Public Workshop: OBD Requirements for Alternative Fuel Retrofit System Certification for 2004 and Subsequent Model Year In-Use Vehicles and Engines

Air Resources Board Auditorium
El Monte, California
November 12, 2013
OBD Compliance for Retrofit Conversions

- New light duty and medium duty alternative fuel vehicles required to meet full OBDII requirements.
- New heavy duty alternative fuel vehicles and heavy duty retrofit conversions required to meet Engine Manufacturer Diagnostic (EMD+) system requirements for 2013-2017 model years (MY).
  - 2018+MY must meet full heavy duty OBD requirements.
- Retrofit conversions have streamlined OBD certification requirements.
  - Meet OBD requirements for new alternative fuel conversions except for following allowances:
    - Reduction in certification documentation for all retrofit conversion manufacturers.
    - Demonstration testing flexibilities for small volume (< 4,500 vehicles) retrofit conversion manufacturers.
OBD Changes for All Retrofit Conversions

- Application requirements same as for new vehicle conversions except the following:
  - Manufacturers can propose a plan for limited documentation including only modifications, additions, and/or deletions to OBD system
    - E.g., OBD monitor documentation with strikeout/underline used to indicate changes.
  - Misfire probability of detection charts/tables not required if misfire monitor calibration unchanged
OBD Changes for Small Volume Retrofit Conversions

- Certified to same emission standard
  - Allow alternate aging requirements for demonstration vehicle through 2017MY
    - Lower mileage in-use vehicle (~25,000 miles) or rapidly aged vehicle (~50,000 miles)
  - Require demonstration of three monitors (exhaust gas sensor, fuel system, and catalyst) through 2017MY
    - For exhaust gas sensor demonstration, manufacturers can propose a plan to conduct a single test using the worst case slow response pattern
    - Waive demonstration of remaining monitors if monitors and emission controls unchanged
- 2018+MY – same requirement as certified to more stringent emission standard
Certified to more stringent emission standard

- Allow demonstration of three monitors (catalyst, exhaust gas sensor, fuel system) to obtain conditional approval
  - Demonstration of remaining monitors required after conditional approval granted
  - Proposed 15-day change: demonstration required within 90 calendar days after conditional approval granted
OBD Demonstration Requirement Highlights

- Demonstration Testing for All Conversions
  - Threshold catalyst must represent real world deterioration (e.g., thermal aging)
    - Holes and bypasses are unacceptable
  - On dual bank systems, both banks must have simultaneously deteriorated components (e.g., exhaust gas sensor, fuel system, and catalyst) to the same level
  - OBD data collected during testing called out in OBD regulations (e.g., section 1968.2(i)(2.4))
    - Include emission data, time of MIL illumination, freeze frame information and test results stored
OBD Approval Process for Retrofit Vehicles

1. Letter of Intent/Pre-certification Meeting
2. OBD Application
3. Review/Q&A
4. OBD Approval Letter
5. Post-Certification Activities
OBD Approval Process for Retrofit Vehicles (cont.)

- Pre-certification application documents including:
  - Letter of Intent
    - Includes intended product line-up for certification
    - Includes certification priority list for each model year
  - Documentation for parties authorized to submit certification information (e.g., conversion system manufacturer, calibration provider) and agreements between the responsible parties (e.g., confidentiality)
  - Authorization to use electronic signatures (MAC 2007-01)
  - Proposed certification documentation plan
  - Preliminary description of conversion system integration into OBD to ensure OBD compliance

- After providing these pre-certification documents with OBD staff, request OBD DMS account for application submittal
OBD Approval Process for Retrofit Vehicles (cont.)

- OBD Application Documentation
  - Cover letter
  - Conversion system description
    - Operating strategy, added hardware with inputs/outputs, deletions or modifications to original system
  - OBD description
    - Additions, deletions, modifications
    - Enable conditions: new versus old
    - Malfunction Criteria: new versus old
    - Monitor control calibrations: new versus old
    - Standardization changes: CAL ID, CVN, readiness, data stream, monitoring test results, etc.
- Production vehicle evaluation (PVE) test proposal
- OBD demonstration data
OBD Approval Process for Retrofit Vehicles (cont.)

