



# General Session – Certification Update

2019 Truck and Engine Manufacturers Association

Compliance Workshop

April 9-10, 2019

# Outline

- Organization Charts
- Relocation to Riverside
- Certification Statistics
- AECD Workgroup Update
- Compression-Ignition and Heavy-Duty Certification
- Off-Road Spark-Ignited Engine Certification
- Field Operations and Warranty

# Organization Update



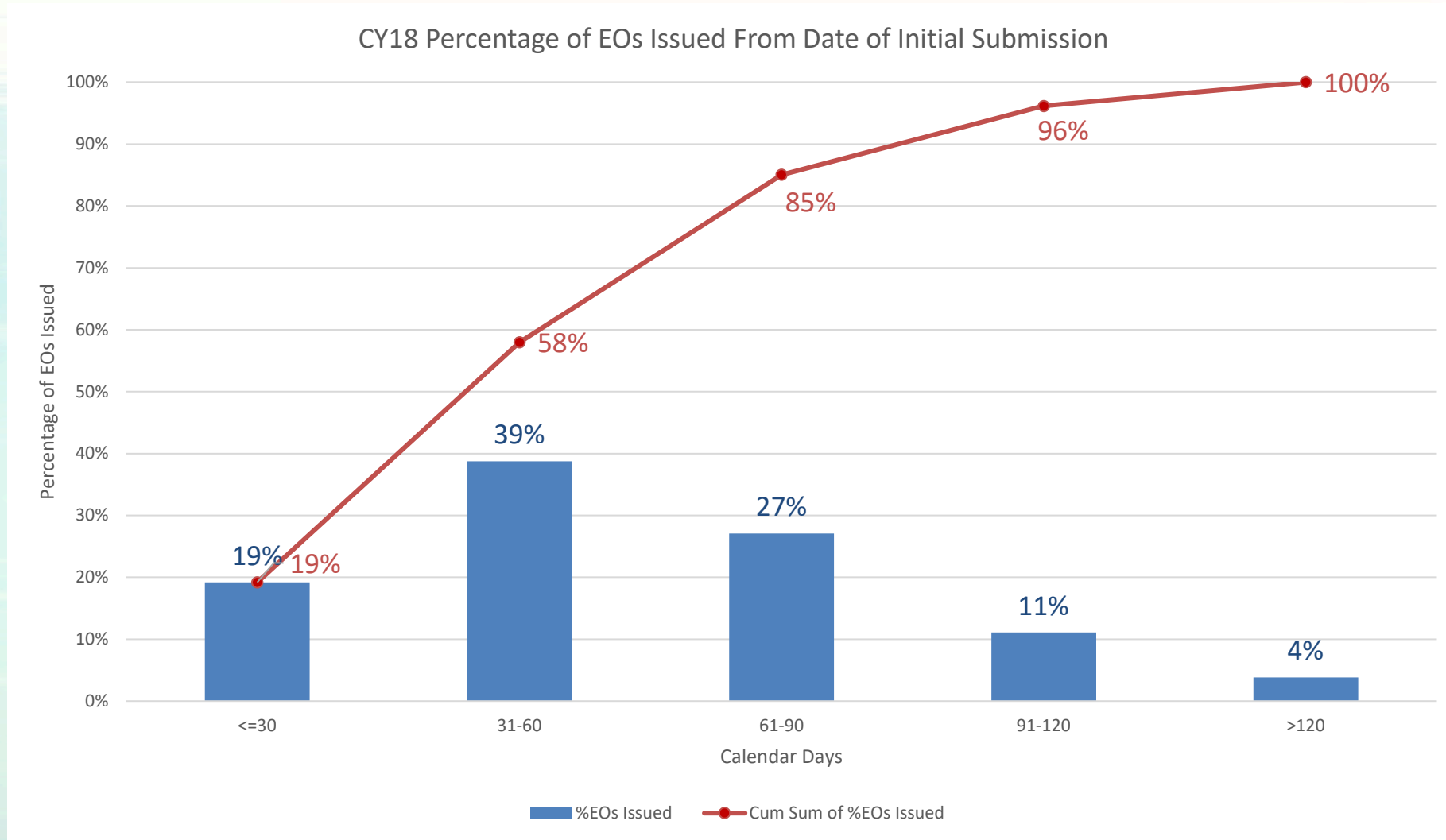


