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Regulatory & Legislative Affairs
U.S. & Canada
Safety & Environment

MEMORANDUM

DATE: Nov. 16, 2018

TO: Michael Ochs, RVIA

FROM: Dale Kardos

RE: CARB Board Hearing of Nov. 15, 2018 to Discuss HD OBD and In-Use Emissions

INTRODUCTION
On November 15, 2018, CARB held a Board hearing to discuss multiple issues. Two issues covered by this memo include:

1) CARB Staff Presentation on Controlling In-Use Emissions from Heavy Vehicles
2) Revised OBD system requirements for heavy duty engines

An overview of the staff presentations and Board activity regarding the above two items is presented below.

EXECUTIVE SUMMARY
Regarding the Staff's presentation on its plan for addressing in-use emissions from heavy vehicles, staff indicated that the in-use emissions issue will be tackled via a new program they are calling REAL which stands for Real Emissions Assessment Logging. REAL will result in each vehicle tracking its own emissions performance (an alternative to lab testing). This will be realized by requiring vehicles to collect and store data collected onboard by engine NOx sensors. CO2 emission data will also be collected to assess fuel consumption/GHG emissions. This will be made possible as a result of changes being proposed to the HD OBD regulation (the topic of the second presentation).

The proposal to amend the HD OBD rule will reportedly cost consumers an additional $43. CARB said that this will bring the total cost of complying with all HD OBD requirements to about $242 per engine (HD OBD requirements initially took effect in 2005).

With the changes being proposed, existing NOx sensors will be used to estimate and track NOx emissions on each vehicle (this will apply to medium- and heavy-duty onroad diesels). The rule will also require engines to log engine activity data (e.g., work, speed, etc.). Recent and lifetime data will be stored, separately. The rule will also require GHG data tracking (using existing technology and hardware on vehicles). This will apply to all HD on-road engines. The OBD amendments will also include larger penalties to deter manufacturers from certifying HD engines with OBD deficiencies. Under the proposal, penalties will approximately triple. It was proposed that the total fine cap go from $500 today to $750 in 2021, $1000 in 2022, $1500 by 2023. 15-day modifications proposed by staff and supported by engine and truck manufacturers will slightly reduce the proposed penalties.

Based on concerns from industry about lead-time and cost, a package of 15-day modifications will delay HD OBD amendments, excluding REAL, MST relaxations, and other flexibilities to 2024MY. It will also amend the REAL proposal as follows: First, it will give manufacturers two compliance options for introducing REAL. Under Option 1, manufacturers can certify OBD systems using reduced compliance parameters in 2022 and 2023 MYs. Under option 2, manufacturers can certify OBD systems to full REAL

in 2022 with reduced OBD demo testing in 2022 and 2023. The 15-day modifications will also delay deficiency fine changes to 2024MY and reduce the fine cap from $1500 to $1250 per engine.

The next step will be for Staff to issue the 15-day modifications. If approved, the Executive Officer will adopt the proposal and modifications without having another Board hearing.

