conditions will never produce a CdA value at 4.5° yaw (as a proxy for wind averaged CdA). There is no good reason to discard the definition final rule of Faltaero, which applies to both GHG Phases 1 and 2. Finally, paragraph (b)(4) references ψeff which is no longer defined in paragraph (b)(1). The EMA proposal restores the missing text and the definition of Falt-aero from the final rule.* (4) Measure the drag area using your alternate method for a Phase 2 tractor used to determine *F*alt-aero with testing at yaw angles of 0°, ±1°, ±3°, ±4.5°, ±6°, and ±9° (you may include additional angles), using direction conventions described in Figure 2 of SAE J1252 (incorporated by reference in § 1037.810). Also, determine the drag area at the coastdown effective yaw angle, ~~*CdA*effective-yaw-alt~~ *CdA*alt(*ψ*eff), by taking the average drag area at *ψ*eff and –*ψ*eff for your vehicle using the same alternate method. *Reason: To be consistent with the notation in Equation 1037.525-1.* (5) *****...Testing under this paragraph (b)~~(4)~~(5) continues to be valid for later model years until you change the tractor model in a way that causes the test results to no longer represent production vehicles.***** *Reason: To be consistent with the new numbering due to the splitting of final rule section (1) into (1) and (2).*	In the NPRM, EPA proposed changes to §1037.525 (85 FR at 28261). EPA agrees with the commenter that Equation 1037.525-1 should continue to be based on the definition from the HD GHG Phase 2 final rule such that $F_{alt-aero}$ is a function of the coefficient of drag areas at the effective yaw angle. We are finalizing (b)(1) with the same equation as the current requirement but with the updated variable names, as recommended by the commenter, that more clearly relate the drag areas to the defined effective yaw variable, and maintain the existing language clearly stating that the drag areas are based on an effective yaw angle for Phase 1 and Phase 2. EPA also agrees with the commenter's suggestion for §1037.525(b)(4) and is finalizing a change from the term $C_dA_{effective-yaw-alt}$ to $C_dA_{alt}(\psi_{eff})$ to be consistent with the updated variable names in Equation 1037.525-1. EPA is also finalizing the suggested additional typographical change to §1037.525(b)(5) to ensure proper numbering consistent with the proposed revisions we are finalizing. Section II.A of the preamble describes additional revisions we are finalizing from §1037.525.

What Commenters Said *(EPA's response follows the two comments listed below)*

EMA (0044):

§1037.520(b)

EMA supports the proposed technical amendments to §1037.520(b)(3)(ii). Additionally, we request modifying §1037.520(b)(3)(i) to clarify that a standard trailer should be used for determining the bin levels for high-roof tractors. That clarification should be added as follows:

(i) Determine bin levels for high-roof tractors based on aerodynamic test results per 1037.525 and as described in the following table:

§1037.525(b)

(7) If a tractor and trailer cannot be configured to meet the gap requirements specified in 1037.501(g)(1)(ii), test with the trailer positioned as close as possible to the specified gap dimension and use good engineering judgment to correct the results to be equivalent to a test configuration meeting the specified gap dimension. Examples of good engineering judgement include using an approved alternate method to correct the test output or substitution of a test vehicle for one which is aerodynamically equivalent in every possible way and can be configured to meet the gap requirements in 1037.501(g)(1)(ii). This allowance applies for all testing, including confirmatory and SEA testing, alternate method and Falt-aero determination, and GEM simulation for both certification and compliance.

Reason: To address a situation where the fifth wheel on the tractor is positioned in a manner that prohibits achieving the gap to the standard trailer that is specified in §1037.501(g)(1)(ii).

Volvo (0035):

§1037.525(b)(6) "Good Engineering Judgment" Correction for Trailer Gap

In the Phase II rule finalized in October of 2016 [FR 81 73478] EPA provided in 1037.525(b)(6) that, when a tractor and trailer could not be configured to meet the requirements as defined with a standard trailer in 1037.501(g)(1)(ii), the manufacturer would use "good engineering judgment to perform testing at the minimum gap attainable and then "correct" the results to be equivalent to the same tractor at the specified gap. The Volvo Group does not believe that the data can be reliably corrected mathematically from one trailer gap dimension to another, leaving a manufacturer at significant risk.

Thus, we proposed to the Agency ahead of publication of the Technical Amendment package that they reference in the regulatory text that one example of "good engineering judgment" in this instance would be to substitute a tractor that is identical in aerodynamic specification except that it can meet the defined maximum allowable gap.

Additionally we requested that the Agency specify that this determination of good engineering judgment would apply to all testing, to include confirmatory and SEA testing, alternate method and Falt-aero determination, and GEM simulation for both certification and compliance. Thus, the Volvo Group request would have made all testing methods consistent with the provision in 1037.201(g) "General requirements for obtaining a certificate of conformity", which states in terms of confirmatory testing that a manufacturer "may choose to deliver another vehicle or component that is identical in all material respects to the test vehicle or component, or a different vehicle or component that we determine can appropriately serve as an emission-data vehicle for the family."

As the intent of the predefined trailer gap was to reduce test burden on manufacturers who would otherwise have to test every possible gap, as well as to "ensure consistency of the drag assessment", Agency staff agreed to include such a provision. Unfortunately, the resultant language change did not provide the specific relief requested; therefore, the Volvo Group would like to make the following proposal for modifications (additions underlined)

Modify 1037.520(b)(3)(i) to read: Determine bin levels for high-roof tractors based on aerodynamic test results per 1037.525 and as described in the following table:

Modify 1037.525(b)(7) 3 to read: If a tractor and trailer cannot be configured to meet the gap requirements specified in 1037.501(g)(1)(ii), test with the trailer positioned as close as possible to the specified gap dimension and use good engineering judgment to correct the results to be equivalent to a test configuration meeting the specified gap dimension. Examples of good engineering judgement include using an approved alternate method to correct the test output or substitution of a test vehicle for one which is aerodynamically equivalent in every possible way and can be configured to meet the gap requirements in 1037.501(g)(1)(ii). This allowance applies for all testing, including confirmatory and SEA testing, alternate method and Falt-aero determination, and GEM simulation for both certification and compliance.

Response

In the NPRM, EPA proposed the addition of the redline text to §1037.525(b)(7):

> *If a tractor and trailer cannot be configured to meet the gap requirements, test with the trailer positioned as close as possible to the specified gap dimension and use good engineering judgment to correct the results to be equivalent to a test configuration meeting the specified gap dimension. This allowance applies for all testing, including confirmatory and SEA testing.*

We agree with the requests from EMA and Volvo for additional clarifications to §1037.525(b). In §1037.525(b)(7), we are finalizing a reference to §1037.501(g)(1)(ii), an example of how we may allow manufacturers to correct test output, and a clarification that this allowance applies for all testing. See Section II.A of the preamble for more information and additional revisions we are finalizing from §1037.525.

What Commenters Said	Response
EMA (0044): **1037.525(c)** EMA proposes several modifications to §1037.525(c), for the reason stated: (c) *Yaw sweep corrections*. Aerodynamic features can have a different effectiveness for reducing wind-averaged drag than is predicted by zero-yaw drag. The following procedures describe how to determine a tractor's *CdA* values to account for wind-averaged drag and differences from coastdown testing: (1) For Phase 2 testing with an alternate method, apply the following method using your alternate method for aerodynamic testing: (i) For all testing, calculate the wind-averaged drag area from the alternate method, *CdA*wa-alt, using an average of measurements at –4.5 and +4.5 degrees. (ii) Determine your wind-averaged drag area, *CdA*wa, rounded to one decimal place, using the following equation: *CdA*wa = *CdA*wa-alt · *F*alt-aero Eq. 1037.525-2 ~~(2) For Phase 2 coastdown test results, apply the following method:~~ ~~(i) For all coastdown testing, determine your effective yaw angle from coastdown, *CdA*effective-yawcoastdown.~~ ~~(ii) Use an alternate method to calculate the ratio of the wind-averaged drag area (using an average of measurements at –4.5 and +4.5 degrees, *CdA*wa-alt) to the drag area at the effective yaw angle, *CdA*effective-yaw.~~ ~~(iii) Determine your wind-averaged drag area, *CdA*wa, rounded to one decimal place, using the following equation:~~ ~~*CdA*wa = *CdA*effective-yaw-coastdown · *CdA*wa-alt / *CdA*effectiveyaw~~ ~~Eq. 1037.525-3~~ *Reason: Paragraph (2) is unnecessary. Coastdown results do not need to be corrected to 4.5° yaw to determine the aerodynamic bin for any tractor – it is sufficient to derive Falt-aero at ψeff and then apply that Falt-aero to the CdAwa as described under section (c)(1) using Eq. 1037.525-2. Where it is actually necessary to do so during an SEA, Eq. 1037.305-2 already serves that function.*	EPA did not propose modifications to the yaw sweep correction provisions in §1037.525(c) but requested comments on general improvements to the aerodynamic test procedures and compliance provisions (see 85 FR 28147). The commenter's suggestion to delete paragraph (c)(2) as "unnecessary" because another regulatory provision "serves that function" appears to be based on a misunderstanding of the existing regulatory text. Wind-averaged drag area (C_dA_{wa}) is a required input for GEM in Phase 2. Paragraph (c)(1) specifies how to calculate C_dA_{wa} when using an alternate test method and paragraph (c)(2) specifies how to calculate it for coastdown testing. EPA may use coastdown for confirmatory testing and manufacturers may choose to use coastdown testing for *all* aerodynamic testing. Consequently, paragraph (c)(2) is needed to properly calculate the wind-averaged input required by GEM in these situations. We revised §1037.525(c) to clarify the use of these paragraphs for compliance and maintain consistency with variable naming updates in §1037.525(b). Both (c)(1) and (c)(2) generate a wind-averaged CdA value for GEM and we added reference to §1037.520. While paragraph (c)(1) relates an alternate method back to coastdown, (c)(2) calculates a value *from coastdown testing*, so the "differences from coastdown testing" phrase in paragraph (c) introductory text could create confusion in attempting to apply it to (c)(2); we removed that phrase to avoid such confusion for (c)(2). This deletion does not and is not intended to change (c)(1), as that paragraph still relates an alternate method back to coastdown. Paragraphs (c)(1) and (c)(2) were rephrased to more clearly communicate that they are two separate options that apply based on which testing method is chosen. Also, we updated the variable naming convention to match those adopted in § §1037.525(b) for consistency.

What Commenters Said	Response
EMA (0044): **1037.527 Baseline vehicle for vocational delta CdA** Section 1037.527(b) references §1037.526 to determine a ΔCdA value for vocational vehicles. Section 1037.526 is intended for trailers. Section 1037.526(a)(1) indicates using §1037.501(g)(1) to determine the baseline trailer to use for a baseline CdA value, but it does not define what to use for a baseline vocational vehicle. Accordingly, EPA should clarify that the manufacturer should choose an appropriate baseline vehicle for the technology and applications.	EPA did not propose any changes to §1037.527, however, we requested comment on other possible improvements to the aerodynamic test procedures and compliance program (85 FR at 28147). We agree with the commenter that clarifying the baseline vehicle for vocational aerodynamic testing is appropriate. Please see Section II.A of the preamble that clarifies our intent for §1037.527.

What Commenters Said *(EPA's response follows the comment below)*

CARB (0030):
1037.530 Wind-tunnel procedures for CdA

In addition, CARB staff recommends adding the requirement for the submission of a detailed uncertainty analysis for wind tunnel testing. Wind tunnel data uncertainties are often presented in the form of repeatability from a few supposedly identical tests. Rarely are estimates of uncertainty based on calibrations of a facility's equipment and instrumentation, or on a thorough review of the process that is producing the data, or a comprehensive accounting of significant biases inherent in the testing.

It is important to improve the quality of wind tunnel test data through a consistent approach that integrates uncertainty analyses into all phases of a test, as well as provides a complete analysis, and documentation, of the uncertainty for each test. Proper analysis and documentation of the uncertainty of final results are important steps of assessing the data quality and should be key parts of the entire wind tunnel testing process. For the uncertainty analysis of a trailer aerodynamic device's aerodynamic improvement performance, the random error plays a more critical role than the bias error because the measured performance value is a delta (Δ) difference, and not an absolute value. Thus, the correlated bias errors are canceled out during the difference calculation.

U.S. EPA's Phase 2 GHG wind-tunnel testing protocol does not provide any specifications on how to assess random uncertainty. It instead relies on the uncertainty calculation method specified in the SAE J1252 Standard. When calculating a difference value, a knowledge of correlated bias uncertainties is required; however, the SAE J1252 Standard does not address such conditions in its uncertainty calculation discussion.

U.S. EPA's Phase 2 GHG procedure permits variability in how testing is done, such as per a testing facility's best practices, which introduces additional uncertainty in the test results. Currently, wind tunnel testing facilities are defining uncertainty from a combination of repeated baseline tests, without repeating aerodynamic device test runs. However, since U.S. EPA Phase 2 GHG procedure did not define a specific calculation procedure for assessing uncertainty, some testing facilities perform repeated baseline tests every three to four aerodynamic device tests while others do it every two device tests based on their facility's best practices. Also, they only use the first two or three baseline tests for averaging instead of the average of all baseline tests. The wind velocity is brought to zero between full tests, while parts may be added on or removed from the test model. Further, test instruments may need to be zeroed between tests, which in turn may cause test model vibrations and orientation differences from test to test. Therefore, more complete procedures are required that account for random error within a test, and specify the source of discrepancies in the data from test to test. Having such procedures would ultimately help to more properly evaluate the aerodynamic device performance improvements and allow better understanding of the test-to-test variability and test-to-test repeatability.

CARB staff recommends that U.S. EPA add a provision to define a specific calculation procedure for uncertainty analysis, and set a strict requirement for uncertainty calculations. Because the assessment of wind tunnel test validity and repeatability is generally done through specific procedures, this recommendation is reasonable. This change would benefit all stakeholders in understanding clearly the requirements, and would facilitate implementation of, and compliance with, the regulations. With CARB staff's experience acquired from implementing our aero device approval program and trailer cert standards, we would like to work with U.S. EPA staff to develop the regulatory language to define this calculation procedure.

Response

In the NPRM, EPA requested comment on other possible improvements to the aerodynamic test procedures and compliance program (85 FR at 28147).

§1037.530 applies to both tractor and trailer wind tunnel testing. The testing method is consistent with the SAE J1252 Standard, an industry standard. EPA acknowledges that the procedure does not require quantification of uncertainty for each test, as noted by the commenter. EPA understands commenter's recommendation as a request to work towards a revision beyond the scope of this rulemaking for future codification, and also notes that we did not propose any procedures for an uncertainty analysis and considers the recommendation as beyond the scope of the technical amendments being finalized in this rule. We appreciate the commenter's offer to help develop procedures for an uncertainty analysis outside of this rulemaking; we may consider the changes suggested by the commenter in an appropriate future rulemaking.

We note that EPA has the ability to conduct confirmatory tests and selective enforcement audits and we will continue to use these tools to review the validity of aerodynamic test results.

What Commenters Said *(EPA's response follows the comment below)*

CARB (0030):

Re: § 1037.532 Using CFD for CdA

Based on CARB staff's experience implementing the Phase 2 trailer certification requirements and evaluating aerodynamic devices for preapproval, CARB staff recommends several improvements related to computational fluid dynamic (CFD) simulation, as detailed in the attachment.

These improvements are important because trailer aerodynamic device manufacturers prefer using CFD simulation rather than using either wind tunnel or coast down testing.

(appendix text)

CARB staff does not have any specific comments about U.S. EPA's proposal on this editorial change from "at yaw angles of +4.5° or –4.5°" to "at yaw angles of +4.5° and –4.5°," however, we have further comments to this section. Currently, the regulations require a minimum limit of 50 million computational elements for performing the Computational Fluid Dynamics (CFD) simulation. Increasing the cell mesh number would increase the accuracy of the CFD simulation; however, at the same time, it would increase the computation time and cost. Further, it would have an impact on the cell quality (i.e., mesh deformation) and time accuracy, which consequently would alter the simulation's end result. Therefore, it is critical to define a specific procedure to calculate and apply the optimal number of computational elements to achieve an accurate CFD simulation, but without putting too much of a burden on the aerodynamic device manufacturers.

Further, the drag coefficient fluctuates with time due to transient flow behaviors; therefore, applying an averaging strategy is an important factor that would highly influence the calculation of a measured delta CdA value. A longer averaging window would leads to a more accurate result, and a higher confidence interval. At the present time, the current regulations do not define a specific procedure for using an averaging strategy to determine the measured CdA value when CFD simulation is used.

Trailer aerodynamic device manufacturers prefer using CFD simulation to certify their aerodynamic devices rather than using either wind tunnel or coastdown testing. There are inherent uncertainties and errors associated with using CFD to predict the measured CdA of aerodynamic devices. Evaluating the uncertainty for the results of a CFD simulation is an important factor in establishing a level of credibility. Both uncertainty and error are factors normally linked to accuracy in modeling and simulation. Uncertainty can be reduced by extending the simulation run time; however, this approach increases the computational cost and leads to longer turnaround times. Moreover, it is desirable to be able to run an unsteady CFD simulation for the minimum amount of time necessary to reach an acceptable amount of uncertainty in the quantity of interest. Thus, calculating the uncertainty in the difference between two measured CdA values is of practical importance for trailer certification.

U.S. EPA's Phase 2 GHG CFD testing protocol does not provide a standard common method for quantifying the uncertainty in using CFD to predict measured delta CdA values for trailers.

The regulations require that a standard tractor must be used when conducting tests to determine the performance of an aerodynamic trailer. Aerodynamic device manufacturers, and those parties conducting CFD simulations on their behalf, may have difficulty in obtaining geometries of the emission certified tractors needed to create a digital representation for CFD simulations. These difficulties arise because of challenges associated with scanning full-size tractors or obtaining access to geometries of proprietary tractor models. Developing and providing a digital representation of standard commercialized certified tractors through U.S. EPA would address the challenges of obtaining these models, and reduce the uncertainty and error linked to accuracy in modelling for simulation purposes. There is a strong need to provide digital representations which are more representative of real-world tractors than relying on an idealized CFD model.

CARB staff recommends that U.S. EPA add a provision to set a strict requirement for a maximum limit of computational elements to perform CFD simulation, and define a specific transient averaging methodology for applying an averaging strategy. It is also recommended to set a strict requirement to quantify the uncertainty in using CFD simulation, and describe an approach and provide guidelines for assessing CFD simulation credibility. CARB staff is supportive of providing a digital representation of standard commercialized certified tractors through U.S. EPA. This would benefit all stakeholders in understanding clearly the requirements, and would facilitate implementation and compliance with the regulations. With CARB staff's experience acquired from implementing our aero device approval program and trailer cert standards, we would like to work with U.S. EPA staff to develop this CFD-related regulatory language.

Response

EPA's proposed modifications to §1037.532 were limited to correcting a single typo by replacing an "or" with "and" in paragraph (a). We did request comment on general improvements to the aerodynamic test procedures and compliance program (85 FR at 28147).

§1037.532 applies to both tractor and trailer CFD testing. EPA acknowledges that our CFD provisions do not include specific procedures for determining the optimal number of computational elements, averaging CdA values, or quantifying uncertainty. EPA understands commenter's recommendation as a request to work towards a revision beyond the scope of this rulemaking for future codification, and also notes that we did not propose any procedures for to address grid size, uncertainty, or averaging and considers the recommendations as beyond the scope of the technical amendments being finalized in this rule. We appreciate the commenter's offer to help develop procedures; we may consider the changes suggested by the commenter in an appropriate future rulemaking.

We note that the aerodynamic bins are designed to account for some of the uncertainty between methods and EPA continues to have the ability to conduct confirmatory and SEA testing to evaluate aerodynamic results submitted by vehicle and device manufacturers.

EPA recognizes the value in providing a common, digital representation of a standard tractor for use in trailer CFD simulations. We initiated discussions with stakeholders to develop a common model, but curtailed them when the EPA trailer program was judicially stayed. If the trailer program is reinstated, we may continue developing a standard tractor model, which could be made available through guidance.

What Commenters Said	Response
EMA (0044): **1037.532: CFD for CdA** EPA should modify §1037.532 as follows: (a)***** (3) Simulate a Reynolds number of 5.1 million (based on trailer width) and an air speed of 65 mi/hr. *Reason: Reynolds number is defined as follows: Re = rho*V*L/mu V is already prescribed (65 mi/hr), but L is not. Based on the trailer width (102") and the properties of air at standard sea level conditions, we get Re ≈ 5.1x106. However, if we use a different characteristic length (e.g., a trailer height of 13'6"), we would be at Re ≈ 8.1x106. The regulation needs to specify the characteristic length used to define the prescribed Reynolds number.* (4) Perform an open-road simulation ~~the General On-Road Simulation~~ (not the Wind Tunnel Simulation). *Reason: To be consistent with the language in §1037.532(c)(1). General On-Road condition is being revised in SAE J2966 to incorporate the impact of traffic via nonuniformities in the inlet boundary condition. That is NOT representative of coastdown testing.* (5) Use a uniform inlet velocity profile ~~free stream turbulence intensity of 0.0 %.~~ *Reason: RIA (section 3.2.1.1.3.2) describes in detail the aerodynamic impact of upstream non-uniformity. Table 3-7 shows negligible impact of upstream disturbance on the scale factor between CdA at 0° and 4.5° yaw. Consequently, EPA decided that it was unnecessary to model non-uniform freestream conditions in CFD. The EMA proposal clarifies that intent, while avoiding any potential misinterpretation regarding the initialization of Turbulence Models that may lead to instabilities and/or inaccuracies in the CFD simulation results.*	In the NPRM, EPA requested comment on other possible improvements to the aerodynamic test procedures and compliance program (85 FR at 28147). We agree with the commenter's first suggestion to clarify that the trailer *width* is the appropriate dimension to properly calculate the specified Reynolds number of 5.1 million. Therefore, we are finalizing revised regulatory language in §1037.532(a) to note that the Reynolds number is based on a 102-inch trailer width consistent with our specifications for a "standard trailer" in §1037.501(g)(1)(i). Related to the commenter's second suggestion, we stated in the Final Regulatory Impact Analysis for the HD Phase 2 Rule on page 3-41 the following: *"SAE J2966 contains provisions for both open road and wind tunnel simulations. We are requiring that the CFD runs must simulate the open road condition."* The intent has been for the requirement to be for open-road simulation and therefore we agree with the commenter's suggestion to clarify the regulatory language. Related to the commenter's third suggestion, EPA did not propose any changes to that paragraph and is not taking any final action on revisions to that paragraph at this time. Furthermore, EPA disagrees with changing paragraph (5) from requiring a "free stream turbulence intensity of 0.0 %" to a "uniform inlet velocity profile". Turbulence intensity is a common parameter in CFD packages and, as stated in the Final Regulatory Impact Analysis for the HD Phase 2 Rule (page 3-41), we evaluated a range of turbulence intensities and intentionally specified that "Turbulence intensity must be 0.0 percent." Manufacturers who wish to use alternative parameters and criteria related to their CFD models, which includes seeking to substitute the specified turbulence intensity with a uniform inlet velocity profile, may have the option to do so by seeking EPA approval under the existing process in §1037.532(f).

2.1.8 Smoke Testing

What Commenters Said	Response
CARB (0030): **Smoke standards and Smoke Measurement Procedures—**CARB staff has no comments in relation to removing smoke standards as part of U.S. EPA certification process. CARB does not require smoke testing as part of our certification process. California enforcement programs rely on the SAE J1667 test which is derived separate from the U.S. EPA certification smoke test standard. CARB staff agrees that the particulate matter (PM) exhaust standards sufficiently cover the needs of the smoke certification test.	We appreciate the comments on this issue. We may consider removing the smoke standards in an appropriate future action.

2.2 GEM Compliance Model Amendments

2.2.1 Model Updates

What Commenters Said	Response
Allison 0043: **EPA Should Consider Further Changes to GEM 3.5** In prior versions of GEM, such as GEM 3.4, the application would accept and process a torque converter map with or without a transmission power loss map being present. Now, in GEM 3.5, the application will accept and process a torque converter map only when a power loss map is present. Allison supports the flexibility to use the torque converter map in GEM 3.5 with or without the transmission power loss map, as was allowed in GEM 3.4.	We agree with the comment that the intent was to maintain the flexibility of inputing the torque converter map independently of inputing a transmission power loss maps and have revised the version of GEM that is finalized with this rule, GEM 3.5.1 accordingly.
CARB (0030): It is unclear how minor the differences are (between GEM 3.5 and GEM 3.0) with regards to transient and idling emissions for vocational vehicles, but it is important for GEM results to be consistent with the program standards. Since the program standards were based on the official GEM 3.0, if manufacturers are allowed to use GEM 3.5 to show compliance with the current Phase 2 standards, and as U.S. EPA stated there might be different GEM results between GEM 3.5 and GEM 3.0, the certified emission levels would not be comparable to the current program standards. This, consequently, would affect the program stringency. CARB staff therefore recommends that U.S. EPA revise GEM to be consistent with the current program standards and to ensure stringency is maintained.	See Section II.A.5 in the preamble to the final rule for EPA's response to this comment and the revisions to GEM we are adopting.

What Commenters Said	Response
Ford (0050): **Vehicle drive tolerance recalibration** It is unclear if the Matlab/Simulink code provided in GEM includes the vehicle drive tolerance recalibration from 3 to 2.5 MPH.	This change was included in GEM 3.5, which was proposed in the NPRM and made available in the docket in its compiled form. Specifically, the change was made in the source code file, GEM_run_sim_script.m. This change will also be included in GEM

Ford recommendation: Clarification is needed regarding if the vehicle drive tolerance recalibration from 3 to 2.5 MPH is incorporated in current Matlab/Simulink code provided in GEM. This guidance could be included in the Regulatory Impact Analysis response to comments or preamble to the final rule.	3.5.1, which we are finalizing and incorporating by reference.
Ford (0050): **Include Vehicle Model code in GEM** Matlab/Simulink code to generate Vehicle Model is not currently included in GEM. **Ford recommendation:** Matlab/Simulink code should be added to GEM to generate Vehicle Model. This guidance could be included in the Regulatory Impact Analysis response to comments or preamble to the final rule.	As noted by the commenter, the Matlab/Simulink version of GEM that is referenced in 40 CFR 1037.550, was removed from EPA's website by accident. The EPA provided the Matlab/Simulink code upon request, but the code wasn't added back to the EPA's website. In conjunction with this rule we will be providing on the EPA's website (https://www.epa.gov/regulations-emissions-vehicles-and-engines/greenhouse-gas-emissions-model-gem-medium-and-heavy-duty) an update version of the Matlab/Simulink code that can be used for powertrain testing as defined in 40 CFR 1037.550. The Matlab/Simulink code will include both the vehicle model and the transmission model, which is needed to perform powertrain testing for engine hybrids.

What Commenters Said
Allison 0043: **EPA should confirm Allison's approach to the Number of Available Forward Gears in Automatic Transmissions** 40 C.F.R. §1037.231(b) provides that powertrains are to be grouped on the basis of shared attributes. Specifically, one attribute that is to be shared among a group is the "[n]umber of available forward gears, and transmission gear ratio for each available forward gear, if applicable." Id. §1037.231(b)(7). The number of forward gears and the minimum gear are necessary information to develop transmission inputs for GEM. Allison has experienced significant interpretative issues concerning this provision in cases where we supply GEM transmission files to vehicle original equipment manufacturers ("OEMs"). The issue arises since: (1) HD vehicles may be specified and controlled to utilize less than the maximum number of gears physically available in an automatic transmission; but (2) in the certification process, OEMs identify the maximum forward gear for purposes of GEM input. This can lead to variation in how the same transmission is characterized in GEM. For example, most work trucks utilizing automatic transmissions incorporate two operational modes: a primary shift schedule ("primary mode") and a secondary shift schedule ("secondary mode"). These two shift schedules often have different maximum forward gears (e.g., a primary mode may use all gears and therefore have a 6th maximum forward gear while a secondary mode may utilize a lower gear as its maximum gear, e.g., a 5th, 4th or even 3rd gear). This issue can also arise where an OEM customer requests or installs a single calibration limiting the operation of the transmission to meet the needs of a particular application. For example, a customer may purchase a 6-speed transmission, but through calibration, limit its operation to gear ranges 1 through 4 or to gear ranges 2 through 6. Allison interprets 40 C.F.R. 1037.231(b)(7) to mean that the maximum forward gear and minimum gear are independent of the calibration selected or shift strategy and "the number of available forward gears" should be based on the number of gears available via hardware and that this number serve as the input to the GEM transmission model.

This interpretation is based on the textual evidence in the preamble to the Phase 2 rules regarding transmission shift strategies and their potential use in GEM. In 2016, EPA considered but rejected an "alternative approach" for automatic transmissions whereby transmission manufacturers would provide OEMs with proprietary information on shift strategies. EPA rejected this approach on several grounds, noting multiple technical and compliance problems. Specifically, EPA noted that "[i]f manufacturers were subject to in-use compliance requirements of their transmission shift strategies, this could lead to restricting the use of certain shift strategies in the heavy-duty sector, which would in turn potentially lead to sub-optimal vehicle configurations that do not improve fuel efficiency or adequately serve the wide range of customer needs; especially in the vocational vehicle segment".

Allison interprets this statement as the EPA recognizing that specification of shift strategies and other calibrations within GEM would realistically limit the number of ranges available and that customers, in practice, make selections to meet the optimal vehicle configurations considering the end use of the vehicle. Allison agrees with this approach as it provides the necessary flexibility while enabling the most fuel efficient vehicles to be deployed in service. In the context of the final rule, EPA should affirm that no changes are being made with respect to EPA's consideration and rejection of this issue in 2016 and that 40 C.F.R. 1037.231(b)(7) is to be interpreted as indicated above.

EPA could also consider a clarifying amendment to 40 C.F.R. 1037.231(b)(7):

> "(7) Number of available forward gears (<u>as determined by the physical architecture of the transmission</u>), and transmission gear ratio for each available forward gear, if applicable."

<u>Response</u>

40 CFR 1037.231 defines how to divide your product into powertrain families for manufactures that choose to use §1037.550 to generate engine fuel maps. If a manufacturer uses this option and performs the powertrain testing with the transmission installed in the test cell, then the engine and transmission calibrations are part of the certified configuration, so the language defining the number of available gears should include what is available in software and hardware. If a manufacture chooses to use 40 CFR 1036.503 (b)(1), (2) or (4) to generate the fuel maps, then the transmission input file as defined in §1037.520(g)(1) should also consist of the available forward gears. Manufacturers should count Available forward gears as available only if the vehicle has the hardware and software to allow operation in those gears. You may use the unrepresentative testing provision in 40 CFR 1065.10(c)(1) to petition our Compliance Division to use a different definition for the number of available forward gears.

We are finalizing a change to 40 CFR 1037.520(g)(1) and 40 CFR 1037.231(b)(7) to make the meaning of available forward gears clear, as explained here.

What Commenters Said	Response
EMA (0044): **HHD Multipurpose vocational duty cycle** EMA has identified an error in GEM 3.5 for the weighting of the HHD Multipurpose duty cycles. The error also is in GEM 3.4. The weighting of the 65 MPH cycle is 0.25 and should be 0.23 to allow the weighting of all three cycles to add up to 1.00. As it is, the 0.54 + 0.23 + 0.25 = 1.02, which gives incorrect GEM results for any chassis that is in the Multipurpose subcategory. EMA requests that EPA make the appropriate correction to the 65 MPH cycle so that it is weighted at 0.23 to allow the weighting of all three cycles to add up to 1.00.	We agree with the comment, as it is consistent with Table 1 of § 1037.510, and have revised the version of GEM finalized in this rule accordingly.
F**ord (0050):** **1037.520 drive axle configurations** For some vehicles with drive axle configurations that can be disconnected, the available options do not adequately represent all drive configurations. **Ford recommendation:** Ford suggests guidance indicating that similar to drive axle ratio, the drive axle configuration expected to be used for the greatest driving distance should be selected for GEM input. Additionally, for vehicles that contain two or more fixed axle disconnects (such as transfer case, center axle disconnect, or wheel end disconnects), the drive axle configuration should be classified as 4x2.	We are finalizing an update to 40 CFR 1037.520(g)(2) to allow 4x2 to be selected for vehicles with two drive axles where one of the drive axles is disconnectable and that disconnectable drive axle is designed to be connected only when the vehicle is driven off-road or in slippery conditions if at least as long as at least one of the following is true: (A) The input and output of the disconnectable axle is mechanically disconnected from the drive shaft and the wheels when the axle is in 4×2 configuration. (B) You provide power loss data generated according to §1037.560 for the combination of both drive axles, where the disconnectable drive axle is in the disconnected configuration.
EMA (0044): **1037.520(j)(1) Neutral coasting for Vocational vehicles** GEM revision is needed to input this technology for vocational vehicles.	We agree with the comment that GEM 3.5 should have included an option for this technology input as proposed in 40 CFR 1037.520(j)(1). This revision is not included in GEM 3.5.1 but, as discussed in section II.A.5 of the preamble, EPA is also issuing a supplemental notice proposing to include this change in proposed revised version of GEM.

What Commenters Said	Response
EMA (0044): **1037.520(h) Idle speed** EMA supports the proposed amendment with the following additions: (h) Idle speed and idle-reduction technologies. (1) Input your vehicle idle speed as follows: (i) For heavy heavy-duty vehicles input your vehicle's maximum adjustable idle speed or 600 rpm, whichever is lower. (ii) For light heavy-duty and medium heavy-duty vocational vehicles input your vehicle's maximum adjustable idle speed or 750 rpm, whichever is lower. For medium heavy-duty tractor vehicles input your vehicle's maximum adjustable idle speed or 650 rpm, whichever is lower. (iii) For spark-ignition vehicles input your vehicle's maximum adjustable idle speed or 600 rpm, whichever is lower. (iv) For vehicles with engines that are not physically mappable down to the numeric values in this paragraph (1), use good engineering judgment to analytically derive GEM input fuel rates that correspond to the appropriate idle speed. EPA used the numeric values it has proposed in §1037.520(h)(1) as part of its Phase 2 GHG stringency setting process. Therefore, the MHD tractor idle speed should be 650 rpm based on the EPA stringency 350 hp 11 liter engine having an idle speed range of 650 rpm to 750 rpm. We support EPA's approach in general because EPA never intended to penalize engines that must be operated at idle speeds greater than those EPA used for its Phase 2 GHG stringency analysis. For that same reason, EMA requests the addition of §1037.520(h)(1)(iv) to address cases in which an engine is physically not mappable down to EPA's speeds. Such cases can, and do, exist when engines have resonant frequencies of vibration at or near EPA's speeds. Unstable combustion potentially could be another reason why an engine is not mappable down to EPA's speeds. Therefore, in those cases EMA recommends that manufacturers determine unmappable fuel rates as "analytically derived GEM inputs", consistent with §1037.235(h). In practice, EMA would expect that manufacturers might use a variety of approaches to analytically derive appropriate GEM inputs, including but not limited to extrapolation of physically mapped values or computer simulation. Because EPA would not be able to physically test those analytically derived GEM inputs, EMA recommends including the clause, "good engineering judgment," as a reference to §1068.5, which prescribes the process by which EPA may effectively audit those analytically derived GEM inputs and take remedial action, if needed. EMA believes its recommended additions to §1037.520(h)(1) both adhere to EPA's stringency-setting process and ensure clear and enforceable implementation of the Phase 2 GHG standards.	In the NPRM, we proposed changes to §1037.520(h) to clarify the vehicle idle speed inputs (85 FR at 28260). We agree with the commenter that further clarification is appropriate. As noted in the proposal, GEM reads idle speed from the vehicle file and allows manufacturers to use default values that EPA used to develop the standards (85 FR 28145). We are finalizing the proposed amendments that specified the default vehicle idle speeds in §1037.520(h)(1) in a new table format, with additional revisions to more fully reflect the numeric values used as part of the Phase 2 GHG stringency setting process. Specifically, we are adopting a default idle speed of 700 rpm for medium heavy-duty tractors, which corresponds to the idle speed used to set the standards for those vehicles, and clarifying that the proposed requirement in that paragraph regarding 750 rpm applies to LHD and MHD *vocational* vehicles. Additionally, we are clarifying in a footnote to the new table when manufacturers can use their maximum and minimum declared warm idle speed in place of the default value. Our final revision clarifies the intent of these requirements after consideration of this comment regarding engines where the default idle speed is physically unmappable. We are not adopting the EMA suggested approach to add a good engineering judgment clause. Instead, the new table footnote in §1037.520(h)(1) states: "If the default idle speed is above or below the engine manufacturer's whole range of declared warm idle speeds, use the manufacturer's maximum or minimum declared warm idle speed, respectively, instead of the default value." This clarification is more specific and consistent with the requirement's intent by requiring the mapped idle speed to be set at the closest possible to the default idle speed while also ensuring that the test procedures are representative of the engine and vehicle subject to these requirements, and by making the regulation clear that it does not require the mapped idle speed to be set below the minimum adjustable idle speed at which the engine can operate.

<table>
<tr><th>What Commenters Said</th><th>Response</th></tr>
<tr><td>EMA (0044):
H2-fueled vehicles
EMA supports continuing the current simulation approach, which results in hydrogen fueled vehicles having zero CO2 emissions in GEM. Since hydrogen is a non-carbon fuel, it is appropriate that no CO2 emissions are generated when it is consumed in a hydrogen fueled vehicle.

While it is true that there are CO2 emissions associated with producing hydrogen, the same is true for any other fuel, and those emissions are not accounted for in GEM. Similarly, CO2 emissions associated with producing electrical power for battery electric vehicle also are not accounted for in GEM. Accounting for well-to-wheel CO2 from all varieties of fuel and power sources, as was done in the California Low Carbon Fuel Standard, is well beyond the scope of GEM as it is configured now.</td><td>We are adding text to the final rule at 40 CFR §1037.615(f) to clarify that hydrogen-fueled vehicles will be treated the same electric vehicles for purposes of calculating credits relative to the CO_2 standards that apply under 40 CFR part 1037.</td></tr>
<tr><td>EMA (0044):
Urgently Needed Technical Amendments
• GEM: Allow the proposed regression limits for NG engines (see below) beyond 2021 for GHG engine certification. Currently, they are approved for 2021 certification via alternative test procedure.

<table>
<tr><th colspan="2" rowspan="2">Proposed limits are only required for ARB cycles</th><th colspan="3">Torque</th><th colspan="2">Power</th></tr>
<tr><th>Y intercept</th><th>SEE</th><th>R^2</th><th>SEE</th><th>R^2</th></tr>
<tr><td rowspan="2">Regulation</td><td>Lower</td><td>-2</td><td></td><td>0.85</td><td></td><td>0.91</td></tr>
<tr><td>Upper</td><td>2</td><td>10</td><td></td><td>10</td><td></td></tr>
<tr><td rowspan="2">Proposed</td><td>Lower</td><td>-3</td><td></td><td>0.7</td><td></td><td>0.75</td></tr>
<tr><td>Upper</td><td>3</td><td>15</td><td></td><td>15</td><td></td></tr>
</table></td><td>For gaseous-fueled engines with a “single-point” injection system, we agree that revised regression limits are appropriate. We are finalizing a revision to include regression limits for these types of engines and fuel injection systems in 40 CFR 1036.540(b).

This change is needed due to the inherent lag between the moment in time that fuel is injected into the intake manifold and the time at which combustion occurs, which affects the responsiveness of the engine, and by extension, the regression limits. This response lag is present on single-point engines, and as such, broader regression limits are justified and needed. We have previously approved this for the same reasons above via request by manufacturer under the special test procedure provision in 40 CFR 1065.10 and are adding this to the regulations in this rule to minimize burden.

The addition of this provision will not have an effect on stringency. The increased regression limits only have a minor impact on how the engine follows the duty-cycle. The addition of this provision more accurately represents such gaseous-fueled engine operation and thus should not result in an emissions impact and it will be more representative of its operation in-use.</td></tr>
</table>

2.2.2 Requests for Clarification

What Commenters Said	Response
EMA (0044): **1037.235(h)** EPA should clarify the definition of an untested configuration. **"**(h) You may ask us to use analytically derived GEM inputs for *untested configurations* as identified in subpart F of this part based on interpolation of all relevant measured values for related configurations, consistent with good engineering judgment. We may establish specific approval criteria base on prevailing industry practice. If we allow this, we may test any configurations. We may also require you to test any configurations as part of a selective enforcement audit.**"**	We have added an example to the §1037.235(h) to help clarify what an untested configuration is. "(h) You may ask us to use analytically derived GEM inputs for untested configurations (e.g. untested axle ratios within an axle family) as…"
EMA (0044): For conventional (non-hybrid) powertrains, a definition is needed regarding the rated power GEM input (peak or continuous rated power?).	We agree with the comment and have revised the regulation in §1036.527(j) in the final rule to state that for conventional powertrains, $P_{\text{contrated}}$ equals P_{rated}. This change was made because conventional powertrains do not have renewable energy storage systems that can be depleted over the test and thus will typically be designed to produce the same power in transient and sustained operation.