# Relocation to Riverside

Moving in early 2021

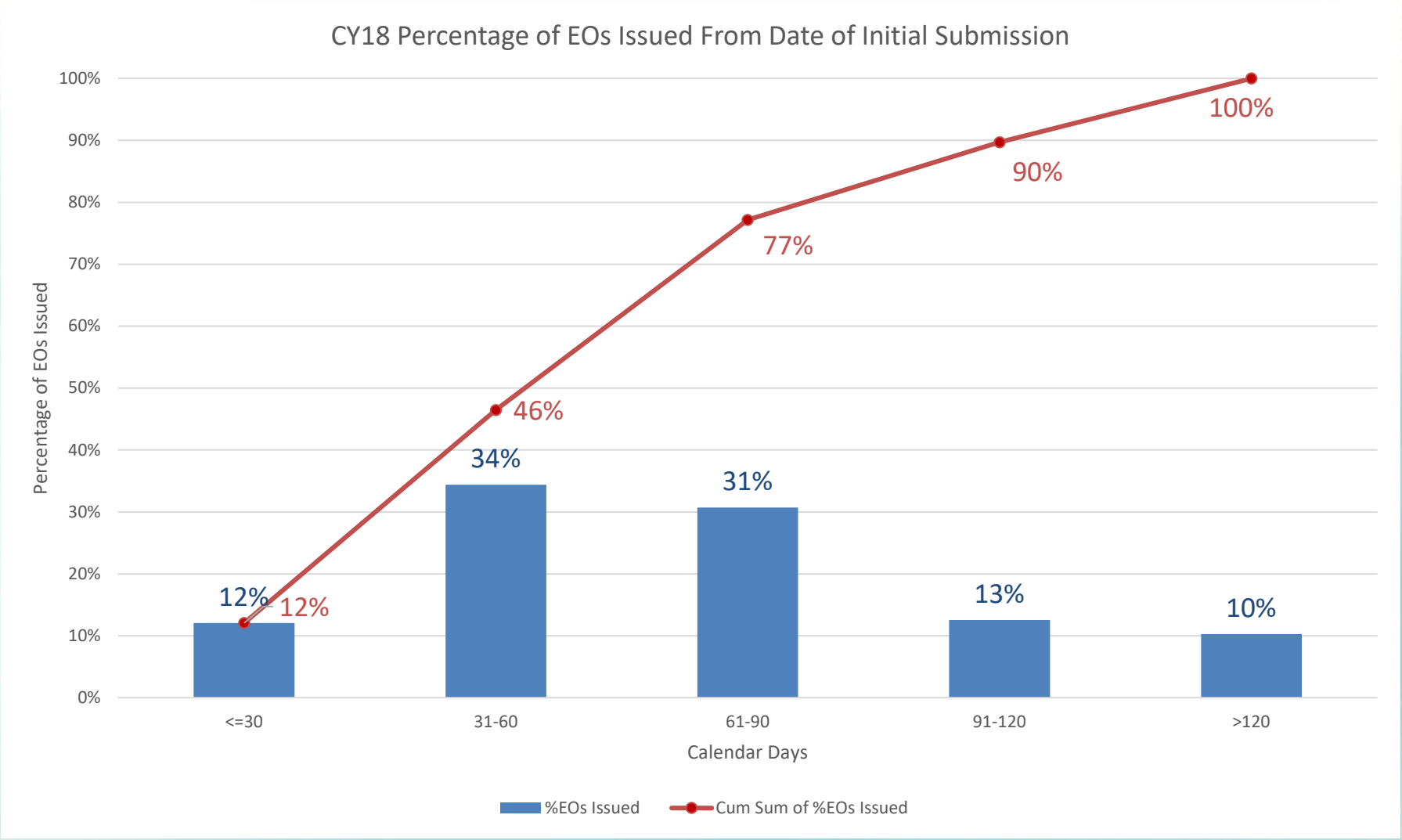


# CY18 Percentage of EOs Issued – Branch





# CY18 Percentage of EOs Issued – CIHD



# AECD Workgroup Update

- Guideline to be finalized summer of 2019
- To be included on AECD document:
  - General technical description
  - Cover table to summarize AECDs used for each engine family
  - Individual AECD description – 7 questions clarified

