On-Board Diagnostics (OBD) Requirements

- Applicable to new vehicles and engines
- Applicable light-duty regulations
  - 1968.2 OBD II (light-duty) and 1968.5 OBD II enforcement
  - In place since the 1996 model year
- Applicable heavy-duty regulations
  - 1971 EMD (engine manufacturer diagnostics)
  - 1971.1 HD OBD (heavy-duty) and 1971.5 HD OBD enforcement
    - Full HD OBD not required until 2018 (proposed) MY
    - "EMD+" per 1971.1(d)(7.5) required on 2013+MY

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

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OBD 101

- Mostly software in the engine and other ECUs
  - Not a magic sensor that directly measures tailpipe emission levels
- Runs ‘monitors’ in the background to diagnose emission-controls
  - Monitors virtually every powertrain component/system that can affect emissions
  - Typically 200+ monitors on an individual vehicle
  - Most critical monitors correlated to tailpipe emissions, less critical monitors calibrated to verify function/rationality
- Illuminates the MIL and stores info for repair techs for faults
- Dominant mechanism used in Inspection programs nationwide to fail vehicles (e.g., vehicles in need of emission repairs)

Major Areas for Alt Fuels

- Work involved to comply
- Certification process
- Post-Certification required testing

Work involved to comply with OBD

- Base OEM Vehicle Selection
  - Start with OBD II certified
  - Convert the same model year (e.g., a 2012 vehicle to a 2012 alt fuel vehicle)
- Control strategy/calibration changes to base vehicle
  - Base control calibration changes (e.g., EGR flow rates, etc.) can alter OBD requirements
- Emission threshold monitors
  - Critical emission controls monitored to detect faults before tailpipe emissions exceed a specified level (e.g, detect an EGR fault before > 1.5x standards)
  - Rely on correlation established by manufacturer from sensed parameter to tailpipe emission level (e.g., sense EGR flow and correlate to tailpipe emission level as flow is restricted)
  - Change to alt fuel alters this correlation
    - Tailpipe emissions may be more sensitive/less sensitive to same degree of fault
  - Certifying conversion to a different tailpipe std (LEV as a SULEV) exacerbates this
    - Emission data required

Work involved to comply with OBD (cont.)

- Demonstration testing
  - Each emission threshold monitor tested with fault implanted
    - Verifies fault detected before exceeding emission threshold
  - Required on 1-3 vehicles per year per manufacturer
  - OBD data collected during testing called out in (i)(2.4)
  - Done on vehicle representative of full useful life (e.g., 120,000 miles)
- Added/Modified/Deleted components
  - Need to add monitors for added components
  - Need to verify/recalibrate monitors for modified components
  - Need to 'cleanly' disable diagnostics for deleted components

Work involved to comply with OBD (cont.)

- Monitoring frequency
  - Minimum in-use frequency required for most critical monitors
  - Data in vehicle tracks how often monitors run relative to how often vehicle is operated
  - Conversions need to ensure they don't jeopardize monitoring frequency
- Standardization
  - SAE and ISO standards called out in section (g)
  - Covers everything from real-time sensor data to information about the calibration being run by the vehicle
  - Conversions need to verify the data being output is still accurate
    - Deleted components/disabled monitors reported appropriately
    - Appropriate fault codes being used
    - Calibration version (CAL ID) information changed to reflect alt fuel calibration

Certification Process

- Certification plans, OBD groups, test vehicle selection
  - Come in well in advance of cert with plans for the year
    - Identify all test groups to be converted/offered for sale, projected sales, etc.
  - ARB will identify specific test groups for demonstration, post-certification testing, etc.
    - Based on total number of test groups planned for the year
- Application
  - Detailed submittal requirements called out in section (h)
    - System description, summary table, etc.
  - Need to document added/modified/deleted diagnostics
    - Fastest review if you use strike-out/underline to show changes from OEM
  - Demonstration data showing emission threshold compliance
- Deficiencies
  - Can still be certified if you fall short of requirements
  - Deficiency(ies) can be granted
    - Require ARB approval, must meet good faith effort to comply and to come into compliance as fast as possible, restrictions on carry-over of deficiencies
  - More than two and $25-$50 per vehicle per deficiency fines apply

Post-Certification Testing

- Standardization Compliance
  - (j)(1): Uses SAE J2534 reprogramming interface plus SAE J1699-3 software to test adherence to standardization requirements
  - Test one production vehicle per test group, within first two months of production
- Monitor Compliance
  - (j)(2): Implants fault one by one to verify MIL illumination for every diagnostic
  - 2-6 vehicles per year by size of manufacturer, within first six months of production
  - No emission testing, only test monitors added/modified/affected by alt fuel conversion
- In-use Monitoring Frequency Compliance
  - (j)(3): Download standardized data from actual in-use vehicles to verify minimum monitoring frequency satisfied
  - Up to 15 vehicles per test group, within first 12 months of production
  - Uses standard scan tool to download data

OBD Contacts

- Contacts:

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