- Post OBD-Application Submission
  - After complete application received:
    - Application reviewed by staff
    - Staff contacts applicant with questions
      - Timely response needed to expedite approval
    - OBD approval letter issued
Post-Certification OBD Requirements

- Production Vehicle Evaluation
  - Verification of standardized requirements (1968.2 (j)(1))
    - Due 2 months after start of production
  - Verification of monitoring requirements (1968.2 (j)(2))
    - Due 6 months after start of production
  - Verification of in-use monitoring performance (1968.2 (j)(3))
    - Due 12 months after start of production

- Quarterly reporting of CAL ID/CVN if new calibrations
  - Needs to be updated to reflect any running changes and field fixes by the original equipment manufacturer
ELECTRONIC DOCUMENT MANAGEMENT SYSTEM (DMS) FOR THE ARB_OBD DOMAIN

Alternative Fueled Vehicle OBD Certification
DMS Requirements

- Submittal of OBD applications required for full OBD compliant systems
- DMS not required for systems certified to EMD+ (heavy duty alternative fuel > 14,000 pounds GVWR through 2017MY)
  - Currently EMD+ applications submitted via email to assigned certification reviewer
- 2018+MY heavy duty conversions must meet full OBD requirements and use DMS for submission
DMS Accounts OBD Domain

- DMS accounts will be created after the manufacturer submits the following
  - Letter of Intent
  - Business Agreement/Authorization Letter
  - Approved Certification Documentation Plan
  - Preliminary description of conversion system integration into OBD to ensure OBD compliance
  - DMS Contact List with access to OBD Domain
Documentation requirements and DMS submission not changed for new alternative fuel conversions
Required Application Bookmarks for Alternative Fuel Retrofit Manufacturers

A. Cover Letter
B. Control System Description
   - At a minimum: hardware/software added, deleted, or modified
C. OBD Documentation Plan
   - Includes PVE plan
D. Demonstration Data Plan
E. Demonstration Data Report
F. List of OBD diagnostics
   - At a minimum: diagnostics added, deleted, or modified
File Naming Convention

- Single Test Group CBI_Test Group Name_A-F.pdf
  - Example: CBI_DCEXH03.2U2A_A-F.pdf

- OBD Group CBI_Manufacturer Code_OBD Group Name_A-F.pdf
  - Example: CBI_DCEX_OBD GROUP 1_A-F.pdf
Where to upload OBD documents?

- OBD Certification Documents go into OBD Domain (ARB_OBD)
- Sign in -> https://ssl.arb.ca.gov/edms/servlet/edms.do
Where to upload OBD Documents?

- Alternative Fuel Conversion Manufacturers will have two methods of reporting
  - Manufacturer of Record – Single directory
  - Manufacturer of Record + OBD Calibration Provider – Two Independent Directories
### Single Directory

**Straight Forward Example**

<table>
<thead>
<tr>
<th>Manufacturer of Record</th>
<th>2014 MY</th>
<th>Large TRUCK PFI</th>
<th>Application</th>
<th>CBI_EABC03.5XYZ_A-C.pdf</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015 MY</td>
<td>Small TRUCK PFI</td>
<td>PVE Reports</td>
<td>J1 Logfiles</td>
</tr>
<tr>
<td></td>
<td>20XX (Template)</td>
<td>BIG CAR PFI</td>
<td>Questions and Answers</td>
<td>J2 Hardware Testing</td>
</tr>
<tr>
<td></td>
<td>CAL ID CVN DATA</td>
<td>Small CAR DI</td>
<td>Running Changes</td>
<td>J3 Rate Based Data</td>
</tr>
<tr>
<td></td>
<td>FINES</td>
<td>OBD Group or Testgroup (template)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meeting Presentations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Two Independent Directories

Independent Directory Example

In cover letter, manufacturer of record must provide calibration provider link indicating location of supporting data.
Workflow Requirements

- Upload documents into corresponding application folders
- Submit documents to a single workflow
  - Workflow Naming Convention (Process Name) \(\Rightarrow\) Request for OBD II approval \((\text{Test Group \ OBD group name})\)
  - Tracking mechanism triggered
  - Certification reviewer notified
  - Process added to queue
- Workflow required for running change
  - Running Change Submission \((\text{Test Group \ OBD group name})\)
- Workflow required for field fix
  - Field Fix Submission \((\text{Test Group \ OBD group name})\)
- Workflow required for quarterly deficiency fine payment
  - Calendar Year 2013 Quarter \# Manufacturer Name
For the following required items, upload documents into corresponding directories in DMS and email a notice to OBD staff instead of creating workflow:

- CAL ID and CVN data
- Standardized communication logfiles per 1968.2 (j)(1)
- Verification of monitoring requirements report and logfiles per 1968.2 (j)(2)
- In-use Monitoring Performance Ratio data per 1968.2 (j)(3)
ARB Contacts

Contact for OBD Alternative Fuel Conversion Certification:

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OBD Homepage:
http://www.arb.ca.gov/msprog/obdprog/obdprog.htm