Air Resources Board

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Secretary for
Environmental Protection

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Governor

February 5, 2013

Reference No. CLC-2013-002

Tim Carmichael, President
California Natural Gas Vehicle Coalition
1029 K Street, Suite 24
Sacramento, CA 95814

Dear Mr. Carmichael:

Thank you for your September 20, 2012, email to the Air Resources Board (ARB), "Suggested Improvements To ARB's Certification and OBD Requirements for NGVs From Small Volume Manufacturers." ARB staff understands the issues facing the alternative fuel conversion (AFC) industry as described in your letter and is committed to working with the industry to address certification issues through flexible application of the current procedures and proposed amendments to the regulations specific to the conversion industry. This letter addresses the items listed in your letter with general suggested alternatives using current regulations. However, other suggested flexibilities may be available based on a manufacturer's particular situation. Please encourage your members to participate in certification preview meetings before they intend to certify engines and vehicles. Preview meetings provide manufacturers with opportunity to discuss specific issues of concern and ARB to suggest alternatives.

As you know, on August 14, 2012, staff conducted a public workshop at our facilities in El Monte, California to explain the requirements and process for manufacturers to submit an application and obtain an Executive Order for the certification of alternative fuel conversions for new and used vehicles and engines. The presentation materials staff used at the workshop are posted on the ARB website; Attachment 1 provides information for accessing these materials. Staff believes the workshop addressed many of your concerns. In addition, at the October 23, 2012, meeting with you and other interested parties, staff offered other flexibilities available within the current regulations to address your issues. The responses below will provide detailed explanations of these items discussed.

Some of the issues you raised would require changes to the regulations. Obviously, consideration of those changes will be undertaken in the public arena and determinations made on which changes introduce more flexibility while preserving the emission benefits of existing requirements. Staff has begun considering changes based on the industry's past comments as well as from the formal industry workgroup and

public workshop meetings on January 15 and 22, respectively. The plan is to present staff's recommendations to the Board this summer. The workgroup meeting and the public workshop focused on ideas and concepts for proposed amendments to the regulations and certification procedures for new and used converted vehicles and engines. Staff was encouraged by the participation of the California Natural Gas Vehicle Coalition and its members in these meetings and the input provided in helping staff better understand the challenges facing the industry in order to craft the amendments to the regulations and procedures to address these issues.

Staff's responses to your specific proposed options are below and are based on current regulatory requirements and technical bases for those requirements.

Option 1: Eliminate the requirement to adjust each monitor to a CNG-specific value.

First, this option would require a regulatory change as the current On Board Diagnostics (OBD II) regulation (Title 13, CCR section 1968.2) does not provide a mechanism to exempt certain vehicles or monitors from meeting the required emission thresholds (i.e., all vehicles are required to have OBD systems that detect certain faults before tailpipe emissions exceed a specific threshold level that is typically 1.5 times the applicable FTP standard). Second, the emission threshold monitors are one of the primary mechanisms by which OBD systems achieve emission benefits in customer use. These monitors ensure major emission controls are detected as faulty (and repaired) before tailpipe emissions are excessive. Faults that are not detected until higher tailpipe levels are reached directly translate to less emission benefits in the real world by allowing vehicles to operate at higher tailpipe levels for a longer period of time—be it weeks, months, or even years.

Experience shows that virtually every converted vehicle has necessitated a calibration change to one or more monitors to detect faults at the required emission thresholds. Conversions that certify to a lower standard than the original vehicle certification typically have even more monitors that require recalibration to be compliant. However, such generalizations are just that because the conversions can vary tremendously and can include those that go beyond remapping of fueling and spark and make changes modifying fundamental emission control strategies such as using higher exhaust gas recirculation (EGR) flow rates or recalibrating cold start emission control strategies. Modifications to the base control strategies alter the correlations between tailpipe emissions and the monitored parameter (e.g., a measure of EGR flow for an EGR monitor or a measure of oxygen storage for a catalyst monitor) that were originally established by the original equipment vehicle manufacturer. Absent a requirement to confirm (and recalibrate where necessary) each of the emission threshold monitors' capability to detect faults at the right level, there would be significant variance in tailpipe emission levels when a fault is detected on converted vehicles and that would reduce the in-use emission benefits of the OBD program.