# Compression-Ignition and Heavy-Duty Certification Section



# Electronic Certification Submissions

- E-Cert
  - February 2019 – Finalized the Data Requirements
  - May 2019 – Publication of the Business Rules
  - Summer 2019 - Workgroup discussions
  - The XML Schema will be produced soon after the Business Rules document
  - Pilot testing with manufacturers in late 2019
- New DMS

# GHG Phase 2

- No “deemed to comply” provisions
- Standards applicable to
  - Trailers
  - Medium- and heavy-duty engines
  - Heavy-duty vehicles
- Trailers: 2020 MY
- Engines and vehicles: 2021 MY

# Flexibility Engines (TPEM)

- General flexibility allowance expired in 2018
- Delayed flexibility allowance available for > 56 kW
  - Equipment manufacturers to follow the applicable 7 year usage period
  - Engine manufacturers to validate requests from equipment manufacturers before submission

# Certification Focus Areas



# Running Changes / Field Fixes

## Differences between application, production, and field engines

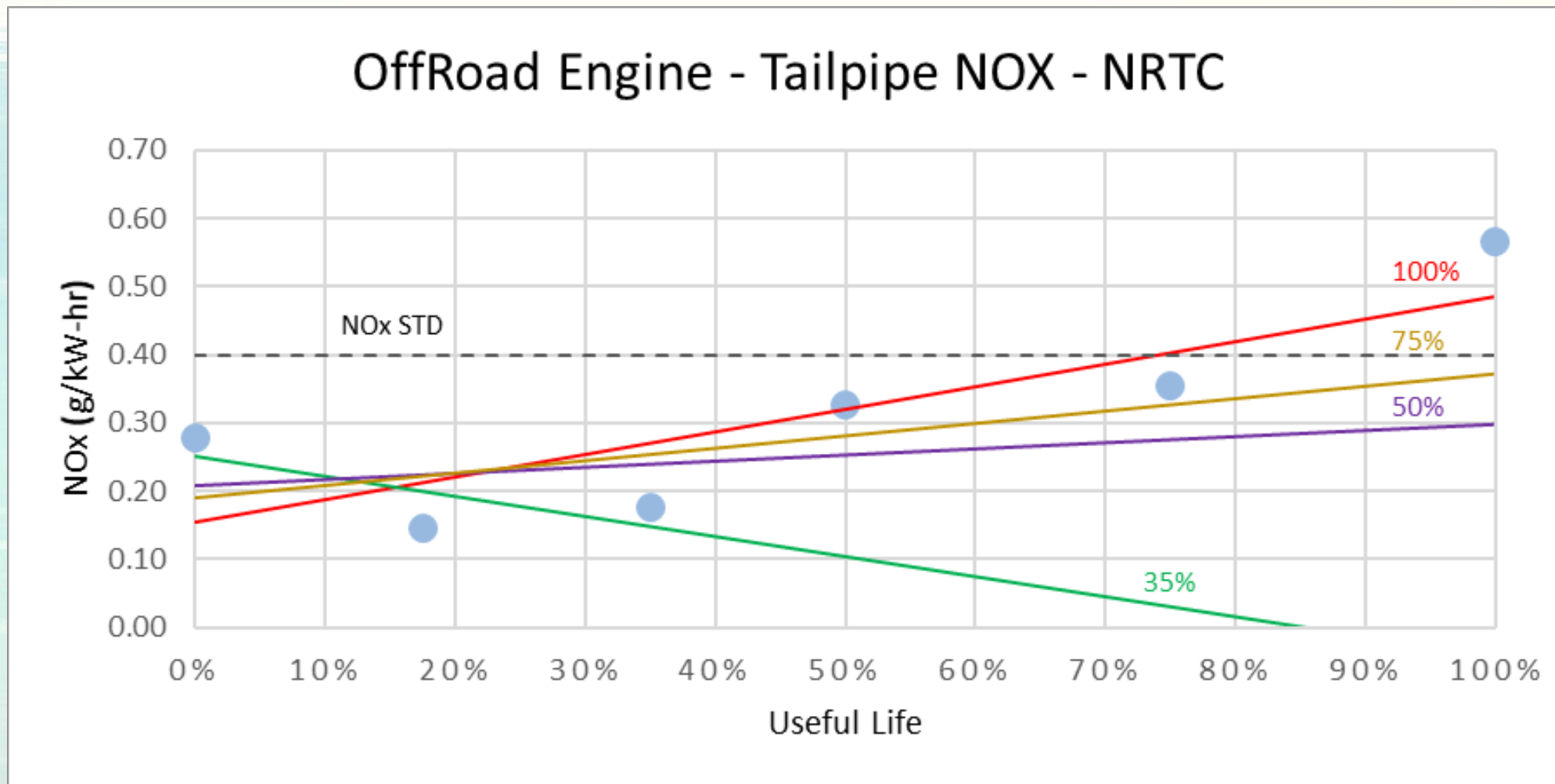
- Needed from manufacturers
  - Timely submissions
  - Complete and accurate submissions
  - All affected engine families listed
  - All affected MYs
- Submit to both OBD and cert as applicable