What Commenters Said	Response
EMA (0044): 1037.520(c)—EMA is requesting clarification of how tires for liftable axles should be handled in GEM. This could be addressed through guidance on this issue in an updated GEM user manual.	§1037.520(c)(6) says that for vehicles with at least three drive axles or for vehicles with more than three axles total, use good engineering judgment to combine tire rolling resistance into three values (steer, drive 1, and drive 2) for use in GEM. This may require performing a weighted average of tire rolling resistance from multiple axles based on the typical load on each axle. This means that one would need to include the tire RR from the liftable axle in the CRR inputs, as §1037.140(f) notes that "for any provisions in this part that depend on the number of axles on a vehicle, include lift axles or any other installed axles that can be used to carry the vehicle's weight while in motion." Further, the GEM user guide states that for Drive Tire Rolling Resistance: "The coefficient of rolling resistance for the drive tires (i.e. all tires used in non-steer positions) should be input by the user in the unit of kg/metric ton where the typical value is greater than 5.5 kg/metric." One of the concerns with the inclusion of lift axles is that the tires are only in contact with the ground when the axle is deployed, not in a lifted state. As such we believe that good engineering judgment dictates that the tire rolling resistance influence from lift axles be weighted based on the percentage of time that the axle is in a deployed state. We are finalizing a revision to §1037.520(c)(6), and have updated the GEM user guide, to reflect this.

2.3 Compliance Margins for GEM Inputs

What Commenters Said
Allison 0043: EPA Should Clarify Compliance Margins Applying to GEM Inputs Other than Fuel Maps and Aerodynamic Drag Area 40 C.F.R. Subpart F includes testing and modeling procedures for HD GHG standards. 40 C.F.R. §1037.501 specifies how to perform emission testing and emission modeling as required for certification and other regulatory obligations. The subsection provides both explicit cross-references to other provisions in Part 1037 (as well as Parts 86, 1065 and 1066) and includes detailed provisions on trailer specifications. To this existing text, EPA proposes to add a new subsection, §1037.501(i). This subsection would provide that "declared GEM inputs for fuel maps and aerodynamic drag area will typically include a compliance margin to account for testing variability."5 But the proposed regulatory language indicates for "other measured GEM inputs, the declared values will typically be the measured values." EPA's proposed regulatory language is fundamentally unclear in two respects. First, EPA indicates that declared values will only be "typically" used, directly implying that they will not be used all the time or may be limited to certain undefined purposes. Second, it cannot be determined on the face of this language how compliance margins may be applied when there are multiple components of a vehicle system involved. In other words, will the declared values allowing variance with respect to GEM inputs be additive within a vehicle system or will components be considered separately? EPA appears to indicate that this proposed addition to §1037.501 results from a concern expressed by vehicle manufacturers that GEM inputs with compliance margins supplied by component manufacturers "when stacked together . . . would result in inappropriately high GEM results that would not represent the vehicles being produced." Balanced against this concern, however, was EPA's observation that compliance margins are necessary to account for normal production variability and to guard against unjustified Selective Enforcement Audit ("SEA") failures. Thus, EPA proposed that with respect to axles and transmissions, additional testing would occur if an initial test showed that an axle or transmission did not pass and the additional results "would be combined into a single ap." EPA further indicated that a "modest compliance margin" for a family emission limit would be sufficient to cover a range of components used in a vehicle. Our difficulty in interpreting this regulatory language stems from the fact that EPA did not propose explicit changes with respect to compliance margins while at the same time the Agency proposed to revise the procedures for conducting an SEA for an axle or transmission apart from a vehicle. Therefore, any final rule should address this discrepancy. One option to accomplish this end would be through amendment of the proposed regulatory text in 40 C.F.R. §1037.501(i). Specifically, EPA should make clear that: (1) the declared values for measured GEM inputs will be considered for a single component at a time; and (2) a specific compliance margin will be available for individual components, such as 2%. Overall, EPA should provide more explicit regulatory provisions regarding how components, particularly components integral to vehicle operations such as vehicle transmissions, are considered as GEM inputs and how both the GEM inputs and SEAs account for normal production variability with respect to transmissions and other vehicle components.

Response

An overview of the updates we are finalizing can be found in Section II.C.8 of the preamble. The proposed addition of paragraph (i) in §1037.501 was to denote that manufacturers would typically declare values that would include compliance margins to account for testing variability for both engine fuel maps and

aerodynamic drag. The paragraph then goes on to state that for testing of other components, the manufacturer would typically declare values that would be the measured values, not values taking into account the variability. This variability would instead be accounted for by the manufacturer in the declared FEL for the vehicle. We did not intend to imply that that the measured values will not be used all the time or may be limited to certain undefined purposes.

The clarification we are finalizing in 40 CFR 1037.235(c) should help address any confusion on where the compliance margin lies with respect to the vehicle and its components and provides a pathway for EPA to perform confirmatory tests and SEAs.

We are not able to support promulgating default allowance values at this time, as suggested by commenter, lacking adequate data to make a thorough determination.

What Commenters Said	Response
CARB (0030): **Clarify GEM compliance margins** How would this modest compliance margin be determined? Would it be similar to the heavy duty GHG engine certification which has a 3 percent margin (family emission limit (FEL) = 1.03 x family certification level (FCL))? CARB staff recommends that this be clearly described in the regulation to provide clarity.	The intent, as discussed in Section II.C.6 of the proposal and as described in 40 CFR 1037.235(c), is that during a confirmatory test, EPA would compare the GEM results using our measured inputs with the declared FEL for the vehicles, which means that the compliance margin for measurement variability is built into FEL of the vehicle. EPA has finalized changes to clarify this intent in §1037.235(c)(2), specifically that the results will only affect your vehicle FEL if the results of our confirmatory testing result in a GEM vehicle emission value that is higher than the vehicle FEL declared by the manufacturer. The modest compliance margin is determined by the vehicle manufacturer by accounting for the component input with the highest uncertainty used to determine the vehicle FEL and would be sufficient to cover the full range of uncertainty for all components.
Dana (0032): **Compliance margins for GEM inputs: 1037.501(i)** *[85 FR 28149 and 85 FR 28254-5]* The proposed rule states that vehicle manufacturers have expressed concern that stacking compliance margins supplied by component manufacturers (i.e. transmissions and axles) would result in inappropriately high GEM results that are not representative of the vehicle being produced. Dana recognizes this concern. However, as an axle manufacturer, Dana also recognizes that power loss maps provided by component manufacturers will have efficiency test variations that need to be accounted for with a compliance margin. To address this issue, Dana suggests that GEM axle inputs provided to OEMs should use values from a supplier power loss map file (which would not include compliance margins) based on an analytically derived approach as outlined in 40 CFR §1037.560. Selective Enforcement Audits (SEAs) for components present a risk for the supplier if a compliance margin is not included in the audit pass/fail criteria. SEAs should be tested against map files that include tolerance values developed with good engineering judgement to account for statistical variation in components. Vehicle OEMs may then use supplier-provided values without the supplied compliance margin and instead add an overall vehicle tolerance. In a SEA test, however, the supplier would be held to a "toleranced" map file rather than to the overall vehicle tolerance values the OEM uses in GEM.	

2.4 Heavy-Duty Engine GHG Emission Standards and Flexibilities

What Commenters Said	Response
CARB (0030): **Vocational Engines and Emission Credits** CARB staff agrees with U.S. EPA's proposal. It would be reasonable to allow manufacturers to generate Phase 1 credits with respect to the Phase 2 baseline and use those for the Phase 2 program as it would reflect their actual Phase 1 certified emission level and Phase 2 baseline. In addition, regardless of whether the engines would need to use credits to meet the Phase 2 engine standards, vehicle manufacturers who use those engines will still be required to meet the applicable Phase 2 vehicle standards; hence the use of Phase 1 credits would not result in an emissions dis-benefit to the Phase 2 program overall.	This comment generally affirms the proposal. As specified in section II.B.1 of the preamble, EPA will be adopting this provision as proposed in the NPRM to allow Phase 1 credits to be used in Phase 2.
CARB (0030): **Alternative standards for MY 2024-26 Vocational Engines** CARB staff agrees with U.S. EPA's proposed alternative standards for vocational engines. These alternative standards are only about 0.7 to 0.8 percent less stringent that the corresponding primary standards. In addition, as U.S. EPA stated, vehicles installed with engines certified to a less stringent standard would still be required to meet the applicable Phase 2 vehicle standards. Hence, this provision would provide vocational engine manufacturers more flexibility without reducing the overall GHG emission benefits.	These comments generally affirm the proposal. As specified in section II.B.2 of the preamble, EPA will be adopting these provisions as explained in the NPRM, allowing alternative engine standards for vocational engines in MYs 2024-2026 where applicable, as specified in §1036.150(p).
VOLVO (0035): **Vocational Engines and Credits** In the Preamble to the Technical Amendment package the EPA requested comment on two proposals pertaining to vocational engine standards and credits. First, at FR 85 28151 (II.D.1) the Agency requested comment on whether to extend the finalized tractor engine flexibility of less stringent model year 2024-2026 standards to vocational engines where a manufacturer has certified 100% of their model year 2020 engines to the model year 2021 standard [1036.150(p)]. Second, at FR 85 28145 (II.B.1) the Agency requested comment on an allowance to carry over Phase 1 vocational engine credits when recalculated against the Phase 2 vocational engine baseline [1036.701(j)]. The Volvo Group is fully supportive of these flexibilities, especially given their lack of impact on overall greenhouse gas reductions [FR 85 28151 (II.D.1)] and believes that their lack of inclusion was an oversight that should be corrected.	

What Commenters Said	Response
Cummins (0036): **§1036.150(p) Vocational Engines and Credits** **Cummins does not support relaxed vocational engine CO2 standards.** In NPRM Section II.D.1., "Vocational Engines and Credits", EPA requested comment on potentially amending 40 CFR §1036.150(p) to allow a manufacturer to meet relaxed model year 2024-2026 vocational engine CO2 standards, and to receive extended emissions credit lifetimes, if that manufacturer certifies an entire averaging set of engine families to model year 2021 standards in model year 2020. (See 85 FR 28151.) Cummins does not support any element of that potential amendment. Manufacturers already have developed and certified engines for model year 2020, without consideration of that potential amendment. Even if EPA were to allow post hoc recertification of model year 2020 engines, it is too late for EPA to offer such a flexibility without EPA also potentially advantaging or disadvantaging individual manufacturers, based on the engine development choices each manufacturer made several years prior. It is simply too late for EPA to equitably implement such an amendment.	EPA is adopting the vocational engine credit life provision and alternative engine standards for vocational engines in MYs 2024-2026 where applicable, as specified in §1036.150(p). A detailed response to comments received on these provisions and an explanation of these changes can be found in section II.B.2 of the preamble.
ACEEE (0069): ACEEE also supports Cummins Inc. in recommending that the extension of emission credit lifetimes be dropped. **Emission** Credit Lifetimes Our first comment deals with the extension of emission credit lifetimes.[i] The EPA requested comment on potentially amending 40 CFR §1036.150(p) to extend vocational vehicle engine emissions credit lifetimes, "if that manufacturer certifies an entire averaging set of engine families to model year 2021 standards in model year 2020". As Cummins notes these engines have already, before the NPRM was released, been designed and certified. It is therefore impossible to allow this without disadvantaging individual manufacturers who already made design decisions in the prior years. Additionally, since these engines were already designed and certified before the NPRM was released, this proposed provision cannot act to reduce emissions under any time-frame, but will instead increase emissions by reducing the rule's effective stringency. We support Cummins Inc. in recommending that this proposed amendment be dropped to prevent any such inequities.	See response to Cummins (0036) §1036.150(p) Vocational Engines and Credits.

What Commenters Said	Response
EMA (0044): **1036.701(j)** EMA supports the proposed amendments. We request clarification in the final rule that a manufacturer may opt into carrying over vocational credits using the Phase 2 baselines on an engine family by engine family basis. EMA already expects that to be the case because EPA's ABT program is voluntary, and EPA only intends to provide additional flexibility with the proposed provision. However, if a vocational engine's Phase 1 FCL happens to be greater than EPA's Phase 2 baseline, the proposed provision could negatively impact a manufacturer's existing status of Phase 1 compliance; effectively increasing Phase 1 stringency, which is not EPA's intention for this proposed provision.	In line with the existing structure of the ABT program, EPA expected that manufacturers who chose to recalculate Phase 2 baselines would do so only on the individual vocational engine families within the initial ABT averaging set, and that this recalculation (or downward adjustment) of credits would not be used to evaluate Phase 1 compliance, but to determine the amount of credit that can be carried forward into the Phase 2 program. In allowing manufacturers to adjust the vocational engine credits in a Phase 1 ABT averaging set, and to make that adjustment on all vocational engine families within that averaging set, we are providing them with the same flexibility that was available to tractor engine manufacturers in the optional ABT program. In the ABT program, all engine families within an averaging set are used in the calculation of credits, and manufacturers cannot pick and choose which engine families are used in that calculation. EPA has clarified the language in §1036.701(j)(2) of the final rule as follows: (2) For credit-generating engines certified to the vocational engine standards in §1036.108, you may optionally carry over adjusted vocational credits from an averaging set, and you may use credits calculated relative to the emission levels in the following table:
EMA (0044): **1036.150(g)(2) DF for N2O** EPA's newly proposed amendment to the interim provision, 1036.150(g)(2), increases the assigned DF for N2O for MY21+ from 0.01 g/hp-hr to 0.02 g/hphr. EMA does not support that proposed amendment. First, EPA's proposed changes are tantamount to a stringency change for those using the current assigned DF of 0.01; therefore, EPA's proposed doubling of that assigned DF does not provide sufficient lead time for manufacturers to design products to account for that increased DF. Products for MY21 certification have already completed development, and in some cases certification, prior to publication of this NPRM. It is impossible for manufacturers to address any potential N2O impacts of EPA's proposal. EPA should maintain the assigned-DF value of 0.01 g/hp-hr for N2O.	We proposed in this rulemaking to correct the deterioration factor ("DF") to 0.02, consistent with EPA's clear statement in the Phase 2 FRM that we were not finalizing the change to the N2O standard. However, given that our specification of an assigned DF of 0.01 g/hp-hr for N_2O was an oversight, and inadvertently internally inconsistent with the Phase 2 final rule, and taking into consideration of EMA's comment that manufacturers would not have time to correct or account for a change in the assigned DF for MY 2021 certifications, we chose in this rulemaking to defer changing the assigned DF to 0.02 g/hp-hr until MY 2022.

2.5 Heavy-Duty Vehicle GHG Emission Standards and Flexibilities

What Commenters Said	Response
EMA (0044): **1037.670 Optional Tractor Category** EMA requests that EPA include provisions to allow manufacturers to obtain EPA certification of tractors in the 97,000 to 120,000 lb GCWR category, to facilitate certification of those tractors for export to Canada. Similar to the approach provided for the optional certification for tractors at or above 120,000 pounds GCWR, proposed in §1037.670, the tractors in that category that are exported to Canada for sale, and operated in Canada and the U.S., would be assessed under the specific optional ECCC provisions applicable to the category and counted in the manufacturer's end-of-year report to ECCC. Tractors in that category that are sold in the U.S. would be assessed under the EPA provisions in §1037.106 and counted in the manufacturer's end-of-year report to EPA **Volvo (0035):** **Alignment with Canadian Standards** EPA requested comment on the need for special provisions for these vehicles at 85 FR 28149. These new sub-categories of highway tractors have gross combination weight ratings of 97,000 lbs. to less than 120,000 lbs. and typically have higher HP engines, heavier-duty transmissions and axles, and greater overall gear reductions than typical U.S. tractors. This new set of tractor subcategories was necessary due to the high penetrations in Canada and the severe greenhouse gas penalty these vehicles would receive simulated in GEM as, and measured against standards set for, 80,000 lbs. tractors. In order to maintain cross-border alignment of greenhouse gas regulations, as well as to avoid a new and unique certification burden, the Volvo Group requests that EPA provide subcategories and standards for these tractors that align with the ECCC regulation.	EPA appreciates EMA's and Volvo's comments related to tractors in the 97,000 to 120,000 lb GCWR category. As described in Section II.C of the preamble, we are not taking any final action on special provisions for 97,000 to 120,000 lb GCWR Canadian tractors, as we have concerns with providing an option for this subset of tractors to meet standards that are less stringent than EPA's standards for the 80,000 to 120,000 lb GCWR category.

2.6 Transition and Phase-in Issues

What Commenters Said

EMA (0044):
Urgently Needed Technical Amendments

Before detailing EMA's remaining concerns, there are a number of the proposed Technical Amendments that are vital to manufacturers' ability to certify their current 2021 model year ("MY") heavy-duty engines and vehicles. Manufacturers will need to utilize those critically necessary Technical Amendments during this year's certification processes in order to avoid unintended regulatory obstacles, inconsistencies, and burdens. EMA has highlighted those especially critical amendments to EPA on numerous occasions over the past year, so the Agency is well aware of manufacturers' real and near-term needs to make use now of certain of the proposed Technical Amendments.

Accordingly, and in light of the fact that the proposed Technical Amendments may not become final sufficiently in advance of the end of this calendar year, EPA should allow manufacturers to utilize the critically important Technical Amendments listed below by treating those proposed amendments as allowed alternative test procedures during the interim period before those amendments become final regulations.

The specific Technical Amendments that EPA should provisionally treat and confirm as acceptable and allowed alternative test procedures that manufacturers can utilize this year for the certification of 2021 MY products are as follows:
• GEM-P2V3.5.
• All test procedure changes in the following sections that were assessed and approved through the multi-stakeholder Emissions Measurement and Testing Committee:
- Part 1036, Subpart F
- Part 1037, Subpart F
- Part 1065
- Part 1066
• All amendments to section 86.010-18, which relate to On-Board Diagnostic ("OBD") certification requirements.
• All amendments to section 1037.520(h), including EMA's proposed modifications, which relate to idle speed and idle-reduction technologies.
• All amendments to section 1037.520(i), which relate to axle, transmission, and torque converter characterization.

[list repeated on p 12 of comments, with the following additional requests]
• Allow manufacturers to utilize the fuel map confirmatory testing procedures as proposed in section 1036.150(q), with additional clarification regarding how to determine the appropriate vehicle category weighting factors.
• GEM: Allow the proposed regression limits for NG engines (see below) beyond 2021 for GHG engine certification. Currently, they are approved for 2021 certification via alternative test procedure.

Proposed limits are only required for ARB cycles		Torque			Power	
		Y intercept	SEE	R^2	SEE	R^2
Regulation	Lower	-2		0.85		0.91
	Upper	2	10		10	
Proposed	Lower	-3		0.7		0.75
	Upper	3	15		15	

• Provide additional necessary clarification for determining fuel maps.

Response

As explained in the final rule's preamble, this rule adopts several technical amendments related to this comment's request. Much of this comment is outside the scope of this final rule as the comment involves requests under our current regulations prior to finalization of the proposed technical amendments. We intend to

make best efforts to work with manufacturers to expedite certification of MY 2021 engines and vehicles after completion of this final rule. We provide substantive responses to these particular technical amendments elsewhere in this document and the final rule's preamble.

What Commenters Said	Response
EMA (0044): **new interim provision for Phase 1 to 2 transition** EMA requests that EPA add a new interim provision to address the transition from GHG Phase 1 to Phase 2 where MY 2020 may include 24 months of production. The interim provision should ensure that the number of special purpose tractors that a manufacturer may produce in MY 2020 is not inappropriately restricted. EMA requests the addition of a new paragraph, §1037.150(n)(3), that reads as follows: (3) During calendar year 2020, a manufacturer may produce up to 7,000 special purpose tractors per §1037.630, regardless of any consecutive three model year total per § 1037.630(c), to accommodate the transition to engine-based model years.	This comment is outside the scope of this rulemaking. EPA did not propose or request comment on any changes to transitional production volumes and is not taking final action on this issue.
Ford (0050): **Ford recommendation:** A Vocational Vehicle Certification Workshop for these revised GHG regulations to discuss changes and requirements would be helpful.	EPA will consider a certification workshop. We encourage manufacturers to continue to work with their Designated Compliance Officer to address questions as they prepare for certification.
PACCAR (0062): Email from PACCAR to EPA commented on the need to change provisions in 1037.150(q)(2) to allow a manufacturer to create separate subfamilies within a vehicle family, even when unique credit multipliers for advanced and off-cycle technology are not applied to all vehicles in that family. Current interpretation of this section would require manufacturers to create a new vehicle family for each combination of credit multipliers.	EPA agrees that allowing subfamilies within a vehicle family is appropriate, even when unique credit multipliers are used, as our current ABT structure is set up to calculate credits this way and this change will have no effect on stringency or environmental benefit. This change will also streamline the certification process by reducing the number of vehicle families that a manufacturer would have to certify. We are adopting in the final rule changes to §1037.150(q)(2) to replace the terms family/families with *sub*family/*sub*families

What Commenters Said	Response
GILLIG/New Flyer (0023): **Re: 1037.601(a)(2) previous tier engines during HDP2 transition** In this letter, GILLIG and New Flyer raise concerns with the restrictions specified in §1037.601(a)(2) and related to the maximum number of previous-tier engines installable during the transition period to the Greenhouse Gas Regulations Phase 2. The current restrictions create risk for severe disruption of vehicle manufacturing operations and potential economic distress for the entire transit bus vehicle industry. As it is stated in §1037.601(a)(2): *"… If new engine emission standards apply in a given model year, you may install normal inventories of engines from the preceding model year … through March 31 of that year … you may not install such engines after March 31 of that year unless we approve it in advance … we will approve your request for up to three additional months to install up to 50 engines … if we determine that the excess inventory is result of unforeseeable circumstances …"* We respectively offer the following comments to the regulatory text of §1037.601(a)(2), as it applies to the transition to the 2021 GHG Phase 2 regulations. Under the current plan, Cummins Inc. ("Cummins"), the only manufacturer of transit bus engines for the North American heavy-duty transit bus market, is expecting to receive EPA approval of its 2021 transit bus engines no earlier than March 1, 2021, with availability to start shipping 2021 engines immediately afterwards. While the target approval date is set at March 1, 2021, history has shown that meeting target dates carries a high level of risk and uncertainty, which normally leads to delays. In the current scenario, if Cummins misses the March 1st deadline, even by only two weeks, GILLIG and New Flyer, as well as any other transit bus manufacturer relying on Cummins bus engines, will not be able to receive 2021 engines in time for the April 1, 2021, bus start of production. The consequences of such delay would likely cause shut-down of vehicle assembly lines for each day of delay past mid-March, with severe economic consequences for the transit vehicle manufacturing business. In consideration of potential delays of availability of new-tier engines, from the engine manufacturer, and the resulting consequences that such delay would cause to the transit bus vehicle business as well as the possible recurring nature of the issue in future years when new engine emission standards apply, GILLIG and New Flyer are together recommending EPA to consider an amendment of the current terms specified in §1037.601(a)(2) as follows: "**…….** *We will approve your request for up to three additional months to install* ***a specified number of engines deemed necessary to maintain continuity of normal business operations,*** *under this paragraph (a)(2) if we determine that the excess inventory is a result of unforeseeable circumstances and should not be considered circumvention of emission standards…"* We collectively believe this is a reasonable and fair request that would prevent severe business disruption while continuing to meet the regulatory intent on stockpiling prohibitions in 1068.105(a), because the previous tier engine inventory would be limited to the minimum required to bridge the time gap before 2021 engines become available, with the only purpose of ensuring a seamless transition to the new regulatory environment.	The allowance to continue producing vehicles with previous-tier engines is conditioned on EPA determining that the vehicle manufacturer has demonstrated that unforeseeable circumstances outside the manufacturers' control led to normal inventories of engines that were not used up in the specified time frame. The provision as originally adopted limits the number of engines to a quantity representing normal business practices, and further constrains that to a maximum of 50 engines. EPA recognizes the concerns raised regarding a circumstance in which normal production volumes for the specified time frame are greater than 50 engines. Since this provision requires EPA to approve the request based on a judgment of the manufacturer's normal business practice, it is appropriate to allow for that judgment to include a specified number of engines that is greater than or less than 50 engines. We are therefore finalizing a revision to §1037.601(a)(2) to specify that EPA's approval of such a request will be limited to a number of engines consistent with normal production and inventory practices, replacing the single maximum numerical limit.

2.7 Heavy-Duty Engine and Vehicle Technologies

2.7.1 Idle Reduction Technologies

What Commenters Said	Response
CARB (0030): **Idle reduction technology credits** CARB staff supports expanding the range of idle reduction technologies that would receive credit under the Phase 2 GEM model. CARB staff also agrees in recognizing combinations of these technologies, which more accurately represents real world conditions. Offering credits for implementing combination of technologies would further incentivize manufacturers to make these technologies more widely available. **Volvo (0035):** **Mixed Technologies for Tractor Parked Idle Reduction** The Volvo Group fully supports EPA's proposed allowance for tractor parked idle reduction credits for mixed technologies provided in 1037.520(j)(4) and Table 9 of 1037.520. We appreciate your willingness to listen to our concerns on this issue and provide a solution aligned with the realities of how real trucks and tractors are specified to meet the demands of owners and operators.	EPA is finalizing the proposed language in §1037.520(j)(4) and Table 9 of §1037.520.

What Commenters Said	Response
Ford (0050): **Automatic engine shutdown (1037.660)** The automatic engine shutdown (AES) system requirements are different for vocational vehicles (60 second shutdown) as opposed to tractors (300 second shutdown). **Ford recommendation:** Ford recommends applying a 300 second limit to vocational vehicles to allow for consistency across the entire vocational vehicle and tractor line-up.	We did not propose and are not taking any final action regarding the time limit for AES systems. EPA notes that the purpose of AES on vocational vehicles is to reduce workday idle, whereas the AES for tractors is intended to reduce overnight or hoteling idle. This was described in the HD Phase 2 Final Rulemaking (81 FR at 73697). If we were to extend the time to 300 seconds for vocational AES, then this would reduce the overall benefit of the AES for these vehicles because it would not be activated in their relatively frequent, short duration stops. Manufacturers have the option to request to apply for off-cycle credits as described in §1037.610 for technologies such as a vocational AES with a 300 second shutdown.

What Commenters Said	Response
Ford (-0070) **1037.660(a)(2) neutral idle** We just noticed a disconnect between our HD gasoline engines and the proposed Technical Amendments NPRM. Specifically, the provision in §1037.660(a)(2) that: *Phase 2 vehicles with hydrokinetic torque converters paired with automatic transmissions qualify for neutral-idle credit in GEM modeling if the transmission reduces torque equivalent to shifting into neutral throughout the interval during which the vehicle's brake pedal is depressed and the vehicle is at a zero-speed condition (beginning within two seconds of the vehicle reaching zero speed with the brake depressed).* We plan to provide comments that we think an interval of up to five seconds (similar to stop-start) is more appropriate, and our HD gas engine with NI is currently set at three seconds. We feel that two seconds is too short to account for normal stops and restarts in real on-road driving (such as a stop sign at an intersection with no traffic) where it would be disadvantageous to shift to neutral and immediately out of it. Do you foresee this as being a "job-stopper" issue for our 21MY certification? We already have some initial sign-off and OBD tests done with the three second system and would like to continue testing as soon as our facilities are back up this week. We do not want to run any more tests until we have some confidence that we will be okay with three seconds (and do not have to redo any prior tests).	We agree and are revising our proposed delay from 2 seconds to 5 seconds, which addresses Ford's concern and is consistent with the permissible delay allowed for stop-start technology specified in §1037.660(a)(3).

What Commenters Said	Response
New Flyer (0026): **Neutral Idle (Idle-Reduction Technologies) § 1037.660(b)(3)** On page 28271 of the NPRM, Section 40 CFR 1037.660 (b)(3)(ii) contains a new condition (transmission in reverse gear) for which it is permissible to delay activating neutral idle. However, it contains no additional conditions for overriding the feature. New Flyer requests that an additional condition be added in the interests of safety. We request a neutral idle override be permissible if the vehicle is on a grade that is greater than or equal to 6.0%, in order to prevent rollback from occurring in the time between when the driver removes their foot from the service brake and when the driveline engages. **EMA (0044):** **1037.660(b)(3) neutral idle overrides** EMA requests the inclusion of additional overrides for neutral idle for the following conditions: safety; thermal protection of the emissions aftertreatment; and maintenance of aftertreatment temperature within a range for adequate emissions control.	In the NPRM, EPA proposed to add a provision in §1037.660(b)(3)(ii) that would allow the neutral idle system to delay shifting the transmission into neutral if the transmission is in reverse gear (85 FR at 28271). EPA agrees with the road grade-related safety concern raised by New Flyer. Therefore, we are adopting §1037.660(b)(3)(ii) as proposed along with a new §1037.660(b)(3)(iii) allowing a delayed shutdown when a vehicle is ascending or descending a grade of 6% or greater. EPA is not adopting a general "safety" override beyond the specific road grade provision above in the final revision. EPA disagrees with EMA's suggestion that neutral idle's impact on the temperature of emissions aftertreatment warrants widespread override provisions for thermal protection or temperature maintenance. Manufacturers continue to have the option to justify the need for additional overrides for their individual systems and seek EPA approval through §1037.660(b).

What Commenters Said *(EPA's response follows the three comments listed below)*

CARB (0030):

Stop-start overrides

In the use of overrides CARB staff would like additional assurance that manufacturers are truly using the override only when needed and emissions are not compromised. CARB staff requests that manufacturers bring their proposals to the agencies and these are approved on a case-by case basis.

EMA (0044):

1037.660(b)(4) stop-start overrides

Limited overrides are currently provided in §1037.660(b)(4). However, additional overrides are needed to ensure safe and effective vehicle operation, ensure truck driver acceptance of the new technologies, and to reduce unintended consequences. The additional overrides are especially needed since stop-start systems are completely new to medium and heavy-duty vehicle manufacturers and operators. EMA supports the inclusion of the proposed additional important conditions where a manufacturer may need to limit activation of a stop-start system. In addition, EMA recommends the following additional override conditions:

- Door open, hood open, cab tilted
- Component failure protection (starter motor overheating)
- System faults active (diagnostics on starting system have active fault(s))
- Special maneuvering conditions as controlled by dash on/off switch for off-road or precise maneuvering situations
- Thermal protection of aftertreatment system
- To ensure aftertreatment temperature is within a range for adequate emissions control

New Flyer (0026):

Stop-Start Overrides (Idle-Reduction Technologies)

On page 28151 (D)(2) of the NPRM, the EPA is asking for comments from manufacturers on which Stop-Start override conditions should be included as permissible in 40 CFR 1037.660 to allow the safe and effective operation of vehicles.

In addition to the 10 conditions currently listed in the NPRM, New Flyer requests including a condition for stop-start override when an engine compartment access door is open and the vehicle is at zero speed. This is a safety-critical situation when personnel are conducting routine servicing or maintenance in the engine compartment at the rear of a bus.

It is recognized that there is already an existing "servicing" condition in the current regulation 1037.660 (b)(1) for stop-start, the system may limit activation—
(ii) If necessary while servicing the vehicle, provided the deactivation of the Stop-Start is accomplished using a diagnostic scan tool. The system must be automatically reactivated when the engine is shut down for more than 60 minutes.

However, not all maintenance personnel will have a diagnostic scan tool, be properly trained to use it, or remember to connect the tool and deactivate Stop-Start prior to working near the engine. With an engine restart possible, we believe this presents a significant safety risk.

Also, as stipulated in the current wording of 1037.660 (b)(1)(ii) section shown above, stop-start function must be automatically reactivated when the engine has been shut down for more than 60 minutes. We request that there be no automatic reactivation required if an engine compartment access door is open, and that the Stop-Start feature re-enabled again only when the door is subsequently closed. Some maintenance or troubleshooting work can require more than 60 minutes, and any type of automatic reactivation presents significant risk of injury to personnel as they could be working in the engine area with no indication as to when the feature was enabled again.

Response

In the NPRM, we requested comment on a list of conditions manufacturers have requested EPA consider additional overrides for stop-start systems (85 FR at 28151) as necessary to ensure safety and effective vehicle operation.

We received comment regarding the stop-start overrides from EMA, CARB, and New Flyer. We are not requiring a "case-by-case" approval process for these overrides, as suggested by CARB, but we note that our existing provisions of §1037.205(b)(5) require manufacturers to describe in their application for certification their "design for idle-reduction technology, including the logic for engine shutdown... described in §1037.660." We believe this continues to be an appropriate level of oversight for these idle technologies and their associated override conditions.

After reviewing the comments provided, EPA is adopting some of the overrides that we sought comment on and some suggested by commenters that clearly related to safety concerns, proper vehicle operation, and serviceability, as explained in Section II.C of the preamble to this final rule. As described in the preamble, after consideration of the concerns raised by New Flyer, we are revising §1037.660(b)(2) for vocational vehicles to allow delayed shutdown if the engine compartment is open, which we believe sufficiently indicates the vehicle is being serviced and stop-start would provide limited environmental benefit.

2.7.2 Weight Reduction

What Commenters Said	Response
CARB (0030): **Table 8 of § 1037.520 Weight reduction** The change would be consistent with medium heavy-duty engines with 6x4 and 6x2 axle configurations being used in heavy heavy-duty vehicles. CARB staff also agrees that the addition of a footnote to emphasize that values are per vehicle family offers clarification to the current regulation. In addition, CARB staff would like to provide comments on Wheel-Related Weight Reductions. CARB staff recommends modifying the emission control identifier DWSW (Dual-wide trailer tires with steel wheel) description. It should be "Dual-wide trailer tires with high strength steel wheel" in Appendix III to 40 CFR Part 1037 since trailer manufacturers would not get any weight reductions for dual-wide trailer tires unless they use a high strength steel (steel with tensile strength at or above 350 Megapascal) wheel. This modification would address manufacturer's confusion when providing wheel-weight reduction information and claiming weight reductions as part of their certification application.	EPA proposed two changes to Table 8 of §1037.520, allowing shared component weight values between MHD and HHD vehicles, and clarifying via footnote that weight values presented apply per vehicle (see 85 FR 28150) and we are finalizing those changes. We did not request comment on additional weight reduction provisions. The commenter recommends updating a weight reduction technology identifier's description in Appendix III of part 1037 to be consistent with the language in Table 6 of §1037.520. While the requirement to use "high strength steel" for dual-wide trailer tires is clear in §1037.520(e), we acknowledge there could exist a perceived inconsistency with respect to the corresponding emissions label identifier for that technology which could result in confusion. We are finalizing a clarification to the description of "DWSW" in Appendix III of part 1037 so it reads "dual-wide trailer tires with high-strength steel wheel"
EMA (0044): **1037.520(e) weight reduction** Manufacturers may have weight-savings technologies that are not listed among the Tables in this section. That includes Table 6 for adding non wide-based single tires and Table 8 for adding disc brakes. There should be a process for adding in other weight-savings technologies. Additionally, EPA should explain how those weight-reduction values were determined. For example, in Table 6, a wide-base single-drive tire with aluminum wheels is ascribed weight savings of 147lb. How was that determined? What was the weight of the "base" wheel used to come up with the 147 lb number? Once manufacturers have the "base" value, they would be able to weigh their non-wide based tires, and take the difference in weight from the "base" wheel that was used to generate all of the other numbers in Table 6. The same could apply for Table 8 and disc brakes. Their weight could be compared to the "base" brake drums that were used.	As stated in §1037.520(e)(5), manufacturers may request to apply for off-cycle credits for weight saving technologies not included in §1037.520(e). We did not propose any changes to and are not taking any final action on the weight reduction values listed in Tables 6 through Table 8 of §1037.520. These values were developed through notice and comment in the HD Greenhouse Gas Emissions Phase 1 and Phase 2 rulemakings based on information as described in the Regulatory Impact Analysis for each of those rules.

2.7.3 Air Conditioning

What Commenters Said	Response
CARB (0030): **Re: § 1037.115 "self contained" A/C system** CARB staff recommends adding an explanation on what the concept of "self-contained" refers to, such as "For purposes of this requirement, an air conditioning or refrigeration unit is considered to be self-contained if the unit's refrigerant circuit is completely separate from the refrigerant circuit of the vehicle's air conditioning system to cool the driver compartment." **New Flyer (0026):** **HVAC Leakage § 1037.115 (e) (1)** In reference to section § 1037.115 (e) (1). (referenced on page 28251 of the NPRM), [restating proposed reg] New Flyer requests further clarification regarding vehicle applicability. As written, it appears that HVAC units on vocational vehicles are exempt from this requirement. Vocational vehicles such as large transit buses, which have large HVAC systems for cooling the passenger compartment including the driver's area would be exempt, provided those units are self-contained. However, these requirements may apply to vocational vehicles which have HVAC or refrigeration units that are not self-contained? Further definition of "self-contained" is needed to adequately define applicability. The statement: *"Air conditioning and refrigeration units may be considered to be self-contained whether or not they draw power from the propulsion engines"* does not provide adequate detail for a vehicle manufacturer to determine if the HVAC system is self-contained. Likewise, the sentence: *"(1) This paragraph (e) is intended to address air conditioning systems for which the primary purpose is to cool the driver compartment. This would generally include all complete pickups and vans."* implies, but does not specify, that this requirement is limited only to pickups and vans. However, as written, it could apply to other vehicles, including large vocational vehicles. To clarify this, we suggest the wording be changed as follows: *"(1) This paragraph (e) applies only to air conditioning systems for which the primary purpose is to cool the driver compartment. This would generally include all complete pickups and vans. This paragraph (e) does not apply for refrigeration units on trailers. Similarly, it does not apply for self-contained air conditioning or refrigeration units on vocational vehicles. Air conditioning and refrigeration units are considered to be self-contained if they contain a combination blower/ evaporator and/or fan/condenser within the same enclosed unit, regardless of whether or not they draw power from the propulsion engine."*	We proposed to revise the regulations in §1037.115(e) to clarify that it is intended to address air conditioning systems for which the primary purpose is to cool the driver compartment. This would generally include all complete pickups and vans, but not self-contained air conditioning or refrigeration units on vocational vehicles. (85 FR at 28151). EPA agrees that our proposed definition of "self-contained" would benefit from additional clarification and we appreciate the commenters' suggestions. We agree with CARB that a separate refrigeration circuit is one way to classify a self-contained air conditioning unit. However, we are aware of systems that share a circuit and feed both the driver compartment and the rest of the vehicle. We are finalizing a modified version of the proposed changes to §1037.115(e)(1) that incorporates some of the feedback from commenters. We are maintaining the proposed statement that this provision is intended for A/C systems that cool the driver compartment. We're clarifying that it generally applies to "cab-complete" pickups and vans (see definition at §86.1803-01) which is more appropriate for heavy-duty than "complete pickups and vans" as proposed. We are expanding the existing statement that the paragraph does not apply for self-contained A/C or refrigeration units by adding the phrases "used to cool passengers" and "used to cool cargo". Finally, we further clarify that a self-contained system for purposes of this provision is an "enclosed unit with its own evaporator and condenser even if it draws power from the engine."

What Commenters Said	Response
EMA (0044): **1037.520(j)(2)(iii) High-Efficiency Air Conditioning Compressors** This section references a testing procedure for improved heat exchangers in light duty applications (86.1868-12(h)(5)). Since the HD language clearly addresses high-efficiency compressors, the more appropriate reference would be to 86.1868-12(h)(1) and (2), which refer to electronically variable compressors. EMA requests that EPA change the reference to 86.1868-12(h)(1) and (2).	We should not change the reference in §1037.520(j)(2)(iii) to §86.1868-12(h)(1) and (2) because those are specific compressor improvements we identified for light-duty vehicles and assigned credit values to; however, we recognize that the section could more clearly state our intent. We consider air conditioning compressors that are electrically powered to be high efficiency. Our intent was to allow mechanically powered compressors to demonstrate that they are "high-efficiency" by applying the SAE Standard J2765 referenced in §86.1868-12(h)(5). J2765 describes the bench test procedure to measure the coefficient of performance (COP) air conditioning compressors, evaporators, condensers, and expansion devices. To qualify as a high-efficiency compressor, we intended to require that the compressor must achieve a COP of 10% higher compared to a baseline compressor, as determined using the J2765. We are revising §1037.520(j)(2)(iii) to clarify that compressors are considered high-efficiency if they are electrically powered or mechanically powered with a demonstrated coefficient of performance improvement of 10% or greater over the baseline design, consistent with the bench test procedures specified for evaporators and condensers in 40 CFR 86.1868-12(h)(5).

