



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL VEHICLE AND FUEL EMISSIONS LABORATORY
2565 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105-2498

OFFICE OF
AIR AND RADIATION

CISD-10-24 (LD-AFC, LDV, LDT, HDV, HDE)

October 28, 2010

SUBJECT: Updated Certification Guidance for Fuel Converters

Dear Manufacturer:

This guidance letter, with its Enclosure, supplements the guidance contained in EPA Dear Manufacturer Letter CISD-09-14, dated June 20, 2009, which may be viewed at: http://iaspub.epa.gov/otaqpub/display_file.jsp?docid=20194&flag=1 Information in this document amends the June 20, 2009 guidance by adding a question and answer No. 22.2 at the very end of the Enclosure.

EPA has received inquiries concerning our policies for converting vehicles to full battery electric, in particular whether such conversions should be certified as protection from a possible tampering violation. This letter addresses this issue by stating that conversions to full battery electric (no on-board source of combustion emissions) do not require alternative fuel vehicle certification.

Questions regarding this letter pertaining to light-duty vehicle conversions should be directed to Martin Reineman at reineman.martin@epa.gov. Questions regarding heavy-duty vehicle and nonroad engine conversions should be directed to Steve DeBord at: debord.steven@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "K. Simon".

Karl J. Simon, Director
Compliance and Innovative Strategies Division
Office of Transportation and Air Quality

Enclosure

Enclosure to CISD-10-24 Questions and Answers

The answers to the questions presented here are based on 40 CFR Parts 80, 85, 86, 88, 600 and the Clean Air Act as Amended.

Questions applicable to all types of fuel conversions

1. *What is the distinction between vehicle certification and engine certification for aftermarket fuel conversions? Are the EPA contacts different?*

Ans. Vehicle certification is required for new vehicles up to 14,000 pounds gross vehicle weight (GVW) using Otto cycle engines. Vehicle certification is also required for new diesel cycle vehicles with GVW up to 8,500 pounds. New diesel vehicles between 8,500 and 14,000 pounds may be optionally certified using either chassis test standards and test procedures, or engine test standards and test procedures. Engines in vehicles of any fuel type with a GVW over 14,000 pounds GVW must be engine dynamometer certified.

Since the certification weight class requirements have changed over time, fuel converters should examine the Original Equipment Manufacturer's (OEM) application for certification to determine if a given vehicle or engine was originally vehicle or engine certified. Fuel conversions must be certified in a manner consistent with how the OEM certified the vehicle or engine. If the vehicle was chassis certified the fuel conversion must also be chassis certified. If the vehicle has an engine certification, the fuel conversion must be engine certified.

Vehicle certification of fuel conversions is administered by EPA's National Vehicle and Fuel Emissions Laboratory in Ann Arbor, MI. The EPA vehicle certification contact is Martin Reineman. His e-mail address is: reineman.martin@epa.gov. Engine certification of fuel conversion is administered in EPA's Washington, DC office. The EPA engine certification contact is Greg Orehowsky. His e-mail address is: orehowsky.gregory@epa.gov.

2. *When must vehicle fuel converters begin certifying through EPA's Verify data system?*

Ans. Vehicle converters are required to submit applications for certification through the Verify data system beginning with the 2010 model year. For most converters, applications for 2009 model year certificates of conformity will continue to be processed outside of Verify. Information on the Verify data entry process may be found at: www.epa.gov/otaq/verify/publications.htm. To receive information and updates about the Verify data system sign up for the Verify Listserv at:

<http://www.epa.gov/otaq/verify/documents/420b07002.pdf>.

3. *Is the EPA certification and data entry process for converting engines to alternative fuels the same for converting vehicles to alternative fuels?*

Ans. No. Heavy-duty highway engines are currently certified through the FileMaker based Information Management System (IMS). Information on the engine certification and data entry process can be found at: <http://www.epa.gov/otaq/hd-hwy.htm>.

4. *The Verify data entry process is complex as are the EPA vehicle and engine certification processes. Does EPA provide assistance to fuel converters who are new to both processes?*

Ans. Yes. The Verify helpline is available to assist with Verify data entry issues and may be contacted by e-mail at: verifyhelp@csc.com or by phone at: 888-890-1995. The EPA certification staff can address many questions about the certification process, but fuel converters new to the process may well benefit from the assistance of technical consultants who are familiar with certification testing requirements and with preparation of the documentation required for EPA applications for certification.