# CARB View: EMA DF Program Showed Mixed Results for SCR Engines

- Engine deterioration
  - Engine out emissions are fairly stable throughout the UL
  - DF is fairly flat
- Tailpipe
  - Tailpipe out emissions are higher at the end of UL when compared to 35%, 50% or 75%
  - DF increases with inclusion of more data out to UL

# EMA DF Program Showed Mixed Results

## SCR Engines



# CARB Position: EMA DF Program Outcome

- Current DF program not providing accurate representation of after treatment deterioration
- Agencies and EMA will continue to have discussions on ways to deal with the gap
- Moving forward manufacturers will be expected to justify being able to carry over the DF generated by 35% or 50% FUL demonstration



# Durability Demonstrations: Near-Term Ideas

- MY 2020-2021?:
  - Carryover applications
    - Possible to use OBD MST data?
    - Test an engine and after treatment system to near FUL and show compliance over test cycles on engine dyno?
    - Others?
  - New engine applications: DF ?%FUL demonstration plus an agreement for future testing of in-use engines?
- MY 2022+: FUL engine aging or bench aging?
- Near term changes to bridge to new durability regulations

# Heavy-Duty Low NOx Rulemaking

## Durability Demonstration Program (DDP)

- Current 35-50% of useful life (UL) aging method does not fully represent real-life component failures and emission deterioration of engine & aftertreatment system
  - Need to enhance the aging process
- OBD regulations (approved Nov. 2018) defined a standardized process for OBD-aging
  - Objective is to obtain similar OBD system response between laboratory aging and real-life in-use aging
- Certification DDP objectives & compliance evaluation process are different:
  - Demonstrate emission related component durability
  - Estimate expected deterioration over UL, i.e. develop deterioration factors (DF)

# Heavy-Duty Low NOx Rulemaking

## DDP Pathways Under Consideration

- Staff is considering several options for demonstration of durability:
  - Use of standardized dynamometer aging cycles
  - Use of the Diesel Aftertreatment Accelerated Aging Cycle (DAAAC) developed by SWRI for a portion of UL for HHDD
  - Use of the accelerated aging protocols under development by U.S. EPA
  - Submission of NOx sensor data as part of the accelerated aging program

# New DF Test Plans

## Improvements Needed

- Representative of real world engine operation
- More cold starts
- Low-hour test point representing stabilized and un-deteriorated emissions



# 2019 CY Review Areas

- IRAFs calculation
  - Alternative guidance applicability
- Service Information Rule (SIR)
  - Passwords should be provided to the CARB contact person and update whenever changed
  - Reports should be submitted to DMS

# Ammonia Storage / Tail-pipe NOx Target

- Strong relationship between ammonia storage levels and optimal SCR conversion efficiency
- Expected same SCR efficiency during certification testing and comparable in-use operation
- Special preconditioning targeted to load the SCR with ammonia
- Ammonia storage level to be disclosed in the AECD document:
  - During all preconditioning and certification cycles
  - During urban and highway driving
- Guidance letter to be issued for additional data

# 2019 CY Review Areas

- OFCI In-use compliance diagnostic connector
  - PEMS testing
  - Requesting manufacturers cooperation