This option also suggests using data collected on in-use vehicles (i.e., rate-based data) in lieu of the required pre-certification demonstration testing to confirm the performance of the system. However, the in-use data do not actually provide any information about the capability of a system to detect faults at the required emission thresholds. Rate-based data indicate whether monitors run frequently in use but cannot distinguish between a monitor that can detect at 1.5 times or 10 times the Federal Test Procedure (FTP) standard. Mode $06 data (i.e., the monitor test results reported by the OBD system to a scan tool) provide information about how individual emission controls on a particular vehicle are currently performing relative to the monitored parameter but again, provide no useable information about whether any monitors are capable of detecting faults at the required emission thresholds.

Option 2: Eliminate the requirement for conducting/reporting FTP emission results of each OBD monitor.

Like option 1, this would require a regulatory change for the same reasons noted above. Also as noted above, the requirement for the emission testing is to ensure that faults are detected before tailpipe emissions are too high. This demonstration requires testing with a barely failing component to show that it is indeed detected as faulty and that tailpipe emissions are below the required levels with that level of fault implanted. Without the emission test results, the only conclusion from testing would be that some level of deteriorated component will be detected as failing—but whether that is when tailpipe emissions are 1.5 times or 10 times the standards would be completely unknown. As a reminder, such testing is not required for that vast majority of the more than 200 to 300 individual diagnostics that make up an OBD system. Instead, the regulation establishes emission thresholds and associated demonstration testing only for the major emission control systems on a vehicle and typically makes up fewer than a dozen monitors.

As noted in the response to option 1, in-use testing as currently structured does not provide any information about the tailpipe levels at which a fault can or will be detected. Further, the 16+ year old tailpipe test equipment of the Smog Check program is not capable of robustly discerning between the emission levels of a properly operating vehicle and a malfunctioning vehicle at the emission standards represented by new vehicles produced today. And, starting next year partially for this very reason, the tailpipe test will be eliminated from the Smog Check program for 2000 and newer model year vehicles. Accordingly, neither in-use data nor the Smog Check program provide an adequate backstop to ensure faults are detected at appropriate emission levels.

Option 3: Eliminate the threshold catalyst monitor.

As with the other options above, this would require a regulatory change for the same reasons noted above. Experience demonstrates that the catalyst monitor is the single monitor that requires the most recalibration on virtually every converted vehicle—even on cases where the converted vehicle is certified to the same tailpipe standard as the base vehicle. Without recalibration, vehicles would be emitting at higher levels without a fault being detected for what could easily be months or years of operation before enough further degradation occurs that a fault is eventually detected. And, from the Smog Check program, it is clear that catalyst faults are not an insignificant portion of the faults that cause vehicles to fail so there would be a loss in emission benefits if emissions were allowed to be at higher levels before a catalyst fault was detected.

Option 4: Reduce excessive documentation requirements.

Subsection (i) of the OBD regulation calls out the specific parts that make up a complete certification application. And, the draft guidance for OBD compliance for alternate fuel conversions provides further information about the application and what is typically required for alternate fuel conversions including any items that ARB waives for conversions that are starting with an engine that is already certified. However, to determine compliance with the OBD requirements, a fairly detailed set of information is still needed to comprehend the modifications to the system by a conversion and assess their impact. Applications typically include general descriptions of the conversion (hardware modifications, control strategy, etc.), a summary table for all diagnostics, and test data demonstrating the capability of the system for misfire detection and emission threshold diagnostics. Already, conversion applications typically do not include a general description of the base OBD system or flow charts of each monitor as are typically required for OBD certification. And, conversions applications are required to include some form of a summary table or chart identifying all OBD calibration changes that were made to accommodate the conversion.

Regarding the summary table, conversion manufacturers are required to submit a full summary table of all diagnostics including those modified, added, deleted, and/or unchanged. While the focus of a review is certainly on the added and modified diagnostics, a full table is required to not only allow staff to assess the capability of the modified and added diagnostics but to also assess any direct or indirect adverse impact on any other diagnostic in the system including unchanged diagnostics. Further, the requirement to document all of the diagnostics also provides assurance that the manufacturer is actually aware of all of the diagnostics and thus, has a reasonable chance of being knowledgeable enough to have already identified any interactions with other diagnostics and taken action to address them.