5. *Where does one find information on federal or state tax credit or rebate policies for aftermarket fuel conversions?*

Ans. Information on federal tax credit policies may be found at the Internal Revenue Service web site: <http://www.irs.gov>. When at that website, search for “alternative fueled vehicles.” Information on individual states’ policies with respect to credits and rebates must be addressed to the state in question, likely through that state’s tax or revenue agency.

6. *What are the OEM's positions on warranty coverage for vehicles converted to operate on alternative fuels?*

Ans. The OEMs differ on this issue, and warranty coverage may change over time. Therefore, vehicle owners should examine the language in their OEM warranty to understand the specific warranty coverage and responsibilities applicable to their vehicle.

7. *Is the certification process the same for any aftermarket conversion, regardless of alternative fuel type?*

Ans. Yes. Fuel conversions of OEM vehicles to any alternative fuel must follow the requirements in Part 86 of the Code of Federal Regulations (CFR). However, there are inherent differences among fuels that can affect test procedures and other detailed fuel-specific requirements that are not explicit in the regulations. For example, test fuel specifications for E10 and E85 are not defined in Part 86, Subpart B. Therefore, it is

important to discuss specific testing issues that are not explicitly described in the CFR in advance with an EPA certification representative.

8. *Have there been any changes to the EPA onboard diagnostics (OBD) approval process for aftermarket fuels converters? Why is OBD compliance for fuel converted vehicles so important?*

Ans. No. Fuel converters are responsible for meeting the EPA OBD regulations in 40 CFR § 86.1806-05 and 86.007-17. Converters must demonstrate that aftermarket changes to the OEM fuel control system have not affected MIL (malfunction indicator light) illumination thresholds and that the OBD system will continue to function properly while operating on the new fuel. Converters may contact EPA with specific OBD questions.

A functional OBD system is important in any vehicle, including a converted vehicle, to alert the vehicle owner to malfunctions that could cause excessive emissions. States with vehicle inspection programs rely almost completely on interrogating the OBD system to ensure that there are no emissions problems.

9. *Is the EPA certification process for aftermarket fuel converters the same in California or states that have adopted California vehicle emission standards?*

Ans. No. California has its own requirements for aftermarket fuel conversions. Conversions of new vehicles in California are administered through California's light-duty vehicle and truck certification staff. The contact for new vehicle certification in California is Duc Nguyen, who may be contacted at: dnguyen@arb.ca.gov. Conversions of in-use vehicles are administered through a different department. The contact for these vehicle conversions is Rose Castro, who may be contacted at: rcastro@arb.ca.gov. For states other than California that have adopted provisions or standards from the California vehicle emissions program, contact the individual state in question to learn the specifics regarding their policies on fuel conversions.

10. *How does the EPA "test group" concept relate to the real world vehicles?*

Ans. The concept of "test group" was created for vehicle certification purposes and is not necessarily easy to associate with "real-world" groupings of vehicles. Test groups typically include vehicles with nearly identical engine, emission control, and fuel system design characteristics. OEMs designate test groups at the time of certification. The characteristics OEMs must evaluate when placing vehicles in test groups can be found in 40 CFR § 86.1827. Examples of OEM test groups are listed in the Green Vehicle Guide under the column heading "Underhood ID." You can download the guide at: <http://www.epa.gov/greenvehicles/Download.do>

11. *Given that converters may use the same basic fuel system design across multiple model years, various manufacturers, and various model types, is it possible to certify a product for several OEM test groups or engine families?*

Ans. Yes. Under certain circumstances EPA will now allow fuel converters to combine certain OEM test groups into a single fuel converter test group on a case-by-case basis. EPA will allow converters to combine OEM test groups if criteria in 40 CFR §§ 86.1820-01 and 86.1827-01 are followed. EPA will consider allowing OEM test groups to be combined if the following criteria are met for each fuel converted test group:

- 1) Same original manufacturer and model year
- 2) Same OBD group
- 3) Same vehicle classification (e.g. LDV, LDT, HDV)
- 4) Same combustion cycle
- 5) Same engine type (e.g. piston, rotary)
- 6) Engine displacements within 15% of largest displacement or 50 CID, whichever is largest
- 7) Same number of cylinders
- 8) Same arrangement of cylinders
- 9) Same fuel type (e.g. diesel/gasoline)
- 10) Same fuel metering system (e.g. throttle body injection vs. port injection)
- 11) Same basic catalyst construction (e.g. metal vs. ceramic substrate)
- 12) All converted vehicles are subject to the most stringent emission standards used in certifying the OEM test groups.
- 13) The fuel converter exercised good engineering judgment when combining OEM test groups.