# **Small Spark-Ignited Engines (SSIE)**

## **Exhaust and Evaporative Requirements**



# SSIE Exhaust Regulations

## MY 2020+ Certification Fuel and DF Testing

- New certification test fuel is LEV III gasoline starting MY 2020
- Production-line testing must use LEV III gasoline
- New deterioration factor (DF) testing required with LEV III gasoline
- Manufacturers encouraged to coordinate with CARB and EPA to use same DF test data

# SSIE Evaporative Regulations

## MY 2020+ Certification Application Templates

- CARB waiting for comments from EMA and OPEI on draft certification application templates
  - MY 2020+ Certification application for  $\leq 80$  cc
  - MY 2020+ Certification application for  $> 80$  cc
- Final templates will be posted in the link below:
  - <https://ww2.arb.ca.gov/small-road-engine-or-equipment-regulatory-and-certification-documents>

# Use of Previously Certified Evaporative Components

- Use of certified components continue for **MY 2020**--no design changes and compliant with CA LEV III (E10) test fuel
  - For fuel lines:
    - Equipment manufacturers include new LEV III component EO # in application
    - Equipment may include fuel lines with existing EO #
  - For fuel tanks and carbon canisters:
    - Equipment manufacturers include new LEV III component EO # in application
    - Equipment may include tanks and canisters with a secondary label showing the new LEV III component EO #

# SSIE Evaporative Regulations

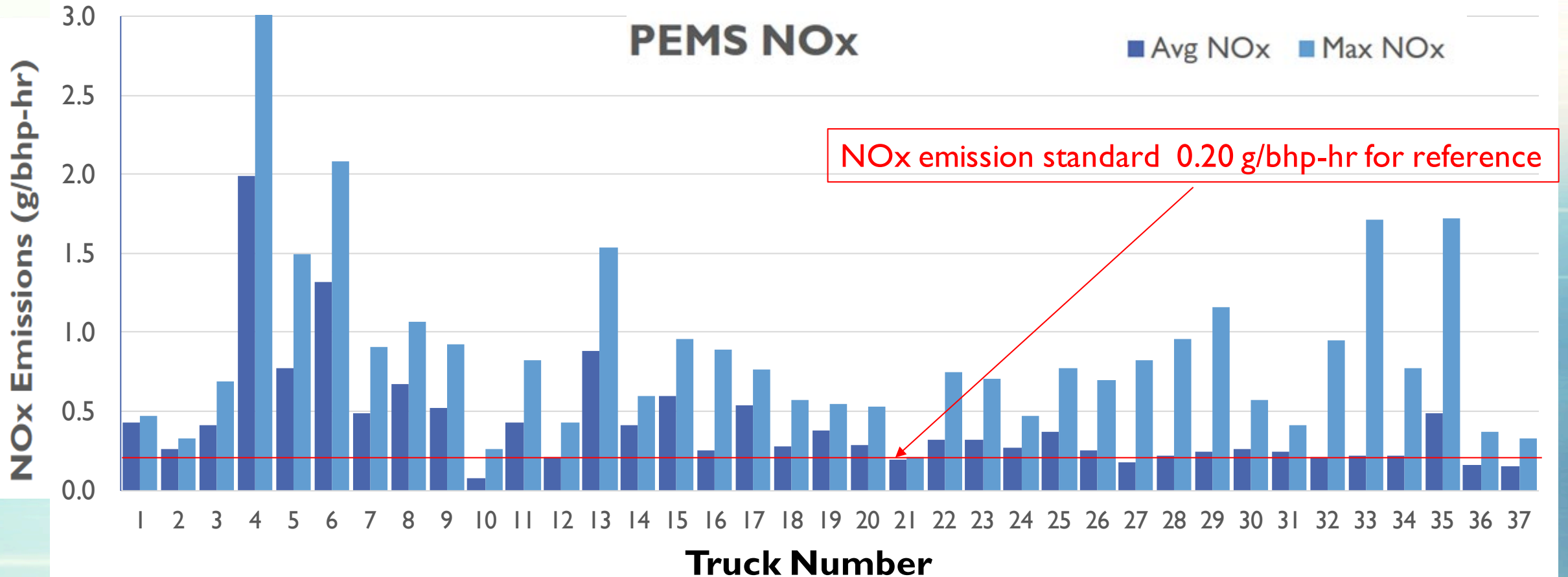
## New MY 2020+ Bond Requirements

- All manufacturers must submit a bond worksheet showing compliance before evaporative Executive Orders (EOs) can be issued
- Required bond value:
  - Calculated based on California-directed production volume
  - \$500 per unit or
  - Minimum bond value = \$500,000 (If fewer than 1000 units, small volume provisions apply (Title 13 CCR 2774(d)(3))
- Manufacturers with long-term U. S. assets ( $\geq$  \$10 million) exempt from bond requirements