Option 5: Extend Executive Order (EO) expiration an additional 12 months.

Current regulations (40 CFR 85.2301 – 85.2305) limit a model year to December 31 of the calendar year for which the model year is named. The regulations stipulate further that vehicles produced after such December 31 date, even where they are all identical to vehicles produced before them, must demonstrate compliance with currently applicable emission standards and requirements and be covered by a new Executive Order (EO). Although ARB is unable to extend the effective date of an EO for new vehicles beyond December 31 under current regulations, this issue which affects the new vehicle conversions the most will be considered through discussions for the proposed amendments to the regulations for new and used vehicle conversions. The ARB welcomes your continued participation in the regulatory process on such proposed regulations and will consider your ideas and suggestions.

Given that the emission standards applicable to small volume manufacturers, including almost all current conversion manufacturers, stay the same in the next few years, there should be none or very few issues for a conversion manufacturer to seek a new EO to convert new vehicles after December 31. For example, to convert new 2012 model-year (MY) base gasoline vehicles that remain after December 31, 2012, a conversion manufacturer can submit an application for a new EO for these vehicles as new 2013 MY conversions. Compliance with the MY2013 emission standards should be no issue (emissions standards for 2013 MY and 2012 MY are the same). Where there are new OBD II requirements for 2013 MY compared to 2012 MY, these might be addressed through a determination of concerns, deficiencies and/or fines. Staff believes that two EOs may be processed at the same time (2012 and 2013 MY) as an interim approach for new vehicle conversions to certify at one time to cover the December 31 limitation of a model year under current regulations. Manufacturers would have to track installation dates and ensure vehicles are labeled correctly for the appropriate model year.

Conclusion:

As mentioned at the beginning of my letter, I am encouraged by your active participation in the development of the proposed regulatory changes. As was discussed in the workshop on January 22, 2013, ARB is open to new concepts that simplify the certification process while optimizing the benefits of alternative fuel conversions and existing ARB requirements. The next workgroup meeting is being scheduled for late February/early March 2013 and the next public workshop will be scheduled sometime this summer.

If you have any questions regarding OBD II, please contact Mr. Michael McCarthy, Chief Technology Officer, Mobile Source Control Division, at (626) 771-3641 or by email at mmccarth@arb.ca.gov. For questions regarding conversions of new PC, LDT, and chassis certified MDV, please contact Mr. Duc Nguyen, Manager, On-Road Light-Duty Certification Section, at (626) 575-6844 or by email at dnguyen@arb.ca.gov. For

questions regarding conversions of new HD vehicles and engines, including engines used in diesel and incomplete MDV 8,501 to 14,000 pounds gross vehicle weight rating, please contact Ms. Kimberly Pryor, Manager, Compression-Ignition and Heavy-Duty Certification Section, at (626) 575-6640 or by email at kpryor@arb.ca.gov. For questions regarding aftermarket/retrofit system conversions of used vehicles and engines, please contact Mr. Tony Martino, Manager, Aftermarket Parts Section, at (626) 575-6848 or by email at amartino@arb.ca.gov.

Sincerely,

Annette Hebert, Chief
Mobile Source Operations Division

Attachment (1)

cc: Peter Ward, Principal
Alternative Fuels Advocates, LLC
5030 Concord Road
Rocklin, CA 95765

Mr. Tim Carmichael

Attachment

References.

The web address below is the slide presentation, "Certification of Alternative Fuel Conversions for New and Used Vehicles/Engines" from the August 14, 2012 workshop held at ARB in El Monte.
http://www.arb.ca.gov/msprog/onroad/cert/ldctp/altfuelwkshop2012.pdf

OBD II specific presentation from the August 14, 2012 workshop.
http://www.arb.ca.gov/msprog/onroad/cert/ldctp/altfuelwkshop2012obdii.pdf

DRAFT Guidelines for Alternate Fuel Vehicle On-Board Diagnostic II (OBD II) Certification
http://www.arb.ca.gov/msprog/obdprog/Draft_altfuelOBD_MO_Aug2012.pdf

On-Road Light-Duty Certification and Regulations web page.
http://www.arb.ca.gov/msprog/onroad/cert/ldctp/ldctp.htm