2.8 General Compliance (40 CFR parts 1036 and 1037)

2.8.1 Selective Enforcement Audits for Axles and Transmissions

What Commenters Said	Response
CARB (0030): **Re: § 1037.320 Audit procedures for axles and transmissions** CARB staff agrees with the proposed additions and deletions, particularly in new subparagraph (c), as they add quantitative specificity for the additional testing. However, U.S. EPA may want to add additional guidance and/or clarification as to whether the two additional production axles or transmissions to be tested must be the same model/type as the original ones, or if they can be different. (continued p 20) CARB staff generally agrees with these proposed modifications to the regulatory SEA language for axles and transmissions, which would be consistent with the suggested guidance/clarification to the subject CFR sections. Would the additional tests use the same model of axles and transmissions, or different ones? How would the second and third axles (or transmissions) be selected? Randomly selected or by worst case selection? CARB staff recommends that the mode of selection be clearly specified in the regulations to provide clarity. See also CARB staff's comment in response to 40 CFR § 1037.320 amendments.	We are finalizing the proposed revisions in 40 CFR 1037.320(c) regarding selection of additional production axles or transmissions to perform additional tests, with an additional clarification to state that EPA has the flexibility to either select the same model axle or transmission for repeat testing or we may select another configuration in the family to cover the range of product included in the family. This is to clarify the original intent, as EPA is free to choose any model axle or transmission configuration in the family for SEA testing. We are also finalizing revisions in 40 CFR 1037.320(c), regarding use of these results for the declared map, with additional clarification. This additional clarification further addresses how the results from the SEA will be used to determine if the manufacturer declared map should be replaced, by stating that if you fail the audit test for any of the axles or transmissions tested, the audit result becomes the declared map and this may also require revising any analytically derived maps.

What Commenters Said *(EPA's response follows the comment below)*

EMA (0044):
1037.320 SEA for axles and transmissions

EMA supports the proposed amendments to §1037.320. However, even with those amendments, the SEA procedures for axles and transmissions do not provide regulatory certainty of the SEA requirements for component suppliers and vehicle manufacturers. Following are examples of barriers to conducting an SEA per §1037.320, even with the proposed amendments:

• §1037.320 points to §1036.540 for vehicle configurations that are to be used for transmission and axle GEM inputs for SEA purposes. If a component-level SEA is being performed, in other words, an SEA on only an axle or transmission, there is not an engine defined for use as a GEM input. Therefore, the SEA cannot be completed.
• For transmission SEAs, there is no way to determine the rear axle ratios that should be used for the GEM runs because the rear axle ratios are determined by the engine torque curve. Without an engine being defined in the regulation, the rear axle ratios cannot be calculated.
• For axle SEAs, the SEA and vehicle manufacturer's certification power loss maps are created for a given axle family, which has a limited range of axle ratios. Those ratios may or may not align with the intended ratios of chassis identified in §1036.540, potentially making the GEM runs unrealistic and thus invalid for SEA pass/fail determination.
• No measurement variability is allowed in the current regulatory text, but is included in engine fuel mapping.
• Clarification is needed on testing the same ratio for repeat tests and how the new result should be integrated into analytically-derived maps.
• One axle manufacturer proposes including a procedure to allow nullifying and re-running an SEA if the test sample is found to be out of specification or another issue arises.
• It is presumed that if an SEA is performed on a component as a part of a vehicle OEM SEA and a failure occurs, the new transmission and/or axle power loss map will only be changed for that vehicle manufacturer. That failure cannot change the power loss map for other OEMs who may be using the same product.

The lack of regulatory certainty associated with conducting an axle or transmission SEA under the proposed provisions would require component suppliers to add large compliance margins to their efficiency measurements, which in turn would limit the effectiveness of the new technology and reduce the potential benefits to truck manufacturers. To begin resolving this complex issue, EMA recommends that EPA schedule a workshop of vehicle manufacturers and axle and transmission suppliers to gather comprehensive technical input on issues related to conducting SEAs. These issues also affect engine and powertrain fuel maps and therefore we request that they be addressed in the workshop as well. With that consultation and input, EPA should develop an effective procedure for axle and transmission SEAs. Until such time as EPA can conduct the necessary workshop with axle and transmission suppliers and vehicle manufacturers, and address the issues raised above, the Agency should not conduct any axle or transmission SEAs.

In the interim, EMA supports the proposed amendments to §1037.320 and §1037.501(i), but also recommends an additional modification to §1037.501(i). Axle and transmission suppliers must avoid adding unnecessary additional compliance margin, because it would undermine the motivation for vehicle manufacturers to utilize those new components.

To ensure that axle and transmission suppliers will provide vehicle manufacturers measured efficiency values, we recommend the following modification to §1037.501(i):
(i) Note that declared GEM inputs for fuel maps and aerodynamic drag area will typically include compliance margins to account for testing variability. For other measured GEM inputs, the declared values will typically be the measured values. Supplier generated test data that EPA finds have been created using the appropriate test procedures and with good engineering judgement will not be considered false information under § 1037.620(d).

Response

See response to CARB (0030) comment Re: §1037.320 Audit procedures for axles and transmissions above, in this section 2.8.1. We are finalizing the proposed changes to 40 CFR 1037.320, with additional clarifications in paragraphs (b) and (c), including clarifications explained in that response above regarding repeat tests and integration of such results into maps.

Regarding transmission SEAs, we have modified 40 CFR 1037.320 to clarify which parameters (the test transmission's gear ratios) should be used in GEM. These parameters are need to run GEM and were also used to create the vehicle standards; as such, these parameters are appropriate for use in SEAs. In the case of the default fuel map that is run in GEM, this map is already allowed for cycle average fuel map testing on the cruise cycles, thus allowing its use for SEAs is just a natural extension. The axle and transmission GEM inputs must now be determined based on the default fuel map in Appendix III of 40 CFR part 1036 and default torque curve that we have added as Table 1 to 40 CFR 1037.520. These inputs serve as the defined engine used as the GEM input.

Regarding measurement variability, this testing is conducted in a manufacturer's laboratory; as such, the intralab variability along with manufacturing variability are the primary sources of variability and should be accounted for by the manufacturer in their declared maps.

Regarding nullifying and re-running an SEA if the test sample is found to be out of specification, EPA did not propose and is not taking final action on such an exception. EPA notes that exceptions are not allowed for an SEA under the current regulations and defeats the purpose of an SEA which is to verify the manufacturer's results ensuring that they account for production variability. A failure would indicate that there was an issue with their original testing or production variability and this is something that is addressed as an outcome of the SEA.

Regarding the commenter's presumption for when an SEA is performed on a component as a part of a vehicle OEM SEA and a failure occurs (presuming that the new transmission and/or axle power loss map will only be changed for that vehicle manufacturer), that is not a correct presumption. Under the current regulations, the map could be changed for any or all vehicle families that use this map.

Regarding the suggested EMA changes to §1037.501(i), we will not make these additional suggested changes and we are instead making the proposed and additional revisions to §1037.320(b) and (c). EMA's suggested change would undermine EPA's SEA authority and the purpose of SEAs and thus we disagree that making the EMA suggested change would be appropriate.

What Commenters Said	Response
Dana (0032): **Selective Enforcement Audits for axles and transmissions: §1037.320(c)** *[85 FR 28149-5 and 85 FR 28254]* Dana believes that this section requires some additional clarity. Dana's concern is specifically around the proposed approach for cases where the initial axle does not pass. In that case, according to the proposed rule, two additional production axles would be tested and "the results of the three tests would be combined into a single map. This would become the official test result for the family." Dana feels that it is important to note that an axle family may represent a range of gear ratios. Each ratio will hold a unique GEM map file. As written, this section does not specify that all three tests must be conducted with the same gear ratio, but good engineering judgement would dictate that this should be the case. Dana suggests adding language in the proposed rule to clarify that the three tests must be conducted with the same gear ratio. This section also implies that all variants in an axle family would have the same GEM map as a result of the three tests. However, this would only be true for the tested axle ratio. Therefore, the updated map file should instead only be applied to the tested axle ratio. The new map could also be used (with an added appropriate compliance margin) to update any analytically derived map files of untested combinations. Dana further believes that provisions should be made to start and end all SEAs with a validation of axle components. This validation study should ensure that all components of the axle are within print specifications in advance of the audit testing and after the audit testing. If the axle is found to be out of specification and/or if a valid reason is identified, the test results can be nullified. The test would then be repeated with a new validated sample and/or after the issue with the original axle is corrected.	See response to CARB and EMA comments Re: §1037.320 Audit procedures for axles and transmissions above, in this section 2.8.1. We are finalizing the proposed revisions in 40 CFR 1037.320(c) regarding selection of additional production axles or transmissions to perform additional tests, with an additional clarification to state that EPA has the flexibility to either select the same model axle or transmission for repeat testing or we may select another configuration in the family to cover the range of product included in the family. This is to clarify the original intent, as EPA is free to choose any model axle or transmission configuration in the family for SEA testing.

2.8.2 Compliance for Electric and Hybrid Vehicles

What Commenters Said	Response
EMA (0044) **1037.106(f)** EMA requests additional revisions to 1037.106 to allow certification of Class 7 electric tractors against the Class 8 standard, or alternatively to allow the unrestricted use of Class 7 tractor credits in Class 8 categories, if all Class 7 tractors are certified to Class 8 standards. The additional provisions are needed to address issues created by the EPA clarification in 1037.140(g) on classification of all-electric and hybrid vehicles. The proposed amendments are as follows: a. Modify 1037.106(f)(1) to read: "You may optionally certify 4×2 tractors with heavy heavy-duty engines, or all-electric drivetrains displacing heavy heavy-duty engines, to the standards and useful life for Class 8 tractors, with no restriction on generating or using emission credits within the Class 8 averaging set." b. Alternatively, modify 1037.106(f)(2) to read: "If you certify all your Class 7 tractors to Class 8 standards, you may use these Heavy HDV credits without restriction. This would include certification of all Class 7 all-electric tractors to the Class 8 standards."	We proposed changes to 40 CFR 1037.140(g) because manufacturers had expressed concern that the Phase 2 regulations are not specific enough regarding how to classify hybrid vocational vehicles (85 FR at 28150). As we explained in the proposal, that concern from manufacturers did not apply to tractors, which are classified based on GVWR. In tandem with other revisions regarding vocational vehicles, our final revision, as further explained in Section II.C of the preamble, expands the proposed sentence in §1037.140(g)(1) to include electric vehicles in this clarification. §1037.140(g)(5) references §1037.106(f) in specifying that, in certain circumstances, you may certify vehicles to standards that apply for a different vehicle service class. As described in Section II.C of the preamble, we agree with the commenters and are also finalizing a corresponding clarification in §1037.106(f)(2) regarding Class 7 hybrid and electric tractor's ability to certify to the Class 8 standards, by adding a sentence that "[t]his applies equally for hybrid and electric vehicles."
Volvo (0035): **1037.106(f)** The Volvo Group supports the clarification provided by EPA in 1037.140(g) regarding classification of tractors and hybrid and all-electric vocational vehicles; however, in order to avoid a significant number of stranded credits due to the Volvo Group's highly Class 8 dominated product mix we request a provision for Class 7 all-electric tractors to be certified against the Class 8 standard, or an allowance for unlimited use of Class 7 all-electric tractor credits in Class 8 categories. We propose one of two options, in order of preference (additions underlined). 1037.106(f)(1) could be modified to read: "You may optionally certify 4×2 tractors with heavy heavy-duty engines, or all-electric drivetrains displacing heavy heavy-duty engines, to the standards and useful life for Class 8 tractors, with no restriction on generating or using emission credits within the Class 8 averaging set." Or, 1037.106(f)(2) could be modified to read: "If you certify all your Class 7 tractors to Class 8 standards, you may use these Heavy HDV credits without restriction. This would include certification of all Class 7 all-electric tractors to the Class 8 standards."	

What Commenters Said	Response
CARB (0030): **Electric and Hybrid Vehicles in Vocational Applications (1037.140)** CARB staff agrees with these proposed amendments and suggests tying certification conditions, e.g., useful life, emission warranty, etc., to the vehicle's gross vehicle weight rating (GVWR) that the hybrid powertrain will be installed in to avoid creating a loophole where a downsized hybrid powertrain that is installed in a heavier vehicle weight class could have shorter useful life and emission warranty obligations than would be expected for a conventional engine that normally is installed in such vehicles. However, CARB staff requests clarification on how the useful life is correlated to hours. Currently the useful life correlation for criteria heavy heavy-duty engines is 22,000 hours with an additional condition that there is an accurate hour meter provided with the engine. An additional requirement is that the hours meter is reasonably expected to operate properly over the useful life of the engine. Currently, there is no corresponding correlation for light heavy- and medium heavy-duty engines. CARB staff requests clarification on how the corresponding useful life in hours would be determined. **Ford (0050):** **Electric and Hybrid Vehicles in Vocational Applications (1037.140)** Ford supports the alternative approaches listed (i.e., "specifying the useful life in hours rather than miles for these vocational vehicles, or allowing electric vehicles to step down one weight class, with justification from the manufacturer.") **Tesla (0034):** **Vocational applications (1037.140(g))** Tesla agrees with the proposed changes "to revise 40 C.F.R. §1037.140(g) to clarify that hybrid vehicles are heavy heavy-duty vehicles if they are either propelled by a heavy heavy-duty engine and all other hybrid and electric vehicles are classified by GVWR class." However, Tesla does not agree with the stated alternative approach to specify useful life in hours rather than miles for vocational vehicles or allowing electric vehicles to step down one weight class. Currently, 40 C.F.R. §86.1805 correctly specifies the useful life values as a given number of calendar years or miles of driving, whichever comes first. The useful life mainly applies to evaporative, refueling, and OBD emission requirements for tractors and vocational vehicles. Creating a second set of criteria to evaluate and compare levels of emissions, in terms of useful life, would add more complexity and confusion. The ability to compare powertrain performance with a single set of criteria, for useful life, encourages healthy competition leading to more advanced technologies. Tesla encourages EPA to use the current single criteria, as described in 40 C.F.R. §86.1805, for evaluating useful life of tractors and vocational vehicle regardless of powertrain type.	In the NPRM, we proposed regulations to clarify how to classify electric and hybrid vehicles in vocational applications and requested comment on alternative approaches, such as specifying the useful life in hours rather than miles for these vocational vehicles or allowing electric vehicles to step down one weight class. (85 FR at 28150). As noted in Section II.C of the preamble, we are finalizing the proposed revisions to §1037.140(g) with an expanded clarification in paragraph (g)(4)(iii) that Class 8 hybrid and electric vehicles are considered "Heavy HDV", *regardless of the engine's primary intended service class*. As noted in Section II.C of the preamble, we are not taking final action on any of the potential alternative approaches at this time.

What Commenters Said	Response
CARB (0030): **1037.235 Mild Hybrid Certification** CARB staff agrees with allowing manufacturers to test a powertrain and apply analytically-derived scaling factors to others (e.g., scale by fraction of battery capacity or motor capacity) under 40 CFR § 1037.235(h) which is in the current regulation. To use international test procedures, CARB staff recommends that the new regulation ensures that the test procedures meet California testing requirements (e.g., 1065 compliant labs, etc.). CARB staff also recommends that manufacturers should seek and receive advanced approval prior to testing.	At this point EPA does not have a test procedure to generate analytically derived powertrain results and did not receive any comments suggesting such a procedure or information on how to perform such a procedure. EPA is not taking any final action on including such a process in the regulations at this time. In the future if we do consider proceeding down this path, we anticipate that 40 CFR 1037.550 would likely be the reference method.
Ford (0050): **1037.235 Mild Hybrid Certification** EPA requests comment on alternative means of evaluating mild hybrids. Manufacturers have asked EPA to consider the following options: - Allow manufacturers to test a powertrain and apply analytically-derived scaling factors to others (e.g., scale by fraction of battery capacity or motor capacity) under 40 CFR 1037.235(h). - Allow manufacturers to use international test procedures for battery capacity, motor power, and motor efficiency. - Provide smaller credit (potentially with a volume limit and/or only for limited time) in exchange for less testing (e.g., reduced benefit when using the simplified model spreadsheet that is available under docket no. EPA–HQ– OAR–2014–0827–2109). Ford supports each of these options.	

2.8.3 Aerodynamic Compliance for Tractors

What Commenters Said	Response
EMA (0044): **§1037.305** EMA supports modifying §1037.305 to increase the minimum number of runs required for a manufacturer to fail an SEA from 24 to 100. Additionally, EMA requests an additional modification to address the situation where the fifth wheel height of the tractor being testing will not allow the standard trailer to meet the height requirement in § 1037.501(g)(1)(i). To address that situation, we request modifying the SEA procedures as follows: (a) Determine whether or not a tractor fails to meet standards as follows: (1) We will select a vehicle configuration for testing. Perform a coastdown measurement with the vehicle in its production configuration according to §1037.528. Where the selected vehicle cannot be configured to meet the trailer height as specified in 1037.501(g)(1)(i) with the standard trailer, good engineering judgement will be used to determine whether another suitable vehicle may be supplied or a correction using your alternate method be used to audit the vehicle family. Instead of the process described in §1037.528(h)(12), determine your test result as described in this paragraph (a). You must have an equal number of runs in each direction.	We proposed several typographical edits to §1037.305 and proposed an increase to the number of runs required to fail an SEA. We are also finalizing additional language to clarify that a manufacturer may seek EPA approval to use an alternate or modified vehicle configuration, consistent with good engineering judgment, if EPA chooses to audit a production vehicle configuration that cannot meet any of the standard trailer requirements specified in §1037.501(g)(1), which would include the trailer height specification of 1037.501(g)(1)(i) as noted by the commenter. See Section II.C of the preamble for more information.

What Commenters Said	Response
CARB (0030): **Re: § 1037.150(s) Confirmatory testing for $F_{alt\text{-}aero}$** CARB staff would like to request added justification for the determination of a minimum of 100 valid test runs. Is this number used in other forms of selective enforcement audit (SEA) testing? Without additional justification and/or analysis, it is difficult to assess the proposed amendment. Staff agrees with all other proposed edits as they are clarifying in nature. (repeated comment on p 18) As indicated in the text, limiting the number of runs to 24 for a manufacturer to fail SEA testing could include false failures. Increasing the number to 100 will ensure more data are used to make the determination if the SEA passed or failed. See also CARB's staff comment in 40 CFR §§ 1037.150 and 1037.320. In addition, CARB staff believes having CARB compliance staff present as well as U.S. EPA compliance staff would be beneficial and encourages U.S. EPA and manufacturers to coordinate with CARB in the future to enable this. This will reduce the likelihood that CARB would need to conduct more aerodynamic confirmatory testing.	The added language we proposed in the NPRM in §1037.150(s) was to clarify the existing language that said, "we will make our determination using a statistical analysis consistent with the principles of SEA testing in §1037.305." (85 FR at 28147) We proposed and are finalizing 100 valid runs in §1037.150(s) to be consistent with the existing regulatory language adopted in the Phase 2 final rulemaking for SEA testing. §1037.305(a)(7)(iii) says the following, "The vehicle passes if you perform 100 coastdown runs and $C_dA_{wa\text{-}upper}$ is greater than and $C_dA_{wa\text{-}lower}$ is lower than the upper limit of the bin to which you certified the vehicle."

What Commenters Said	Response
EMA (0044): **1037.150(s) Confirmatory testing for Falt-aero.** EPA proposes to revise the interim provision for confirmatory testing for Falt-aero to require the Agency to perform a minimum of 100 valid runs before replacing a manufacturer's value. EMA supports that revision as an effective way to minimize the negative impacts of test-to-test variability that is inherent with coastdown testing. Additionally, the provision includes a statement that EPA intends to minimize the differences between its testing and a manufacturer's by testing at similar times of the year. EMA supports that proposed additional sentence in the interim provision, but to further minimize the difference, we request that it also state that the Agency intends to test at the same location as the manufacturer. The interim provision for confirmatory testing of Faltaero states that EPA will use the principles of SEA testing in § 1037.305 to make its determination. EMA requests revising that element to be more specific about how the Agency will determine whether a test fails or passes. Additionally, the interim provision does not identify how EPA would replace a manufacturer's Faltaero in the event of a failure of a confirmatory test. An equitable manner of replacing a manufacturer's Falt-aero in the event of a failure would be for the Agency to calculate at least two Falt-aero values from the test data acquired during the audit and average them to replace the manufacturer's Falt-aero. To address all the issue raised above, EMA recommends modifying the proposed interim provision for confirmatory testing of Falt-aero as follows: (s) *Confirmatory testing for Falt-aero.* If we conduct coastdown testing to verify your Falt-aero value for Phase 2 tractors, we will make our determination using ~~a statistical analysis consistent with~~ the principles of SEA testing in §1037.305. ~~We will calculate confidence intervals~~Following the procedures in §1037.305, if your reference tractor passes, we will not replace your Falt-aero value. If your reference tractor fails, we will use the data from a minimum of 100 valid runs ~~using~~and the ~~same SEA equations and will not replace your test results with ours if your result falls within our confidence interval or is greater than our test result~~procedures in §1037.528(h) to calculate at least two CdA and yaw angle test pairs. Using those test pairs and the yaw curve for your reference tractor from your alternative method, we will generate at least two Falt-aero values and average them to replace your Falt-aero value. Note that we intend to minimize the differences between our test conditions and those of the manufacturer by testing at the same location and at similar times of the year where possible.	In the NPRM, EPA proposed revisions to §1037.150(s) related to confirmatory testing of Falt-aero (85 FR at 28147). We are adopting as proposed the requirement for EPA to perform a minimum of 100 valid runs before replacing a manufacturer's value. EPA agrees with the commenter that we should add details to §1037.150(s) to clarify how we will perform our confirmatory tests and determine whether a test passes or fails. See Section II.C of the preamble for a description of our final revisions to confirmatory testing provisions.

2.8.4 Compliance for Vocational Vehicles

What Commenters Said	Response
EMA (0044): **1037.135(c)** Additionally, EMA believes that it is unnecessary to identify the vocational vehicle subcategory on the certification label. It is a complication and burden for manufacturers to identify on each vocational vehicle certification label whether the vehicle is in the Urban, Multi-Purpose or Regional category. Further, it would not provide anyone reading the label any useful information. For an in-use compliance assessment, EPA would need to contact the manufacturer to learn the specifications of the vehicle beyond its vocational vehicle category. Accordingly, we request that EPA remove the requirements in § 1037.135 (c)(3) and (4) that require identifying the regulatory subcategory.	We are removing the requirement to explicitly state the regulatory subcategory on the emission label as specified in §1037.135(c)(4), after consideration of comments. However, we are not revising the current requirement in §1037.135(c)(3) to print the standardized designation for the vehicle family name and the regulatory subfamily can continue to be identified from that family name, which should help address CARB's concern regarding consumers. See Section II.C of the preamble.
CARB (0030): CARB staff supports and encourages U.S. EPA to require the certified subcategory be on the label. This would help consumers choose the appropriate certified vehicles for their intended vehicle operation cycles.	

What Commenters Said *(EPA's response follows the two comments listed below)*

CARB (0030):

Re: § 1037.150(bb) Vocational duty cycle

CARB staff supports the proposed provision of allowing any vocational vehicles to be classified as Multi-purpose. However, it was unclear how U.S. EPA came up with the proposed 1:5 and 5:1 ratios for Regional vehicles to Urban vehicles within an averaging set if manufacturers do not certify their vehicles with the Multi-purpose duty cycle. CARB staff is concerned that restricting certified Regional and Urban vehicles to a specified ratio could inadvertently drive manufacturers to certify the vehicles with an inappropriate duty cycle. As U.S. EPA pointed out, some GHG-efficient technologies will result in different emission reductions depending on actual duty cycle. In addition, while technologies such as aerodynamic devices would provide significant emission reductions from reducing air drag on Regional vehicles that travel frequently at high speeds, such technologies would provide minimal emissions benefit or even an emissions dis-benefit due to the potential weight penalty of the equipment if installed on Urban-duty vehicles that do not travel at high speeds. CARB staff recommends if manufacturers are not able to provide good justification for their vehicles to be certified with either the Regional or Urban duty cycle, they be required to certify their vehicles with the Multi-purpose duty cycle. This would also apply for specialty manufacturers that have less diverse product offerings. [...]

CARB staff also suggests minor edits shown in underline to indicate additions and strikeout to indicate deletions to the first sentence of subparagraph (bb) for clarity to read as follows:

"(bb) Applying good engineering judgment in ~~selecting~~ classifying ~~vocational~~ the intended duty cycles for each vocational vehicle."

EMA (0044):

1037.150(bb) vocational duty cycles

EMA member companies build commercial vehicles that are specified by business customers to best suit their particular applications, and the resultant mix of a manufacturer's products may vary greatly due to their customers' needs. The proposed safe harbor provisions of §1037.150(bb) include arbitrary ratios for vocational vehicle categories that may not be reasonable for a manufacturer's model mix during any specific year. Instead of the proposed safe harbor provisions, the regulatory text should confirm that manufacturers are deemed to be exercising good engineering judgment when they categorize a vocational vehicle as Urban, Multi-Purpose or Regional based on the duty cycle weighting under which it performs most efficiently in GEM. Accordingly, we request that EPA modify §1037.150(bb) as follows:

(bb) *Applying good engineering judgment in selecting vocational duty cycles.* Except as specified in paragraph (z) of this section, ~~compliance with the following criteria~~classifying your vocational vehicle as Urban, Multi-Purpose or Regional based on the duty cycle under which it performs best is deemed to be consistent with good engineering judgment. Note that paragraph (bb) addresses whether other selection criteria are consistent with good engineering judgment.

~~(1) Any vocational vehicle may be classified as Multi-purpose.~~

~~(2) Your vocational vehicles not classified as Multi-purpose must be classified and Regional and Urban as specified in this paragraph (bb)(2). We are proposing a quantitative measure of that evaluates the ratio Regional vehicles to Urban vehicles within an averaging set. Specifically, ratio of Regional vehicles to Urban vehicles in each averaging set must be between 1:5 and 5:1. An equivalent way of saying this is that the number of Regional vehicles divided by the number of Urban vehicles would need to be between 0.20 and 5.0.~~

Response

We are finalizing the portion of the proposed safe harbor provisions allowing manufacturers to select the Multi-purpose regulatory subcategory for any vocational vehicle, except as otherwise specified in §1037.150(z). We agree with the concerns expressed by CARB and EMA and are not finalizing the ratios of Regional to Urban vehicles proposed as paragraph §1037.150(bb)(2) of the proposed safe harbor provisions.

Section II.C of the preamble describes how we integrated the Multi-purpose safe harbor provision into our final revisions to §1037.150(z) and provides clarification on how a manufacturer could likely apply good engineering judgment under §1037.140(h) when selecting an appropriate vocational regulatory subcategory.

2.8.5 General

What Commenters Said	Response
MECA (0046): **Role of suppliers in certification process** In addition to supporting the proposed revisions to test procedures and other technical amendments, MECA suggests that EPA consider that suppliers will need to conduct testing in accordance with EPA's revised requirements for hybrid and electrified powertrain systems. Therefore, it is important during implementation that the regulatory language does not hinder suppliers from conducting development testing due to lack of access to proprietary software and/or other constraints specifically referenced by the test procedures. Furthermore, we suggest that EPA remain flexible during the certification process when new technologies in the hybrid and electrified powertrain space are identified by suppliers and OEMs, especially if these may not be cost-effectively tested via the current proposed requirements. For example, technologies not envisaged by the current amendments may face hurdles when trying to conduct testing according to the required test procedures. In those instances, we request that EPA staff remain open to reviewing alternative test procedures with OEMs and suppliers for new and emerging technologies with limited initial sales.	EPA included an off-cycle credit program for heavy-duty engines and vehicles in both the Phase 1 and Phase 2 programs so that manufacturers could seek credit for new and emerging technologies. Beginning in MY 2021, technologies that are not accounted for in the GEM simulation tool, or by compliance dynamometer testing (for engines or chassis certified vehicles), would be considered ''off-cycle'' and can be evaluated using our provisions in §1037.610. In addition, we recommend that suppliers work with manufacturers to ensure that they can determine or are provided with the information they need to carry out the test procedure.

What Commenters Said	Response
Allison 0043: **EPA Should Further Consider Warranty Provisions** EPA has proposed limited changes to current warranty provisions, proposing only to revise §1037.120(b) with respect to tires and to include Heavy Heavy Duty ("HHD") vehicles. Allison supports these elements of the proposed rule. Allison would also note, however, that in connection with EPA's recent Advance Notice of Proposed Rulemaking ("ANPR") regarding nitrogen dioxide ("NOx") standards, EPA explored broader issues concerning useful life periods and warranties. EPA identified five key areas of potential focus, including "warranties that cover an appropriate fraction of engine operational life." In connection with EPA's continuing evaluation of the Phase 2 program, Allison supports further investigation of mechanisms which would "vary the length of warranty coverage across different types of components." While HD and HHD vehicles represent major investments and are used for many years in the commercial sector, EPA should recognize that it may not be possible in all cases to design, or to cost-effectively design, every emission-related component to reach the same useful life period. Serious consideration must be given to the very large, upfront costs that could be experienced by adopting a singular focus on ensuring that all components meet the same useful life periods. EPA has outlined conceptual approaches to addressing warranties, including through prorated parts & labor and through limited, prorated parts only coverages. CARB has also explored concepts that would differentiate as between the warranty coverage applicable to criteria emissions and to GHG emissions. While the proposed rule does not implicate such changes, we would encourage EPA to further explore issues regarding the differential in warranty periods that should be applicable to GHG versus criteria emission standards/certification.	With regard to this rule, this comment generally affirms the proposal. Additionally, EPA appreciates Allison's comments on potential warranty considerations affecting the heavy-duty industry. We may consider the changes suggested by the commenter in an appropriate future rulemaking.

What Commenters Said *(EPA's response follows the comment below)*

ECJV (0027):

Emissions Related Warranty for Transmissions and Axles (§1037.620)

In accordance with §1037.620, Responsibilities for Multiple Manufacturers, certified component suppliers must provide warranty for their products for 5-years or 100,000 miles, as stated in §1037.120, if certified within the Class 8 segment, regardless of certification class (Tractor vs Vocational). Our concern is that the additional cost to cover warranty for vocational and severe-duty applications may result in axle and transmission suppliers choosing not to certify, or limiting certified product use to certification classes with less severe duty cycles such as tractors.

The current language in regards to warranty terms does not reflect the current industry standards in terms of standard warranty, mileage, and duty cycle. For example, a vocational application is likely to only accumulate one-third of the miles that a tractor would accumulate in a one-year period. For severe-duty applications it's likely that the annual mileage will only be about twenty percent of a tractor application. Under the current emissions component warranty terms, a transmission or axle installed in a tractor would only be covered under one-year of emissions related warranty, while more severe-duty applications would be covered by three to five years.

The primary concern is that vocational and severe-duty vehicles are subject to significantly more aggressive duty cycles than those in the linehaul/on-highway segment. Transient events drive frequent loading and unloading of the drivetrain, along with significantly more shift events that can contribute to accelerated component wear.

Warranty terms across the industry reflect this difference in duty cycle (Figure 5). ECJV offers a standard 5-year/750,000 mile warranty for new products used in on-highway linehaul applications. For vocational applications, the warranty varies between 2-years for severe-duty, off-highway applications, to 3-years for all other vocational applications. The mileage portion varies between 300,000 and unlimited. Research has found that these trends are common for other transmission and axle suppliers.

Figure 5: Example Class 8 Warranty Terms (Axles and Transmissions)

Warranty Class	Term	Miles
Emissions Component Warranty	***5-years***	***100,000 miles***
Eaton-Cummins On-highway Warranty	5-years	750,000 miles
Eaton-Cummins Vocational Warranty	3-years	Unlimited
Eaton-Cummins Severe Duty/Heavy Haul	2-years	Unlimited
Transmission Supplier A – Linehaul	4-years	Unlimited
Transmission Supplier A – Vocational	3-years	Unlimited
Transmission Supplier A - Severe Duty/Heavy Haul	2-years	Unlimited
Axle Supplier A – Linehaul	5-years	750,000 miles
Axle Supplier A – Severe Duty	2-years	Unlimited
Axle Supplier A – Vocational	3-years	350,000 miles

Our goal is to provide the benefits of power-loss certification to the OEM's with little financial impact to the end-user. This can be accomplished in part by not having to pass additional warranty costs through to our vocational and severe-duty customers.

We are requesting further review by the agency to consider aligning the time portion of the emissions warranty with industry standard warranty terms for transmissions and axles, relative to duty-cycle and certification class. Figure 6 includes our proposal for emissions related warranty terms. A tiered set of terms, relative to the weighting of the transient cycle for each of the certification classes, offers a more representative approach to administering warranty, with minimal cost impact to the end-user.

Figure 6: Proposed Class 8 Emissions Component Warranty Terms For Transmissions and Axles

Certification Class	Term	Miles
Tractor – Sleeper Cab/Day Cab	5-years	100,000 miles
Tractor – Heavy Haul	2-years	100,000 miles
Vocational – Regional/Multipurpose	3-years	100,000 miles
Vocational – Urban/Severe-Duty	2-years	100,000 miles

We would also like to see clarifying language in the regulations in terms of what constitutes a warranty claim for GHG Phase 2 certified components such as transmissions and axles.

Response

Commenter's recommendation is outside the scope of this rule. We did not propose or request comment on reevaluating warranty periods and are not taking final action on this recommendation at this time.

EPA intends to reevaluate warranty for its criteria pollutant regulations as part of the Cleaner Trucks Initiative. We may reevaluate warranty for GHG emission-control components in an appropriate future rulemaking.

We note that under §1037.120(a), which reflects decades-long obligations under the CAA, a vehicle manufacturer is obligated to warrant that their "new vehicle, including all parts of its emission control system" is designed, built, and equipped to meet the standards, and is free from defects, as specified in the regulation. If a vehicle owner submits an emissions warranty claim, manufacturers are obligated to act on the claim, though 40 CFR 1068.110 and 1068.115 describe the limited situations where manufacturers may deny a warranty claim. We are not taking final action regarding the commenter's request to further clarify what constitutes a warranty claim.

The comment includes multiple errors in describing the provisions that apply under §1037.620. To clarify:

- §1037.620 describes how vehicle manufacturers can share responsibilities with other manufacturers to build certified vehicles. There is no separate certification for axles, transmissions, or other components.
- §1037.620(e) describes how component manufacturers can play a role to fulfill warranty obligations that would otherwise fall on the certifying vehicle manufacturer. As EPA explained in the Phase 1 rulemaking, EPA holds the certifying entities responsible for warranty obligations and then, if a specific component is the concern, the vehicle manufacturers may require action from the component manufacturer responsible as part of their sourcing and purchasing agreements. See 76 FR 57277-57278.

What Commenters Said	Response
CARB (0030): **Re: § 1037.621 Delegated Assembly** CARB staff believes all the requirements specified in the current "delegated assembly" provision are needed to ensure the final, complete vehicles have all emission-related components installed as certified. The delegated assembly provisions would help ensure secondary vehicle manufacturers correctly install all the required emission-related equipment by obligating them under a contractual agreement with the primary vehicle manufacturers. The provisions would also help ensure primary vehicle manufacturers perform appropriate follow-up actions with secondary manufacturers to ensure vehicles are installed to their certified configurations as well as support U.S. EPA's enforcement auditing mechanisms. Staff therefore encourages U.S. EPA to keep the delegated assembly provisions unchanged.	EPA requested comment on the issue of delegated assembly, noting that some manufacturers have previously expressed concern that the requirements were too burdensome. We agree with the commenter on the general value of these provisions. We received no comments opposing these existing provisions or providing suggestions for updated text and the delegated assembly provisions remain unchanged other than the single clarifying edit in §1037.621(g), finalized as proposed.
Ford (0050): **1036 intro: Default rated power** It is unclear how to determine default rated power where scaling for default engine power is equal to 1. **Ford recommendation**: Additional guidance requested for determination of default rated power where scaling for default engine power is equal to 1. This guidance could be included in the Regulatory Impact Analysis response to comments or preamble to the final rule.	It is not clear to us what "1036 intro" refers to. There is no reference in part 1036 to default rated power. Rated power and continuous rated power for powertrain testing are determined in the new §1036.527. See Section II.A. of this final rule's preamble for additional discussion of the provisions in 40 CFR 1036.527 that we are adopting in this rule.
CARB (0030): **Data requirements for H2-fueled Vehicles** CARB staff recommends that the status quo be maintained because the current demonstration of compliance with the CO2 emissions standards is adequate. Currently, manufacturers that certify California-only (non-U.S. EPA) hydrogen powered fuel-cell vehicles do so without running the GEM. They are able to demonstrate via engineering analysis that CO2 emissions are "zero" which we accept. Alternatively, the current regulation can be amended to include a similar language as it pertains to electric vehicles (40 CFR §1037.150(f)) to cover hydrogen-fueled vehicles. Also, with the adoption of the Zero-Emission Powertrain certification regulation, an alternative pathway for certifying hydrogen fuel cell vehicles is currently provided for California certifications beginning with model year 2021. Beginning with the 2024 model year, this alternative certification pathway will be required to receive the Advanced Clean Trucks Zero Emission Vehicle Credits.	EPA appreciates CARB's comment on data requirements for H2-fueled vehicles. No changes were proposed regarding data requirements for these vehicles and we are not taking final action on any changes.

What Commenters Said	Response
Auto Innovators (0049): **§ 1037.730 ABT reports** Paragraph (f)(2) allows a manufacturer to correct errors in its averaging, banking, and trading report that mistakenly decrease a balance of emissions credits within 270 days after the end of the model year. Auto Innovators requests that EPA allow manufacturers to request updates after the deadline with EPA approval. Not all errors are identified in the first 270 days following the end of a model year. Allowing updates with EPA approval would enable manufacturers to make corrections when errors are identified so that they do not lose emission credits they would have otherwise been entitled to.	EPA appreciates Auto Innovators concerns. This issue was not proposed in the NPRM and we are not taking any final action on this issue at this time. EPA may revisit this in an appropriate future rulemaking.
CARB (0030): End-of-year ABT reports It would also be appropriate to allow manufacturers to reassign subcategories for their end-of-year ABT reports as long as all the emission credits/deficits are accordingly documented and recalculated in the report.	We requested comment on whether or not we should allow manufacturers to reassign subcategories for their end-of-year ABT reports. EPA appreciates CARB's comment on this issue. We are not taking any final action on this issue at this time. We note that a vehicle's subcategory designation is an integral part of a manufacturer's certification application and it is unclear to EPA what information a manufacturer may obtain after a vehicle was introduced into commerce that would change the applicable subcategory.

What Commenters Said	Response
CARB (0030): **Re: § 1037.150 Trailer exemptions** Finally while U.S. EPA did not propose any exemptions for certain type of trailers in this NPRM, CARB staff encourages U.S. EPA to include an ability to exempt specific trailer configurations from meeting the required emission standards when it is determined that the technology is not available to meet the standard. Although in general the trailer emission standards are readily attainable, this proposed amendment is necessary for a few specialty trailer types that have unique design specifications. These unique design specifications may make it difficult for these trailer manufacturers to meet the applicable emissions standards in the early years of the program's implementation. CARB staff believes that these difficulties would be overcome with time, and expects that this exemption provision would rarely be used.	EPA did not propose or request comment on additional exemptions for trailers and is not taking any final action on such provisions in this rule. We agree with the commenter that there are specialty trailers with unique designs that could make it challenging to meet our standards in the early years of the program and EPA addressed this issue in our Phase 2 final rule through a "transitional allowance" for manufacturers to exempt such trailers through MY 2026 (see §1037.150(v)). Manufacturers can exempt 20% of their US-based production (up to 350 box trailers or 250 non-box trailers) until the final implementation year of the program. Certification requirements for these trailers are limited to accounting for the production volume in their annual reports and applying a label that denotes they are exempt.

What Commenters Said	Response
CARB (0030): **Re: § 1037.150(y)(4) small manufacturers** CARB staff supports allowing small manufacturers the ability to certify to Phase 1 standards in 2022 as the early Phase 1 compliance for small manufacturers in 2021 could potentially offset any emission benefit reduction in 2022. (continued p 22) CARB staff agrees that the proposed provision would encourage small business manufacturers to certify their vehicles earlier than required. See also CARB staff's comment in response to 40 CFR § 1037.150 amendments. CARB staff requests clarification on how this proposed provision would affect small business manufacturers using alternative fuels (fuels excluding diesel, gasoline and E85), since vehicles using these fuels are not required to meet the Phase 2 standards until 2023.	We are finalizing the early certification provisions for small manufacturers as discussed in Section II.C of the preamble to this final rulemaking. Regarding CARB's clarification request, the existing regulation in §1037.150(c) states: Qualifying small manufacturers are not subject to the greenhouse gas standards of §§ 1037.105 and 1037.106 for vehicles with a date of manufacture before January 1, 2022. Similarly, qualifying small manufacturers are not subject to the greenhouse gas standards of § 1037.107 for trailers with a date of manufacture before January 1, 2019. In addition, qualifying small manufacturers producing vehicles that run on any fuel other than gasoline, E85, or diesel fuel may delay complying with every later standard under this part by one model year. As such, small businesses that manufacture engines/vehicles that run on alternative fuels are subject to Phase 2 starting Jan 1, 2022 (the same single-year delay as the other small manufacturers). The additional one model year to comply applies to "every later standard" such that the final steps of the Phase 2 program for these manufacturers occur in MYs 2025 and 2028. (See 81 FR 73965). Consequently, the proposed and finalized small manufacturer early credit provisions of §1037.150(y)(4) cover small business manufacturers producing alternative fuel engines/vehicles over the same period as small manufacturers of conventionally-fueled vehicles. We are reorganizing §1037.150(c) into subparagraphs as noted in Section II.C.15 of the preamble to this final rule. We are combining the related statements regarding the MY 2022 implementation date for tractor and vocational vehicles and the additional delays in later years for alternatively-fueled tractors and vocational vehicles into the new paragraph (c)(2) to provide further clarification in response to CARB's seeming misinterpretation of the regulations noted previously.