Advance EPA approval is required for fuel converters to combine OEM vehicle test groups. EPA must also approve the selection of a worst case test vehicle among the combined OEM test groups. Fuel converters may need to contact EPA to determine if the OEM test groups are in the same OBD test group because this information is not typically publically available.

EPA will also allow fuel converters to combine certain OEM heavy-duty engine families into a single fuel conversion test group. EPA will allow converters to combine OEM engine families if the following criteria are met for each fuel converted test group:

- 1) Same original manufacturer
- 2) All converted vehicles are subject to the most stringent emission standards. For example, 2005 and 2007 heavy-duty diesel engines may be in the same family if they meet the most stringent (2007) standards.
- 3) Same service class (e.g. LHDDE, MHDDE, HHDE)
- 4) Same combustion cycle
- 5) Method of air aspiration

- 6) Engine displacements within 15% of largest displacement or 50 CID, whichever is largest
- 7) Same number of cylinders
- 8) Same arrangement of cylinders
- 9) Same fuel type (e.g. diesel/gasoline)
- 10) Same fuel metering system (e.g. mechanical direct or electronic direct injection)
- 11) Same basic catalyst/filter construction (e.g. metal vs. ceramic substrate)
- 12) The fuel converter must use good engineering judgment when combining OEM engine families
- 13) Same OBD group after 2013.
- 14) Same emission control technology (e.g., internal or external EGR)

Once you have identified the engines to be included in the conversion test group, select the highest emitting engine, pre-conversion, to be the test engine for the group.

12. *Where can one find which manufacturers have been issued EPA certificates for aftermarket vehicle and engine fuel conversions?*

Ans. Certificates for aftermarket vehicle conversions may be viewed on the EPA Document Index System (DIS). The DIS search field called “model year” refers to the year in which the certificate is valid. Therefore, multiple EPA model year searches may be necessary to find conversion certificates for a particular OEM model year vehicle. Information on the DIS is updated periodically but you may need to contact EPA or the fuel converter directly for more recent certification information. Aftermarket alternative fuel certificate holders for a particular EPA model year may be viewed by going to: www.epa.gov/dis. When at the DIS:

Select “Certificates of Conformity” in the list of Document types
 Select “Alternative Fuel Conversions” in the list of Industry types
 Select the desired EPA certificate (not vehicle) model year from the Model Year list
 Select “All” in the Manufacturers list
 Select “Search”

OEM certificates may be accessed in a similar manner by selecting “Light-Duty Vehicles and Trucks” in the list of industry types instead of “Alternative Fuel Conversions,” and by selecting the desired vehicle manufacturer instead of “All” in the Manufacturer list.

Certificates for aftermarket engine conversions may be found at: www.epa.gov/otaq/certdata.htm.

13. *Where can one find the OEM or fuel converters’ applications for certification?*

At present, applications for aftermarket conversion certificates are not on the DIS, but

will be in the near future. OEM applications are posted on the DIS and may be accessed as follows:

Select “Applications” in the list of Document types
Select “Light-Duty Vehicles and Trucks” in the list of Industry types
Select the desired EPA model year from the Model Year list
Select the desired OEM manufacturer from the Manufacturers list
Select “Search”

Vehicle certificates and applications not found on the DIS may be obtained by contacting EPA’s Freedom of Information officer Fred Hart at hart.frederick@epa.gov. Information on heavy-duty engines not published on an EPA website may be obtained through the Freedom of Information Act by contacting Robert Doyle at doyle.robert@epa.gov.

14. *Does EPA have authority to conduct in-use testing on fuel converted vehicles and engines?*

Ans. Yes.