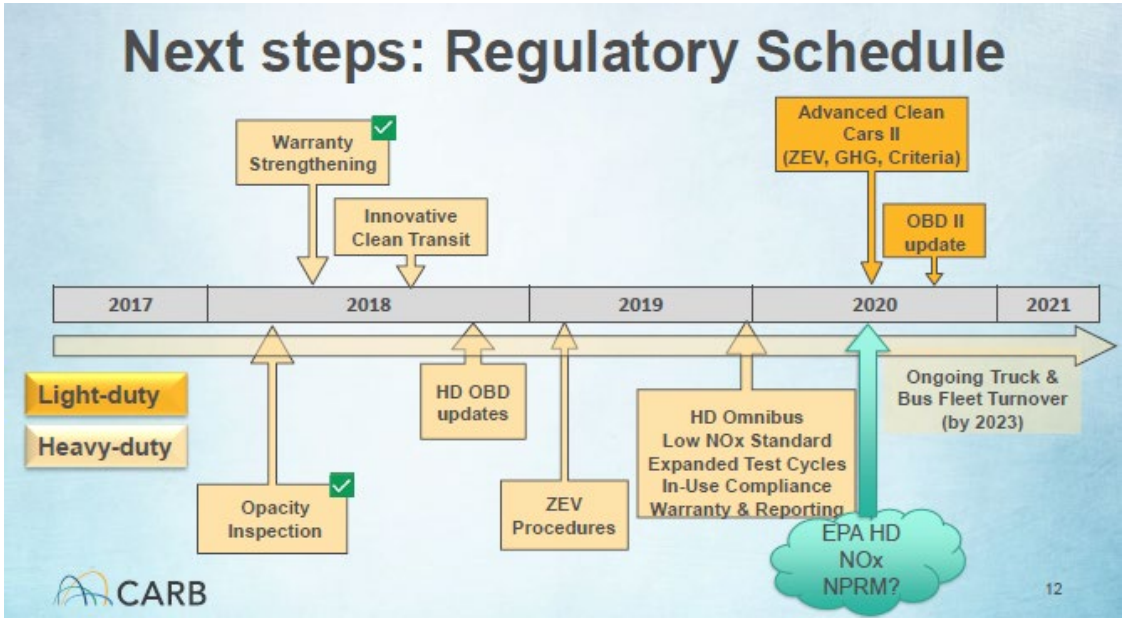
For additional details, see notes on the presentations below. Links to the presentations are also provided.

OVERVIEW OF THE CARB STAFF PRESENTATION ON ITS PLAN FOR ADDRESSING IN-USE EMISSIONS

Link to Staff presentation: https://www.arb.ca.gov/board/books/2018/111518/18-9-3pres.pdf

Background

- In-use emissions have been found to be higher than expected.
- What more can be done? Long-term Answer: Transition to electrification.
- Near-term, vehicles will continue to utilize combustion engines. What can we do to ensure in-use emissions from combustion engines are low?
    - Address all operating conditions.
    - monitor onroad performance
- CARB's game plan
    - Re-design existing standards and in-use programs
    - Leverage new technology and data
    - See the regulatory schedule shown on the next page.



As shown above, CARB plans the following for 2019 and later:

- 2019: ZEV procedures
- 2019: HD Ominibus Low NOx standard; expanded test cycles, in-use compliance warranty & reporting
- 2020: EPA HD NOx NPRM
- 2020: Advanced clean cars II (ZEV, GHG, Criteria)

- 2020: OBD II update
- All years: truck and bus fleet turnover

Staff reported that a new CARB emissions lab is being constructed in southern CA. It is scheduled to open in 2021. It will offer:

- increased HD and LD labs
- On-road PEMS & OBD testing

A major feature of future efforts to address in-use emissions is the Real Emissions Assessment Logging program or REAL. REAL features include the following:

- Requires vehicles to track emission performance
  - Requires new software to store aggregated data on the vehicle
- Utilizes existing sensors
  - Accuracy of on-board NOx sensors already within 15%
  - Fuel usage (to infer CO2emissions) already even more accurate
- Potential benefits:
  - Comprehensive feedback
  - More efficient than laboratory or PEMS testing
  - Future standards linked to on-road performance

Proposed Revisions to On Board Diagnostic System Requirements, Including the Introduction of Real Emissions Assessment Logging, for Heavy Duty Engines, Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines

Link to the Staff presentation: https://www.arb.ca.gov/board/books/2018/111518/18-9-4pres.pdf

Key Points Contained in the Staff Presentation (The staff presentation outlines CARB's proposal for amending the HD OBD regulation)

- Big picture
  - Several regulations forthcoming to clean up heavy duty vehicles
  - OBD is the topic of today's proposal
  - CARB is separately addressing in-use emissions, warranty, electrification, etc.
- OBD changes needed – the proposal addresses:
  - Industry concerns regarding in-use testing burdens
  - Lack of clarity in portions of regulation
  - Issues discovered through certification and testing
  - Need to begin advancing mobile source program
- Proposed HD OBD amendments
  - Monitoring Requirements
    - Require monitoring to occur more frequently
    - Require detection of more crankcase ventilation malfunctions
    - Make it easier to exclude specific components from monitoring
  - Testing Requirements
    - Engine demonstrations more representative of real-world aging
    - More data to evaluate compliance
    - Improved on-road verification of production OBD systems
  - Data requirements
    - The proposal: Track and report data characterizing NOx and GHG/CO2 emissions in the real world.
    - REAL NOx data tracking