What Commenters Said	Response
CARB (0030): **Re: § 1037.801 Definitions** CARB staff agrees with the proposed revisions for § 1037.801. In addition, CARB staff recommends deleting the phrase "other than trailers" in the Vehicle (2) definition, "Vehicles ~~other than trailers~~ may be complete or incomplete vehicles as follows:…" The current "Vehicle" definition inadvertently states that trailers cannot be considered incomplete vehicles, thus not allowing them to be built by more than one manufacturer through delegated assembly.	This comment is outside the scope of the proposed rule. We did not propose and are not taking final action on changes to the definition of "Vehicle" in §1037.801. We note, however, that the regulatory text following the quoted text describes only how non-trailer vehicles may be complete or incomplete. As a result, it would be inappropriate to make the suggested change. We may consider whether or how to address the possibility of incomplete trailers, multiple manufacturers, and delegated assembly for trailers in an appropriate future rulemaking.
EMA (0044): **1037.801—**EPA should add a definition for "Compression-ignition" in section 1037.101. Section 1037.801 refers to a "Compression Ignition" definition in section 1037.101.	The definition of "Compression-ignition" in 40 CFR 1037.801 states that "*Compression-ignition* has the meaning given in §1037.101." 40 CFR 1037.101 describes "compression-ignition" engines as they relate to application of the provisions and standards in 40 CFR part 1037 and that is the purpose of the cross-reference in 40 CFR 1037.801 to 40 CFR 1037.101. Therefore, no modification of the definition in 1037.801 is warranted.

2.9 Onboard Diagnostics

What Commenters Said	Response
EMA (0044) Differences between EPA and CARB regulations—EMA recognizes that due to differences in program goals and regional air quality needs, there will continue to be necessary differences in the EPA and CARB OBD regulations. At the same time, due to the technically detailed nature of the regulations and their impact on the engine and vehicle service industries, EMA encourages EPA to continue to make efforts to harmonize the Agency's technical definitions and standardization requirements with CARB, SAE, and ISO. For example, EPA does not currently include Cold Start Emission Reduction Strategy monitoring requirements in 40 CFR 86.010-18. If EPA should adopt such requirements in the future, EMA requests that the form and technical implementation of the standards parallel the requirements in the CARB regulation, even if the stringency is adjusted to reflect appropriate federal program objectives. That would allow common diagnostic trouble codes and service procedures to be used, which would avoid having to develop separate tools and service procedures for engines certified to California and federal requirements. To that end, EMA has attached to these comments a tabular summary of additional definitions and clarifications that have been added to CARB Heavy Duty OBD regulations since EPA last promulgated their Heavy Duty OBD requirements. EMA encourages EPA to harmonize the federal On-Board Diagnostic regulations for Heavy Duty Engines with those additional definitions and clarifications.	This comment affirms the proposed rule and EPA's goal of updating existing OBD regulations in order to harmonize with CARB's more recent OBD requirements. The NPRM to this rule proposed six specific updates to EPA's OBD program. We are finalizing four of these proposed updates, as discussed in more detail in Section II.D of the preamble to this final rule. EPA may consider additional updates to our OBD requirements to further harmonize with CARB OBD requirements as a part of the Cleaner Trucks Initiative (CTI) (see Docket EPA–HQ–OAR–2019–0055).

What Commenters Said	Response
EMA (0044) CARB's Low NOx OBD Limits for ETMs—CARB's latest proposal for MY24+ heavy-duty diesel and Otto-cycle engines is to 'freeze' the OBD NOx and PM monitoring thresholds using the current standards. As currently drafted, proposed §86.010-18 (a)(5)(i) could imply that manufacturers designing to meet CARB OBD requirements in MY24 would still have to still meet the intent of EPA's OBD requirements in §86.010-18 (additive/multiplicative OBD limits). With CARB moving away from additive/multiplicative threshold limits in MY24+, EMA would like to carry forward CARB's OBD limit proposal to EPA for 50-state certified products.	EPA appreciates EMA's comments on the need for a method to accommodate threshold policy changes made by CARB for MY2024 engines certified to lower CARB NOx requirements. We are not finalizing the proposed renumbering changes to §86.010-18 (a)(5)(i) at this time. However, EPA notes that this comment is in regards to existing requirements in §86.010-18 (a)(5) and that EPA had not proposed any revisions to this paragraph (beyond the renumbering) and is not finalizing any revisions to this requirement. EPA does not believe that the existing EPA requirements would allow for the approval of an OBD system with different threshold requirements. EPA may consider this issue when we consider updates to our OBD requirements to further harmonize with CARB OBD requirements as a part of the Cleaner Trucks Initiative (CTI) (see Docket EPA–HQ–OAR–2019–0055).

What Commenters Said *(EPA's response follows the four comments listed below)*

Allison 0043:

EPA Should Provide Additional OBD Updates for engines used in vehicles greater than 14,000 pounds GVWR

EPA has proposed various updates to 40 C.F.R. Part 86, including to on-board diagnostics ("OBD") for engines used in vehicles and applications greater than 14,000 lbs. gross vehicle weight rating ("GVWR"). Allison is supportive of updates to OBD regulations for engines used in vehicles greater than 14,000 pounds GVWR, but EPA should additionally adopt provisions addressing compliance with California Air Resources Board ("CARB") regulations where an engine is receiving vehicle speed information from a transmission control unit. This additional specification would be fully consistent with EPA's overall intent that CARB compliance and federal OBD compliance are congruent, leading to greater efficiency in the certification of engines and vehicles.

California Air Resource Board ("CARB") regulations (sec. 1971.1, title 13 CCR, paragraphs (g)(3.1.6)(A), (g)(3.1.6)(B), and (g)(3.1.6)(C)) define requirements for an engine receiving vehicle speed information from a transmission control unit. Allison is requesting this language update beyond the ones provided in the proposed rule, to be accomplished through further amendment to Part 86:

§86.010-18
(a) * * *
(5) * * *
(iii) A manufacturer may demonstrate how the OBD system receives vehicle speed information from a transmission control unit and uses vehicle speed as part of the diagnostic strategy for any other OBD monitored system or component as permitted in CARB OBD regulations (13 C.C.R. §§1971.1(g)(3.1.6. (A)-(C)) in the following manner:
(A) The OBD system shall monitor the vehicle speed information to the extent feasible in accordance with the requirements of this section;
(B) The OBD system shall detect a fault and illuminate the MIL when the OBD system is unable to properly receive the vehicle speed information; and
(C) If the transmission control unit monitors the vehicle speed information and indicates an error of the information to the OBD system (e.g., valid vehicle speed data is no longer available), the OBD system shall handle the error indication subject to standard MIL illumination requirements.

CARB 0030:

§86.007-17 and § 86.1806-17 OBD for engines < & > 14,000 lb GVWR

CARB staff recommends that the same proposed regulation language be applied to those engine-certified heavy-duty engine families subject to 40 CFR § 86.007-17 and § 86.1806-17 (i.e., those heavy-duty engines installed in vehicles with GVWR below 14,000 pounds). Considering heavy-duty engine manufacturers may build one engine to be used both in vehicles above 14,000 pounds and below 14,000 pounds, if the engine was subject to two different OBD regulations based on what vehicle it is installed in, the manufacturer would have to develop two different OBD systems for the same engine. CARB's HD OBD and OBD II regulations were designed such that engine manufacturers of such engines would only need to develop one OBD system to meet both requirements, which would save the manufacturer money, time, and work.

EMA (0044)

Applicability to Below 14k lbs. GVWR Products—EMA requests that the technical amendments pertaining to 40 CFR 86.010-18 also be made to engine families subject to 40 CFR 86.007-17 and 86.1806-17.

MEMA (0038):

OBD Updates for HDV

MEMA supports EPA's proposed updates to OBD for engines used in vehicles greater than 14,000 pounds gross vehicle weight rating (GVWR).7 However, MEMA recommends EPA include the additional specification from California Air Resources Board's (CARB) OBD regulation, which defines requirements for an engine receiving vehicle

speed information from a transmission control unit. The language should be included in EPA's update to § 86.010-18 HDV OBD requirements. This CARB OBD requirement is important since nearly every engine requires vehicle speed as an input into their diagnostic control system and most engines depend on that vehicle speed data from a source other than their sensors.

Response

EPA appreciates comments from Allison, CARB, EMA, and MEMA on applicability of OBD changes to other engine families and Allison's comment on the need for greater harmonization between EPA and CARB regulations with respect to transmission control systems used in vehicles greater than 14,000 pounds GVWR. These changes were not proposed in the NPRM and EPA is not taking final action on such changes at this time. EPA may consider these options as part of a broader effort to harmonize OBD requirements with CARB in a future action.

What Commenters Said	Response
CARB 0030: **CARB's recent changes** As mentioned above, CARB recently approved more stringent requirements to California's HD OBD regulation that require more comprehensive and robust monitoring of emission related systems. These include more stringent requirements for monitors such as the crankcase ventilation system and an increase in the required monitoring frequency of emission-related components and systems in-use. CARB also approved amendments that require heavy-duty engine manufacturers to provide more information in their OBD certification applications in order to assist CARB staff in reviewing these applications and determining if the HD OBD systems meet the requirements of the HD OBD regulation. CARB also recently approved amendments that require heavy-duty engines to track new data to assist other California mobile source emissions programs. These data, deemed "Real Emissions Assessment Logging (REAL)," are intended to help characterize the GHG and NOx emission performance of heavy-duty engines in-use. In addition to these more stringent requirements, CARB approved amendments that address manufacturers' implementation concerns and provide clarification on existing requirements. These amendments were finalized in October of 2019. CARB staff believes these amendments are necessary to help ensure the integrity of the HD OBD systems and to provide valuable information for other CARB programs, and therefore recommends that U.S. EPA adopt these same amendments.	EPA recognizes the importance of many of the updates CARB has made to the heavy-duty program, including the "REAL" data requirements. Though these requirements were not proposed in this NPRM, and EPA is not taking any final action on them at this time, they were discussed in the CTI ANPR. EPA may consider harmonizing with CARB's REAL data requirements as part of the CTI NPRM.

What Commenters Said *(EPA's response follows the two comments listed below)*

CARB 0030:

CARB staff recommends that U.S. EPA align as much as possible with California's On-board Diagnostics (OBD)-related definitions and requirements, as detailed in the attachment.

(App p 25) **CARB vs EPA programs**

U.S. EPA's heavy-duty OBD (HD OBD) regulation is consistent with CARB's California regulation in many important aspects. However, the California HD OBD regulation in general still establishes more comprehensive and stringent requirements than the federal OBD regulation. For example, the HD OBD regulation generally requires California OBD systems on diesel engines to detect malfunctions before emissions exceed more stringent thresholds than those required by the federal HD OBD regulation (e.g., +0.2 grams/brake horsepower-hour (g/bhp-hr) versus +0.3 g/bhp-hr for NOx OBD thresholds). Further, CARB recently approved more stringent requirements to California's HD OBD regulation (officially approved in 2019 https://ww2.arb.ca.gov/rulemaking/2018/heavy-duty-board-diagnostic-system-requirements-2018) that require more comprehensive and robust monitoring of emission related systems and require new data to be tracked by heavy-duty engines to assist other California mobile source emissions programs. U.S. EPA's proposed amendments do not include these more stringent amendments. Although differences exist between the state and federal requirements, HD OBD systems can be designed to comply with both the federal and California programs. In fact, U.S. EPA's regulation directly allows acceptance of systems that have been certified to California's HD OBD regulation and to date, virtually all heavy-duty engine manufacturers have chosen this path for certification.

EMA (0044)

OBD general—EMA appreciates EPA's intent and efforts to align the Agency's On-Board Diagnostic Regulations for Heavy-Duty Engines with the various technical corrections, clarifications, and enhancements incorporated in the California Air Resources Board's updates to CARB's Heavy Duty OBD (13 CCR §1971.1) and Heavy Duty OBD Enforcement (13 CCR §1971.5) regulations over the past decade. EPA's effort will ensure that federal OBD compliance is based on the effectiveness of the OBD system in identifying emissions-related faults rather than on technical differences between California and federal regulations.

EMA included additional information in an appendix to their comments which listed specific CARB OBD requirements with some discussion including the following:

1971.1(c) Definitions

- Add definition of "Smart device"
- Modify definition of "Diagnostic of emission critical" components by removing "field programmable" criteria

1971.1(d) General Requirements

- Allow general denominator to increment after 800 minutes of engine operation for monitors conducted with infrequent regeneration events
- Add exceptions to MIL and Fault Code Requirements

1971.1(e) Monitoring Requirements for Diesel/Compression-Ignition Engines

- Allowance for inducements instead of illuminating the MIL for poor DEF quality

1971.1(g) Monitoring Requirements for All Engines

- Provide a low temperature exception for certain monitoring requirements
- Provide a high vehicle speed exception for certain monitoring requirements
  Additional allowance with regard to high voltage disablement of monitors
- Wait-to-start lamp circuit monitoring requirements
- Request for clarifications for handling transmission control unit signals
- Relief for fault isolation
- Exemptions for monitoring requirements for components/systems that pass both safety functional and touchpoint tests, and no significant emissions monitor impact
- Exemptions to general requirements for MIL illumination and fault code storage
- Approval of default actions for evaluating emissions neutral diagnostics
- Relief on PVE testing for safety critical emissions neutral default actions
- Latching across key cycles allowable with Administrator approval where uptime is essential
- Hosting of emissions neutral diagnostics on Automotive Safety Integrity Level ("ASIL") C or D systems, or tamper proof controls

Response

EPA appreciates comments from CARB and EMA on our efforts to further harmonize OBD requirements. The NPRM to this rule proposed six specific updates to EPA's OBD program. We are finalizing four of these proposed updates, as discussed in more detail below and in the preamble to this final rule (see Section II.D.). EPA appreciates the additional comments EMA provided on further ways we can harmonize with CARB OBD requirements. EPA intends to consider additional updates to our OBD requirements in a future action, for example such changes may be considered as a part of the Cleaner Trucks Initiative ("CTI)" (see Docket EPA–HQ–OAR–2019–0055). EPA is not taking final action on these additional issues at this time but may consider the additional issues raised in the comments in a future action.

What Commenters Said	Response
CARB 0030: **In-use ratio of 0.088** While CARB staff agrees with this change, CARB staff recommends some additional changes. First, U.S. EPA's language indicating that the OBD system is considered noncompliant if "a representative sample indicates the in-use ratio is below 0.088" is not clear, specifically how the ratio is determined from a "representative sample". CARB's language in its HD OBD enforcement regulation (13 CCR 1971.5(b)(6)(B)) indicates that the "average" ratio of the engines in the test sample group has to be below 0.088 for the OBD system to be considered nonconforming. CARB staff recommends that U.S. EPA modify the language to make clear that the 0.088 is also based on the "average" ratio of test sample. Further, CARB staff recommends that U.S. EPA also adopt the other criterion used by CARB to determine noncompliance. Specifically, CARB's HD OBD enforcement regulation indicates that the OBD system is considered nonconforming if (1) the average ratio of the engines in the test sample groups is below 0.088 or (2) 66.0 percent or more of the engines in the test sample group have a ratio that is less than 0.100. The second criterion is needed to avoid cases where the majority of the engines have ratios below the required ratio, but a few engines with very high ratios cause the "average" ratio to exceed 0.088. **EMA (0044)** In-use compliance thresholds EMA supports—EPA's proposal to align the in-use rate compliance criteria in the federal OBD regulation with those in CARB's enforcement regulation. This will allow for consistent application and interpretation of in-use compliance criteria nationwide. It also will better align the federal OBD regulations with criteria used in the CARB regulations to determine whether or not an engine is eligible for an OBD deficiency.	EPA appreciates the comments from CARB and EMA on the proposed changes to existing in-use ratio requirements. While both commenters were generally supportive of these changes, CARB raised concerns that EPA's proposal is not clear as to how the in-use ratio would be determined. CARB recommended EPA include the word "average" in the regulations to make clear that the ratio is based on the average data from a monitoring performance group (see Section II.D of the preamble for further information). EPA agrees and added this clarification to §86.010-18(p)(4)(ii). Further, CARB recommended that EPA adopt an additional requirement to ensure that an engine in the sample with a high ratio does not mask potential problems, such as where the majority of engines in the same performance test group have low ratios. This requirement was not proposed in the NPRM, and EPA is not taking any final action on it at this time but intends to further consider this issue in an appropriate future action to determine whether a more comprehensive and updated approach should be adopted.

What Commenters Said *(EPA's response follows the two comments listed below)*

CARB 0030:
CARB's new definitions

CARB adopted the new definition for "alternate phase-in" in 2013 to address manufacturers concerns about meeting specific implementation dates required by the HD OBD regulation. The new definition, which allows manufacturers to use alternate implementation schedules instead of those required in the regulation, provides manufacturers some flexibility and allows more time for meeting some requirements with phase-in schedules. CARB staff recommends that U.S. EPA adopt this new definition.

CARB adopted amendments to the definition of "diagnostic or emission critical electronic control unit" in 2013 and 2019 to limit the number of control units that would be subject to report the calibration identification number (CAL ID) and calibration verification number (CVN) parameters to the most important control units. The CAL ID identifies the software version installed in the engine, while the CVN verifies the integrity of the software. These two parameters are intended to be used during heavy-duty vehicle inspections to help verify that valid software is installed in the on-board computer and that the software has not been corrupted or tampered with, which may occur for performance or fuel economy reasons or to defeat the OBD system. The HD OBD regulation currently requires a CAL ID/CVN combination for each "diagnostic or emission critical" electronic control unit, which is intended to cover control units that play a significant role in the emission control system or diagnostic systems. However, there is an ongoing trend with engine and vehicle designs to distribute diagnostic and control functions across multiple control units thereby subjecting more control units on an engine or vehicle to reporting these parameters. Under the previous definition language, there was a potential proliferation of CAL ID and CVN data and maintenance of those data without a commensurate OBD program benefit. CARB staff therefore modified the definition of "diagnostic or emission critical" to limit the number of control units that are subject to the requirement while preserving the requirement for control units that serve a significant role in emissions or diagnostics or would likely be targeted for tampering. CARB staff recommends that U.S. EPA adopt this new definition.

Finally, CARB adopted the new definition for "smart devices" in 2019 to address the increasing use of "smart devices" by manufacturers in place of conventional sensors and actuators to control and monitor powertrain functions. The primary difference between smart devices and similar conventional components is that smart devices incorporate microprocessors to condition or convert input and output signals so that such signals can be used more effectively and reliably. Also, smart devices most commonly communicate with the on-board computer through a digital interface instead of analog signals. The previous regulation language for the comprehensive component monitoring requirements was not clear on how to address components that used such devices. CARB therefore adopted changes to clarify that components are required to be monitored if they (1) provide input to or receive commands from a smart device and (2) affect emissions or the OBD system. Further, CARB clarified that further detection or pinpointing of faults internal to smart devices is not required, and that fault consolidation for out-of-range faults is allowed when the input is transmitted digitally to the on-board computer. Therefore, CARB staff recommends that U.S. EPA adopt this new definition as well as the related amendments to the comprehensive component monitoring requirements.

EMA (0044)

New CARB definitions—The definitions in 13 CCR §1971.1(c) are aligned with both the OBD regulatory language and associated SAE and ISO standards. As an example, the definition for "Diagnostic or Emissions Critical Electronic Control Unit" determines which electronic modules are obliged to perform standardized Calibration ID and Calibration Verification Number reporting.

To avoid the potential for "technical" federal non-compliances with systems that meet the California HD OBD requirements, EMA recommends that EPA update the definitions in the federal OBD requirements for Heavy Duty Engines to align with the CARB definitions.

Response

EPA appreciates comments from CARB and EMA on the need for EPA to update specific definitions for the heavy-duty OBD program. This change was not proposed in the NPRM and EPA is not taking any final action on such a change at this time. However, EPA intends to consider this issue in the Clean Trucks Initiative (see Docket EPA–HQ–OAR–2019–0055) which, as explained in that rule's ANPR, we intend to include a broader effort to harmonize OBD requirements with CARB.

What Commenters Said	Response
CARB 0030: **Update SAE and ISO standards referenced in OBD regs** CARB staff agrees that the SAE and ISO documents listed by U.S. EPA should be updated to more recent versions. CARB staff generally incorporates by reference updated version dates of the SAE and ISO documents in the OBD regulations to reflect new technologies in the marketplace and improvements in the standardization requirements. In general, CARB staff updates to the most current versions of these documents with a few exceptions where issues are identified. CARB staff, though, would like to point out that CARB's HD OBD regulation refers to a more recent version of the ISO 15765-4 document (the 2016 version) rather than the 2011 version U.S. EPA references above, and CARB staff recommends U.S. EPA reference the more recent version of ISO 15765-4 as well **EMA (0044)** Updating to latest versions of SAE and ISO standards—Similar to the definitions discussed above, the SAE and ISO standards incorporated by reference in 40 CFR 86.010–18(k) are integral to multiple aspects of the OBD regulatory requirements. Production vehicle evaluation testing required under 40 CFR 86.010–18(j) requires verification of proper communication with SAE J1939/J1978-compliant scan tools, and assurance that the engine supports the datastream requirements of the latest version of the J1979 and J1939 standards. Durability Data Engine emissions demonstrations required for certification include submission of snapshots of data in the standardized data stream. Also, importantly, service tool manufacturers will have expectations about data stream contents and configuration for engines of a given model year that are aligned with the latest versions of the standards. EMA therefore recommends that EPA update the references to standards SAE J1699-3, SAE J1930, SAE J1939, SAE J1939-DA, SAE J1939–13, SAE J1939–73, SAE J1939-84, SAE J1939-90, SAE J1962, SAE J1978, SAE J1979, SAE J1979-DA, SAE J2012, SAE J2403, and ISO 15765–4 to reflect the most recent versions.	EPA appreciates comments from CARB and EMA on updating the regulations to reflect more recent versions of SAE and ISO standards. This change was not proposed in the NPRM and EPA is not taking any final action on such a change at this time. However, EPA intends to further consider this issue in the Clean Trucks Initiative (see Docket EPA–HQ–OAR–2019–0055) which, as explained in that rule's ANPR, we intend to include a broader effort to harmonize OBD requirements with CARB.

What Commenters Said *(EPA's response follows the two comments listed below)*
CARB 0030: **Retroactive deficiencies** CARB's HD OBD regulation allows manufacturers to certify OBD systems with "deficiencies" in cases where the manufacturer does not meet a requirement but has demonstrated a good faith effort to fully comply. While manufacturers generally perform some validation work before the start of production to ensure the OBD system is working properly and meeting the requirements of the HD OBD regulation, it is not always possible to find all problems within the OBD systems during this time. Therefore, CARB's HD OBD regulation requires manufacturers to perform thorough validation testing of the OBD system on production engines and vehicles after the start of production (and after OBD system certification). As an incentive, a manufacturer could request that any problem discovered during this testing be evaluated as a deficiency and take effect retroactively to the start of production of the engine. If the other factors necessary to qualify for a deficiency are indeed satisfied, the Executive Officer would amend the certification to retroactively assign the deficiency to the start of production of the affected engines. In contrast, problems discovered later by CARB staff during in-use testing would become noncompliance issues and be handled in accordance with OBD-specific enforcement regulations. Additionally, manufacturers have often found problems through means other than this production engine/vehicle evaluation testing that require them to apply running changes and/or field fixes to address the problems. Without the allowance for retroactive deficiencies, CARB staff would most likely have granted a deficiency for this issue on the affected engines in the next model year, which would mean that manufacturers would be given an "extra" model year to fix the issue given the 2-3 year carryover allowance for deficiencies. Furthermore, if the manufacturer cannot get a retroactive deficiency, then the manufacturer would be subject to the OBD enforcement regulations when the running changes and field fixes are submitted, and CARB is notified of the issues. In other cases, if that specific model year was the last model year for the engine, no deficiency would have been applied at all to the engine. CARB staff believes that this would incentivize manufacturers to approach CARB later than they should to report problems in the field and applicable running changes/field fixes, which is not appropriate. Therefore, CARB staff recommends U.S. EPA adopt the requirements related to retroactive deficiencies.
EMA (0044) OBD deficiencies—Due to the complex and technology-forcing nature of the OBD regulations, manufacturers will occasionally discover issues necessitating OBD deficiencies after the start of engine production that were not detectable from the testing of development vehicles and engines. Those issues can be discovered in the production process, through analysis of in-use performance and warranty data, through OBD production vehicle evaluation testing, or through other methods for receiving feedback about on-road vehicles and engines. Retroactive deficiencies still must meet the rigid criteria requiring that the engine manufacturer has made a good faith effort to comply, and that the manufacturer could not have reasonably anticipated the identified problem before commencement of production. As with pre-production deficiencies, manufacturers cannot be granted deficiencies for OBD issues that would cause the engine to exceed mandatory recall criteria for OBD compliance. Retroactive deficiencies also create a mechanism for manufacturers to formally document OBD issues that do not: (i) rise to the level of necessitating field action, (ii) require the manufacturer to address the issues in a time-sensitive manner, or (iii) require regular reports on progress to regulatory agencies. EMA recommends that EPA either adopt equivalent retroactive deficiency provisions to those set forth in 13 CCR §1971.1(k)(6), or implement an equivalent policy through existing certification, compliance, and defect reporting mechanisms.

Response

EPA appreciates comments from CARB and EMA on the rationale behind retroactive deficiencies allowed under CARB's program. EPA understands that stakeholders believe having a deficiency program can be important to facilitate OBD implementation where relatively minor engine shortfalls could prevent certifications. EPA did not propose any changes on this issue and is not taking any final action on this issue at this time. EPA may consider this issue in the Clean Trucks Initiative (see Docket EPA–HQ–OAR–2019–0055)

which, as explained in that rule's ANPR, we intend to include a broader effort to harmonize OBD requirements with CARB.

What Commenters Said *(EPA's response follows the two comments listed below)*
CARB 0030: **5% threshold for misfire** CARB staff agrees with U.S. EPA's amendments. However, CARB's requirements do not limit the continuous misfire monitoring requirements to engines that are equipped with sensors that can detect combustion or combustion quality like U.S. EPA's regulation does – CARB's requirements apply to all diesel engines regardless of whether or not they are equipped with such sensors. CARB's previous regulation only required diesel engines equipped with such sensors to continuously monitor for misfire, since these engines would likely be more precisely controlling the combustion process based on information from these sensors such that misfires could likely exist only in limited operating regions. Additionally, since these sensors directly measure combustion quality, they should have sufficient resolution to detect a total lack of combustion that results in misfire. Other diesel engines were subject to misfire monitoring during idle conditions only. However, the complexity of today's control strategies on all diesel engines and the addition of new technologies in recent years, like aggressive use of exhaust gas recirculation (EGR) or target air-fuel ratios or fresh air concentrations in certain operating conditions, has resulted in additional factors that can cause misfire in very specific operating conditions instead of continuously under all conditions. Further, CARB staff had found that in the field, misfire can occur during specific speed and load regions and would not likely be detected by an idle-only misfire monitor. Therefore, CARB staff modified the regulation to require all diesel engines to continuously monitor for misfire. CARB staff recommends that U.S. EPA modify the misfire monitoring requirements to apply to all diesel engines. Further, CARB staff recommends that U.S. EPA's language in 40 CFR § 86.010-18(g)(2)(iii)(D) be corrected so that the requirement applies to "100 percent of 2021 and later model year diesel engines," not "100 percent of 2021 model year diesel engines," since the requirement is meant to apply to engines from the 2021 model year and later.
EMA (0044) Misfire threshold and monitoring conditions—EMA supports aligning the federal misfire thresholds and required monitoring conditions with the California regulations. This proposed change avoids unnecessary complexity and potential confusion in the service industry with respect to engines of the same model year, which otherwise would have separate criteria for fault detection. It also is consistent with CARB's and industry's understanding of the state of the art for monitoring capability for engines subject to the misfire requirements.

Response

See Preamble Section II.D for more information on the adopted misfire provisions and EPA's response to these comments. EPA appreciates the comments from CARB and EMA on the proposed updates to our misfire requirements. While both commenters were generally supportive of these proposed updates, CARB raised concerns that EPA's proposal does not reflect the most current CARB OBD requirements for misfire monitoring and recommended that EPA modify the proposed update to match CARB's. EPA is adopting as proposed the misfire provisions but intends to further consider this issue in an appropriate future action to determine whether a more comprehensive and updated approach should be adopted. Further, CARB recommended that EPA correct an error in the regulations to reflect that misfire requirements apply starting with the 2021MY not only to 2021MY engines. EPA has made this correction to §86.010-18(g)(2)(iii)(D).

What Commenters Said	Response
CARB 0030: **Allow use of CARB OBD templates for EPA reporting** CARB staff recommends that U.S. EPA adopt these changes to the regulation to allow manufacturers to use the templates found in CARB's Mail-Out #MSC 09-22 for reporting to U.S. EPA. The templates, which are currently being used by heavy-duty engine manufacturers to meet the HD OBD regulation requirements in California, were designed by CARB to ensure that all information required to be submitted by manufacturers are included and presented in a clear format. Including language referring to these templates in U.S. EPA's regulation would provide clear direction to manufacturers on where to find the templates, as well as let manufacturers know they can use the same templates they are currently using for California HD OBD systems. **EMA (0044)** Reporting templates and engine family counting—EMA supports EPA's proposals to standardize compliance reporting templates and to clarify engine family "counting" conventions for determining the required number of Heavy Duty OBD Certification Applications, Durability Demonstration Engine obligations, and Production Vehicle Evaluation groupings. Those changes allow for uniformity in data submission and testing obligations, and for a more streamlined certification process without impacting the stringency of the OBD requirements.	EPA appreciates comments from CARB and EMA on the proposal to allow the use of CARB OBD templates for EPA reporting. These comments affirm the proposed rule. EPA is finalizing the revision as proposed to allow the use of CARB's OBD template for EPA reporting and further our goal of harmonizing requirements.

What Commenters Said	Response
CARB 0030: **§ 86.010-18(l) Use of CARB data for OBD** U.S. EPA's statement that "our intent is to allow the use of test data generated for CARB" seems to mean that U.S. EPA will allow manufacturers to submit to U.S. EPA demonstration testing data that previously were submitted to CARB by the manufacturer for California-certified products. However, CARB staff could not find any such language in U.S. EPA's proposed regulation language that allows for this. Further, with U.S. EPA proposing to exclude California-certified configurations from the count of separate engine families for demonstration testing, it seems that manufacturers would not be able to submit the demonstration test data for these California-certified configurations. This seems to contradict U.S. EPA's previous statement regarding allowing the use of test data generated for CARB. Therefore, CARB staff believes clarification is needed on U.S. EPA's intent for demonstration testing data requirements. Additionally, U.S. EPA's proposed regulation language regarding the request to exclude "special families" (e.g., California engine families) from the engine family count does not include the criteria that U.S. EPA would use to approve or deny the request (including how "special families" is defined). CARB staff is concerned that manufacturers may use this provision to reduce the number of demonstration tests they are required to perform, even though they may be certifying a sufficient number of engine families that would warrant additional testing. Lastly, concerning the proposed regulation language in 40 CFR § 86.010-18(l)(2)(iii), CARB staff recommends the language in the last sentence of the paragraph be changed from "you may ask" to "the manufacturer may ask" to be consistent with the rest of the paragraph.	EPA appreciates CARB's comments on the proposed revision to testing requirements for demonstrating performance of monitoring systems. After review of these comments, EPA believes the proposed provisions require more review and EPA is not taking any final action on the proposed change at this time. EPA intends to further consider this issue in the Clean Trucks Initiative (see Docket EPA–HQ–OAR–2019–0055) which, as explained in that rule's ANPR, we intend to include a broader effort to harmonize OBD requirements with CARB.

What Commenters Said	Response
CARB 0030: **§86.010-18(a) and (m) Allow carryover OBD data** While CARB staff agrees that specific engines such as 49-state engines and those sold in Canada should be allowed a simplified carryover OBD certification path, CARB staff has concerns about U.S. EPA's proposed regulation language regarding this. U.S. EPA indicated that the proposed carryover provision is intended for "special engine families, such as those certified for export to Canada." However, U.S. EPA's proposed regulation language does not limit the carryover provision to just these engines – instead, the language seems to apply to any new engine family as long as the manufacturer can demonstrate that the "new engine family complies with the intent of the provisions of paragraphs (b) through (l)" of 40 CFR § 86.010-18. Further, the language indicates that this includes engine families with OBD systems that are equivalent to the OBD systems on previously certified engine families that were deemed to comply based on meeting California's OBD requirements. CARB staff is concerned that manufacturers could use such a provision on any federal engine, and that a new engine with an OBD system that was previously certified to the older California OBD requirements could be certified and sold, even if the engine does not meet the requirements applicable for the current model year (i.e., the engine meets the older California OBD requirements, but not the newer requirements applicable to the model year of the engine). CARB staff recommends that U.S. EPA modify the language to narrow the applicability of this provision to avoid these issues. Lastly, concerning the proposed regulation language in 40 CFR § 86.010-18(a)(5), CARB staff recommends the language be changed from "that we determine conform" to "that the Administrator determines conform" to be consistent with the rest of the regulation. **EMA (0044)** Simplified carryover OBD certification path—EMA supports EPA's proposal for a streamlined certification path for engines with OBD systems that are substantially similar to previously approved OBD systems. That streamlined approach will reduce the unwarranted burdens related to the compilation and submission of redundant documentation, and will provide the Agency the opportunity to perform a more focused review centered around differences between current and previously approved OBD systems.	EPA appreciates comments from CARB and EMA on the proposal to allow carryover data. CARB raised concerns with this proposal. They were concern that the use of the term "special engine families" to enable carryover is not defined in EPA's regulations which could create compliance concerns. EPA agrees that this proposed compliance flexibility will require additional consideration (see Section II.D of the Preamble for further discussion). At this time, EPA is not taking final action on the proposed change to carryover OBD certification. EPA intends to revisit this issue in the Clean Trucks Initiative (see Docket EPA–HQ–OAR–2019–0055) which, as explained in that rule's ANPR, we intend to include a broader effort to harmonize OBD requirements with CARB.

Chapter 3: Other Amendments

Removing obsolete content in 40 CFR parts 88-94 required correction or adjustment in other parts. Where these related amendments led to comments, we treat those comments in this document as being related to the specific sector affected, rather than treating them as issues related to removing the obsolete content in 40 CFR parts 88-94. We received no comments specifically related to removing regulatory content from 40 CFR parts 88-94.

Section 3.1, Section 3.3, and Section 3.4 include comments that apply across multiple CFR parts. The other sections in this chapter cover issues that are specific to an individual CFR part.

3.1 Cross-Cutting Issues

We proposed several minor amendments to align the detailed regulatory text across programs. Commenters focused on a single issue from this set of amendments, as noted below.

What Commenters Said *(EPA's response follows the seven comments listed below)*
EMA (0044) §1039.225— EPA has modified the provisions regarding the applicability of amendments to a manufacturer's application for certification, running changes and corrections to applications. Manufacturers have no concern with clear expectations that the effective date of an amendment regarding new hardware or software should be aligned with the timing of the product modification. However, in the case of amendments that are submitted solely to correct errors discovered within the original application, such as a state condition (temperature or pressure condition), part number correction, or typographical error, EPA's proposal to consider those amendments as prospective only is unreasonable. Applications for certification are extremely voluminous submissions, leaving many opportunities for human error that may render some small detail inaccurate, or some minor element inadvertently omitted, without bad faith on the part of the manufacturer, or any material effect on the engine's demonstrated emissions characteristics. Voluntary actions by a manufacturer to correct an error or omission to "make the amended application correct and complete" should not be viewed as excluding the products manufactured up to that point. The Agency should revise the proposed amendment accordingly.
EMA (0044) 1060.225, Retroactive applicability of an amended application—As noted previously, if an application is modified and corrected, as long as the engines under the current Model Year application are still represented accurately, then the revision should still apply retroactively.
OPEI (0040) 1060.225, Retroactive applicability of an amended application—In the event an application is modified and corrected, as long as the engines under the current Model Year application are still represented accurately, revisions should still apply retroactively. OPEI requests further discussion on this proposal.
EMA (0044) 1054.225, Retroactive applicability of an amended application—If an application is modified and corrected, as long as the engines under the current Model Year application are still represented accurately, then the revision should still apply retroactively. (See also §1039.225.)
OPEI (0040) 1054.225, Retroactive applicability of an amended application—In the event an application is modified and corrected, as long as the engines under the current Model Year application are still represented accurately, revisions should still apply retroactively. OPEI requests further discussion on this proposal.
CARB (0030)

§1039.225—CARB supports this clarification in that it holds manufacturers accountable for engines that may have been certified inappropriately, e.g., the engines were initially certified to a more stringent FEL than after the application amendment. The proposed clarification would ensure that those engines remain subject to corrective actions should they fail to comply with the originally certified FEL. Such engines may have been purchased under the presumption that they were cleaner than they actually are.
Progress Rail (0054) §1033.225, §1042.225—EMD petitions typographical errors and missing updates when entered become retroactive.

Response

The existing regulatory text in the referenced sections describes how to amend an application for certification to include new or modified configurations, without similarly detailed provisions describing how to make corrections. The preamble to the proposed rule described this amendment as a perfunctory change to clarify that corrections should not apply retroactively. This was intended to be an expression of our current policy implementing the regulatory prohibition against submitting false or incomplete information (see, for example, §1054.255(c)(2)).

We are deferring action on this proposed amendment to give us opportunity to more carefully consider how to describe the process and possible consequences related to submission of corrected information. We intend to pursue a clarification in a future proposed rulemaking.

3.2 Motor Vehicles and Motor Vehicle Engines (40 CFR parts 85 and 86)

We proposed several different technical amendments to the regulations that apply for motor vehicles. This includes changes to compliance provisions in 40 CFR part 85 in addition to changes that are specific to heavy-duty engines (40 CFR part 86, subpart A, and 40 CFR part 1036), highway motorcycles (40 CFR part 86, subparts D and E), and chassis-certified cars and trucks (40 CFR part 86, subparts B, C, and S). Chapter 2 addresses many of the amendments that affect heavy-duty engines in 40 CFR part 1036.

The material described in this section is addressed more broadly in Section III.D of the preamble to the final rule.

What Commenters Said	Response
MIC (0052) MIC understands that the intention of the proposed changes to 40 CFR 85.1501 is to change applicability for heavy-duty engines. We request the proposed language to be reconsidered and revised as needed to avoid unintentionally impacting importation of other motor vehicle engines, such as those for on-highway motorcycles, subject to 40 CFR 85 and 40 CFR 86.	We agree with the concern expressed in the comment and have revised the regulation accordingly.
Tesla (0034): §86.1803—Definition of Zero Emission Vehicles. Tesla agrees with the definitions of "Zero Emission Vehicles" and "Electric Vehicles" found at 40 CFR §86.1803.01 with the following recommended change to recognize that commercial heavy duty vehicles will predominantly utilize commercial charging facilities. Tesla suggests revising 40 C.F.R. §86.1803.01 to read as follows (change in red bold font): (1) The vehicle is capable of drawing recharge energy from a source off the vehicle, such as residential or commercial electric services;	This comment is outside of the scope of the limited revisions to part 86 proposed in this rulemaking. We note, however, that the current regulations use "residential" in an example. Expanding the example would not change the scope or meaning of the defined term. Perhaps more importantly, part 86 is focused on vehicles under 14,000 pounds GVWR, which would rarely use commercial charging facilities; the change would therefore not be appropriate.
CARB (0030) §86.1810-17—Currently, a small volume manufacturer that modifies and sells vehicles (secondary vehicle manufacturer) that have already been certified by a larger OEM must demonstrate compliance with the same certification and compliance requirements in 40 CFR, Part 86, Subpart S as a small volume OEM. These requirements include meeting all emission standards, fleet average emission levels, and testing provisions for both exhaust and evaporative emission criteria pollutants and for GHG emissions. CARB staff agrees that secondary vehicle manufacturers should not be required to repeat the exhaust and evaporative emission criteria pollutants fleet average calculations for the affected vehicles. While nothing in the proposed paragraph (j) suggests that it affects a secondary vehicle manufacturer's compliance obligations for meeting GHG emission standards, it would be helpful to add clarifying language to state this more explicitly.	The comment appropriately points out that the proposed rule did not describe how the secondary vehicle provisions apply with respect to GHG emission standards. We are not taking any final action on this issue in this rulemaking. We intend to consider how compliance with fleet average standards for GHG emissions may be different than what we proposed for criteria emissions in an appropriate future rulemaking.