15. *Is a Vehicle Emission Control Information (VECI) label required to be displayed under hood for an EPA certified fuel converted vehicle? Is there a similar requirement for Engine Family labeling of fuel converted engines?*

Ans. Yes. The conversion kit installer must apply a second VECI label next to or near the original OEM underhood VECI label, which should remain in place. The secondary VECI label is a requirement for all EPA-certified fuel converted vehicles. States that have vehicle inspection programs may deny registration if there is not a valid VECI label which links the fuel converted vehicle to an EPA certificate. The label should clearly indicate which fuel the converted vehicle operates on, the name of the manufacturer of the fuel conversion system, the installer of the aftermarket fuel system if different from the fuel system manufacturer, the converter’s test group name for the specific vehicle, and the date the conversion system was installed. There are analogous labeling requirements for converted engines.

16. *Do you need to obtain a certificate of conformity to convert nonroad equipment and stationary engines to alternative fuels?*

Ans. Yes. Since EPA’s certification policies for non-road sources and stationary sources ensure compliance with emission standards for the full useful life of the regulated emission source, certification is required to demonstrate compliance with emission standards when converting a vehicle to operate on an alternative fuel.

17. *What are EPA’s fuel conversion policies with respect to vehicles outside of EPA’s defined full useful life?*

Ans. EPA policy exempts alternative fuel converters from the Clean Air Act prohibition against tampering if they obtain a certificate of conformity for the conversion. However, the certification process may not be appropriate for vehicles outside their regulatory full useful life. EPA recognizes this inconsistency and has initiated a rulemaking process to update the policy. The rulemaking will identify alternate regulatory pathways for exemption of legitimate alternative fuel conversions from the prohibition on tampering.

During this interim period while we reconsider our existing regulations, current policy remains in place. This means that until a new policy is finalized, no certain protection against a tampering charge exists for converters of outside useful life vehicles. A prudent course of action for such converters may be to demonstrate through reliable testing that the conversion does not increase emissions, and to maintain records documenting test results. We recommend that converters with further questions about the Clean Air Act tampering prohibition contact EPA's Office of Compliance and Enforcement Assistance at: <http://www.epa.gov/compliance/basics/index.html>.

Questions about conversion to specific fuel types and about fuel additives

Fuel Additives

18.1 *What is a fuel additive?*

Ans. 40 CFR Part 79.2 defines a fuel additive as "... any substance, other than one composed solely of carbon and/or hydrogen that is intentionally added to a fuel..." Fuel additives to on-road gasoline and diesel fuels must be registered with the EPA.

18.2 *Does adding a registered fuel additive to gasoline or diesel fuel require vehicle fuel conversion certification?*

Ans. No, as long as 1) there are no changes to the vehicle's engine or emission system, 2) the additive is registered by EPA, and 3) you only add the quantity allowed under additive registration.

18.3 *How do I register a fuel additive?*

Ans. The registration requirements depend on the specifics of the additive. Please see EPA Form 3520-13 for further information. The form and additional information are available at: <http://www.epa.gov/otaq/regs/fuels/ffarsfrms.htm>.

Ethanol

19.1 *What concerns does EPA have about aftermarket fuel conversions to E85?*

Ans. OEM E85 flexible fuel vehicles (FFVs) frequently use E85 fuel system components that differ in fuel delivery capacity, calibration, and material composition from the fuel system components used in gasoline-only vehicles. In some cases OEMs will use E85-

compatible materials and design specifications in gasoline-only vehicles to avoid the extra costs associated with maintaining two types of part inventories. If these OEM vehicle-specific design differences are not understood and taken into consideration when converting a gasoline vehicle to E85, emission and vehicle performance problems may result.

19.2 *What components differ between OEM gasoline and E85 fueled vehicles?*

Ans. The component differences between OEM gasoline and E85 FFVs vary as a function of manufacturer, model year, and test group. Since the 1996 model year, all light-duty vehicles have been designed to accommodate E10 – a mixture of 10% denatured ethanol and 90% gasoline. However, unlike a vehicle designed to accommodate E10 fuels, a vehicle designed to use E85 and intermediate blends may require design changes in any or all of the metals, elastomers, and polymers used in the fuel supply system from the fuel pipe inlet to the fuel injectors and intake manifold. Software calibration changes to the computer controlled fuel supply are also necessary to account for ethanol's reduced volumetric energy content and unique stoichiometry. Depending on the test group, fuel pumps, fuel injectors, and other key components in the fuel supply system may need to be changed to accommodate the need for greater fuel delivery when using E85.