- Use existing NOx sensors to estimate and track NOx emissions on each vehicle
- Medium- duty and heavy-duty onroad diesels would be required to comply
- Require engines to log NOx emissions and engine activity data (e.g., work, speed distributions)
- Store recent and lifetime data separately
- CARB is working with industry -- SAE J1979 and J1939 standards will contain protocols
- Leadtime will be required to update control modules

▪ REAL GHG data tracking
- Relies on tech and hardware already on vehicles
- Critical for determining actual benefits and establishing future standards (This will be important with regard to tracking compliance with Phase 2 rule)
- NO GHG OBD malfunction criteria
- Applicable to all HD on-road engines
- Log GHG technology activity and CO2 emissions/fuel consumption of HD trucks in real world.

o Compliance and enforcement requirements
▪ Deficiency provisions
- Some mfrs take advantage of the deficiency provisions
- Staff proposing to increase deficiency fines
- Current fine is $50 for major; $25 for minor; $500 max; fines are too low to deter noncompliance
- 2021MY: $100 to $450 fine for major deficiencies depending on how much thresholds are exceeded; $50 to $100 fines for others;
- Total fine cap: $750 in 2021, $1000 in 2022, $1500 by 2023

▪ Engine testing provisions
- Testing burden to be reduced
- Larger scope of vehicles to be tested

▪ Investigations
- CARB to require mfrs provide details of engines during investigations.

o Cost impact of proposal
▪ $43/engine is the calculated incremental costs to consumer
▪ Additional costs associated with noncompliance provisions

o Benefits
▪ Motivates industry to increase durability
▪ OBD will be basis for future in-use testing
▪ Preserves promised benefits from standards previously established
▪ Cost per ton is reasonable - $28 per pound of PM and $0.20 per pound of NOx

o Industry concerns
▪ REAL program timing - should be delayed – Staff disagrees
▪ Overall cost – CARB believes it is necessary to support I&M and warranty program; noncompliant system costs can be avoided
▪ Compliant systems can save mfrs money in the long run

o Proposed 15-day modifications
▪ Delay HD OBD amendments, excluding REAL, MST relaxations, and other flexibilities to 2024MY
▪ Amend the REAL proposal:
- Give mfrs two compliance options for introducing REAL
  - Opt 1: reduce compliance parameters in 2022 and 2023
  - Opt 2: full REAL in 2022 with reduced OBD demo testing in 2022 and 2023

- Delay deficiency fine changes to 2024MY
- Reduce fine cap from $1500 to $1250 per engine
- Agree to come back to Board in 2021 with technical review of requirements and conduct economic analysis

- Staff proposed that Board adopt proposal with 15- day modifications proposed

If approved, the Executive Officer would adopt the proposal and modifications without having another Board hearing.

Witness testimony

Jed Mandell, Truck and Engine Manufacturers

- Member companies are committed to pursuing additional NOx reductions on a nationwide basis.
- It will take time to develop new standards on a nationwide basis.
- EPA announced commitment yesterday.
- OBD changes proposed are very expensive without any real benefits.
- Staff is proposing to defer certain requirements (we agree).
- We support Staff's revised proposal and urge the Board to adopt it.

Kate Blumberg, ICCT

- Supports REAL program and OBD proposal.

MECA, Michael Geller

- Supports REAL program and OBD proposal.
- Supports the 15-day changes as well.
- Believes that OBD data can be used to verify real work off-cycle credits for advanced technologies.

Bill MaGavern, Coalition for Clean Air

- Supports the proposal.
- Looks forward to low NOx standard and comprehensive I&M program.

Q&A

Member Eisenhut: Why not apply this to off-road engines?

A: There is no OBD program for off-road. However, we will look to see if OBD should be brought to offroad.