What Commenters Said	Response
Tesla (0034): §86.1813—EV Evaporative Emissions. Tesla agrees and appreciates the inclusion of the stated clarification that, per 40 C.F.R. § 86.1813-01, EVs are not subject to evaporative and refueling emission standards. Additionally, Tesla agrees and appreciates, per 40 C.F.R. §86.1813-17, the inclusion of the stated clarification that "§ 86.1829 allows you to certify without testing in certain circumstances. These evaporative and refueling emission standards do not apply for electric vehicles, fuel cell vehicles, or diesel fueled vehicles, except as specified in paragraph (b) of this section."	The comment affirms the proposed rule.
Auto Innovators (0049): At 40 C.F.R. § 86.1823-08(c)(1)(iii), the regulations specify that durability data vehicles must be ballasted to a minimum of loaded vehicle weight for light-duty vehicles and light light-duty trucks and a minimum of adjusted loaded vehicle weight (ALVW) for all other vehicles. In contrast, 40 C.F.R. § 86.1823-08(c)(1)(iv)(A) specifies that the simulated test weight for the mileage accumulation dynamometer setup will be the equivalent test weight using a weight basis of the loaded vehicle weight for light-duty vehicles and ALVW for all other vehicles. For consistency, the equivalent test weight should use a weight basis of the loaded vehicle weight for light-duty vehicles and light light-duty trucks. Recommended change: (c)(1)(iv)(A) The simulated test weight will be the equivalent test weight specified in §86.129 using a weight basis of the loaded vehicle weight for light-duty vehicles <u>and light light-duty trucks</u> and ALVW for all other vehicles. * * * * *	This comment is outside of the scope of the limited revisions to part 86 proposed in this rulemaking. We may consider this issue in an appropriate future rulemaking.
Auto Innovators (0049): § 86.1868-12—EPA proposes to amend 40 CFR 86.1868-12 to exclude battery electric and certain plug-in hybrid electric vehicles from AC17 test requirements. Auto Innovators supports the formalization of this practice in the regulation. For plug-in hybrid electric vehicles, we recommend that EPA clarify that the range is the combined city / highway value.	We agree with the recommendation expressed in the comment regarding our proposed amendment to 40 CFR 86.1868-12 and have revised the amendment we are finalizing accordingly to clarify the range specified is combined city and highway.
CARB (0030) 86.1868-12—Subparagraph (g)(5)(ii) says that one of the conditions that must be met for the provisions of paragraph (g)(5)(i) to apply to hybrid electric vehicles is "if they have an all electric range of at least 60 miles after adjustment to reflect actual in-use driving conditions (see 40 CFR § 600.311 (j))." It is not clear how the adjusted "all electric range" referenced in 40 CFR § 86.1868-12 (g)(5)(ii) is determined using 40 CFR § 600.311 (j) since § 86.1868-12 (g)(5)(ii) and § 600.311 (j) do not use the same terminology to describe all electric range. § 86.1868-12 (g)(5)(ii) and § 600.311 (j)(4) should use consistent terminology, so it's clear what the requirement that a vehicle must have "an all electric range of at least 60 miles after adjustment to reflect actual in-use driving conditions" means. CARB staff also recommends elaborating on the rationale of specifying the lower threshold of adjusted all-electric range at 60 miles for qualifying plug-in hybrid electric vehicles for relief from AC17 testing.	We agree with the comment. The instruction for establishing range values relies on SAE J1711, which refers to "all-electric range". We are revising §600.311(j)(4) to use this term instead of "battery driving range". This aligns with the new provision adopted in §86.1868-12. As described in the proposed rule, we selected 60 miles to include vehicles for which an owner can typically expect to avoid using the engine for daily commuting, including commutes on a hot summer day.

What Commenters Said	Response
Tesla (0034): §86.1868-12—EV A/C testing requirements. Tesla agrees with proposed 40 C.F.R. §86.1868 and appreciates the inclusion of the stated clarification that "manufacturers do not need to make a demonstration to qualify for air conditioning efficiency credits for pure electric vehicles or for plug-in hybrid electric vehicles, provided that those vehicles qualify for waived AC17 testing as described above. This is due to the complexity of quantifying credit quantities in grams CO2 per mile for driving without engine power."	The comment affirms the proposed rule.
Auto Innovators (0049): Guidance and Advisory Circular Updates—Auto Innovators believes that a number of EPA guidance and advisory circular documents related to light-duty vehicle testing and certification should be reviewed for needed revisions and updates. The following list provides some initial thoughts that we would be happy to discuss further with EPA staff at your convenience. *CISD-09-19 (Policy Revisions for Testing Vehicles Equipped with Select-Shift Transmissions, Multimode Transmissions and Shift Indicator Lights (SILs)* – Updates in recognition that surveys demonstrate that the predominant mode of transmission operation is the key-off (default) mode for virtually all vehicles regardless of weight-to-power ratio and whether a driver must remove a hand from the steering wheel to change gears or modes. *AC 89 (General Criteria for Making Car Line and Truck Line Determinations)* – Updates to allow manufacturers to apply good engineering judgement to combine or split car lines based on existing criteria. *AC 72A (Shift Points for Manual Transmission Vehicles)* – Updates to reflect modern manual transmissions with greater than four speeds. *CD-15-22 (Updated Criteria for Manufacturer-Conducted Confirmatory Testing)* – Updates to allow manufacturers to forego confirmatory testing based on good engineering judgement and supporting justification (e.g. data from other testing); updates to the cut-points based on the most recent available data. **New Guidance** Auto Innovators believes that new guidance regarding alternative method off-cycle credit pre- model year requirements would be potentially helpful for both clarifying expectations and ensuring consistency among manufacturers. We have been developing concepts for this that we are interested in discussing with EPA staff at your convenience.	We agree that the identified documents and issues deserve attention to ensure that we are implementing regulatory requirements in a way that reflects ongoing developments in technology and best practices for certifying vehicles. We may also consider proposing some of these guidance provisions in an appropriate future regulation.
VW (0039) We are aware that a revised version of SAE J2263 was recently published. We request the opportunity to review this new version. If necessary, we will take the opportunity to seek permission to use the new version. [SAE J2263 Road Load Measurement Using Onboard Anemometry and Coastdown Techniques, revised May 2020]	EPA appreciates the input on this area of comment. We may consider referencing the newer version of SAE J2263 in an appropriate future action. In the meantime, it may be possible to approve testing based on the updated version of SAE 2263 as an alternative procedure.

3.3 Ethanol-Blend Test Fuels for Nonroad Spark-Ignition Engines and Vehicles, Highway Motorcycles, and Portable Fuel Containers

The proposed rule described an approach of allowing manufacturers to certify based on exhaust testing with EPA's E10 test fuel (40 CFR 1065.710(b)). To avoid changing the stringency of the existing standards, the proposed rule preserved EPA's option to do confirmatory testing with EPA's E0 test fuel (40 CFR 1065.710(c)), which was the originally specified test fuel. We did not propose to change the gasoline test fuel specifications for evaporative emission testing.

The material described in this section is addressed more broadly in Section III.A of the preamble to the final rule.

What Commenters Said *(EPA's response follows the comment below)*

NMMA (0031)

As EPA is aware, the National Marine Manufacturers Association (NMMA) and its members worked with staff from the U.S. EPA and California Air Resources Board to develop a certification fuel test program in order to quantify exhaust emissions from various recreational marine engines operated on California LEV-III E10 and EPA Tier-3

E10 certification fuels. Based on feedback from both CARB and EPA staff, an EPA Tier-2 E0 test fuel was added to the test matrix along with reporting raw modal data for engines and reporting greenhouse gas emissions including carb dioxide and methane from test engines.

The purpose of the testing program is to allow for some flexibility in the type of certification fuel used for exhaust emissions testing by providing test data to prove substantially similar exhaust emissions between EPA and CARB E10 test fuels. In 2020, EPA and CARB will require different certification fuels; the primary difference between E10 fuels relate to fuel volatility and differences in the distillation curve. Marine engine manufacturers would like the ability to use either E10 test fuel for engine exhaust emissions certification and subsequent exhaust emissions testing such as production line testing, in-use testing and confirmatory testing, if applicable. Furthermore, changes are taking place within ISO 8178 and/or 18854 specifications that will allow the use of E10 certification fuels -- resulting in a globally harmonized marine test fuel.

The E10 test fuels relative to the E0 fuel generally resulted in an average increase in HC+NOx of about 6 percent and an average decrease in CO emissions of about 20 percent. The primary driver for the increase in HC+NOx for E10 fuels relative to E0 was related to NOx emissions; a result of enleanment due to the oxygen content of the fuels.

The differences observed between EPA Tier-3 E10 and CARB LEV-III E10 test fuels were limited and generally less than 5 percent and 8 percent for HC+NOx and CO respectively. The comparative results between E10 fuels across the variety of test engines, together with the expected test-retest variability means there is no significant difference between EPA Tier-3 E10 and CARB LEV-III E10 with respect to exhaust emissions. Based on these series of tests NMMA offers the following comments in 1045.501 regarding the changes to include a direct reference of the EPA E10 fuel in 1065.701 (b). We believe that these recommended changes are fully supported by the attached NMMA test program.

1. If ethanol-blended fuel is used for certification the proposal states that EPA reserves the right to test engine families with either ethanol-blended fuel or E0 test fuel. NMMA recognizes that the primary fuel in the US is E10. Our engine manufacturers would prefer that if the certification fuel is E10 then the EPA test fuel would be E10 for confirmatory testing.

2. NMMA strongly urges EPA to allow the use of CARB LEV III E10 fuel for certification without seeking separate approval to use this fuel. CARB allows for the flexibility to use either CARB LEV III E10 or EPA Tier 3 E10 providing the chosen test fuel is consistent across all engine families.

The NMMA test data clearly shows that any variability is within acceptable parameters. NMMA supports the use of either certification fuel providing it is consistent.

3. NMMA supports efforts of the U.S. EPA to achieve consistency and harmonization in applying emissions standards, while considering the level of burden to manufacturers which such standards may impose. There is some

concern that the consideration of adopting adjusted standards to maintain "equivalent stringency", as mentioned in the "Other Amendments" section of the proposed rule, and the potential for associated revision of standards may create a divergence from the current harmonization status. This objective would likely increase cost burden and complexity to manufacturers' requirements for certification procedures. Furthermore, with respect to adjusted standards for ethanol fuels, marine engine manufacturers have established their emissions limits accordingly to account for variations while maintaining compliance with the standards. Based on NMMA and marine industry testing, the impacts of E10 test fuels on family emissions limits for HC+NOx is generally limited to about 6% while reductions in CO emissions are generally observed.

Response

This response relates to item #1 in the NMMA comment. As described in the proposed rule, reserving EPA's ability to test with the test fuel originally specified in the regulation allows us to keep the same emission standards without changing overall stringency. Committing EPA to use the same test fuel that manufacturers use, instead of the originally specified test fuel, would require us to adopt modified numerical emission standards to ensure no change in stringency.

For items #2 and #3 from the NMMA comment, the NMMA comment is duplicated below, with a corresponding response for each item.

What Commenters Said	Response
MIC (0052) MIC appreciates the proposed language in 40 CFR 86, 40 CFR 1051, and 40 CFR 1065 allowing the use of ethanol-blended gasoline for general testing; including the use of CA LEV III E10. MIC requests the ability to use the alternate test fuel, CA LEV III E10, proposed in 40 CFR 1065.701(b) for both HMC (40 CFR 86.513(a)(3)) and OHRV (40 CFR 1051.501(d)) without first seeking EPA approval. As EPA indicates, there should be no appreciable fuel related exhaust emission effects between EPA's E10 specification and CA LEV III E10 test fuel.	See Section III.A in the preamble to the final rule.
NMMA (0031) NMMA strongly urges EPA to allow the use of CARB LEV III E10 fuel for certification without seeking separate approval to use this fuel. CARB allows for the flexibility to use either CARB LEV III E10 or EPA Tier 3 E10 providing the chosen test fuel is consistent across all engine families. The NMMA test data clearly shows that any variability is within acceptable parameters. NMMA supports the use of either certification fuel providing it is consistent.	See Section III.A in the preamble to the final rule.
Polaris (0048) These comments relate to the provisions of the NPRM addressing E10 test fuels for off-road recreational vehicles & engines (OHRV) and on-highway motorcycles (ONMC). Polaris directionally supports the flexibility being proposed by EPA to allow certification using E10 test fuel. We think the burden of use should be as low as possible, including in the case where a manufacturer chooses to use the CARB LEV III variant of E10. See Section 1 of these comments.	See Section III.A in the preamble to the final rule.

What Commenters Said	Response
Polaris (0048) Section 1. EPA notes in the preamble that manufacturers may be interested in testing with CARB LEV III fuel as opposed to EPA E10 fuel. We agree, especially for recreational vehicles given that CARB began requiring certain OHRV certification testing to be performed with the CARB LEV III fuel beginning in Model Year 2020. Polaris thinks it defeats the purpose of the proposal and reduces certainty if manufacturers are still required to seek EPA certification staff approval on a case-by-case basis under 40 CFR 1065.701(b) to use CARB LEV III E10 test fuel instead of EPA's E10 test fuel. Such case-by-case approvals can be burdensome for the manufacturer and for the Agency staff. The confirmatory testing risk to manufacturers choosing to certify with E10 or CARB LEV III fuel is understood, i.e., that EPA may conduct confirmatory testing with either E0 or E10. This will incentivize manufacturers planning to certify with an E10 fuel to conduct development testing with both E0 and E10 fuels, so they understand the fuel effects well enough to certify confidently with E10. In this way, the confirmatory testing policy has a self-policing effect on manufacturers choosing to certify with E10 fuel. In recognition of this fact EPA should otherwise make the burden of use as low as possible. Given EPA's recognition that "there are no appreciable fuel effects on exhaust emissions between EPA's E10 test fuel and LEV III E10 test fuel", and the above-noted development testing incentive of EPA's confirmatory E0/E10 testing policy, we request that EPA directly permit certification of OHRV's using CARB LEV III test fuel without the need to request EPA certification staff permission. We understand this allowance would be subject to EPA being able to conduct confirmatory testing with either E0 or E10. We trust that EPA would use its discretion and that multi-fuel confirmatory testing would not become automatic when a manufacturer chooses to certify with E10 or the CARB LEV III variant of E10. Polaris' comments on the proposed regulation language changes to 40 CFR 1051.501(d) are shown below in redline / strikeout format. Polaris supports similar changes to the proposed language for on-highway motorcycles in 40 CFR 86.513(a)(3). 1051.501 (d)***(1)***(i) For gasoline-fueled engines, use the grade of gasoline specified in 40 CFR 1065.710(c) for general testing. You may alternatively use ethanol-blended gasoline meeting the specifications described in 40 CFR 1065.710(b) for general testing or CARB LEV III test fuel, without our advance approval. If you use one of these ethanol-blended fuels for certifying a given engine family, you may also use it for production-line testing or any other testing you perform for that engine family under this part. If you use one of these ethanol-blended fuels for certifying a given engine family, we may use the ethanol-blended fuel or the specified neat gasoline test fuel with that engine family. CARB LEV III test fuel is specified in Title 13, section 1961.2 of the California Code of Regulations and 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," adopted December 6, 2012.	See Section III.A in the preamble to the final rule.

What Commenters Said	Response
NMMA (0031) NMMA supports efforts of the U.S. EPA to achieve consistency and harmonization in applying emissions standards, while considering the level of burden to manufacturers which such standards may impose. There is some concern that the consideration of adopting adjusted standards to maintain "equivalent stringency", as mentioned in the "Other Amendments" section of the proposed rule, and the potential for associated revision of standards may create a divergence from the current harmonization status. This objective would likely increase cost burden and complexity to manufacturers' requirements for certification procedures. Furthermore, with respect to adjusted standards for ethanol fuels, marine engine manufacturers have established their emissions limits accordingly to account for variations while maintaining compliance with the standards. Based on NMMA and marine industry testing, the impacts of E10 test fuels on family emissions limits for HC+NOx is generally limited to about 6% while reductions in CO emissions are generally observed.	The comment affirms the proposed rule.
MIC (0052) MIC agrees with EPA that setting alternate standards related to manufacturers use of E10 test fuels would be complex. This is likely not necessary considering the requirement to meet standards using US market fuel.	The comment affirms the proposed rule.
Polaris (0048) We agree with EPA that it would be complex to establish alternate E10 standards and make certification with E10 mandatory. We believe such alternate standards are not warranted until the Agency decides to make other, more substantive changes to the Part 1051 (OHRV) or Part 86 Subpart E (ONMC) standards. See Section 2 of these comments for our specific input on the Part 1051 standards.	The comment affirms the proposed rule.
Polaris (0048) Section 2. Polaris agrees with EPA that setting alternate numeric standards and requiring E10 certification fuel would be complex for these OHRV and ONMC sectors, especially due to the diversity of technology and vehicle types within the OHRV sector. Further it seems that such a limited-scope initiative would be without environmental benefit. Polaris thinks that EPA's mandatory E10 efforts for OHRV's would be best served as part of a more comprehensive review of the category, including a review of the emission limit values as applicable, to reflect current technology and to address provisions limiting the applicability of Part 1051 to certain types of off-road vehicles that are currently excluded from the scope of coverage.	The comment affirms the proposed rule.

What Commenters Said	Response
NMMA (0031) Recreational marine evaporative emission component manufacturers currently measure permeation emissions using a splash blended E10. As EPA mentions in the proposal the test fuel is nearly identical to EPA's specified E10 test fuel except for the volatility. EPA's Tier 3 E10 test fuel has a nominal volatility of 9 psi. RVP and the splash blended E10 have a volatility of about 10 psi RVP. NMMA does not oppose EPA amending the regulation to allow the option of using EPA Tier 3 E10 as an evaporative emission test fuel with a lower Reid Vapor Pressure (RVP) standard. NMMA supports flexibility for our manufacturers providing they can comply with the regulation. Addressing EPA's request for comment to allow a 9 psi RVP fuel vs. a 10 psi RVP fuel raises two questions. 1. For existing marine evaporative components many of NMMA members have designed their components to meet the stringent 10 psi RVP standard produce carry over product and do not want to have to recertify. Also, unlike automotive and many nonroad sectors the evaporative component market for recreational vessels with installed fuel tanks is not very large. Thus, marine evaporative emission component manufacturers design and test to meet the standards in the 50-state market. With the California Air Resources Board requiring that component manufacturers test and comply with a 10 psi RVP fuel, marine manufacturers will likely continue to test to the CARB standard. 2. This would be the same for marine portable fuel tanks where some of our manufacturers comply with design-based standards. As stated in the preceding paragraph NMMA does not oppose amending the regulation to allow the flexibility of an option and we would also be interested in discussing this further with EPA staff to better understand the benefits of this flexibility and any specific data we can provide.	1. The comment affirms the proposed rule. 2. Design-based certification does not depend on test fuel.
MIC (0052) We request EPA to allow non-US local market fuels splash blended to the listed specifications, for manufacturer's having test labs outside of the US. Splash blended local market fuels could reduce the significant costs associated with importing US and/or CA fuels into foreign countries. We also hope that US certification test fuel specifications can be simplified through the harmonization of CA specifications with EPA's.	The "listed specification" in question is gasoline without ethanol. As a result, splash blending with local fuels is not a viable option for meeting regulatory requirements. The alternative E10 test fuel proposed in this rule is a variation from the originally specified E0 test fuel. Moving this alternative even further from the original specifications by allowing a different base fuel to create an E10 test fuel would be too far removed from the original specification to allow confidence that test results reliably demonstrate compliance with emission standards.

What Commenters Said	Response
Polaris (0048) In the long term we encourage EPA to use its leverage when feasible in the waiver process to minimize the number of similar, but different, test fuels required between the two Agencies - particularly in cases where there is technical equivalence and the stringency of the California standard is not compromised.	We did not propose to any changes or describe any principles related to reviewing waiver requests, so this comment is outside the scope of the rule. We will continue to review waiver requests as specified in Clean Air Act section 209.
EMA (0044) 1060.501—Listing reference test fuels, EPA should consider adding CA LEV III test fuel as an option to align with CARB and reduce testing burden. **OPEI (0040)** 1060.501, Listing reference test fuels —EPA should consider adding CA LEV III test fuel as an option to align with CARB and reduce testing burden. **EMA (0044)** 1060.515, Addition of reference fuels—Add CA LEV III and EPA E10 Reference Fuel as options under section (a)(1). **OPEI (0040)** 1060.515, Listing reference test fuels—While amendments to the rule are being considered, OPEI suggests EPA add CA LEV III and EPA E10 Reference Fuel as options under section (a)(1)	The current test fuel is a splash-blended E10. The preamble to the proposed rule described why we did not propose to allow premixed E10 test fuel for permeation testing, mostly based on the lack of available data supporting a conclusion that change in fuel would have no substantial effect on the stringency of the standard. The comments provided no new information to help us reach a different conclusion.
CARB (0030) 40 CFR 1060.515 and 1060.520—CARB staff notes that splash-blended E10 fuel may not yield results that are as reproducible as with a pre-mixed gasoline blend specified in 40 CFR § 1065.710(b), and that the ethanol content would not be known accurately if the splash-blended fuel were not analyzed. 40 CFR 59.650—CARB staff notes that splash-blended E10 fuel may not yield results that are as reproducible as with a pre-mixed gasoline blend specified in 40 CFR § 1065.710(b), and that the ethanol content would not be known accurately if the splash-blended fuel were not analyzed.	We did not propose to change the test fuel specification for permeation testing, so these comments are outside the scope of the rule. We may revisit these test fuel specifications in an appropriate future rulemaking.

3.4 Nonroad Spark-Ignition Engines and Vehicles (40 CFR parts 1045, 1048, 1051, and 1054)

We proposed several different technical amendments to the regulations that apply for the standard-setting parts that define certification requirements for different types of nonroad spark-ignition engines and vehicles.

The material described in this section is addressed more broadly in Section III.J of the preamble to the final rule.

What Commenters Said	Response
Kohler (0033) The intended NPRM's proposed regulatory change provides an example to illustrate how a manufacturer could divide a period into 'four quarters' if the 'annual' production period is longer than 52 weeks. See 85 Fed.Reg. 28165. In doing so, the proposed regulatory changes create conflicting requirements between the required and alternative approaches. The NPRM proposed regulation makes subtle changes in the regulations (i.e. "if your annual production period is ~~less than~~ not 12 months long…". Strike out and underline addition added to 85 Fed.Reg. 28297) and adds an example if the 'annual' production period is 301 days or longer. The example provided in the NPRM proposal extends over fifty-six (56) weeks or thirteen (13) months. The NPRM proposal evenly divides the fifty-six (56) weeks into four (4) test periods of fourteen (14) weeks (or ninety-eight (98) days). In comparison, under the required test period determination of the introductory sentence in 40CFR1054.310(a)(1) which has not been changed, the thirteen months would be divided by three (3) months to create four (4) or possibly five (5) test periods. Expanding the NPRM proposed language to example above in Section II, the NPRM proposal would have eighteen (18) months (or seventy-two (72) weeks) divided by four (4) resulting in four (4) test periods of eighteen (18) weeks each. As previously noted above, the required test period determination would result in six (6) test periods with each quarter being three (3) months long. The NPRM Proposal fails to rectify the required test period calculation with the discretionary alternative calculation. Kohler's suggests the following regulatory changes: 1054.310(a)(1) For engine families with projected U.S.-directed production volume of at least 1,600, the test periods are defined below: These proposed changes address several issues: 1. Creates a direct, simple approach to determining test periods. 2. This eliminates problematic references to 'quarterly' test periods. 3. This proposed language, coupled with the 'annual production period' being the Model Year as specified in 40CFR1068.103(b), allows 'annual production' over two (2) calendar years. 4. Agrees with intent of NPRM Proposal for a maximum of four (4) test periods. The entire [MY] period could extend over two calendar years as allowed by 40 CFR 1068.103(b).	We agree with the concern expressed in the comment and have revised the regulation accordingly. The same conclusion applies for §1045.310, §1051.310, and §1054.310. We note, however, that §1068.103(b) emphatically does not allow for extending a model year over two calendar years. The regulation repeatedly describes the model year as annual production period. There is flexibility in shifting the annual production period to start over a wide range of dates, but it remains an annual production period. We have applied this consistently across all our programs for the last 50 years.

What Commenters Said	Response
Kohler (0033) 50-STATE CERTIFICATION Separately, the State of California also regulates engines that are federally regulated under 40CFR1054. Many manufacturers obtain certification approvals for the same engine under both federal and State of California requirements. The State of California is not (and will not be) fully aligned with federal PLT regulations. For example, California PLT requirements in 13 California Code of Regulations [CCR] 2407 are not the same as current federal 40CFR1054.310 requirements. For these '50-state' certified engines, both test requirements in 40CFR1054.310 and 13CCR2407 must be met. This requires redundant testing for the same engine. KOHLER PROPOSAL The clear intent of the NPRM Proposal is to limit the number of test periods to a maximum of four (4) test periods. However, the NPRM Proposal fails to clearly state this intent and also fails to clarify how to determine the test periods. In concert with the NPRM Proposal's intent, Kohler submits the following clarification and simplification of the PLT requirements in 40CFR1054.310(a) (strike-out and underline addition from current regulation noted). Additionally, to reduce redundant testing for the same engine under both federal and California PLT processes, Kohler suggests that, USEPA accept California PLT testing as an alternative to federal requirements. Kohler's suggests the following regulatory changes: §1054.301(d)(2)* * * Alternatively, we will automatically waive an engine family Production Line Testing program meeting the requirements of 13 California Code of Regulations [CCR] §2407.	As noted in the comment from CARB below, there should be no difference between the EPA and CARB test programs that would require different testing for the two agencies. More importantly, it would not be appropriate for EPA to revise its program to allow manufacturers to choose between programs where there might be some different specifications. EPA needs to oversee compliance with the EPA regulation.
CARB (0030) §1045.310—This change would not adversely impact California spark-ignition marine requirements for these engines as it serves to clarify the existing process for calculating quarterly periods by dividing the annual period by four.	The comment affirms the EPA regulation and the proposed rule.
EMA (0044) 1054.105, California Phase 2 test fuel—EPA should align the test fuel terminology with CARB CALEV III" terminology for consistency **OPEI (0040):** 1054.105— While amendments to the rule are being considered, OPEI recommends alignment of test fuel terminology with CARB "CALEV III" for consistency.	CARB's internal references allow for shorthand terminology. EPA regulations need to reference California test fuels in a way that is clear from outside CARB's regulatory context.

What Commenters Said	Response
EMA (0044) 1054.125, Elimination of current rules for HH maintenance during DF aging—This allowance needs to be maintained since it is the basis for DF aging maintenance for HH engines. **OPEI (0040)** 1054.125, Removed current rules for HH maintenance during DF ageing—The eliminated allowance is the basis for DF ageing maintenance for HH engines. Elimination of this allowance will significantly impact testing and compliance for HH manufacturers without supporting data. OPEI requests further discussion on this proposal.	We learned in a follow-up discussion that the maintenance step in question is cleaning exhaust ports for handheld engines. We address this in §1054.125(a) by allowing manufacturers to get EPA approval for critical emission-related maintenance steps that are more or different than the maintenance steps we identify. We generally approve such maintenance specifications if manufacturers can demonstrate that engine owners perform this maintenance with in-use engines.
CARB (0030) §1054.130— CARB staff agrees with this change [instructions also apply for stationary engines]. Clearer instructions from engine manufacturers will create fewer opportunities for equipment manufacturers to use engines in inappropriate equipment applications.	The comment affirms the proposed rule.
EMA (0044) 1054.205, Requirement to report invalid test results—If tests are determined to be invalid they should not be included in a certification application. **OPEI (0040)** 1054.205, Added requirement to report invalid test results—OPEI is unclear why invalid tests should be included in certification applications. There is no rationale to included invalid test results in a certification application. The proposed requirement should be rejected. OPEI requests further discussion on this proposal.	We proposed to discontinue routine submission of invalid test results, which aligns with the suggestion in the comments. Manufacturers would need to keep a record of invalid tests and submit the data if we request it.
EMA (0044) 1054.230 —Engine manufacturers would like to be allowed to include both open and closed-loop EFI engine configurations in a single engine family. The worst-case engine configuration would be selected for certification purposes. The expanded engine family grouping either should be specifically recognized in the proposed technical amendments, or through written guidance. **OPEI (0040)** 1054.230—OPEI requests EPA consider an allowance to include both open and closed-loop EFI engine configurations in a single engine family. Consistent with the regulations, the worst-case engine configuration shall be selected for certification purposes. If EPA agrees, OPEI requests this expanded engine family grouping be recognized in the proposed technical amendments, or through written guidance.	EPA did not propose to amend the criteria for creating engine families; these comments are therefore outside the scope of this rule. We may consider this issue in an appropriate future rulemaking.
EMA (0044) 1054.245, Adding calculations and assigned DF factors—EPA should provide clarification regarding how those values were determined. **OPEI (0040)** 1054.245, Added calculations and assigned DF factors—OPEI is seeking clarification as to how the proposed values were determined.	The proposed rule simply copied in the provisions from part 90 that have applied for the last 20 years.

What Commenters Said	Response
EMA (0044) 1054.245(a), Remove word in-use—The proposed language conflicts with 1054.245 (b)(2), which allows the use of a representative duty cycle. **OPEI (0040)** 1054.245(a), Added word in-use—The inclusion of "in-use" is inconsistent with 1054.245 (b)(2), which allows the use of a representative duty cycle. The current language should be retained.	The comment betrays a wrong understanding of §1054.245(b)(2). "Representative" duty cycles refers to engine operation that represents in-use operation. We are revising the regulation at §1054.245(b)(2) to clarify this terminology.
EMA (0044) 1054.245(b)(5), Changes in significant figures—The language of this section conflicts with 1054.240(c). EPA should remove the proposed change and instead align the language with 1054.240(c). **OPEI (0040)** 1054.245 (b)(5), Revised significant figure reporting requirement—The language of this section conflicts with 1054.240(c). The proposed language should be reconsidered and harmonized with 1054.240(c).	We agree with the concern expressed in the comment and have revised the regulation accordingly. Calculations properly reference decimal places for additive deterioration factors and significant figures for multiplicative deterioration factors.
EMA (0044) 1054.250, Adding requirement to keep valid and invalid emission tests—EPA should provide the reasoning for this proposed requirement. **OPEI (0040)** 1054.250, Added requirement to keep valid and invalid emission tests—The rationale for this proposed requirement is unclear. OPEI requests further discussion on this proposal.	As described for §1054.205, we proposed to discontinue routine submission of invalid test results. The proposed amendment in §1054.250 merely clarifies that the requirement to keep test records continues to apply for invalid tests. As noted in CARB's comment on §1060.205, this is important for us to be able to consider whether the manufacturer inappropriately invalidated the test or otherwise intended to avoid disclosing test results showing high emission rates. This would apply for incomplete tests to the extent the data collection includes any information to indicate whether emissions might have exceeded the standard for any pollutant.
EMA (0044) 1054.505—EPA should align the provisions for test fuels and timing with the EU Stage provisions to minimize duplicative DF testing **OPEI (0040)** OPEI request EPA consider alignment of the provisions for test fuels and timing with the EU Stage V provisions to minimize duplicative DF testing.	§1065.701(b) allows manufacturers to request approval to use alternate test fuels, such as those specified by European regulations. The changes to allow testing with E10 test fuel will likely make it easier to use ethanol-based test fuels specified in European regulations.

What Commenters Said *(EPA's response follows the three comments listed below)*

EMA (0044)

1054.505 EPA should revise this paragraph as follows:

(d) (1)(iii) If an engine family includes engines used in both intermediate-speed equipment and rated-speed equipment, such as carbureted engine with user-adjustable engine speed control lever, select the test speed for emission-data engines that will result in worst-case emissions as follows.

(a) If all engines in the engine family are used in a full-load speed operation of less than a range of 3,300-3,400 rpm, then select a test speed of A Cycle that is specified in this paragraph (d)(1)(i).

(b) If all engines in the engine family are used in a full-load speed operation of a range of 3,300-3,400 or greater, select a test speed of B Cycle that is specified in this paragraph (d)(1)(ii).

(c) If engines in the engine family are used in a full-load speed below and above a range of 3,300- 3,400 rpm, test on both A Cycle and B Cycle and determine the worst-case for HC+NOx emissions.

(2) In unusual circumstances, you may ask to use a test speed if it better represents in-use operation.

(i) If engines in the engine family are used at a full-load speed of between or equal to 2,400 rpm and 4,200 rpm under steady-state condition, determine A Cycle or B Cycle in accordance with the provisions specified in this paragraph (d)(1).

(ii) If engines in the engine family are used at a full-load speed outside of 2,400 rpm and/or 4,200 rpm under steady-state condition, determine which engine speed produces the worst-case HC+NOx emissions from the entire range of governed speeds.

EMA (0072)

1054.505 Based on further discussion with EMA members industry can work with the 2700 – 4000 rpm range as set forth in the May 11th, Test Cycle Guidance document. However manufacturers understand that that they may request additional flexibility from EPA in determining the appropriate Test Cycle Range for a specific engine family/application based on good engineering judgement. We understand that the EPA Test Cycle Guidance Document will be operative until the time it is superseded by amendment of the regulation.

We are requesting that EPA include the language proposed by EMA in the Technical Amendment Package comments and our further discussion, with the understanding that the rpm range in the amendment will reflect the EPA Guidance Document of 2700 – 4000 rpm (rather than the 2500 – 4000 rpm proposed by EMA).

OPEI (0040)

1054.505 — While amendments to the rule are being considered, OPEI proposes the following revisions to clarify the recently published test mode guidance document:

(d) (1)(iii)

(iii) If an engine family includes engines used in both intermediate-speed equipment and rated-speed equipment, such as carbureted engine with user-adjustable engine speed control lever, select the test speed for emission-data engines that will result in worst-case emissions as follows.

(a) If all engines in the engine family are used in a full-load speed operation which is less than a range of 3,300 and 3,400 then select a test speed of A Cycle that specified in this paragraph (d)(1)(i).

(b) If all engines in the engine family are used in a full-load speed operation which is higher than a range of 3,300 and 3,400, then select a test speed of B Cycle that specified in this paragraph (d)(1)(ii).

(c) If engines in the engine family are used in a full-load speeds below and above a range of 3,300 – 3,400 rpm, test on both A Cycle and B Cycle and determine worst-case for HC+NOx emissions.

(2) In unusual circumstances, such as electronically-governed engine, you may ask to use a test speed different than that specified in this paragraph (d)(1) if it better represents in-use operation.

(i) If engines in the engine family are used at full-load speed of between or equal to 2,4002 rpm and 4,200 rpm, determine A Cycle or B Cycle in accordance with the provision specified in this paragraph (d)(1).

(ii) If engines in the engine family are used at full-load speed outside of 2,400 rpm and/or 4,200 rpm, determine which engine speed produces the worst-case HC+NOx emissions from the entire range of governed speeds.

Response

The comments are largely consistent with recently published EPA guidance related to duty cycles. The suggested approach includes some noteworthy departures from the guidance document, which calls for further discussion to work out the full range of specifications. We may consider amending the regulation in an appropriate future rulemaking to address these issues.

What Commenters Said	Response
EMA (0044) 1054.601, Addition of paragraph d—EPA should provide clarification regarding the need for this new paragraph. **OPEI (0040)** 1054.601, Added paragraph (d)—The rationale for the proposed paragraph is unclear. OPEI requests further discussion on this proposal.	As noted in the proposed amendment, §1054.601(d) gives us a problem-solving tool in case innovation leads to multi-fuel engines that don't fit neatly into categories we have identified to align with current technologies.
EMA (0044) 1054.701, Added reference of "US – directed" in reference to production—EPA should add the same amended definition to section 1054.801. **OPEI (0040)** 1054.701, Added reference of "US – directed" in reference to production—Consider including as definition in §1054.801.	§1054.801 already includes a definition of "U.S.-directed production volume, in line with the suggestion in the comments.
EMA (0044) 1054.705, Industry request consistency in reporting units—Kilowatts should be expressed in the same units as described in 1054.140(a). **OPEI (0040)** 1054.705 —While amendments to the rule are being considered, OPEI suggests the following revision: Harmonize kilowatt reporting requirements with §1054.140(a).	Both §1054.140(a) and §1054.705 refer to engine power expressed in kilowatts. It is not clear that there is a need for an amendment to accomplish the desired consistency and harmonization.
EMA (0044) 1054.730, Removed the reference family and added averaging set—This provision should include a definition of averaging set. **OPEI (0040)** 1054.730, Removed the reference family and added averaging set—OPEI suggests averaging set is clearly defined.	§1054.701(b)(2) defines "averaging set". It is not clear that any amendment is needed to address the concern expressed in the comments.

<table>
<tr><th>What Commenters Said</th><th>Response</th></tr>
<tr><td>EMA (0044)
1054.801, Industry requested clarification on definition of adjustable parameter—Speed control adjustment “rabbit / turtle” is not considered as an adjustable parameter.

OPEI (0040)
1054.801 —While amendments to the rule are being considered, OPEI suggests additional clarification to the adjustable parameters definition.
Per some manufacturers’ discussion with EPA staff the engine speed control adjustment (“rabbit / turtle”) is not considered as an adjustable parameter. This has been a point of confusion for industry in recent years, in-part due to disparate positions of EPA and CARB regarding what is and what is not an adjustable parameter. OPEI agrees the idle speed range control is not an adjustable parameter and requests that this is clarified for the record. OPEI suggests “Engine idle speed adjustments (“rabbit / turtle”) are not considered adjustable parameters in this regulation.”</td><td>Since the beginning of EPA’s emission control programs, manufacturers have been responsible for controlling emissions throughout an engine’s adjustable range. Adjustable parameters can take many forms, but the “rabbit/turtle” feature to control engine speed clearly qualifies as an adjustable parameter. EPA’s confirmatory testing has consistently included speed adjustments using the rabbit/turtle control feature. We will continue this approach.</td></tr>
<tr><td>EMA (0044)
Part 1054, Appendix II—Industry requests the addition of a test cycle for constant speed engines, as set forth below:

<u>Constant Speed Generator Set Test Cycle</u>
<table>
<tr><th>MODE</th><th>SPEED</th><th>LOAD</th><th>WEIGHTING</th></tr>
<tr><td>1</td><td>Rated</td><td>Full</td><td>9%</td></tr>
<tr><td>2</td><td>Rated</td><td>75% of full</td><td>21%</td></tr>
<tr><td>3</td><td>Rated</td><td>50% of full</td><td>31%</td></tr>
<tr><td>4</td><td>Rated</td><td>25% of full</td><td>32%</td></tr>
<tr><td>5</td><td>Rated</td><td>10% of full</td><td>7%</td></tr>
</table>
OPEI (0040)
Part 1054, Appendix II — While amendments to the rule are being considered, OPEI proposes the constant speed engine test cycle is added to Appendix II.

<u>Constant Speed Generator Set Test Cycle</u>
<table>
<tr><th>MODE</th><th>SPEED</th><th>LOAD</th><th>WEIGHTING</th></tr>
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<tr><td>4</td><td>Rated</td><td>25% of full</td><td>32%</td></tr>
<tr><td>5</td><td>Rated</td><td>10% of full</td><td>7%</td></tr>
</table></td><td>We appreciate the comments on this issue. Manufacturers have been using the specified duty cycle as an approved alternative test procedure for many years. We will consider whether to modify the regulation in an appropriate future rulemaking to specify this duty cycle in the regulation.</td></tr>
</table>

What Commenters Said	Response
CARB (0030) §1045.145—CARB staff supports this action in that it increases the emissions stringency for some federally certified sterndrive and inboard engines, bringing them more into alignment with existing California requirements. The amendment would ensure that engines subsequently brought into California that were originally purchased out-of-state meet the most stringent emission standards available.	The comment affirms the proposed rule. However, we note that the deleted provisions have not applied for several years so the change will have no impact.
MIC (0052) MIC requests EPA to consider addressing definitions and provisions of 40 CFR 1051 limiting vehicle applicability, specifically: (1) The ORUV and ATV definitions in 40 CFR 1051.801 that, for side-by-side (UTV) type vehicles, limit the application of the paragraph (2) all-terrain vehicle definition, and (2) The engine power and displacement restrictions 40 CFR 1051.1(a)(4) that prevent the use of 40 CFR 1051 for off-road utility vehicles having an engine displacement > 1,000 cc and a rated engine power > 30 kW. Requiring certification of vehicles exceeding these limits to LSI requirements and standards does not make sense when they are otherwise similar in design and nature to those at or below these limits which are appropriately certified as recreational vehicles. **Polaris (0048)** Polaris thinks that EPA's mandatory E10 efforts for OHRV's would be best served as part of a more comprehensive review of the category, including a review of the emission limit values as applicable, to reflect current technology and to address provisions limiting the applicability of Part 1051 to certain types of off-road vehicles that are currently excluded from the scope of coverage. Specifically, we support appropriate changes that would reduce applicability constraints in the following sections of the Part 1051 regulations: (1) the current all-terrain vehicle (ATV) and off-road utility vehicle (ORUV) definitions in 40 CFR 1051.801 that, for side-by-sides, effectively limit the application of the all-terrain vehicle definition's paragraph (2) to vehicles that meet the primarily intended for recreation criteria laid out in the off-road utility vehicle definition, and (2) the engine power and displacement restrictions in 40 CFR 1051.1(a)(4) that prevent use of Part 1051 for off-road utility vehicles with maximum speeds > 25 mph and having ≥ 1,000 CC engine displacement or ≥ 30 kW power. Off-road vehicles that do not qualify for certification under Part 1051 for either of the reasons above, but that are otherwise similar to vehicles subject to Part 1051, would currently have to be certified under the large spark ignition engine regulation. The LSI regulation's engine-based standards and fixed-mode test cycle do not fit this type of off-road vehicle. The typical LSI engine equipment applications are unlike OHRV's. Such vehicles should be subject to an appropriate chassis-based limit under Part 1051.	EPA did not propose to amend the scope or stringency of ATV or UTV standards; these comments are therefore outside the scope of this rule. As with most of our engine-based programs, the standards in 40 CFR part 1048 are designed to apply for a wide range of equipment types. We have no reason to believe that engines designed to those standards are improper for vehicles that fall outside the scope of 40 CFR part 1051.