19.3 *What are the considerations that go into designing E85 vehicles?*

Ans. The challenge of properly designing E85 vehicles or converting gasoline-fueled vehicles to E85 begins with understanding ethanol's unique chemical and physical properties relative to gasoline. The principal design considerations which must be properly managed include ethanol's solvency of organic materials, the potential for galvanic corrosion of dissimilar metals due to ethanol's high electrical conductivity relative to gasoline, hydrocarbon permeation, and seal failure if swelling of gaskets and O-rings occurs.

19.4 *How do aftermarket fuel converters assure EPA that proper components are being used when converting a gasoline-fueled vehicle to E85?*

Ans. On a test group specific basis there are four ways:

- 1) A converter could use the same OEM parts that the OEM used in the E85 FFV.
- 2) A converter could provide information to demonstrate that the fuel system part numbers for the OEM gasoline vehicle and a similar vehicle which the OEM sells as an E85 FFV are identical. Identical part numbers demonstrates that the gasoline-fueled vehicle was also designed with E85 compatible parts. The comparison between part numbers is best performed by comparing dealer or OEM part numbers.
- 3) The fuel converter could provide whole vehicle durability data using EPA standard durability testing protocols published in 40 CFR Part 86, Subpart S. For example, having passing emission data and knowing that the emission control system, fuel system, and other powertrain components did not experience failure of components during the

durability aging would be adequate.

4) Proof of component durability may be accepted by EPA in the form of an analysis demonstrating that the components in the gasoline-fuel system are E85 compatible. Such a document would need to come from an OEM or a Tier 1 parts supplier, or the equivalent. Documentation or analyses should include references to recognized standard industry practices, for example, reference to testing methods for metallic materials or polymers described by the Society of Automotive Engineers.

19.5 *Would EPA be satisfied if the converter extends the OEM's base vehicle warranty to cover any concerns due to the installation of the conversion kit or the use of ethanol in the OEM gasoline-fueled vehicle?*

Ans. No. Simply extending the base-vehicle warranty does not completely address concerns about component compatibility. The concern with offering a limited warranty extension of time or mileage to the OEM base vehicle warranty is that a component problem may occur outside of the extended warranty limits.

19.6 *Does EPA share the same concerns it has regarding component compatibility in E85 conversions with other types of fuel conversions, such as gasoline-to-CNG or gasoline-to-LPG conversions?*

Ans. Yes. Ensuring that fuel conversions use components that are durable for the full useful life of the vehicle is important for any alternative fuel because, unlike conventional large volume OEMs, fuel converters are a type of small volume manufacturer. As such, they have neither upfront durability demonstration requirements nor in-use testing requirements. EPA recommends that converters resolve component compatibility issues before conducting emission or OBD testing. For example, if a conversion to CNG requires changes to the powertrain, such as installing a different type of intake or exhaust valve or valve seat, EPA would expect such modifications to be part of the fuel conversion requirements.

19.7 *What emission tests does EPA recommend for certification of an E85 conversion?*

Ans. The types of emission tests EPA recommends will depend on the configuration of the OEM vehicle and on the nature of modifications involved in its conversion. If the converted vehicle operates as a flexible fuel vehicle (e.g. capable of operating on gasoline, E85, or any blend of the two), exhaust testing will be required on both E85 and on the original fuel. Testing for evaporative emissions could be required on E10, which is the worst-case fuel for evaporative emissions. If the converted vehicle operates only as a dedicated E85 vehicle testing would only be required on E85.

At minimum, recommended testing would include running FTP and Highway test cycles. However, as indicated above, the appropriate testing protocol will be technology specific and other exhaust as well as evaporative emissions cycles might be recommended. E85 converters should examine the OEM application and discuss with EPA any planned

modifications to the OEM configuration before establishing testing plans. Decisions regarding what tests are required must be approved by EPA in advance.

19.8 *Have there been any test procedure changes with respect to measuring NMOG (non-methane organic gas) exhaust or OMHCE (organic material hydrocarbon equivalent) for the evaporative emission, running loss, or ORVR tests?*

Ans. EPA regulations still reference California Air Resources Board test procedures for determining NMOG. EPA regulations allow the use of equivalent or better practices when supported by data and approved in advance by the EPA Administrator. Since the California NMOG procedures were proposed, OEMs have been granted approval to use a photo acoustic multi-gas analyzer called an Innova to measure alcohols from an E85 vehicle. EPA uses the Innova methodology for measuring alcohols at its Ann Arbor laboratory.