3.5 Evaporative Emission Standards for Nonroad Spark-Ignition Engines and Equipment (40 CFR part 1060)

We proposed technical amendments to the regulations that evaporative emission standards, testing, and certification for nonroad spark-ignition equipment.

The material described in this section is addressed more broadly in Section III.I of the preamble to the final rule.

What Commenters Said	Response
EMA (0044) 1060.104, Revise existing language—EPA should further revise this section as follows: (b)(3) Obtain an approved Executive Order or other written approval from the California Air Resources Board showing that your system meets applicable running loss standards in California, or demonstrate that your system is the same as a California Air Resources Board approved system in the case where the engine/equipment is intended to be sold outside of California. **OPEI (0040)** 1060.104, Revised existing language — OPEI suggests the following revision to the proposed language: (b)(3) Obtain an approved Executive Order or other written approval from the California Air Resources Board showing that your system meets applicable running loss standards in California, or demonstrate that your system is the same as a California Air Resources Board approved system in the case where the engine/equipment is intended to be sold outside of California.	The proposed amendment addresses the fact that CARB approval for running loss controls may be established without an Executive Order. This option to demonstrate compliance with running loss standards is intended to be an administrative exercise that relies on California ARB's review process to establish that a given technology is suitable for a particular emission family. For products sold outside of California that have not been certified by California, EPA approval would no longer be an administrative exercise and would instead involve EPA certification staff performing a technical review of the design to make a judgment about whether a system designed for one emission family would meet running loss standards when applied to a different emission family. The regulation establishes no criteria or principles for making these judgments. We therefore conclude that it would be inappropriate to revise the regulation as suggested in the comments.
EMA (0044) 1060.120, Defining start of warranty period—If the purchase date cannot be determined, then the date of production should be the start of the warranty period. **OPEI (0040)** 1060.120, Revised warranty period terms —Because small-engine powered equipment does not require registration like other equipment in this regulation, evidence of the date of sale is generally limited to purchase receipts. OPEI requests the EPA consider further amending the warranty terms to state that where no proof record of the original sales date can be demonstrated, then the equipment production date shall be considered the start of the warranty period.	The proposed amendment simply updates the terminology to refer to "the date the equipment is sold to the ultimate purchaser" instead of the "point of first retail sale." In a future we may revisit the question of implementing warranty requirements in the cases where owners do not have documentation of purchasing the equipment.

What Commenters Said	Response
EMA (0044) 1060.135, Defining relationship of equipment and engine manufacturers in regards to labeling—EPA should revise the Note language as follows: "Note that engine manufacturers are also considered equipment manufacturers if the engine manufacturer installs a complete fuel system on an engine~~they install engines in equipment~~." **OPEI (0040)** 1060.135, OPEI is concerned the revised "Note" language missed the intent. Specifically, regarding SSIE, the intent of the regulation is that if an engine manufacturer installed a complete fuel system to an engine it is concerned [considered] the "equipment manufacturer" in the context of the regulation. (However, we recognize that as proposed, it could also be a true statement if the engine is also the complete equipment OEM.) With SSIE in mind, OPEI suggests the following revision to the proposed change to more clearly clarify the intent of the statement for this sector: "Note that engine manufacturers are also considered equipment manufacturers if the engine manufacturer installs a complete fuel system on an engine~~they install engines in equipment~~."	We agree with the concern expressed in the comment and have revised the regulation accordingly.
EMA (0044) 1060.205, Requirement to report invalid test results—If tests are determined to be invalid they should not be included in a certification application. **OPEI (0040)** 1060.205, Added requirement to report invalid test results—OPEI is unclear why invalid tests should be included in certification applications. There is no rationale to included invalid test results in a certification application. The proposed requirement should be rejected. OPEI requests further discussion on this proposal.	We proposed to discontinue routine submission of invalid test results, which aligns with the suggestion in the comments. Manufacturers would need to keep a record of invalid tests and submit the data if we request it.
CARB (0030) 1060.205—CARB staff notes that U.S. EPA may require reporting of additional test results and believes that reviewing invalid test results can be helpful in evaluating an application.	The comment affirms the proposed rule.

What Commenters Said	Response
EMA (0044) 1060.250, Adding requirement to keep valid and invalid emission tests—EPA should provide the rationale for keeping invalid test results. **OPEI (0040)** 1060.250, Added requirement to keep valid and invalid emission tests—The rationale for this proposed requirement is unclear. OPEI requests further discussion on this proposal.	As described for §1060.205, we proposed to discontinue routine submission of invalid test results. The proposed amendment in §1060.250 merely clarifies that the requirement to keep test records continues to apply for invalid tests. As noted in CARB's comment on §1060.205, this is important for us to be able to consider whether the manufacturer inappropriately invalidated the test or otherwise intended to avoid disclosing test results showing high emission rates. This would apply for incomplete tests to the extent the data collection includes any information to indicate whether emissions might have exceeded the standard for any pollutant.
CARB (0030) §1060.520—CARB staff agrees with the changes to the slosh test. The requirement to "void" a test if the fuel tank leaks in 40 CFR 1060.520(b) may need additional clarification. It is not clear whether an applicant could continue to seek certification based on testing of additional fuel tanks manufactured by the same process as the leaking fuel tank, since that process, without improvements, would have been shown to yield leaking fuel tanks. It is also not clear whether such a voided test would constitute a failure to meet the emission standard or other requirements.	The comment affirms most of the proposed changes to §1060.520. The proposed amendment simply stated that a test should be voided for any kind of leak. Manufacturers use prototype tanks to demonstrate compliance. Before certification is complete, there is therefore no connection to manufacturing processes or the validity of an existing certificate.
EMA (0044) 1060.525, Harmonization of procedures with ARB—EPA should consider adding CARB TP 902 as an optional procedure for diurnal certification. **OPEI (0040)** 1060.525 —While amendments to the rule are being considered, OPEI suggests EPA consider adding CARB TP 902 as an optional procedure for diurnal certification.	EPA did not propose to amend diurnal test procedures; these comments are therefore outside the scope of this rule. Moreover, EPA accepts diurnal data from products certified in California, but there is no EPA-specified diurnal test procedure for Small SI engines or equipment.
EMA (0044) 1060.610, Increase burden to manufacturers— EPA needs to provide more explanation of the reasons for adding this language. **OPEI (0040)** 1060.610, New section added Increase burden to manufacturers—OPEI is concerned the proposed new section unnecessarily increases regulatory burden to manufacturers. OPEI requests further discussion on this proposal.	The proposed provisions mostly clarify how manufacturers can use flexible arrangements for making products at multiple locations and with multiple companies working together to comply. This includes modest documentation requirements that are consistent with what has applied for engine and equipment in 40 CFR 1068.260 for many years.
EMA (0044) 1060.825, Clarifying recordkeeping requirements—There is a numbering error for subpart (e)(1)(iii). **OPEI (0040)** 1060.825, Recordkeeping requirements —Editorial: Missing (e)(1)(iii).	We agree with the concern expressed in the comment and have revised the regulation accordingly. The final rule includes a similar correction in §1054.825(e)(2).

What Commenters Said	Response
EMA (0044) 1060.825(d)—Remove the sentence: "We may require you to send us these records whether or not you are a certificate holder." **OPEI (0040)** 1060.825(d). —"We may require you to send us these records whether or not you are a certificate holder". OPEI is unclear how or why this provision is needed, especially since we understand "you" in the context of these regulations to be a certificate holder. The requirement is unclear, or redundant depending its interpretation, and OPEI suggests it is removed. If the intention is that non-certification holders, not the subject of this regulation, are required to provide certification data, OPEI requests further discussion on this proposal.	We are not aware of any information requirements in 40 CFR part 1060 that would require non-certification holders to submit information. We therefore agree that there is no need or benefit to including reference to "whether or not you are a certificate holder" and have removed that from the amendment. It is appropriate to state that certificate holders must submit compliance information to EPA so we are removing the clause as noted above rather than removing the whole sentence.

3.6 Land-Based Nonroad Diesel Engines (40 CFR part 1039)

The proposed rule included technical amendments to the regulations that apply for land-based nonroad diesel engines.

The material described in this section is addressed more broadly in Section III.F of the preamble to the final rule.

What Commenters Said	Response
EMA (0044) EPA has requested comment regarding whether the smoke test procedures that apply to Parts 1033 and 1039 should be modified. EMA recommends that EPA revise section 1039.105. That provision details which non-road engines require smoke testing. Beyond single-cylinder and constant-speed engines, EPA exempts "Engines certified to a PM emission standard or FEL of 0.07 g/kW-hr or lower." With the full implementation of Tier 4 standards, all non-road categories have a PM standard of 0.03g/kWh or less, except for engines <19kW, and engines >560kW. For engines >560kW, the PM standard is 0.04g/kWh, and 0.03g/kWh for gensets and other engines, respectively. In instances where a manufacturer uses PM credits to certify to an FEL of 0.07g/kWh or higher, the smoke test is required. The smoke test, by the nature of its aggressive torque input, is detrimental to the very expensive high-load capacity dynamometers used for large engines. The cycle is not representative of in-use operation for engines < 19 kW and > 560 kW. It is also a significant burden for < 19 kW engines due mostly to the time it takes to tune the dynamometer to execute the required test cycle. Therefore, EMA recommends that EPA adjust the threshold PM certification level for smoke test requirements from 0.07g/kWh to 0.40 g/kWh. This change would not be expected to result in an increase in smoke emissions, since engines meeting a 0.40 g/kWh PM standard necessarily emit smoke below the smoke standards.	EPA appreciates the input on this area of comment. We may consider the suggested changes in an appropriate future action.
EMA (0044) §1039.205— EMA understands EPA's intent to be clear about the requirements to provide a description of DEF-fill and DEF-quality inducement diagnostics required under §1039.110. EMA recommends that EPA refer to §1039.110 in the provisions of §1039.205(c), so as to be clear about the scope of the diagnostic description requirement. EMA also recommends that the reference to "malfunction indicator lamp" be replaced by "warning lamp" to be consistent with the inducement provisions. The term "malfunction indicator lamp" has a specific meaning linked to OBD regulations.	We agree with the concern expressed in the comment and have revised the regulation accordingly.

What Commenters Said	Response
CARB (0030) §1039.205—This section should explicitly state disclosure of the diagnostic communication protocol (J1939, proprietary, etc.).	We agree with the concern expressed in the comment and have revised the regulation accordingly.
EMA (0044) §1039.740—EPA is contemplating sun-setting the provisions of section 1039.740, which permit manufacturers of land-based non-road CI engines to use Tier 2 and Tier 3 emissions credits when certifying Tier 4 engines. Manufacturers continue to rely on the provisions of section 1039.740 to certify non-road engine families, and EPA should preserve manufacturers' ability to do so in the future.	We agree that the final rule should not remove references to Tier 2 and Tier 3 emission credits.
EMA (0044) §1039.801, definition of "low-hour"— While 125 hours run-time may be adequate for engines not using aftertreatment systems, it is in most cases inadequate for aftertreatment-equipped engines. In aftertreatment-based applications, 125 hours does not meet the stated objective in the definition of representing "an engine that has stabilized emissions" (while also having an "undeteriorated" emissions level). In the preamble, EPA requests "comment on instead specifying the 125-hour threshold only for engines not expected to use NOx aftertreatment." Since EPA recognizes the need for more representative break-in periods for aftertreatment equipped engines, EMA proposes that the Agency make a distinction in the definition to allow aftertreatment-equipped engines to retain the 300-hour limit without the need for approval from the Agency. EMA requests that, just as with respect to nonroad engines, EPA should make a distinction in the "low-hour" engine definition for marine engines, and should allow aftertreatment-equipped engines to retain the 300-hour limit without the need for Agency approval.	We agree with EMA that NOx aftertreatment is a fundamental parameter for determining how long engines need to operate to stabilize emissions. We have revised the regulation to allow for longer stabilization for engines with NOx aftertreatment.
CARB (0030) §1039.801, definition of "low-hour"—CARB supports the concept of placing an upper limit on the definition of low-hour, but requests a more detailed explanation why the selected limits are the most appropriate values. De-greening of aftertreatment often occurs well below the hours specified, especially for engines in the lower power categories. As proposed, these upper bounds are general guidelines which do not supersede the fundamental presumption of low-hour as that duration at which stabilized emissions are achieved; therefore, CARB staff remains neutral with respect to the proposal.	As noted in EMA's comment, engines with aftertreatment typically need more than 125 hours to achieve stabilized emission levels. Especially in the case of SCR aftertreatment, systems and components need more time to go through a de-greening process that allow for stabilized and reliable emission levels. It is important to reach stabilized emission levels to serve as the starting point for comparing full-life emission rates to a low-hour condition.

What Commenters Said	Response
EMA (0044) §1039.101— EPA also should take this opportunity to address the "Alternate FEL cap" sales volume limit, currently set at 5% (See, 40 C.F.R. §1039.101(d)(2).). That provision restricts cost-effective emissions solutions from being deployed in specialized, low-volume agricultural and construction equipment, and so has potentially negative emissions impacts. The volume limit forces engine manufacturers to pick "winners and losers," by being obligated to decide which OEMs are provided ALT FEL engines. Market volumes are constrained due to this regulation. Using Alternate FEL Caps would allow for a more cost-effective emissions solution for low-volume specialty products where a fully-compliant Tier 4 solution would be cost-prohibitive. Removing this volume limit would allow market demands to be met, without any net emissions impact, since credits are required to offset the higher-emissions products. Given the environment-neutral outcome with credit offsets, EPA should eliminate the percentage limit on the annual production cap for both PM and NOx. If the Agency chooses not to eliminate the volume limits, EMA requests that EPA, at a minimum, increase the sales volume limit to 10%.	EPA appreciates the input on this issue for which we requested comment in the proposed rule. We may consider the suggested changes in an appropriate future action.

3.7 Marine Diesel Engines (40 CFR parts 1042 and 1043)

The proposed rule included technical amendments to the regulations that apply for marine diesel engines. The material described in this section is addressed more broadly in Section III.G of the preamble to the final rule.

What Commenters Said	Response
EMA (0044) Category 2 engines also should have the ability to switch between IMO II & IMO III requirements when outside of US waters, since clear compliance guidelines are now in place for approving such systems, and the current on/off controls limitation in Part 1042 is putting SCR-based systems at a disadvantage compared to non-SCR based systems that do not have codified and enforceable monitoring requirements. **Progress Rail (0054)** §1042.115— Add paragraph (h) as follows: (h) <u>On-off controls for Category 2 engines</u>. Manufacturers may equip Category 2 engines with features that disable Tier 4 NOX emission controls subject to the provisions of this paragraph (g). See §1042.650 to determine if this allowance applies for a given Category 1 or Category 2 engine. Where this paragraph (h) applies for a Category 1 or Category 2 engine, read "Tier 2" to mean "Tier 3" and read "Tier 3" to mean "Tier 4". There is market opportunity for Category 2, US flagged vessel certified to Tier4 standards equipped with diluent technologies for emission reduction that operate beyond the emission control area. We petition that Category 2 engines be certified with On-Off controls and comply with Tier 3 standards when operating outside the emission control areas.	EPA did not propose to amend regulatory provisions to allow Category 2 engines to downgrade to a higher-emitting configuration outside of U.S. waters; these comments are therefore outside the scope of this rule. The requested regulatory change would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenters' request.
EMA (0044) §1042.135(c)(13)—The phrase "FOR COMMERCIAL VESSELS" should be removed from the specified wording of the marine engine label at issue, as some of the covered engines may be installed in recreational vessels.	This comment affirms the change proposed for §1043.135.
EMA (0044) §1042.615—The marine engine regulations include unique provisions that are different from some of the tracked engine provisions of 1068.240. EPA has proposed to significantly modify those provisions, although it is difficult to discern the motivation and interpretation of those modifications. One reading of the revised language is that it would allow for the shipment of replacement engines to distributors before the "correct tier" of the replacement engine is determined. If that reading and interpretation is correct, then EPA's revision should be included for the other product lines as well. EPA needs to clarify this issue. EMA's other comments about tracked engines are included below. (See section 1068.240.)	The replacement engine exemption is unique for marine engines in that the advance determination described in §1042.615(a)(1) allows for simplified documentation, which is indeed especially relevant for marine engines shipped through distributors. We may consider amending §1068.240 to address issues related to distributors in an appropriate future action.

What Commenters Said	Response
EMA (0044) §1042.615(a)(1)— EMA does not support the proposed amendments to this section. EMA recommends that EPA continue to exclude all Tier 4 engines from mandatory consideration for replacement engines. Fully compliant products in the Tier 4 engine market must meet additional requirements beyond more stringent emission standards, and necessarily involve significant additional costs and vessel redesigns. To ensure a level regulatory playing field, compliance and monitoring requirements for Tier 4 technologies, other than SCR, should be the same as for SCR-equipped. IMO, for example, has provided that compliance may be demonstrated in a variety of ways, and associated guidelines have been developed for SCR systems, exhaust gas scrubbers, and EGR bleed-off water, such that the requirements for each technology present clear and comparable regulatory burdens.	See Section III.G.1 in the preamble to the final rule for EPA's response related to the proposed change to §1042.615(a)(1). Regarding compliance and monitoring requirements, EPA adopted SCR-related diagnostic and reporting requirements under §§1042.110 and 1042.660 to account for the fact that these emission controls would function only if operators continue to supply Diesel Exhaust Fluid. EGR-equipped engines also require operators to take steps to deal with waste products, but emission controls will continue to function regardless of the operator's behavior. It would therefore be inappropriate to create the same kind of diagnostic and reporting requirements for EGR-equipped engines.
CARB (0030) §1042.615(a)(1)— CARB staff recognizes the role of the replacement engine exemption, which allows newly manufactured engines to meet less stringent standards if replacing an engine on a vessel originally built to accommodate the physical characteristics of uncertified engines or engines certified to less stringent emission standards. CARB funded a study by the California Maritime Academy that showed several in-use marine diesel-powered vessels can successfully accommodate Tier 4 engines with aftertreatment systems. Consequently, CARB staff recommends that U.S. EPA remove the blanket determination listed in 40 CFR § 1042.615(a) that Tier 4 engines with aftertreatment are not suitable replacements for engines certified to less stringent emission standards. CARB staff supports U.S. EPA's proposal to require a case-by-case engineering analysis before granting a replacement engine exemption for Tier 4 engines without aftertreatment, and suggests that U.S. EPA require the same evaluation for all Tier 4 engines – whether they are certified with aftertreatment or not.	See Section III.G.1 in the preamble to the final rule.
CARB (0030) CARB staff recognizes the role of replacement engine exemptions for some in-use vessels, but recommends requiring vessel operators to perform a more thorough and specific case-by-case engineering analysis than specified in 40 CFR § 1042.615(a) to show the cleanest available (i.e., Tier 4 marine) engines do not have the appropriate physical or performance characteristics to replace existing engines that have failed. CARB funded a study by the California State University Maritime Academy (https://ww2.arb.ca.gov/resources/documents/commercial-harbor-craft-tier-4-feasibility-report) that showed the feasibility of repowering in-use dredge, ship assist/escort tug, excursion, slow-speed ferry, and special use vessels with Tier 4 engines without moderate or substantial structural reconfigurations. Therefore, opportunities exist to require the cleanest available engines when Tier 3 and older engines fail on in-use vessels.	See Section III.G.1 in the preamble to the final rule.

What Commenters Said	Response
EMA (0044) §1042.615(a)(3)— EMA supports the Agency's proposal to report tracked engine quantities annually in lieu of reporting within 30 days of each shipped engine. The required breakdown of quantities to be reported by category and by Tier seems unnecessarily burdensome, and EMA requests that the Agency review whether that level of reporting detail adds value to the process. Moreover, there appears to be overlap in the reporting requirements of subsections (3)(i) through (3)(iv), with the same replacement engines being reported multiple times. The whole of those requirements likely could be achieved through a single requirement to report all tracked engine shipments, with a simpler breakdown of engine category and Tier. EMA recommends that EPA review and simplify those provisions. EPA also should add the word "produced" for clarity as shown below in italics: (i) Identify the number of Category 1 and Category 2 exempt replacement engines *produced* that meet Tier 1, Tier 2, or Tier 3 standards, or that meet no EPA standards. Count engines separately for each tier of standards.	1. We agree that paragraph (ii) should be appended to paragraph (i) to clarify that one is a subset of the other. There is no other duplication. 2. The tracking by category and tier is as simple as we can manage to adequately oversee these provisions. 3. The parent paragraph (a)(3) refers to numbers of *shipped* engines; it would be inappropriate to shift the terminology to refer to *produced* engines.
EMA (0044) §1042.615(f)—EMA supports the streamlining of reporting requirements as proposed. EPA should, however, eliminate the reference to "1068.240(b)", and simply state "…if you meet all the requirements of ~~40 CFR 1068.240(b) and~~ this section by the due date of the annual report." EMA agrees that the streamlining proposed related to the use of Tier 3 replacement engines (i.e., because they do not present the complications involved with packaging aftertreatment systems) will likely become obsolete when Tier 4 engines will require replacement in the future. That said, it is difficult to foresee when this allowance should be eliminated, and what special circumstances or considerations ultimately could be involved in making that decision. Therefore, EMA recommends that EPA not include a sunset date in this rulemaking, but rather detail a sunset date in a later rulemaking when the appropriate experience and data have become available to make a reasoned decision on this matter.	1. We agree that the reference to 1068.240 should be removed. 2. We agree that there is no clear point in time when we should sunset the simplified documentation for Tier 3 replacement engines. We may revisit that in an appropriate future action.

What Commenters Said	Response
CARB (0030) CARB staff also suggests that U.S. EPA should not allow exemptions to purchasing Tier 4 replacement engines in all situations where the assessed vessel value doubles and the vessel is therefore classified as "new" pursuant to 40 CFR § 1042.901 without establishing an exemption criteria requiring engineering and financial analysis. We recognize the need for in-use vessels with older, worn, and higher-emitting engines to have options for installing engines certified to cleaner standards. However, determining the value of a vessel could be subjective, and older in-use vessels with a lower pre-project value equipped with older Tier or pre-Tier 1 engines could potentially double in assessed "value" more frequently than newer in-use vessels when undergoing modifications and installing new Tier 4 engines. Exemptions granted by the assessed value doubling methodology has the potential to slow fleet turnover to Tier 4 engines in cases where Tier 4 is already technically feasible in some older vessels operating higher-polluting engines. Therefore, CARB staff recommends that U.S. EPA should require vessels to purchase Tier 4 replacement engines if they are certified, available, and installation is determined to be feasible through engineering analysis.	"Assessed value" is used to determine whether a vessel becomes new. It is not a trigger for applying exemptions. Exemption for vessels that become new by modification is approved only if a financial and feasibility assessment determines that Tier 4 engines are not suitable. The proposed approach is consistent with CARB's recommendation.
EMA (0044) §1042.625(a)(1)(iv)— EMA recommends that the "emergency engine" definition be amended to include any engine that is installed in a location that requires engines meeting ASTM F2876 requirements, or that is a direct drive fire-pump used exclusively for operating fire-pumps.	EPA did not propose to treat direct drive fire pumps as an additional emergency application under §1042.625; this comment is therefore outside the scope of this rule. We may consider the suggested change in an appropriate future action.
Progress Rail (0054) §1042.650(a)—Based on market needs to operate category 2 vessel outside the territorial waters of United States where ULSD and or urea may not be available, we petition that provision for exemption includes vessel requiring USLD and or urea.	Referencing the availability of diesel exhaust fluid is appropriate to reflect the policy as originally described in the 2008 rule and adopted at §1042.650(a). We are making this change in the final rule.
EMA (0044) Like IMO, EPA should apply comparable section 1042.660(b) monitoring and reporting requirements for all emission control systems that are competitive with SCR systems. The regulation of one technology and not another creates an uneven regulatory playing field when monitoring and reporting requirements are not uniform for each technology. That is particularly the case when end-users can assess the different compliance requirements and costs when choosing an engine technology.	This comment is outside the scope of this rule. We may consider it in an appropriate future action. Note that the MARPOL Annex VI program is independent of the Clean Air Act, and thus EPA is not required to harmonize with MARPOL Annex VI.

What Commenters Said	Response
Progress Rail (0054) §1042.660(b)— We petition removing reporting requirements for the two urea related faults. With availability and acceptance of urea as a reductant well established in the marketplace, adding the reporting requirements puts an additional burden on customers. Recording of reductant quality and tank level faults will continue in non-volatile memory and accessed by EPA for audit.	EPA did not propose to amend the referenced reporting requirements; these comments are therefore outside the scope of this rule. The diagnostic requirements in §1042.110 and the DEF-related reporting requirement in §1042.660 reflect the operator's responsibility to keep the engine in a certified configuration. The requested regulatory change would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenters' request. We may consider the suggested changes in an appropriate future action, depending on whether future information supporting such a change is forthcoming.
Progress Rail (0054) §1042.815(a)—If a certified kit, meeting the availability requirement exist, any additional kit meeting stringent emission requirement also becomes available. This section of the rule limits the ability to certify and make emission kit available that significantly lowers emission with technology that otherwise exceeds $45,000 per ton PM removal threshold. Certified kits for the same engine configuration that meets $45,000 per ton PM as an optional kit that significantly lowers both NOx and achieves 25% PM emission are also available. Some customers and local authorities require installation of kits at lower emission level and are willing to accept the increased kit cost due to added technology. We petition for a review of this requirement.	EPA did not propose to amend the provisions related to certifying or demonstrating availability of remanufacturing kits or systems; these comments are therefore outside the scope of this rule. The requested regulatory change would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenters' request. We may consider the suggested changes in an appropriate future action, depending on whether future information supporting such a change is forthcoming.

What Commenters Said	Response
Progress Rail (0054) §1042.836(a)(4)— EPA has proposed eliminating §1033.150 Interim provisions for availability cost calculation. Accordingly, we propose elimination of total marginal cost calculation per 1042.815.	The locomotive provision in §1033.150 is obsolete. The marine program is designed differently, such that the cost threshold continues to apply. We did not propose to eliminate the total marginal cost calculation in §1042.815; this comment is therefore outside the scope of this rule.
EMA (0044) EPA has interim provisions in the regulations for locomotive engines — section 1033.150. Similarly, and as detailed above, the corollary requirements for remanufactured marine engines in sections 1042.815 and 1042.836(a)(4) should be revised to include consideration of Tier 3 and Tier 4 engines.	This comment is outside the scope of this rule. We may consider the suggested change in an appropriate future action.
Progress Rail (0054) To facilitate overhaul of engine after the end of useful life, we petition marine engine regulation include certification of emission kits covering Marine Tier 3 and Tier 4 standards. Note marinized rail kit options exist for Tier 0, Tier 1, and Tier 2 under CFR 1033 certified engine families.	EPA did not propose to amend the provisions related to certifying or demonstrating availability of remanufacturing kits or systems; these comments are therefore outside the scope of this rule. The requested regulatory change would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenters' request. We may consider the suggested changes in an appropriate future action, depending on whether future information supporting such a change is forthcoming.
Progress Rail (0054) §1042.820— Add: (h) A remanufacture kit certified to Tier 3 and Tier 4 emission standards for engine overhaul. Based on customer feedback and the availability of emission kit including marinized rail kit, there is a market demand for a certified Tier 3 and Tier 4 marine engine emission kit. It simplifies the maintenance practices for the customer.	This comment is outside the scope of this rule. We may consider the suggested change in an appropriate future action.

What Commenters Said	Response
EMA (0044) §1042.801, definition of "low-hour"— While 125 hours run-time may be adequate for engines not using aftertreatment systems, it is in most cases inadequate for aftertreatment-equipped engines. In aftertreatment-based applications, 125 hours does not meet the stated objective in the definition of representing "an engine that has stabilized emissions" (while also having an "undeteriorated" emissions level). In the preamble, EPA requests "comment on instead specifying the 125-hour threshold only for engines not expected to use NOx aftertreatment." Since EPA recognizes the need for more representative break-in periods for aftertreatment equipped engines, EMA proposes that the Agency make a distinction in the definition to allow aftertreatment-equipped engines to retain the 300-hour limit without the need for approval from the Agency. EMA requests that, just as with respect to nonroad engines, EPA should make a distinction in the "low-hour" engine definition for marine engines, and should allow aftertreatment-equipped engines to retain the 300-hour limit without the need for Agency approval.	We agree with EMA that NOx aftertreatment a fundamental parameter for determining how long engines need to operate to stabilize emissions. We have revised the regulation to allow for longer stabilization for engines with NOx aftertreatment.
CARB (0030) CARB staff suggests that U.S. EPA consider a more stringent [Marine CI] PM standard that would align with CARB's proposed At Berth Regulation (https://ww2.arb.ca.gov/rulemaking/2019/ogvatberth2019) at 0.03 grams per kilowatt-hour. The benefit of doing so would result in significant health benefits to affected port communities and send a strong signal to manufacturers for the appropriate target for auxiliary engine development.	We did not propose new standards for Marine CI engines, so the comment is outside the scope of this rule. We may consider the suggested change in an appropriate future action.

3.8 Locomotives (40 CFR part 1033)

The proposed rule included technical amendments to the regulations that apply for locomotives and locomotive engines.

The material described in this section is addressed more broadly in Section III.E of the preamble to the final rule.

<table>
<tr><th>What Commenters Said</th><th>Response</th></tr>
<tr><td>
Progress Rail (0054)
Amend Table 2 – switch locomotive standards Tier 3 and Tier 4 switch locomotive standards:
<table>
<tr><th rowspan="2">Year of original manufacture</th><th rowspan="2">Tier of standards</th><th colspan="4">Standards (g/bhp-hr)</th></tr>
<tr><th>NOX</th><th>PM</th><th>HC</th><th>CO</th></tr>
<tr><td>2011-2014</td><td>Tier 3</td><td>8.1</td><td>0.13</td><td>0.60</td><td>2.4</td></tr>
<tr><td>2015 or later</td><td>Tier 4</td><td>3.1</td><td>0.04</td><td>0.14</td><td>2.4</td></tr>
</table>
Linehaul Tier 2 and Tier 3 standards are identical. Petition to change Tier 3 switch locomotive standards identical to Tier 2 switch standards. Duty cycle weighting factors limit the ability to meet Tier 3 switch locomotive standards thus limiting production or conversion of remanufactured or refurbished switch locomotives. Similarly, Tier 4 locomotives utilizing diluent to achieve emission reduction are limited by operating temperatures at lower throttle notches. We petition to change the emission limits as shown in the amended Table; “Amend Tier 3 and Tier 4 switch cycle locomotive standards.”
Improvements in PM emission of less than 10% for a Tier 2/ Tier 3 locomotive (standard: 0.1 g/bhp.hr) does allow a change in FEL. We petition FEL for PM emission to be set to three significant digits after the decimal point. This change will provide incentive in lowering PM emission.
</td><td>
EPA did not propose to amend the switch locomotive standards; these comments are therefore outside the scope of this rule.
The regulatory change that the commenter requests would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenter’s request. We may consider the suggested changes in an appropriate future action, depending on whether future information supporting such a change is forthcoming.
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<tr><td>
Progress Rail (0054)
[EPA proposed to remove §1033.150(k) and (m) from the CFR. §1033.150(k) allowed manufacturers to use test fuels specified in §92.113 for testing performed during calendar years 2008 and 2009. §1033.150(m) allowed remanufacturers to certify using assigned deterioration factors for certifying remanufactured engines in 2008 and 2009.]
Note some of our certification application includes downward adjustment for test fuels (k) and upward adjustment (m). Petition to continue previously certified engine families under this provision to remain certified. The proposed change may otherwise result in burden of additional testing. For future certification, we are in support of the proposals.
</td><td>
We agree that §1033.150(k) remains relevant because carryover data provisions allow manufacturers to continue certifying locomotives tested in 2008 and 2009. We will keep paragraph (k) in the CFR. The assigned DF provisions in paragraph (m) allow for certification only in model years 2008 and 2009, so there is no need to keep that paragraph.
</td></tr>
</table>

What Commenters Said	Response
Progress Rail (0054) §1033.601(c)(4): identical configuration exemption— EMD sold locomotives outside the United States that were identical to EPA certified locomotives. We petition such locomotives be included under this exemption.	§1033.601(c)(4) states that the identical configuration exemption from §1068.315 does not apply for locomotives. We did not propose to amend this part of the regulation; this comment is therefore outside the scope of the rule. The regulatory change that the commenter requests would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenter's request.
Progress Rail (0054) §1033.640(f)(2)— During the locomotive rulemaking it was recognized that replacement rates for existing locomotives compared to freshly manufactured locomotives are low. Particularly the replacement rates for EMD Progress Rail locomotives are significantly lower and this in turn lowers the replacement rate for older locomotives. A remanufactured line-haul locomotive that is considered refurbished is subject to the current standards for freshly manufactured line-haul locomotives. To fulfil EPA's emission reduction target proposed during the rule making, we petition refurbished locomotive meet Tier 3 standards. This will achieve emission reductions from locomotives that would otherwise remain at Tier 0+ emission standards. During the locomotive rulemaking it was recognized that replacement rates for existing locomotives compared to freshly manufactured locomotives are low. In particular the replacement rates for EMD Progress Rail locomotives are significantly lower and this in turn lowers the replacement rate of older locomotives. To positively impact this troubling decades-old trend and improve the turnover of the older locomotives, EMD Progress Rail is proposing this emission kit that would voluntarily cause to end the service life of older locomotives that would otherwise remain in service. Locomotives voluntarily reaching their end of service life due to the proposed kit certified under a new FEL will generate positive emission credits.	EPA did not propose to revise provisions related to marine remanufacturing standards or certification; this comment is therefore outside the scope of this rule. The regulatory change that the commenter requests would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenter's request. We may consider the suggested change in an appropriate future action, depending on whether future information supporting such a change is forthcoming.
Progress Rail (0054) §1033.705— We petition to clarify emission credit calculations are for service life of the locomotive.	§1033.705 describes how to calculate emission credits based on the useful life, with a proration factor to account for the locomotive's estimated remaining service life. Adding further description would only risk confusing how these provisions apply, and the agency concludes that the requested change is not necessary.

What Commenters Said	Response
Progress Rail (0054) §1033.705—The calculations result in under reporting of generated credits when averaging multiple locomotives in a given engine family. EMD recommends the following change "For multiple locomotives the average age of the locomotive be rounded to first decimal place and the proration factor be recalculated". For example, the average age of 10 line haul locomotives for a given engine family is 12.3 years. The proration factor for a 12-year locomotive is 0.54 and for a 13- year locomotive is 0.50. The calculated Adjustment factor will be 0.54-(0.54-0.50)*(12.3-12) = 0.531 calculated to (3) three decimal places.	We may consider changes to provisions governing the precision for calculating and reporting credits in a future rule that involves revised emission standards. The regulatory change that the commenter requests would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenter's request. Until then, we are not prepared to make changes that could change the stringency of current standards, or to require EPA or manufacturers to go through the effort to modify reporting templates and practices.
Progress Rail (0054) Petition to allow positive credits generated from hybrid, battery electric, and fuel cell based locomotives that includes publicly funded projects be held by the certificate holder. This will provide further incentive to the certificate holder to invest in new technologies.	We did not propose to amend locomotive credit calculations; this comment is therefore outside the scope of this rule. The regulatory change that the commenter requests would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenter's request. We may consider the suggested change in an appropriate future action, depending on whether future information supporting such a change is forthcoming.
Progress Rail (0054) §1033.740—We report credits generated under PART 92 as PART 92 credits in the AB&T form. Petition to keep §1033.740 Credit restrictions rule as is.	We expect to modify credit accounting to no longer differentiate emission credits based on part 92 or part 1033 certification. In the meantime, we will keep §1033.740(a), but refer to model years instead of a referencing CFR text that is no longer in print.
Progress Rail (0054) 1033.925— While the information seems REDUNDANT, but it serves as an important reminder FOR SMALL RAILROADS and operators. We petition to keep the existing language under § 1033.925 (e) as is.	It is not clear that repeating information twice in a single section is necessary or effective in increasing compliance rates. We are adopting the correction as proposed.

What Commenters Said *(EPA's response follows the comment below)*

AAR (0045)

AAR's comment focuses on additional changes to the locomotive emissions labeling requirements imposed under 40 C.F.R. § 1033.135. Specifically, AAR requests that EPA amend the current regulations to allow for the electronic tracking of the emissions label requirements on the locomotive cab and engine to maintain emissions compliance.

These labeling requirements were part of the initial locomotive regulations promulgated more than 20 years ago and impose a requirement that labels be applied to the cab and engine of a locomotive in order to maintain emissions certification. Placarding and decals were a product of a time when equipment-specific recordkeeping methods had not advanced to the level of technological sophistication we currently enjoy in the United States. Moreover, these regulations present significant practical challenges and costs associated with maintaining physical labels in areas exposed to extreme conditions that continuously challenge the integrity of the label. Vandalism is also an issue.

To be clear, AAR is not requesting an exemption from the emissions regulations. Rather, AAR is requesting that the required data be collected in an online database that is readily accessible by railroad personnel for observation by EPA and other government agencies.

The locomotive emissions labeling regulations are found in 40 C.F.R. § 1033.135. There are two types of required emissions labels – one for the locomotive and another for the engine.

The regulations also include a detailed list of the information required to be reflected in each label affixed to engines in order to satisfy the labeling requirements.

There is significant overlap between the information required to be printed on the two types of locomotive emissions labels, creating redundancy and the possibility for conflicting information.

II. Physical Locomotive Labels are Outdated and Problematic. AAR is requesting the discontinuation of emission label requirements on the cab and engine currently required to maintain emissions compliance. During emissions audits, labels placed externally on cabs are often found to be damaged as a result of the various harsh environments to which they are subjected. These include extreme temperature changes, rain, wind, sun, and debris. Exposure to these conditions causes the labels to crack, fade, otherwise become damaged, and, in some cases, be completely lost. Cab labels, because they are externally applied, are also subject to vandalism, scuffing and can degrade over time due to cleaning.

Similarly, engine labels, although applied to the engine and not directly exposed to weather, suffer similar harshness at the hands of lubricating oil residue and the rapid heating and cooling as varying levels of power are demanded of the engines. Engine labels can also be damaged when employees are maintaining the engines.

Importantly, when damaged or lost, replacing locomotive labels is far from straightforward. The process involves a long lead time and significant costs (including locomotive out-of-service time). Indeed, manufacturers routinely struggle to provide replacement labels in a timely manner, generally resulting in anywhere from 1 to 2 months lead time. And even when the replacement label is received, railroads are presented with a logistical challenge associated with getting the label to the particular shop location where the locomotive is stored, out-of-service.

The current process also creates practical problems associated with the application of the labels, which generally come in kits. There are many variations of the locomotive emissions labeling kits, many of which are produced with blank spaces that must be filled in by employees, thereby introducing the risk of variability and errors. The legibility of handwritten information has also been an issue.

III. Proposed Amendment. AAR proposes the labeling requirements be amended to allow for the electronic collection of the same data required to be printed on physical labels in a database available to the locomotive manufacturer and EPA. Specifically, AAR suggests the addition of a new 40 CFR 1033.135(f):

> (f) In lieu of affixing a label on the locomotive or engine, each manufacturer or remanufacturer may use an electronic record containing the information required to be on the respective locomotive or engine labels. Any remanufacturer must update the electronic record for the engine and/or locomotive, as applicable, each time the locomotive or engine is remanufactured, identifying the most recent certification. The manufacturer or remanufacturer must maintain the electronic record for the locomotive or engine throughout its service life and must provide the electronic record to the next subsequent owner of the locomotive or engine. Electronic records must be made available to EPA for inspection and copying upon reasonable request.

IV. Conclusion. Promulgating this change will improve the emissions tracking process for AAR members, locomotive and engine manufacturers and remanufacturers, and EPA in several ways. First, tracking locomotive emissions

information in an electronic format will allow for real time updates and tracking. Second, using electronic labels containing the pertinent emissions information will eliminate the real-life concern of damage to physical labels due to harsh operating conditions in which locomotives and engines must operate, while improving access to this information by allowing input or viewing only by authorized database users and regulators. This will not only prevent corruption of the emissions information, but will also enable efficient auditing of the emissions information through an online database. In addition, updating the outdated labeling requirements for locomotives will reduce material and labor costs associated with renewing labels. Moreover, allowing for implementation of an electronic means of labeling locomotives and engines furthers the EPA's technology advancement initiatives by designing regulations that are easier to implement and enforce through use of technology.

Response

EPA did not propose to amend labeling requirements; this comment is therefore outside the scope of this rule. The regulatory change that the commenter requests would necessitate EPA requesting, obtaining and analyzing additional data to determine whether such a change would be appropriate to propose. Such a proposal to make this change would also require EPA to provide another round of public comment on the amendment and its technical, policy and legal bases before the agency could consider whether to promulgate any final change reflecting the commenter's request. We may consider the suggested change in an appropriate future action, depending on whether future information supporting such a change is forthcoming.

3.9 Stationary Engines (40 CFR part 60)

We proposed to amend the regulations related to New Source Performance Standards in 40 CFR part 60, subpart IIII and subpart JJJJ. Most of these amendments were necessary for correcting regulatory citations to 40 CFR parts 89 – 94, which we are proposing to remove in this rulemaking.

The material described in this section is addressed more broadly in Section III.B.2 of the preamble to the final rule.

What Commenters Said	Response
API (0029), GPA Midstream (0051), Class of '85 (0053), INGAA (0047), and EMA (0060) The regulation at 40 CFR 60.4243(f) refers to the definition of "engine rebuilding" in 40 CFR 94.11(a) that describes conventional engine overhauls. The current regulation sets an appropriate trigger for the testing requirements that apply for rebuilt stationary engines. The proposed rule removes 40 CFR part 94 such that 40 CFR 60.4243(f) relies on a definition of "rebuilding" from 40 CFR 1068.120, which broadens the scope of rebuilding to inappropriately include turbocharger replacement and other routine maintenance steps. The Class of '85 further recommended copying the text of the rebuilding definition directly into 40 CFR 60.4243(f) to avoid creating a change in policy.	We agree with the comments and will revise the final rule accordingly.
EMA (0044) 60.4210(k) What are the values for the proposed assigned DFs? EMA anticipates those values would apply both above and below 560 kW. What useful life would the assigned DFs cover? In that regard, an 8000 hour requirement would greatly exceed the hours of use of emergency engines. The 75th percentile is an appropriate basis for selecting DFs. EPA's regulations for stationary emergency engines are generally consistent with CARB's and do not require separate certification or DF requirements.	We intend to publish a guidance document with assigned deterioration factors once the final rule is complete. These published values will reflect currently available information, and we may updated those values in the future as additional information becomes available. We are also revising the regulations for the final rule to (1) reference the relevant regulatory provisions in 40 CFR parts 1039, 1042, and 1048 for compression-ignition and spark-ignition engines and (2) clarify that the usual approach of limiting assigned deterioration factors to small businesses does not apply for emergency stationary engines.
EMA (0044) Delete provisions from 40 CFR parts 60 and 63 that the court has vacated.	We did not proposed revisions to remove vacated provisions; this comment is therefore outside the scope of this rule. We may consider the suggested amendment in an appropriate future rulemaking.

What Commenters Said	Response
EMA (0044) 60.4212(a) —EPA should amend 60.4212 (a). Alternatively, for stationary CI ICE that comply with the Tier 2 or Tier 3 emission standards, as described in 40 CFR Part 1039, Appendix I, or with the Tier 2 emission standards, as described in 40 CFR Part 1042, Appendix I, performance tests may follow the testing procedures specified in §60.4213, as appropriate, *and also may apply a humidity correction to NOx measurements as prescribed in 1065.670.*	The proposed rule did not include a change to allow humidity correction for stationary engines; this comment is therefore outside the scope of this rule. We may consider this for a future rulemaking.
EMA (0044) 60.4216 —EPA should clarify that for 2014 MY and newer engines: Larger engines with displacements ≥ 30 l/cylinder need to meet the requirements of § 60.4205 (emergency engines). **EMA (0060)** EMA understands this issue is beyond the scope of the proposed Technical Amendments, and that the Agency cannot take the requested action at this time.	As noted in EMA's follow-up comments, this issue is outside the scope of this rule. We did not propose the suggested revisions.
EMA (0044) 60.4241 —EPA should clarify whether the new language will eliminate the volume restrictions and apply more generally.	As stated in the proposed regulatory text, the allowance to certify using assigned deterioration factors applies for all stationary engines subject to 40 CFR 60.4241.
EMA (0044) 60.4241(i)— EPA regulation states that "For engines being certified to the voluntary certification standards in Table 1 of this subpart, the VOC measurement shall be made by following the procedures in 40 CFR 1065.260 and 1065.265." Referring to subpart C eliminates the need for detailed revisions if any new Part 1065 methods are added in the future. This provision should be revised to reference Subpart C, as follows: *For engines being certified to the voluntary certification standards in Table 1 of this subpart, the VOC measurement shall be made by following the procedures in 40 CFR (Subpart C).*	EPA intended to align these measurement procedures for stationary and nonroad engines. We have modified the regulation as recommended in the comment. This change has the practical effect of allowing VOC measurement with a Fourier transform infrared analyzer meeting the requirements of 40 CFR 1065.266. This is a widely acceptable method for reliably measuring engine emissions.
EMA (0044) 60.4242— EPA should clarify whether the new amended language is in error, and whether the language ***"for engines that are certified"*** should be added in order to avoid any misinterpretation (see bolded text). **EMA (0060)** The revision to 60.4242(a) as proposed by EPA removes the term "that are certified" and combines the requirements of Parts 1048, 1054 and 1068. EMA recognizes parts 1048 (per 60.4242(e)) and 1068 (see 1068.1(10)) apply, albeit narrowly, to engines manufactured for site compliance testing by owner operators. Part 1054 does not apply to engines that are performance-tested on-site and this distinction is not clear in the EPA proposed text.	The current regulation refers to "engines that are certified to the emission standards in 40 CFR part 1048 or 1054" to say that they are also subject to 40 CFR part 1068. Engines that were certified to 40 CFR part 90 were not subject to part 1068. Since the reference to part 90 is going away, it is no longer necessary to make this distinction. The regulation already states that requirements apply "if applicable" to accommodate the exception for certain engines that are not subject to certification requirements. We are therefore finalizing the amendment as proposed.

What Commenters Said	Response
Class of '85 In response to EPA's request for comments on the need for other technical corrections and clarifications, the Class of '85 would like to call to EPA's attention an area of ambiguity in Subparts IIII and JJJJ that may benefit from further clarification. Subparts IIII and JJJJ require facilities to maintain certification of engines by complying with the manufacturer's written emission-related instructions. However, manufacturers do not always clearly identify which instructions are "emission-related," nor do the regulations clearly delineate the type of equipment considered to be "emission-related." The Class of '85 recommends that EPA engage with stakeholders to determine whether it would be appropriate to provide greater clarity on this issue in the regulatory text or in guidance that would apply prospectively to new engines where such instructions are ambiguous. **EMA (0060)** Subpart JJJJ, IIII, Part 1042 or 1039 "emission-related maintenance" instructions may be spelled-out in the air handling section for turbochargers, in the fuel system section for the fuel components, etc., or may be consolidated in their own "emissions-related maintenance" table format in other cases. Therefore, there is not one "normal" format for emissions-related instructions in the industry. A regulatory requirement to use a specific "normal practice" would require significant work within industry, and such a proposed mandate would require significant lead-time to implement for the thousands of product manuals that are issued in a variety of languages.	Manufacturers certifying stationary engines generally meet the information requirements that apply for nonroad engines, which includes emission-related maintenance instructions. The regulation includes detailed specifications about how manufacturers should prepare their instructions. In contrast, 40 CFR part 60, subparts IIII and JJJJ require owners and operators to follow both emission-related maintenance instructions and emission-related operating instructions, but there is no specified protocol for manufacturers to follow when preparing their emission-related operating instructions (see §60.4211(a) and 60.4243(a)). EPA did not propose to amend requirements related to maintenance or operating instructions; this comment is therefore outside the scope of this rule. However, we will consider how we might amend the regulation in an appropriate future rulemaking or otherwise work with engine manufacturers to clarify how to prepare these instructions for users.

What Commenters Said	Response
MTU (0071) Part 89 defines adjustable parameters as follows: Adjustable parameter means any device, system, or element of design which is physically capable of being adjusted (including those which are difficult to access) and which, if adjusted, may affect emissions or engine performance during emission testing. Part 1039 defines adjustable parameters as follows: Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation. This includes, but is not limited to, parameters related to injection timing and fueling rate. You may ask us to exclude a parameter that is difficult to access if it cannot be adjusted to affect emissions without significantly degrading engine performance, or if you otherwise show us that it will not be adjusted in a way that affects emissions during in-use operation. Both definitions refer to emission testing as the trigger for determining emissions impact. However, emissions testing in Part 89 is defined differently compared to Part 1039. Part 89 defines the appropriate duty cycle according to Subpart E Appendix B Table 2 as a combination of engine torque and speed points at rated speed. Part 1039 defines the appropriate duty cycle according to Subpart I Appendix II (a)(1) as a combination of engine torque and speed points at engine governed speed. In addition, Part 1039 is also referring to in-use operation which Part 89 does not. Consequently, it is [the] understanding that some of the parameters which are adjustable would not fall under the official adjustable parameters definition if tested and certified under Part 89 requirements but would become official adjustable parameters if tested and certified under Part 1039. An example of such a parameter is the engine droop setting which is typically adjustable between 0 and 5% of engine rated speed. If such an engine is tested under Part 89 requirements you would always test this engine with a droop setting of 0% because the duty cycle requirement is to operate the engine at rated speed. Plus Part 89 does not refer to in-use operation. You would also not list this parameter as an adjustable one because it would not fall under the Part 89 definition. On the other hand, if such an engine is tested under Part 1039 requirements you would have to test this engine with a droop setting of 0% and 5% because the duty cycle requirement is to operate the engine at governed speed. Plus Part 1039 does refer to in-use operation. In this case you would also list this parameter as an adjustable one. Given the above and your below feedback, it would also be the understanding that for the engine families which have previously been certified under Part 89 – and still refer to Part 89 standards –[the manufacturer] doesn't have to report additional adjustable parameters which would be considered as such if certified under Part 1039.	We recognize that the changed definition of "adjustable parameter" may introduce uncertainty about testing. As is normally the case with revised test procedures, we believe it is most appropriate to allow continued carryover of any certification that was based on the procedures and definitions under 40 CFR part 89. We did not intend for the administrative exercise of eliminating otherwise obsolete content in 40 CFR part 89 to create new testing requirements. However, under the amended rule, any new testing for certification would depend on meeting all the requirements that apply under the new definition of "adjustable parameter".

3.10 General Testing Provisions (40 CFR parts 1065 and 1066)

The proposed rule included technical amendments to the general testing provisions in 40 CFR part 1065 and to the vehicle testing provisions in 40 CFR part 1066.

The material described in this section is addressed more broadly in Section II.A.3 and II.A.4 of the preamble to the final rule.

What Commenters Said	Response
Auto Innovators (0049): § 1065.303—At 40 C.F.R. § 1065.303, EPA notes that linearity verification for intake-air, dilution air, diluted exhaust, and batch sampler flow rates is not required if the accuracy of the flow signal is verified by a propane check or by a carbon balance error verification. A constant volume sampler (CVS) bag fill mass flow controller (MFC) measures a "batch sampler flow rate" as in Table 1 of § 1065.303. Propane verification does not significantly exercise this MFC and will not detect non-linearity of its output signal. This could compromise proportionality of sampling during vehicle tests. The proportionality verification under § 1065.545 will not detect nonlinearity as it assumes accuracy/linearity of the MFC output signal. We recommend adding additional text to the proposed footnote d to Table 1 of § 1065.303 to read, "We recommend linearity verification be performed for flow control devices that are used to maintain proportionality in batch samplers."	We agree that it is appropriate to add the suggested optional procedure as it is good practice and have revised the regulation accordingly.
EMA (0044) 1065.307, Linearity Verification—EPA should provide more explanation of the reasons for changing max references to smallest engine. **OPEI (0040):** 1065.307, Linearity verification— OPEI requests further discussion on this proposal as it relates to the wide range of engine designs and displacement ranges included in SORE.	The proposed amendment was intended to ensure that the linearity limits were not unrealistically large. Linearity must be held tight enough to get robust measurements from engines that have the lowest fuel flow rates.
EMA (0044) 1065.360(a)(4), Adds new requirement to determine methane and ethane THC FID response factors as a function of exhaust molar water content when measuring emissions from a gaseous-fueled engine—EPA should remove the last sentence in the preamble language; it is an incorrect statement. Regulation uses "may," so this is not a requirement. It is an option.	The intention was that this provision is optional, however if you choose this option you must generate and verify the humidity as described in 1065.365(d)(12). We agree with the comment and will revise the description in the preamble and update the reg text in 1065.360(a)(4) in the final rule accordingly.
EMA (0044) Preamble reference to 1065.370(e)(3)(i) and (ii). Edits made to clarify intent—This section should be labeled 1065.307, not 1065.370.	We agree with the comment, noting that the changes in the draft regulatory text in the proposal were made to the correct section 1065.307. We will revise the description in the final rule accordingly.

What Commenters Said	Response
Auto Innovators (0049): § 1065.370—EPA proposes to update 40 C.F.R. § 1065.370 to allow the use of water vapor injection for humidification of gases. EPA's approach in § 1065.370 is to use the term "humidity generator" in place of language describing the "bubbler" method. However, in all other proposed revisions to allow the use of water vapor injection (40 C.F.R. §§ 1065.309, 1065.342, 1065.350, 1065.355, and 1065.375), EPA keeps language describing the "bubbler" method and adds language explicitly describing a device that injects distilled water as vapor. Auto Innovators supports expanding methods for humidification of gases, but recommends that EPA use a consistent approach in all affected sections. If EPA prefers to create the new term "humidity generator" for use in these sections, we recommend that a definition be provided in 40 C.F.R. § 1065.1001 that would include both the "bubbler" and water vapor injection methods. **EMA (0044)** 1065.370(e)(5), Updated to allow the use of water vapor injection for humidification of gases—The reference to a bubbler was removed. Sections 1065.309, 342, 350, 355, 375 all maintain language that reference a bubbler for humidification of gases. Consistency is required concerning maintaining/allowing the use of both the bubbler and a humidity generator. **VW (0039)** §1065.370—Volkswagen supports EPA's proposed modifications to the definition in 1065.370 for humidity. Sections §1065.309; §1065.342; §1065.350; §1065.355 and §1065.375 also have language referencing humidity generation. We request that EPA review these sections where humidity generation is referenced to maintain consistency and clarity with the proposed update in 1065.370.	We agree in part with the comment. We have updated all the affected sections for consistency to use the term "a device that introduces distilled H_2O as vapor into a controlled gas flow". We do not believe it is necessary to add a definition to 1065.1001 as the humidification methods are adequately described in the affected sections.
EMA (0044) The existing provision allows for partial emission reduction (neutral-idle credit in GEM) if a vehicle reduces torque partially but not enough to be equivalent to neutral-idle. EMA requests that similar provisions be included in Part 1065 to provide corresponding credit for torque reduction for vehicles and engines subject to standards in Parts 86, 1036 and 1037. 1065.610—Paragraph(d)(3)(iv) states that when NI is activated, set the idle torque to Zero Nm. When running GEM with the -d flag, column CF gives the Neutral Idle crankshaft Avg torque in Nm to a nonzero value. There is an inconsistency between Parts 1065 and 1037. Torque for Neutral Idle operation should be the same in Parts 1037 and 1065.	This comment is outside the scope of this rule. This rule did not propose any changes or request comment on changes to include torque reduction credit for other vehicles and engines subject to standards in parts 86, 1036, and 1037, and is taking no final action on this issue.

What Commenters Said	Response
EMA (0044) 1065.650(c)(6), Provides option for omitting NMNEHC calculations—EPA should revise this paragraph as follows: (6)(i) Mass of NMNEHC. If the test fuel has less than 0.010 mol/mol of ethane and you omit the NMNEHC calculations as described in § 1065.660(c)(1), take the corrected mass of NMNEHC to be 0.95 times the corrected mass of NMHC. (ii) Mass of NMNEHC. If the test fuel has equal or greater than 0.010 mol/mol of ethane and you omit the NMNEHC calculations as described in §1065.660(c)(1), take the corrected mass of NMNEHC to be 1.0 times the corrected mass of NMHC. **EMA (0044)** 1065.660(c)(1), Provides option for omitting NMNEHC calculations and refers to 1065.650(c)(6)—EPA should correct the citation and add the following to the section: If the content of your test fuel contains less than 0.01 mol/mol of ethane, you may omit the calculation of NMNEHC concentrations and calculate the mass of NMNEHC as described in §1065.650(c)(6)(i). If the content of your test fuel contains equal or greater than 0.01 mol/mol of ethane, you may omit the calculation of NMNEHC concentrations and calculate the mass of NMNEHC as described in §1065.650(c)(6)(ii).	This comment is outside the scope of this rule. This rule did not propose any changes or request comment on changes to the determination of NMNEHC for test fuels that contain greater than 0.010 mol/mol of ethane. EPA is taking no final action on this issue in this rule. We may consider the issue in an appropriate future rulemaking.
EMA (0044) §1065.720—EPA has requested comment on the use of ASTM test method D2784, "Standard Test Method for Sulfur in Liquefied Petroleum Gases," to measure the sulfur content in liquefied petroleum gas test fuels. That test method was withdrawn without replacement by ASTM in 2016. However, section 1065.720 and 1065.1010(b)(23) still specify that test method. EMA recommends that EPA instead incorporate by reference active test method ASTM D6667, "Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence," into the regulations.	We agree with the comment and will revise the regulation to reference the latest version of ASTM D6667. EPA is similarly changing regulatory requirements to specify ASTM D6667 as the correct procedure for fuel manufacturers measuring sulfur in butane.

What Commenters Said	Response
Auto Innovators (0049): § 1065.790—EPA proposes to add paragraph (b) to 40 C.F.R. § 1065.790 which would specify the use of NIST-traceable calibration weights. For practicality in locations outside of the United States, Auto Innovators recommends that EPA allow the use of other international standards with documentation of the international standard used. **VW (0039)** §1065.790—Volkswagen appreciates the update by EPA to reference industry standards for gases. ISO standards are recognized in the EU as fully-traceable and therefore used in EU testing labs with success. Providing a wider range of allowable standards will streamline lab processes and gas supplies in international markets and reduce overall testing costs. Volkswagen believes that the equivalency of ISO will not impact the calibration process. As is allowed in 1065.301(d), VW will continue to provide statements at the certification preview meeting or in the certification application declaring which international standards are being used in place of NIST-traceable. **EMA (0044)** 1065.1001, Broaden acceptable traceable standards–International standards recognized by CIPM Mutual Recognition Arrangement are equivalent to NIST and do not require additional agency approval. **OPEI (0040):** 1065.1001, Broaden acceptable traceable standards— International standards recognized by CIPM Mutual Recognition Arrangement are equivalent to NIST and do not require additional agency approval.	This comment is outside the scope of this rule. This rule did not propose any changes or request comment on changes to the requirement to request approval for non-NIST traceable standards. EPA is taking no final action on this issue in this rule. We may consider the issue in an appropriate future rulemaking.
EMA (0044) §1065.1005—EPA also provides a table of acronyms used in 40 CFR Part 1065. In that regard, ASTM changed its name from the "American Society for Testing and Materials" to "ASTM International" in 2001.	We agree with the comment and have revised the regulation accordingly.
VW (0039) §1066.135—VW supports increasing the upper limit to 60%. However, the lab processes and available gases in EU testing labs may not readily accommodate implementing a lower limit. Volkswagen requests EPA modify the proposed language in 1066.135 to eliminate the lower limit, or alternatively to move the lower limit to 8%. This modification will better align with the calibration gases readily available to our EU labs and reduce costs.	EPA is not removing the lower limit and is not changing it to 8%. The range of 10 to 60% provides adequate margin for labs to procure gasses of the appropriate concentration for the range. We also note that this verification is optional.

What Commenters Said	Response
Auto Innovators (0049): Acceleration of Earth's gravity—EPA proposes to revise 40 C.F.R. § 1066.210(d)(3) to specify a default value of 9.80665 m/s^2 for the acceleration of Earth's gravity, replacing the current location-specific calculation. The proposed default value is acceptable, but automobile manufacturer laboratories have already implemented the existing location-specific requirement. Auto Innovators recommends that EPA allow the use of either the proposed default value, or the existing location-specific calculation at the manufacturer's discretion. If EPA chooses to allow only a default value, Auto Innovators requests a three-year lead-time for manufacturers to make the necessary dynamometer modifications.	
EPA also proposes revisions to 40 C.F.R. §§ 1036.505 and 1036.805 which would add a default value of 9.81 m/s^2 for the acceleration of Earth's gravity. Similarly, 40 C.F.R. §§ 1037.550(f)(1) (which will become (g)(1) if proposed changes are finalized) and 1037.805(f) already include a constant value of 9.81 m/s^2. We recommend that a value of 9.80665 m/s^2 be used in these locations for greater precision and consistency with the proposed change to 40 C.F.R. § 1066.210(d)(3). Finally, we believe that the location-specific calculation specified by 40 C.F.R. §1065.310 remains appropriate and that no changes should be made in this section.	EPA is finalizing the default value of 9.80665 m/s^2 as proposed in 40 CFR 1066.210(d)(3). The proposed change in §1066.210 is limited to road grade, which does not apply for light-duty vehicles. As a result, automotive manufacturers are unaffected by the change and therefore do not need lead time to comply. We agree with the comments regarding 40 CFR 1036.505, 40 CFR 1036.805(f), 40 CFR 1037.550(g)(1), and 40 CFR 1037.805(f) and have revised the regulation accordingly, harmonizing with 9.80665 m/s^2.
VW (0039) §1066.210—We request the approval to use the acceleration due to gravity calculation as referenced in the current regulation at §1066.630. However, should a change to a fixed value be required, we request a phase-in period for the conversion of the dynamometers to satisfy the requirement. This conversion cannot be completed to all our dynamometers at the same time. Additionally, to maintain consistency across the testing regulations, we would suggest EPA review other sections, such as §1037.550(f), §1037.805(f) and §1065.310 to ensure no errors.	
EMA (0044): Gravitational constant—There are inconsistencies between Parts 1036, 1037, and 1066 for the gravitational constant. EMA recommends harmonizing the value to 9.80665 m/s2 for Parts 1036, 1037, and 1066.	

What Commenters Said	Response
Auto Innovators (0049): § 1066.405—EPA proposes to amend 40 C.F.R. § 1066.405 to add paragraphs (b) and (c) for consistency with 40 C.F.R. § 1065.410. The proposed text in paragraph (b) uses the term "bad engine components." Auto Innovators prefers paragraph (b) to describe "malfunctioning engine or emission-related components." In paragraph (c), we believe it would be appropriate to allow repairs to emission-related components in advance of mileage accumulation subject to the submission of an engineering report. These requested changes are intended to reduce the risk of emission data vehicle invalidation due to component failures identified at the very beginning of certification testing. Recommended changes: § 1066.405(b) If you inspect a vehicle, keep a record of the inspection and update your application to document any changes that result. You may use any kind of equipment, instrument, or tool to identify ~~bad~~ malfunctioning engine or emission-related components or perform maintenance if it is available at dealerships and other service outlets. (c) You may repair a test vehicle as needed for defective parts that are unrelated to emission control. If a defective part related to emission control is identified in advance of mileage accumulation, you may repair the vehicle. After mileage accumulation has started, ~~Y~~you must ask us to approve repairs that might affect the vehicle's emission controls. If we determine that a part failure, system malfunction, or associated repairs make the vehicle's emission controls unrepresentative of production engines, you may no longer use it as an emission data vehicle. Also, if engine installed in the test vehicle has a major mechanical failure that requires you to take the vehicle apart, you may no longer use the vehicle as an emission-data vehicle. **VW (0039)** §1066.405— Volkswagen requests EPA provide regulatory language that allows repairs to emission-related components prior to mileage accumulation subject to the submission of an engineering report. There may be instances where vehicles need repair or maintenance that might otherwise render the vehicle unusable for emissions certification. In many instances, these vehicles can be repaired with no loss of test fidelity which can be documented within the engineering report. As vehicle development continues to become more costly, the flexibility to repair and extend the use of the limited number of test vehicles will help reduce overall costs and development time. Development and certification vehicles in particular have high upfront costs and limiting the conditions under which they are no longer usable for emissions testing is costly and unnecessary. If an engine has a failure, we request that we may seek approval from the Agency to repair or replace an engine as needed.	We agree that the regulation should refer to malfunctioning components, rather than bad components. This allowance to inspect applies for all components as any emission related components are considered part of the engine, therefore the regulation does not need this language added. The comments related to repairs before the start of service accumulation is outside the scope of this rule. We may consider this issue in an appropriate future rulemaking.

What Commenters Said	Response
EMA (0044) 40 CFR 1066.420, Table 1, Updated footnote format in table—When EPA moved this from Part 86 to Part 1066, the word "average" for humidity of SCO3 was dropped. However, facilities/laboratories are set up for averaging, not instantaneous measurement of humidity. The word "average" should be added back into the text. **Auto Innovators (0049):** § 1066.420—Auto Innovators recommends that EPA clarify Table 1 to indicate that the test cell humidity requirement for the SC03 test is 100 ± 5 (grains H2O per pound dry air) average. Currently, Table 1 does not specify average or instantaneous values for the tolerance. A humidity setting of 100 ± 5 average is consistent with EPA and manufacturer testing practices and with the original specifications at 40 C.F.R. § 86.161-00(b)(1). **VW (0039)** §1066.420— The previous SC03 testing requirement in section §86.161-00 (b) specifically stated that the ambient humidity in the test cell must be controlled to an average of 100±5 grains H2O /pound of dry air and recorded continuously at a minimum of 30 second intervals. We understand that the transition from Part 86 to Part 1066 was not meant to change the test cell requirements during SC03 testing. To maintain consistency, for the SC03 test cycle, we request the word "average" to be added to the 'Tolerance' column of Table 1.	We agree with the comments and have revised the regulation accordingly.
VW (0039) §1066.710— EPA Guidance CD-2020-04, issued March 23, 2020, specifies how manufacturers shall test vehicles with "full automatic systems". We suggest you incorporate the clear language of the guidance letter into this regulation section. These proposed modifications to the regulation at §1066.710 do not mention full automatic systems – only automatic temperature control systems and manual systems. We are requesting clarification between full automatic systems and automatic temperature control systems as well as requesting the regulations to detail how to test vehicles with full automatic systems.	We agree with the comment regarding clarification of the proposed regulatory text in 40 CFR 1066.710(c) for full automatic control systems and how to test such vehicles and are finalizing the amendments with further revisions accordingly.
VW (0039) §1066.801— Volkswagen supports the Agency update to the FTP test sequence flow chart in Figure 1 in order to match the regulatory text. This provides the clarity that the testing laboratories require.	The comment affirms the proposed rule.
VW (0039) §1066.835(f)(2)— To alleviate confusion, we request to remove the word "instantaneous" from paragraph (f)(2). This will help clarify that humidity is measured on an average.	We agree with the comment and have revised the regulation accordingly.

3.11 General Compliance Provisions (40 CFR part 1068)

The proposed rule included a few technical amendments to the general compliance provisions in 40 CFR part 1068.

The material described in this section is addressed more broadly in Section III.K of the preamble to the final rule.

What Commenters Said	Response
CARB (0030) §1068.21—CARB staff issues experimental permits annually and would like to refer U.S. EPA staff to the California Experimental permit program (HSC 43014).	We appreciate the comment on this issue.
CARB (0030) §1068.30, Definition of "Element of design"—The first sentence should include the word hardware. It should read, "Element of design includes hardware, any computer software, electronic control system, emission control system, or computer logic, along with any related calibrations."	We are deferring action on this proposed item to allow for further deliberation and coordination across industry sectors. We note reference that CARB did not cite the whole proposed definition, omitting the text that includes a description of "hardware".
Auto Innovators (0049): § 1068.30 Definitions—EPA proposes to add a definition for "Element of design." However, the proposed definition is not the same as that in 40 C.F.R. § 86.1803-01. *Prima facie*, the definitions appear to have the same intent, and it is our understanding that the § 1068.30 definition is not applicable to light-duty vehicles regulated under Part 86, subpart S. However, given our impression that EPA is striving for consistency across various sectors where possible, we recommend that the definitions in §§ 86.1803-01 and 1068.30 be consistent. **VW (0039)** §1068.30, Definition of "Element of design"—§86.1803-01 defines Element of design as "any control system (i.e., computer software, electronic control system, emission control system, computer logic), and/or control system calibrations, and/or the results of systems interaction, and/ or hardware items on a motor vehicle or motor vehicle engine." We recommend the Agency to maintain consistency of the definitions between Part 86 and Part 1068. *Element of design* means any control system (i.e., computer software, electronic control system, emission control system, computer logic), and/or control system calibrations, and/or the results of systems interaction, and/ or hardware items on a motor vehicle or motor vehicle engine. Element of design includes any computer software, electronic control system, emission control system, or computer logic, along with any related calibrations. Element of design also includes the results of related interaction with hardware items or other parameter settings on engines/equipment.	We are deferring action on this proposed item to allow for further deliberation and coordination across industry sectors.

What Commenters Said	Response
Auto Innovators (0049): **§§ 85.2109, 1068.30, and Guidance Letter CD-15-18 – Regarding definitions of and address for "Designated Compliance Officer"** Auto Innovators recommends that EPA address inconsistencies in required contact information under § 85.2109(a)(6), § 1068.30 "Designated Compliance Officer", and EPA Letter CD-15-18 for customer inquiries about emissions performance warranties and violations thereof. At §85.2109, EPA directs manufacturers to the definition of "Designated Compliance Officer" at § 1068.30 and specifies that customer inquiries should be directed to "Warranty Claim." The address provided in CD-15-18 related to § 85.2109 (a)(6) inquiries differs from that in § 1068.30 and requests customer claims be directed to "Warranty Complaints."	We appreciate the comment on this issue. We will adopt current contact information in the final rule and will revisit guidance documents as appropriate.
EMA (0044) 1. EMA understands the other proposed definitional changes in 1039.801 and does not object to the proposed amendments, including the "model year" amendment, subject to the following additional changes (in italics): However, we request that EPA clarify that for new engines, certificate holders may revise the *date of manufacture* based on the engine modification date, consistent with a newer model year. Without such a provision, the *date of manufacture* could be earlier than the certification submission date. It would be reasonable, therefore, for manufacturers to be permitted to modify the *date of manufacture* in those cases. **2.** We similarly suggest that EPA modify the existing 1068.30 text as follows: §1068.30 Date of manufacture means one of the following: (1)* * *(ii) Manufacturers may assign a date of manufacture at a point in the assembly process later than the date otherwise specified under this definition. For example, a manufacturer may use the build date printed on the label or stamped on the engine as the date of manufacture. *Similarly, manufacturers that modify new engines to a currently certified configuration may revise the date of manufacture to reflect the date the engine or equipment was modified*	1. The only purpose of "date of manufacture" is to determine model year, so there is no need to change paragraph (5)(ii) in the definition of model year in 1039.801. 2. "Date of manufacture" and "model year" already allow for manufacturer to select date based on a later stage in the assembly process.

What Commenters Said	Response
EMA (0044) The test exemption allowance described in this section is critical to the development process as manufacturers work to evaluate and implement advanced emissions control designs and calibrations to meet regulatory requirements. Overall, EMA finds EPA's requirements associated with test-exempted engines to be practical and workable. However, EMA recommends certain modifications to improve and streamline the management of these exemptions. Manufacturers need flexibility to conduct testing for a longer duration than currently allowed. Longer prototype testing for both engine and equipment provides valuable feedback to manufacturers regarding the design of their products. Considering shipping leadtimes, prototype builds, and test scheduling, two years is often insufficient to provide adequate feedback. EPA should remove the current language specifying a two-year period to align with §1068.210(d), and should rely on the Agency's approval of extension requests to determine the duration of tests, using the following suggested language: §1068.210(c) If you are a certificate holder, you may request an exemption for engines/equipment you intend to include in test programs ~~over a two-year period~~.	We appreciate the comment on this issue. We will consider whether or how to amend the regulation to address these concerns in an appropriate future action.
EMA (0044) §1068.240—EMA supports the Agency's proposal to remove the requirement to recover the engine block before counting a replacement engine as tracked in the annual report. To ensure that securing the return of engine blocks remains a matter of priority among manufacturers nonetheless, EMA further proposes that manufacturers be given 5 years to recover the engine block. Otherwise, they must report an untracked engine debit in that 5th calendar year to count against that year's allotment. This could be accomplished, for example, by inserting the following text into §1068.240: "(c)(3) Send the Designated Compliance Officer a report by September 30 … due date for the annual report. *For any engine you report as a tracked replacement engine, you must meet the requirements of (b)(3) by the fifth annual report following the calendar year you produced the engine. Otherwise, you must debit an untracked engine in the fifth year's report.* You may include the information required under this paragraph (c)(3) in production reports required under the standard-setting part."	We agree with the comment and have revised the regulation accordingly.

What Commenters Said	Response
EMA (0044) §1068.240(c)(5)—This section precludes certain categories of engines from using the untracked provisions of paragraph (c). Section 1068.240(b)(6) limits the conditions under which replacement engines may be placed into commerce, but makes an exception with regard to the engines identified in (c)(5). EMA recommends that EPA clarify the language with respect to those engines, by amending the sentence in §1068.240(b)(6) to read as follows: "We may waive this restriction for the engines ~~excluded~~ *identified* in paragraph (c)(5) of this section, when you ship them to a distributor." EMA requests that these amended provisions be applied to the accounting for tracked and untracked engines starting with replacement engines built in CY2020. EMA further recommends that these suggested amendments apply to all product sectors regulated under §1068.240, including where special provisions may apply, such as marine engines that also are regulated under §1042.615. EMA believes that the above proposals, in total, will provide manufacturers with the needed flexibility to better manage the complex and resource intensive task of complying with the exempt replacement engine provisions, without removing any of the rigor of those provisions.	We agree with the comment and have revised the regulation accordingly.
EMA (0044) EMA also recommends that EPA revise "§1068.325 Temporary exemptions for imported engines/equipment" to provide more flexibility for the disposition of imported engines or equipment. Specifically, EMA recommends that EPA revise this section using language similar to §1068.240: §1068.325 […] You must eventually export the engine/equipment as we describe in this section unless it conforms to a certificate of conformity or it qualifies for ~~one of the permanent exemptions in §1068.315 or the standard-setting part~~ another valid exemption. Otherwise, you must destroy the engine or equipment.	This comment is outside the scope of this rule. We may consider the suggested amendment in an appropriate future rulemaking.

Chapter 4: Out of Scope and Possible Future Rulemaking Topic

The proposed rule covered a wide range of amendments across most of the industry sectors that are subject to EPA emission standards. Several comments included suggested amendments to EPA's regulatory provisions that were related neither to a proposal nor a specific request for comment. We generally identify those out-of-scope comments in the sections where the subject would belong if it had been included in the proposed rule. This is intended to allow readers with specific interests to see comments on related subject matter to be grouped together.

The proposal also included several specific requests for comment on existing regulatory provisions or on possible future regulatory provisions. Several such comments are included in Chapter 2 and Chapter 3 in the respective issue areas. This chapter describes comments related to broad issue areas. We did not intend to finalize these provisions in this rulemaking. Rather, we intend to use this input to help us make judgments about potential future rulemaking actions. Since we are not taking final action on these issues in this rule, we include only a limited response to these comments.

4.1 Engines Used in Hazardous Locations

Engines are sometimes used in oil drilling or other places where there is a greater risk of fire due to operation in a potentially explosive environment. The Occupational Safety and Health Administration and the U.S. Coast Guard have adopted requirements for equipment with installed engines to meet certain specifications to reduce the risk of accidents in these hazardous environments. As described in the proposed rule, the diesel engine industry has requested that EPA modify the EPA emission regulations to exempt engines used in these hazardous locations from the EPA Tier 4 emission standards for nonroad land-based and marine diesel engines, so that such engines are subject to the less stringent EPA Tier 3 emission standards for these categories of diesel engines. They have indicated that EPA should consider this change because they believe that it would be cost-prohibitive for them to qualify diesel engines meeting EPA's Tier 4 standards to these other rules. The concern applies for engines and equipment operating in Class I hazardous locations as identified in 29 CFR part 1910 or 46 CFR part 111. These hazardous locations generally include land-based and marine oil-extraction facilities and paper manufacturing facilities. These regulations require that manufacturers modify engines and equipment, for example, by limiting maximum surface temperatures to 200 °C or less.

The proposed rule requested comment in several areas to help inform our decision-making related to this concern.

What Commenters Said *(EPA's response follows the five comments listed below)*
EMA (0044) EPA has requested information concerning the markets served by non-road and marine engines in hazardous environment applications. Those applications are subject to specific design and performance requirements to ensure their safe operation in hazardous locations ("hazloc"). For example, the US Coast Guard requires that all vessels constructed after April 2, 2018, and which operate as Mobile Offshore Drilling Units ("MODU's"), and all vessels engaged in Outer Continental Shelf ("OCS") activities include surface temperature limits that meet the requirements of ASTM-F2876 (see 46 CFR 111.108-3(g)). Those marine engine applications also are subject to EPA emissions control standards regulated under 40 CFR Part 1043. In addition to those marine engine applications, there are other non-road applications, involving a wide range of engine displacements, that also operate in hazardous environments and which

require similar additional design measures to assure safe operation. Those engines and applications are subject to EPA's Tier 4 emission standards.

The Tier 4 standards are aftertreatment-forcing standards. However, the surface temperatures associated with the use of the required aftertreatment systems far exceed the surface temperature limits permitted by the US Coast Guard and OSHA in these hazloc/ATEX applications. As such, the cost of producing a Tier 4 engine with the necessary shielding and other protective mechanisms is substantially higher than the cost of similar treatments required to shield and protect applications using Tier 3 (or Tier 2) compliant engines (which do not require the use of aftertreatment for emissions compliance purposes).

EPA should note that there are no "one-size-fits-all" technical solutions to achieving hazloc compliance. The installation requirements vary depending on the equipment or vessel involved. Those often case-by-case variable design requirements further exacerbate the costs incurred to allow Tier 4 engines to safely operate in hazardous environments. Those high costs, in turn, have significantly impacted the sales of Tier 4 engines for hazardous environment applications. While some engines have been purchased for such applications, we believe that they were upfitted by third parties with treatments to control the high surface temperatures. We do not have any information as to whether those third party configured hazloc engines meet the applicable safety standards. However, we do have suspicion and concern that such modifications may compromise compliance with the applicable emission standards.

EPA should make reasonable accommodations to assure that OEMs can cost-effectively produce engines for applications operating in hazardous environments that meet both the applicable safety and emissions requirements. As we have explained to EPA on multiple occasions, it is cost-prohibitive to produce Tier 4 engines for such applications. Indeed, the questions that EPA has posed in the preamble to this NPRM already have been answered, on multiple occasions, by engine manufacturers individually and collectively through EMA. (See, EMA presentation to EPA, *Need for Exemption Provision for Engines used in Hazardous Environments*, June 25, 2019, Ann Arbor, MI; Matthew Spears (EMA) letter to Alan Stout (EPA), Subject: *EMA Responses to EPA Questions about Engines in Hazardous Locations*, Sept 18, 2019.)

EMA and its members have approached EPA for some years requesting that hazloc engine applications be exempted from Tier 4 standards to avoid the significant costs and installation complexities described above. We urge EPA to finalize a rule that allows manufacturers to sell Tier 3 engines for those applications (Tier 2 for land-based non-road engines >560kW). Though a previous-Tier hazloc engine is significantly more costly than a standard Tier 4 engine, allowing previous-Tier compliant engines to be sold for those applications would allow for new engines to be sold for use in hazardous applications. Otherwise, customers are likely to keep their older, higher emitting engines.

It is worth noting that the market in question is very low volume and already high cost. The emissions impact of allowing the continued sale of previous-Tier engines for hazardous applications would be de minimis. It also is worth noting that both Europe and Canada recognize the concerns that we have raised and exempt hazardous applications from Tier 4 and, instead, allow the continued use of previous-Tier engines.

Accordingly, EPA should exempt engines used in hazardous applications from the Tier 4 standards and, instead, should align with Europe and Canada and allow the continued use of Tier 3 engines for land-based non-road applications less than or equal to 560kW and marine applications greater than 600kW, and Tier 2 engines for land-based nonroad applications less than 560kW.

In addition, fire-pump engines less than 600 kW currently are required to meet Tier 3 emission standards. EMA recommends that for engines that are greater than 600 kW and that are used exclusively to drive fire-pumps, they also should be able to operate at the Tier 3 marine standards, since those engines operate few hours per year and do not approach a reasonable Tier 4 cost-effectiveness threshold.