Vegetable Oil

20.1 *What are EPA's policies with respect to diesel-to-vegetable oil conversions? Are they the same for virgin and waste vegetable oil?*

Ans. EPA's policy is the same for both virgin and waste vegetable oil. Like other fuel conversions, aftermarket systems that allow diesel vehicles to run on either virgin or waste vegetable oil fuel must be certified. This is necessary because diesel engines cannot operate on vegetable oil without significant modification to the fueling system. As part of the certification application, EPA would expect the fuel converter to demonstrate that the converted vehicle will meet standards despite potential variation in vegetable oil fuel properties.

20.2 *Can pure vegetable oil be "registered" as a diesel fuel with EPA?*

Ans. No. Vegetable oil is not classified as a type of diesel fuel. Vegetable oil and diesel fuel differ substantially in their chemical and physical properties. It may be possible to register vegetable oil as a diesel fuel additive if the additive volume is less than 5%.

20.3 *Can I add a small amount of vegetable oil to my diesel fuel as a diesel fuel additive?*

Ans. Yes, assuming that you meet the following two criteria:
1) There are no engine or emission control system modifications to your vehicle.
2) The vegetable oil is registered with EPA as a diesel fuel additive. EPA may register vegetable oil as a diesel fuel additive at a volume of 5% or less. For information about registering vegetable oil as a diesel fuel additive, please visit EPA's fuel registration web site at <http://epa.gov/otaq/regs/fuels/ffarsfrms.htm>.

Hydrogen

21.1 *What are EPA's policies with respect to converting OEM vehicles to 100% hydrogen?*

Ans. Aftermarket conversions to hydrogen must certify under the appropriate standards and testing requirements in 40 CFR Part 86. However, a few test procedures are not required since hydrogen-powered vehicles use a closed fueling system no evaporative emission data submissions are necessary. Additionally, because a pure hydrogen-powered vehicle has no compounds in the fuel that contain carbon, there are no reporting requirements for CO or NMOG.

21.2 *What are EPA's policies on adding hydrogen generator systems, such as hydrolysis systems (often referred to as HHO systems) to an OEM certified vehicle or engine?*

Ans. EPA's policy depends on the design of the HHO system and whether modification to the OEM configuration is involved. Any HHO kit that requires engine or fueling system modifications, or that includes components that alter the emission control system, would require EPA certification to avoid a potential violation of anti-tampering provisions of the Clean Air Act. In addition, if the system introduces into the engine any elements other than carbon and/or hydrogen, fuel additive registration would be required. See questions 18.1-18.3 for more information.

Most hydrogen generator systems produce less than 1% of total engine fueling requirements and many less than 0.1%. EPA does not view these systems as a type of fuel switching, but rather considers them a type of aftermarket device. EPA does not certify aftermarket devices. Manufacturers may voluntarily choose to have their aftermarket system evaluated under EPA's "511 Program," which refers to EPA's testing program of aftermarket devices, formerly conducted under authority of Section 511 of the Motor Vehicle Information and Cost Savings Act. More information on the 511 Program may be found at: <http://www.epa.gov/otaq/consumer/reports.htm>.

Electricity

22.1 *What are EPA's policies with respect to converting hybrid electric vehicles to plug-in hybrid electric vehicles?*

Ans. EPA's conversion policy applies to hybrid electric-to-plug-in conversions. Certification is required to ensure that the converted plug-in hybrid will meet applicable emission standards and will remain clean and durable for its full useful life. This is necessary because any change to an OEM-certified configuration could affect the emission control system and could be considered a tampering violation. In the case of an aftermarket plug-in hybrid conversion, for example, it is possible that the altered interaction between the internal combustion engine and the battery electric system could cause more "cold starts" of the internal combustion engine, thereby increasing emissions relative to the OEM vehicle.

22.2 *What are EPA's policies with respect to converting vehicles to full battery electric?*

Ans. Vehicle conversions to full battery electric (no on-board source of combustion emissions) do not require alternative fuel vehicle certification as protection from a possible tampering violation.