Miretti Group (0037)

The challenge of being able to meet both the safety requirements that are needed for equipment that need to operate in formally classified areas and emission regulations is certainly an open one but we believe technologies are available in today's world to try and address both issues. While it is true that the technological complexity of being able to meet all the requirements commands a higher cost, it is also true that young technologies often do.

While not all Tier 4 engines can be easily developed by engine manufacturers or converted by Explosion Protection equipment manufacturers (it very much depends on a series of variables that need to be assessed on a case to case basis), it would also be not correct to state that it is impossible to address both Hazardous Area Requirements and Emission Regulations : our group has some experience in dealing with these challenges both on stand-alone engines and on earth moving machines / construction equipment (with NRTL approval in some cases).

As we do know the challenges, we also understand the difficulties behind adhering to ASTM F2876-10 and that it is sometimes not possible to do so on Tier 4 engine platforms or it is only possible with extensive testing/development that would not be viable economically in a low volume market. Volumes for Hazardous Area engines within the North American market are deemed to be in the region of tens/year.

The other challenge is that as of today only part of the test results and development that is carried out on one engine platform can be directly extrapolated across multiple engine platforms.

Tier 3 engines are simpler to address and they represent an acceptable compromise in a small market that contributes little in the global economy of emissions management.

For the above reasons, we would be open to an emission derogation for Tier 3 engines that operate in Hazardous Areas and need to comply with ASTM F2876-10.

Pyroban (0028)

Engines used in Offshore well service, fabric maintenance, pipeline testing and production and pumping are often located in a formally classified area. These engines should adopt the hazardous location engine requirement for engines meeting ASTM F2876-10.

The market for Diesel engines working in hazardous Class 1 Division 2 and Class 1 Zone 2 areas is < 20 units per year of 40 to 1000 bhp. There is not yet viable technology that can allow these engines to meet the requirements of a low thermal signature as per ASTM F2876 and also meet any emissions level above Tier 3.

Poor viability is a combination of the costs and impact of thermal management of hot turbo chargers and after treatment equipment that is designed to have an exothermic reaction internally, completed package size and weight post treatment, maintainability once offshore or in a hazardous area, market size, and finally cost. These are often 2 machines in a batch. Engineering must be amortized under very small quantities in what looks to be a fragile and new normal oil and gas industry.

Because of this viability issue, end users and packagers are sometimes re-manufacturing existing Tier 1 and 2 engines when they must meet ASTM F2876 and in some cases using Tier 4F engines without adherence to the intent of F2876. This has a negative effect on emissions and safety levels and doesn't allow manufacturers of Diesel engines or Explosion protection systems to profitably develop new solutions aimed at Tier 3 Engines that could improve safety and prevent constant remanufacture of old technology engines.

The Emissions level difference between Tier 3 and Tier 4F can be negated very quickly if a refinery or oil rig catches fire. In place of measuring engine emissions in grams - you measure them in tonnes very quickly.

For these reasons, we would support an emissions derogation for engines working in hazardous atmospheres as per the European union.

Anonymous (0025)

EPA does not have sufficient information to evaluate this request at this time. Therefore, we request that commenters with relevant information address the following aspects of this issue:

Information on the annual production of new engines and equipment that have been sold in the past several years that are designed to be used in Class I hazardous locations, and any projections regarding future needs on an annual basis.

The cost of producing fully compliant engines that could be used in affected hazardous locations that are compliant with EPA's Tier 3 standards and EPA's Tier 4 standards. - Cost to produce compliant engines 4 to 5 times higher than the cost of a standard Tier 4 engine. Heat treatment of the exhaust system to keep the skin temps to an acceptable level will drive the majority of the cost.

The typical equipment applications the engines are used in and the price of the equipment. - Oil and gas -- Work over rigs, drilling rigs, coil tubing units, snubbing units, cementing units, and nitrogen units. To date we stopped building hazardous are packages due to the regulation of tier 4. Industrial -- pump application, fire pumps, factory forklifts.

Information regarding the past and likely future market response in the absence of additional flexibility for these engines (manufacturers have already been subject to Tier 4 standards for 2-4 years, after accounting for flexibility provisions to phase in the new standards. It drives down the use of safer engine package in hazardous applications.

Marine & Hazardous Engines, Ltd. (0061)

As stricter emission demands are set worldwide, the application of these stricter standards into more and more diverse market sectors such as marine and hazardous areas require engine OEMs to engineer specific solutions for specific applications.

The majority of engine OEMs look to simply supply standard Stage V engines or Tier 3 engines with after-treatment systems fitted into these demanding market sectors which is not practical from an installation and operation aspect. In the case of the hazardous area sector, it is difficult for these standard Stage V engines to comply with the requirements of ATEX, IECEx and NEC.

At Marine & Hazardous Engines we have developed a range of 4 and 6 cylinder engines from 4 to 20 litres capacity for both marine and hazardous area applications that from concept have taken into consideration the applicable standards and packager and operator demands. This provides a kW power range from circa 80 kW to 600 kW range and potentially more.

For the marine engines, our extensive knowledge and experience has enabled us to develop a product that encompasses as many of the customer requirements as possible whilst providing a commercially attractive product that provides a durable solution. These engines will all meet CLASS requirements.

The hazardous area engines use the marine Stage V units as a base donor product and are then engineered to meet all the requirements of the ATEX, IECEx and NEC standards such as surface temperatures, electrical discharge, etc.

For the hazardous area engines, we have been working with a specialist manufacturer with regards to the additional equipment, such as exhaust gas cooler, control and shut down system, etc., that need to be fitted to the base engine in order to meet the ATEX, IECEx and NEC standards. Therefore, when the engines are released to the market the clients can be assured of having a complete accredited solution available to them. Again, using our extensive knowledge, market and project experience, we have engineered a range of products that provide the customer and operators with a solution that meets their requirements whilst also meeting all the relevant standards.

Our marine Stage V engines are suitable for propulsion, auxiliary power and the growing hybrid power application and are suitable for vessels in numerous applications such as passenger vessels, inland waterway barges, rig support vessels, emergency response vessels to name a few. As we offer a remote mounting solution for the after-treatment system, they are especially suitable for repowering existing vessels, thereby enabling operators to maximise the vessel life by being able to operate them and meet the latest emission standards.

We do not see any technical reason as to why Stage V emission standards should not be applied to both Marine and Hazardous Area applications. We have developed the relevant products that can be used in both market sectors without creating any difficulties for the customer / operator whilst meeting all the relevant standards.

We are working towards availability of the products from the end of the first quarter 2021.

With respect to specific points regarding these engines and their application, we would comment as follows:

Operating Costs.

Whilst the initial capital cost of a Stage-V engine is more than a Tier 3, the higher efficiency of the Stage-V engine from a fuel consumption aspect means that the operating costs over the engine lifetime will be less than the Tier 3. Therefore, balancing up the total cost of ownership during the working life of the equipment.

To meet the demands of the Stage-V emission standards, engines burn the fuel more efficiently and produce more power from their capacity. Torque curves have also improved, which when combined with the power output also improves overall consumption and operability.

There is the requirement for DEF for the SCR system in the after treatment, but this is a very low percentage of the fuel consumption, circa 2% - 2.5% of diesel consumption at 100% load.

Packaging.

If a standard Stage-V engine from other OEM's were to be applied to these applications, the physical size, weight and location of the after-treatment could cause many issues for the packager and most probably the operator. Some of these after-treatment packages are very large when compared to the size of the engine.
Our after-treatment package is optimised giving it one of the smallest footprints on the market, while keeping the OEM packager and operator requirements in mind. Primarily this means making the unit as compact
as practically possible, reducing overall weight, ensuring ease of operation and servicing at the same time but not compromising the efficiency of the after-treatment. We do offer several fixed after-treatment locations and a customer specific location as long as

the location the customer requests meets all the relevant engineering requirements for the emissions and is signed off by our engineering team.

This flexible approach means that our engines are suitable for refitting into existing vessels and packages. Recognising the typical space claim restraints has been a prime factor in our product design and having the option of remote mounting option for the after-treatment package means that the majority of installations can be accommodated.

The space claim and accessibility are key in these applications. Engine rooms in vessels are invariably compact and hazardous area installations are usually very limited space wise due to the additional package equipment that is installed alongside the engine. The Haz Area units are being developed based on our units for use in the Marine market. Developing the engines from a common base platform enables us to develop and optimize the solutions for both market sectors. It also brings benefits from a cost and service and support aspect.

We have designed our systems to ensure that they are robust and well protected from physical damage. They are also protected from operator modification thereby ensuring that all the systems operate correctly to maintain the Stage V emissions compliance and in the case of the hazardous area systems, fully meet the various requirements including surface temperatures, etc.

Servicing

Our base engines are Stage-V engines, not industrial Tier 3 engines that have simply been fitted with an after-treatment system. They are fully optimised Stage-V engines operating as designed and certified.

From a servicing standpoint, the engine will in fact require very little additional servicing over a Tier 3 unit, i.e., standard oil change, 500 hours which can be extended, and oil and fuel filter changes on a set basis. The other service points are as per a standard service programme that would be applied to a Tier 3 engine service programme.

There are additional DEF filters that will require changing annually and a DEF tank to fill, but this is in line with today's servicing requirements of other construction equipment with Stage-V engines.

The regeneration cycle is fully automatic and controlled by the engine ECM. The ECM ensures optimum operation of the complete system without any detrimental effect on engine performance. The engine will accept full load at any point and the ECM will not change engine speed or available power when it regenerates in normal conditions.

Manual regeneration is not required unless there has been a fault or situation where the ECM has not been able to regenerate, this will have been shown as a fault code on the ECM and been sent via telematics to our control centre where we can monitor these engines. With a telematics type remote monitoring system, it is possible to fully monitor the operation of the system remotely via numerous methods, including LAN line, satellite, cell phone signal, WIFI, etc. This can then be used as a preventative maintenance system whereby potential faults can be identified before they become a failure issue.

The after-treatment system does not require any additional specific servicing as it will automatically go through the regeneration process without any need for manual intervention. With the engine being serviced correctly, the after-treatment system will not require any attention for circa 15,000 hours, unless there has been a turbo or oil leak in the engine where oil has been allowed into the exhaust system. Wrong fuel (High Sulphur), un-burnt fuel, oil or the use of incorrect oil will shorten the life of the after-treatment.

As with any engine, Stage-V or lower, good service and support is of extreme benefit and provides long operational life of the product. We will provide full customer training and have service engineers available around the clock to support these products.

The below is an extract from a standard Service & Support contract that we can offer up to any operating hour level:

Item	Running hours	Description	Activity
1	500	Engine:- 1) Engine Fuel / Water Separators x 2 2) Engine oil Filter x 1 3) Engine oil 4) Engine air filter 5) Crankcase breather tube 6) All hoses and Clamps 7) Coolant circuit	 1) Replace. 2) Replace. 3) Drain and replace. 4) Clean. 5) Clean. 6) Inspect / Clean / Tighten. 7) Inspect.
2	1,000	Engine:- 1) Item 1 Plus:- 2) Engine air filter 3) Crankcase breather filter 4) Drive belts 5) Battery 6) Fuel lines 7) Raw water pump. 8) General inspection	 1) Item 1 plus:- 2) Replace. 3) Replace. 4) Check all belts and belt tensioner spring - adjust if necessary. 5) Check all battery / cable connections - tighten and grease if necessary. 6) Check all fuel lines for leaks or damage, replace if necessary 7) Replace raw water pump impeller 8) Walk around entire engine looking for any oil leaks, coolant leaks, diesel leaks, exhaust leaks, erratic vibrations or noise
3	1,500	Engine:- 1) Item 1	 1) Item 1
4	2,000	Engine Item 2 plus:- 2) Raw water pump	1) Item 2 2) Replace complete pump.
5	2,500	Engine item 1 plus:- 2) Top end inspection	1) Item 1 2) Remove rocker arm cover and crankcase ventilator tube. Inspect and adjust valve clearances where necessary.
6	3,000	Engine:- 1) Item 2 plus:- 2) Raw water pump 3) Coolant Temperature Thermostat 4) Cooling System Supplemental Coolant Additive (SCR) 5) Crankshaft Vibration Damper	 1) Item 2 2) Replace pump impeller. 3) Replace 4) Test / add if necessary 5) Inspect
7	3,500	Engine item 1:- 1) Item 1	 1) Item 1
8	4,000	Engine Item 4:- 1) Item 4	 1) Item 4
9	4,500	Engine item 1 plus:- 1) Item 1 2) Crankshaft Vibration Damper	 1) Item 1 plus:- 2) Inspect and replace if necessary
10	5,000	Engine:- 1) Item 2 + item 5 plus:- 2) Electrical Starter Motor 3) Turbocharger 4) Raw Water Pump	 1) Item 2 + item 5 plus:- 2) Inspect and clean if necessary 3) Inspect and clean if necessary 4) Replace pump impeller

Thermal Protection and Exhaust Gas temperature

The after-treatment temperature requirements pose a conflict with the requirements of the Haz Area requirements. We can see why others are pushing back on this. We have developed a new solution to keep the surface temperatures of the engine and exhaust system below T3 (200°C) and that is gas tight. This solution does not affect the exhaust gas temperature itself and therefore does not affect the normal operation of the after-treatment. This system will be common to both the marine and hazardous area engines, though the marine does not require to be gas tight.

For the exhaust gas temperature leaving the after-treatment, working with a specialist company, we have developed an exhaust gas cooler to handle the different exhaust gas temperature from normal mode to regeneration mode. The system can operate seamlessly from one mode to the other without any detrimental effect on engine performance whilst still maintaining the exhaust gas T3 temperature requirement from the system outlet.

Engine Performance

As the engine is designed and built as a Stage-V unit and not by simply fitting an after-treatment system to an existing Tier 3 engine, the complete unit is fully optimised to provide optimum performance. The engine is fully capable of taking full load during the exhaust after treatment regeneration cycle – no increase or reduction of engine rpm is required during cycle.

The ECM controls exhaust temperature using exhaust valves and fuel timing, which maintains after treatment temperatures at optimum temperatures regardless of loading. This allows for a smaller and more optimised after-treatment system to be fitted.

Control System

We are currently working with a specialist OEM regarding a customer interface panel for both Marine and Hazardous Area applications. It will also have full capability of providing full control of the completed OEM package in accordance with the clients' requirements and full shut down protocols in accordance with the demands of any of the standards.

In some applications it will allow the operator to override an engine shutdown due to an after-treatment fault if the application is critical and would endanger life if the engine did shut down, however this event would be transmitted and recorded for records. Once the engine has completed its job, it would require the fault to be repaired before producing full power again.

Applications like Rail, Mining, O&G drilling and fire pumps, marine vessels main propulsion engines and other identified applications could have this.

On life saving equipment like Fire Pumps the software would be configured so that the engine could continue to operate at full power and speed regardless of after-treatment error codes and in some applications would run till destruction if required. Again, the codes would be transmitted and recorded for records. The application of Stage V engines with after-treatment to a fire pump will therefore have zero impact of the safe and reliable operation of the pump.

In Industrial engines there is a forty hour timer before the engine shuts down. In Marine applications this is not advisable. The vessel could be several days from a safe place where the repairs can take place, in this instance the optimum solution is to allow the vessel to continue under power. Full data could be recorded of this failure event and held on file to prove the engine was repaired at the earliest opportunity.

The ECM would have a record but using the Telematics system we would have a separate record that the owner/operator could not alter which could be made available to relevant authorities.

Response

We appreciate the comments on this issue. We will consider these comments and additional information as it becomes available to determine whether or how to amend the regulation to address these concerns.

4.2 Replacement Engine Exemption

The regulation at §1068.240 allows engine manufacturers for sale and installation of exempted engines for replacement purposes. The exemption provisions allow manufacturers to make an unlimited number of engines based on a demonstration that a new engine certified to current standards does not have has the appropriate physical or performance characteristics to repower the equipment. We refer to this as the "tracked option". The exemption provisions also include an "untracked option" to allow for a limited number of replacement engines where there is no such demonstration. The production limit was 1.0 percent of annual production from 2008 through 2013, and has been 0.5 percent since 2014. The untracked option is important to allow manufacturers to sell replacement engines to create an inventory with dealers and users to prepare for cases of catastrophic failure and an urgent need to replace the failed engine.

Engine manufacturers have expressed concerns that the tracking requirements and the production limits in §1068.240 unreasonably constrain their ability to supply the demand for replacement engines. In the proposed rule we requested comment a variety of possible adjustments to the terms of the replacement exemption to address these concerns.

What Commenters Said *(EPA's response follows the three comments listed below)*

CARB (0030)

While there could be an instance of unforeseen demand for replacement engines under this provision, CARB staff's opinion is that this instance is rare. Meeting these requirements should only be a matter of keeping up to date and accurate records of customer orders and production records. Moreover, if demand for replacement engines exceeds the 0.5 percent for the year, that does not preclude a manufacturer from providing the customer with a suitable replacement, but only utilizing this provision to do so. CARB staff recommends keeping the 0.5 percent limit.

What Commenters Said

EMA (0044)

Today, the restrictions associated with making replacement engines available to distributors in quantities limited by the 0.5% untracked engine allowance of §1068.240(c)(1), in effect, force OEMs and distributors to guess which engines and engine configurations, in combination, will fail in the field or otherwise require replacement. As a result, the current exempt replacement engine provisions cause considerable uncertainty with respect to OEMs' decisions regarding which models to produce. In order to reduce the risks caused by this uncertainty, EMA recommends that the total number of untracked replacement engines permitted per year be adjusted from today's 0.5% to 1.0%. That small, but important adjustment will provide manufacturers the additional headroom to work within these complex tracking and reporting requirements, and to have a better chance of covering the replacement engine needs associated with premature failures, with minimal environmental impact. The recommended change does not increase the market demand for replacement engines, and untracked engines would still be required to have controls in place to ensure the replacement engine has no higher emissions than the replaced engine.

EPA also should recognize that for manufacturers producing limited volumes of engines in certain reporting categories, even a 1% untracked volume provision can be insufficient. For example, if a manufacturer produces only 140 engines per year within a given category of engines (as detailed in §1068.240 Table 1), a 1% untracked replacement engine allowance would mean that only a single untracked engine could be produced. To remedy that situation, EMA recommends that EPA permit an untracked engine allowance of 1% *plus 5 engines*. With such an adjustment, the OEM in the aforementioned example would be granted a more workable 6 untracked engines for that calendar year. Meanwhile, engine manufacturers with much higher volumes would have their untracked engine allowance only minimally increased.

As an additional mechanism to streamline the management of replacement engines, without adding to the total permissible quantity, EMA recommends that EPA offer additional flexibilities in the management of untracked engine allowances. Any of the alternatives below (listed in no particular order) would be effective toward that end:

First alternative: Permit manufacturers to bank unused untracked engine allowances calculated for any calendar year. Banked allowances could be added to the subsequent year's untracked allowance. Any unused allowance "credits" would expire after 5 years, following the FIFO rules of criteria emissions credits.

Second alternative: Today, a manufacturer can produce an exempt replacement engine and ship it to a distributor. That engine can be counted as a tracked engine if the determination of the correct replacement engine Tier is made by the time the September 30th report is submitted in the calendar year following the year the replacement engine was produced. (Today, the engine block also would have to be recovered in order to count as a tracked engine, but as mentioned earlier, EPA has proposed to remove that requirement.) EPA could modify the regulation to permit that for each exempt replacement engine where the customer has been identified, and where the determination of the correct replacement Tier has been made pursuant to §1068.240(b)(2) at a date subsequent to the first September 30th annual report following the calendar year the replacement engine was produced, the engine manufacturer could add one untracked engine allowance to the calendar year the determination was made.

Third alternative: EPA could include a third category to classify exempt replacement engines in the annual reports. In addition to classifying an engine as "tracked" or "untracked," EPA also could accept a classification of "inventoried." Such an engine would have its classification updated when shipped to a customer, either as a tracked engine (where the determination of (b)(2) has been made) or an untracked engine.

What Commenters Said

NMMA (0031)

On a separate issue specific to replacement engines, NMMA members support changes to the untracked option of exempt replacement engines found in 1068.240 & 1042.615 with one of the following alternatives included.

Under the current EPA rule, the restrictions associated with making replacement engines available to distributors in quantities limited by the 0.5% untracked engine allowance of §1068.240(c)(1), requires OEMs and distributors to know which engines and engine configurations, in combination, will fail in the field or otherwise require replacement. As a result, the current exempt replacement engine provisions cause considerable uncertainty with respect to OEMs' decisions regarding which models to produce. To reduce the risks caused by this uncertainty, NMMA recommends that the total number of untracked replacement engines permitted per year be adjusted from today's 0.5% to 1.0%. That small, but important adjustment will provide manufacturers the additional flexibility to negotiate the complex tracking and reporting requirements, and to have a better chance of covering the replacement engine needs associated with premature failures. The recommended change has no effect on the market demand for replacement engines, and untracked engines would still be required to have controls in place to ensure the replacement engine has no higher emissions than the replaced engine.

As EPA is aware there are marine manufacturers that produce limited volumes of engines in certain reporting categories, such that even a 1% untracked volume provision can be insufficient. For example, if a manufacturer produces only 100 engines per year within a given category of engines (as detailed in §1068.240 Table 1), a 1% untracked replacement engine allowance would mean that only a single untracked engine could be produced. To remedy that situation, NMMA recommends that EPA permit an untracked engine allowance of 1% *plus 5 engines*. With such an adjustment, the small volume OEM would be granted a more workable 6 untracked engines for that calendar year.

As an additional mechanism to streamline the management of replacement engines, without adding to the total permissible quantity, NMMA recommends that EPA offer additional flexibilities in the management of untracked engine allowances. Any of the alternatives below would be effective toward that end:

First alternative: Permit manufacturers to bank unused untracked engine allowances calculated for any calendar year. Banked allowances could be added to the subsequent year's untracked allowance. Any unused allowance "credits" would expire after 5 years, following the FIFO rules of criteria emissions credits.

Second alternative: Today, a manufacturer can produce an exempt replacement engine and ship it to a distributor. That engine can be counted as a tracked engine if the determination of the correct replacement engine is made by the time the September 30th report is submitted in the calendar year. Today, the engine block also would have to be recovered in order to count as a tracked engine, but EPA has proposed to remove that requirement. EPA could modify the regulation to permit that for each exempt replacement engine where the customer has been identified, and where the

determination of the correct replacement has been made pursuant to §1068.240(b)(2) at a date subsequent to the first September 30th annual report following the calendar year the replacement engine was produced, the engine manufacturer could add one untracked engine allowance to the calendar year the determination was made.
Third alternative: Another method of creating flexibility without increasing the total number of replacement engines would be to create a new a category of replacement engines with a 'inventoried' or 'temporary' state. These would be held by the manufacturer or distributor until a determination is made and would then change category to tracked or untracked when sold to a customer and would then follow all the applicable requirements.

Response

We appreciate the comments on this issue. We are amending the regulation as described in Section III.K of the preamble to the final rule to address concerns for product lines with low annual production volumes. We will consider the other comments and additional information as it becomes available to determine whether or how to amend the regulation to address these broader concerns.

The principal source of information related to volumes of untracked replacement engines should come from manufacturers' annual reports. These reports are required for any manufacturer that uses the untracked option for producing exempt replacement engines. Based on the number of reports we have received, we can only conclude that there is no great need for the untracked option and certainly no need to increase the 0.5 percent limit. We will continue to monitor information from annual production reports to gain a better understanding of current practices for replacement engines.

4.3 Data Reporting Requirements

We requested comment broadly on opportunities for regulatory amendments to improve the effectiveness of data reporting.

What Commenters Said *(EPA's response follows the eight comments listed below)*
CARB (0030) CARB staff thinks all data reporting is useful in certifying CA vehicles.
CARB (0030): **1037.205 Certification Reporting Requirements—**CARB staff recommends rephrasing 1037.205 (k) to indicate that the FELs of subfamilies in between the highest and the lowest FELs also be reported. This would align with the corresponding Phase 1 regulations and would prevent manufacturers from omitting them in their certification applications.
Auto Innovators (0049): **§ 86.1843-01(f)(2)—**The regulations specify that a manufacturer must submit a final update to Part 1 and Part 2 of the Application for Certification (Application) by January 1 of the subsequent model year. Auto Innovators recommends that the due date of the final update be changed to May 1 of the subsequent year. Changing the due date to May 1 would align this reporting to the deadlines for the Tier 3 averaging, banking, and trading report and the California Air Resources Board zero emission vehicle regulation compliance report. If the final Application due date is changed, there will be no need to update the application. Recommended change: (f)(2) The manufacturer must submit a final update to Part 1 and Part 2 of the Application by ~~January~~ May 1st of the subsequent model year to incorporate any applicable running changes or corrections which occurred between January 1st of the applicable model year and the end of the model year. A manufacturer may request the Administrator to grant an extension (of no more than 90 days) for submittal of the final update. The request must clearly indicate the circumstances necessitating the extension. * * * * *
Auto Innovators (0049): **§ 600.512-12 Model year report** Paragraph (b) specifies that the model year report must be submitted no later than 90 days after the end of the model year. Auto Innovators recommends changing the due date for the model year report to May 1 of the calendar year following the given model year. This change would make the deadline for the model year report consistent with that of the annual report required under 40 C.F.R. § 86.1865-12(l)(2) that includes compliance information such as air conditioning and off-cycle credits. Given that final model year compliance levels cannot be determined without such credit information, it is logical to make the reporting deadlines consistent. Recommended change: 40 C.F.R. § 600.512-12(b)(1) The model year report shall be in writing, signed by the authorized representative of the manufacturer and shall be submitted no later than ~~90 days after the end of the model year~~ May 1 of the calendar year following the given model year. (2) The Administrator may waive the requirement that the model year report be submitted no later than ~~90 days after the end of the model year~~ May 1 of the calendar year following the given model year. Based upon a request by the manufacturer, if the Administrator determines that 90 days is insufficient time for the manufacturer to provide all additional data required as determined in §600.507, the Administrator shall establish an alternative date by which the model year report must be submitted. * * * * *

What Commenters Said

Auto Innovators (0049):

Section 600.514-12 describes requirements for the pre-model year (pre-MY) greenhouse gas (GHG) emission report. The deadline and content requirements for this report are not harmonized to the closely related Corporate Average Fuel Economy (CAFE) pre-model year report resulting in unnecessary burden for similar information. Although EPA cannot address National Highway Traffic Safety Administration (NHTSA) requirements under Title 49 of the Code of Federal Regulations, it can address its own requirements.

Requirement for a GHG Pre-Model Year Report

Auto Innovators requests that EPA consider eliminating the requirement to submit a pre-model year GHG report. While such a report may have been important at the inception of the GHG program, we believe it adds little or no value at the present time and instead creates an undue burden. Our preferred approach is to continue discussion of GHG compliance plans with EPA at pre-certification meetings in lieu of a formal reporting requirement. If EPA instead chooses to continue the requirement for a pre-model year GHG report, we ask that action be taken to align its requirements with those of the NHTSA CAFE program as described below.

Pre-Model Year Report Deadline

The deadline for the EPA GHG pre-MY report occurs before that of the CAFE pre-MY report. Paragraph (a)(2) requires submission of a GHG pre-MY report before the start of a model year and no later than December 31 of the calendar year two years before the model year. The CAFE pre-MY report is not due until December of the calendar year one year before the model year (see 49 C.F.R. 537.4(b)(1)). Therefore, manufacturers are required to prepare separate GHG and CAFE pre-MY reports for different model years that are due at the same time. For example, by no later than December 2020 manufacturers will need to prepare a pre-MY GHG report for model year (MY) 2022 and a pre-MY CAFE report for MY 2021. The requirement to prepare a pre-MY report for two different model years at the same time is an unnecessary burden. We recommend that EPA make its GHG pre-MY report deadline consistent with that of the CAFE pre-MY report.

Recommended change:

> 40 C.F.R. § 600.514-12(a)(2) The pre-model year report required by this section for each model year must be submitted ~~before the model year begins and before the certification of any test group,~~ no later than December 31 of the calendar year ~~two~~ one year~~s~~ before the model year. For example the pre-model year report for the 2012 model year must be submitted no later than December 31, ~~2010~~ 2011.

Pre-Model Year Report Content Requirements

Paragraph (b)(1) requires manufacturers to include information on the applicable model year plus, to the extent possible, two model years into the future. This exceeds the requirements of the CAFE pre-MY report that only requires assessment of the applicable model year. Collecting and analyzing anticipated GHG compliance data for three years is an unnecessary additional burden and inconsistent with EPA's approach to other light-duty vehicle emissions programs. EPA has now been administering the light-duty vehicle greenhouse gas program for approximately ten years. Given this history, we feel that it would be appropriate to reduce the amount of pre-reporting required. We therefore recommend that the GHG pre-MY report include only data for the applicable model year.

Recommended change:

> 40 C.F.R. § 600.514-12(b) *Content of pre-model year reports.* (1) Each pre-model year report must include the following information for each compliance category for the applicable future model year ~~and to the extent possible, two model years into the future~~:

* * * * *

What Commenters Said
VW (0039) In addition to the proposed regulatory amendments, EPA also asked for comment on several provisions related to reporting requirements. While no changes were proposed, we support maintaining flexibility in report submissions and corrections. Submitting forecast reports can be time consuming and due to evolving product plans, often result in multiple forecast revisions. As the current pandemic crisis continues to unfold, it demonstrates that forecasting can be drastically affected by elements out of our control in a very short amount of time. We support aligned and concise reporting requirements across all programs and pollutants. We request alignment of the CAFE, CREE, A/C credits and Off-Cycle credits to May 1. Being able to include credits in the reports will allow a truer picture of compliance rather than a placeholder subject to revisions. We also request EPA to review their record retention requirements across the entire emissions compliance sections. Several sections have been previously updated to maintain records for 8 years. This rule updates other sections, while still other Part 86 sections have never been made in alignment. While electronic storage is less constraining than paper storage, an effort should be made to harmonize all the retention requirements to a suitable length.
EMA (0044) EPA has requested comment on the schedule for End-of-Year reporting requirements for Averaging Banking and Trading ("AB&T") programs. Current regulations require an initial report 90 days after the end of the Model Year, and a final report 270 days after the end of the Model Year. EPA has asked whether a single reporting deadline is adequate. Many manufacturers find it difficult to gather all the information necessary to provide a robust report within 90 days. EMA recommends that EPA modify the reporting requirements to state that the AB&T report is due 180 days after the end of the Model Year. The manufacturer should be allowed an additional 90 days to submit any corrections to the report, if necessary. Such a requirement would give most manufacturers the time needed to create a single AB&T report in which they have good confidence of accuracy and completeness, yet preserve additional time should they become aware of any need to adjust the report. EPA's access to "final" data would be no different than it is today.
EMA (0040) EPA should eliminate the requirement that nonroad engine manufacturers measure and report unregulated emissions. Specifically, EPA should eliminate the provisions of section 1039.205 which require that nonroad engine certification results include the measurement of CO2, CH4 and N2O emissions. The required investments in measurement systems, testing processes, and dedicated personnel are widely disproportionate to any putative benefits. By now, the Agency has gained a good understanding, based on the wealth of data provided to date, as to how those engines perform regarding those unregulated emissions, and there is little or no additional value to continuing to provide more of those same data to EPA.

Response

EPA appreciates the input on this area of comment. We may consider the suggested changes in an appropriate future action.

4.4 Voluntary Standards

We requested comment on adopting voluntary standards that invite manufacturers to comply with standards representing an extra degree of emission control beyond the mandatory standards.

What Commenters Said
CARB (0030) The locomotive provision at 40 CFR § 1033.101(l) that provides more stringent, voluntary standards shows the effectiveness of achieving additional emission reductions with manufacturer support. Similarly, in the on-road heavy-duty sector, CARB staff recommends U.S. EPA adopt more stringent voluntary standards to encourage and promote the development of advanced technology that can achieve emissions much lower than the required emission standards. In December 2013, the Board adopted optional low NOx engine standards for on-road heavy-duty engines that were 50, 75 percent, and 90 percent lower than the required NOx emission standard. Currently, many engine families have been certified to these optional low NOx engine standards, including ten 2019 model year engine families certified to 90 percent lower than the required emission standard. These lower emitting engines are typically utilized in incentive programs such as the Carl Moyer Memorial Air Quality Standards Attainment Program and are excluded from participation in the average, banking, and trading program. CARB staff also plans to propose a new generation of voluntary optional low NOx standards for on-road heavy-duty engines that are 50 percent lower than the proposed Heavy-duty Omnibus Regulation 2027 model year engine standards, at a CARB hearing later this year. As part of U.S. EPA's Cleaner Truck Initiative, CARB staff recommends that U.S. EPA establish voluntary optional low NOx standards that are similar to CARB's proposed optional low NOx standards for 2027 and subsequent model year engines.

Response

EPA appreciates the input on this area of comment. We may consider the suggested changes in an appropriate future action.

4.5 Production-Line Testing for Marine Diesel Engines

The proposed rule described a possible alternative approach for production-line testing to reduce testing rates, but to broaden the scope of testing. This would reduce the overall test burden, but each family (even small families) would need to have a single passing test to demonstrate that the manufacturer could meet emission standards using a production engine. This contrasts with certification testing where manufacturers test a prototype engine to demonstrate compliance with standards to qualify the engine for the start of production.

What Commenters Said *(EPA's response follows the seven comments listed below)*
EMA (0044) As a general matter, PLT in the first 60 days of production, especially for marine engines and other lower-volume applications, is too short. To alleviate that PLT burden, the Agency should allow 90 days for PLT testing, or should specify that PLT should be completed as soon as practical after the testing threshold is met. In addition, if an engine from a small-volume family fails PLT, engine manufacturers may not be able to meet the requirement in section 1042.310(c) regarding the number of additional test engines within the model year. Therefore, EPA should cap the required number of tests if an insufficient quantity of engines is produced during the model year. Random selection of test engines can further reduce the engine manufacturer's ability to conduct the required number of tests for a small volume family. Accordingly, and as specified further below, EPA should remove the requirement to select engines randomly. That revision would allow manufacturers to select the PLT engine earlier in the production sequence. Category 2 marine engine tests can cost $300,000/test, which is overly burdensome for such low-volume production. Therefore, flexibilities for Category 2 engines should mirror those that are allowed for Category 3 engines.
EMA (0044) §1042.310(a) EMA has a number of specific recommended amendments to the current PLT provisions for marine engines. For Category 1 and 2 engine families, the minimum sample size is one engine. Such testing should be conducted after initial production exceeds 100 engines for Category 1 engines and 10 engines for Category 2, based on the cumulative production volume of a family, including all model years of a family using carryover based on the entire historical production volume of each engine family (omitting model year designation in the family name). If no engines are produced in a family in a given model year, no testing should be required for that family unless it is to complete testing based on prior year production. If a PLT test threshold is surpassed in the calendar year that coincides with the last model year for a family with no future carryover, the PLT should be completed as soon as practical in the year the threshold is surpassed or as soon as practical in the subsequent year. The transition period to the new revised PLT requirements, if adopted, should span from 2020 through 2024 to avoid repeat tests on engines in 2020 and to allow manufacturers to amortize additional test burdens over a longer period of production. A testing threshold is based on historical production volumes as well as a transition period, should be provided for testing multiple historical family tests that must be completed based on production volumes. That approach would assure that engine families are tested and that a reasonable timeframe is provided to transition to the new requirements.
EMA (0044) 1042.310(b) As noted above, EPA should change this provision to say, "~~Randomly~~ Select one engine from each engine family after exceeding the production volume threshold…"
EMA (0044) 1042.310(e) This provision should be revised similarly to state, "You may elect to test more ~~randomly chosen~~ engines than we require under this section."

What Commenters Said
EMA (0044) 1042.345(a)(3) This provisions also should be revised similarly to state, "Describe how you ~~randomly~~ selected engines." EMA also requests that EPA clarify that no PLT requirements will apply for a new engine family if no engines are produced in a given model year. Engine manufacturers may certify families in a given model year based on forecast production. However, changes in market demand, production schedules, etc., may impact the actual production. If no engines are produced within a family, EPA should remove any testing requirements for that model year.
Progress Rail (0054) Revise§1042.310(c) as follows: (c) For each Category 1 engine that fails to meet emission standards, test two from the same engine family from the next fifteen engines produced, or within seven days, whichever is later. For each Category 2 engine that fails to meet emission standards, test one engine from the same engine family from the next fifteen engines produced in the model year it becomes available, or within seven days, whichever is later. If an engine fails to meet emission standards for any pollutant, count it as a failing engine under this paragraph (c).
Progress Rail (0054) Revise§1042.315(b) as follows: (b) For Category 1 and Category 2 engines having annual production volume greater than fifteen engines per year, if a production-line engine fails to meet emission standards and you test two additional engines as described in §1042.310, calculate the average emission level for each pollutant for the three engines. For Category 2 engines having annual production volume less than fifteen engines per year, if a production-line engine fails to meet emission standards and you test ~~**one**~~**two** additional engine**s** as described in §1042.310, calculate the average emission level for each pollutant for the ~~**two**~~ **three** engines. If the calculated average emission level for any pollutant exceeds the applicable emission standard, the engine family fails the production-line testing requirements of this subpart. Tell us within ten working days if this happens. You may request to amend the application for certification to raise the FEL of the engine family as described in §1042.225(f). For each Category 2 engine that fails to meet emission standards, test one engine from the same engine family from the next fifteen engines produced in the model year it becomes available, or within seven days, whichever is later. This provides the opportunity to defer testing in model year an engine becomes available for the engine family. EMD Progress Rail locomotive petitions changes to Production line tests under CFR 1042. Given the extremely low production volumes, we petition for relief on requirements for reducing the number of additional testing required for a failed engine. We petition for production volume up to fifteen engines the additional test burden be reduced from two to one additional engine. Production line testing places considerable financial burden for extremely low production volumes in terms of testing cost and sales opportunity cost for the business.

Response

We appreciate the comments on this issue. We will consider these comments and additional information as it becomes available to determine whether or how to amend the regulation to address these concerns.

4.6 Highway Motorcycle Standards

We requested comment on adopting the WMTC as a means of certifying highway motorcycles to EPA emission standards. We also requested comment on any appropriate adjustment to the exhaust emission standards that apply for highway motorcycles to ensure equivalent stringency for testing with the WMTC.

What Commenters Said *(EPA's response follows the two comments listed below)*
MIC (0052) MIC and member companies are supportive of EPA harmonizing with or otherwise adopting Euro 5 standards and procedures for on-highway motorcycles with suitable adjustments to account for differences between the US and other countries. This includes the use of the WMTC, SRC-LeCV accumulation cycle, and other optional procedures including catalyst bench aging. Another possible option is EPA adoption of Euro 5 exhaust emission standards without adoption of the evaporative standards. Euro 5 requirements and standards for enduro and trials motorcycles should not be included in EPA or CARB harmonization. Enduro and trials motorcycles are primarily off-highway or closed-course competition exempted vehicles subject to off-road use only operation in the US, where, in Europe, they may be required to have limited on-road trail-to-trail use and street legal status during competition events. Additionally, Euro 5 performance increase prohibitions related to European tiered licensing restrictions should not be included in EPA or CARB harmonization or adoption of Euro 5 standards, procedures, or requirements.
CARB (0030) CARB staff is currently developing regulatory amendments for certification and testing of on-road motorcycles (ONMC). The tentative schedule is to complete this rulemaking process in 2021 and require all new ONMC to comply with new emissions standards and test procedures starting in 2025. CARB staff is considering provisions which may allow for a significant degree of harmonization with European Union L category standards as specified in the European Union's 168/2013 and 134/2014 regulations, including use of the WMTC as the test cycle for determination of compliance with certification emissions standards. Currently CARB requires the 3- phase urban dynamometer driving schedule (UDDS) cycle in order to determine emissions compliance. CARB staff has begun a comprehensive test program to quantify the differences in measured emissions during the WMTC and UDDS cycles. Testing is ongoing, but initial results indicate that the WMTC incorporates a wider range of RPM-torque demands than the UDDS. The WMTC more accurately replicates real world motorcycle riding patterns than the UDDS cycle and is thus more likely to generate results more representative of real-world emissions. Further, early testing results appear to indicate that emissions generated on the WMTC are significantly higher than those generated on the UDDS test cycle, indicating that adoption of the WMTC would likely result in equal or more stringent emissions standards than are currently in place. Results of CARB ONMC testing so far are generally consistent with similar testing conducted by Environment and Climate Change Canada (ECCC) and the European Commission (https://op.europa.eu/en/publication-detail/-/publication/f3f268fc-943f-11e7-b92d-01aa75ed71a1). Preliminary test results have been shared with U.S. EPA staff, and we intend to continue sharing data and collaborating with U.S. EPA throughout our rule development process.

Response

EPA appreciates the input on this area of comment. We have been in communication with regulators in Europe and in California to better understand possible issues. We may consider the suggested changes in a future action to update highway motorcycle standards and test procedures.