# In-Use Vehicle Programs Branch

# Heavy-Duty In-Use Compliance (HDIUC) Results



In-Use Compliance Program: 49% Compliance based on NTE regulation, CFR 86.1912

Mostly Freeway Driving, 37 Trucks, All SCR equipped

# HDIUC Testing Experience

- CARB's HDIUC testing using Not-To-Exceed (NTE) protocol
  - A valuable tool to identify and correct noncomplying Heavy-Duty (HD) engine families (EFs) and defective emissions control components
  - Chassis and engine dyno testing support noncompliant findings from HDIUC testing
  - Filling gaps between findings from CARB and OEMs
    - CARB's: High warranty claims, consumer complaints, and high in-use emissions measured through other CARB programs like truck & bus surveillance program
    - OEM's: 4% of noncomplying engines out of 518 engines tested & 1 noncomplying EF out of 100 EFs tested (from Manufacturer-Run Heavy-Duty In-Use Testing (HDIUT) Program)

# HDIUC Testing Experience and Next Steps

- Completion of HDIUC testing of 2 EFs
  - One EF: Over 500,000 HD truck emissions nationwide
  - The other EF: On-going discussions of corrective actions
- Current on-going HDIUC testing of 4 EFs
- On-going HDIUC testing of more EFs from all HD engine manufacturers
- Future Off-Road HD Diesel Engine HDIUC Testing
- Recommendation to OEMs: OEMs should conduct testing programs similar to CARB's HDIUC program to better assess in-use performance of engines



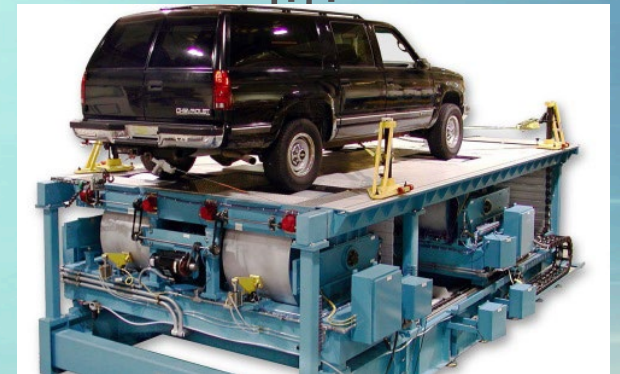
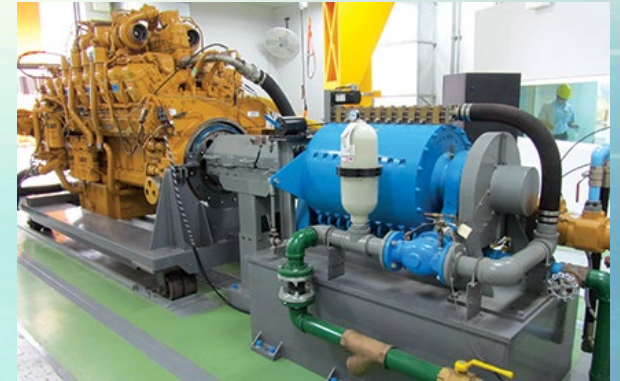


# HDIUT Findings and Next Steps

- HDIUT program intended to “...assess compliance with NTE ... and help ensure overall compliance ... throughout the engine’s useful life...” (CARB ISOR 2006)
- Since the program started, no meaningful identification of noncompliance engines/EFs
  - Despite information of high noncompliant engines/EFs from CARB programs, only 4% of noncomplying engines & 1% of noncomplying EFs
- Upon examination of HDIUT data, CARB staff found:
  - Data exclusion/limitation – Insignificant or no emissions data to be examined
  - Biased data processing – Selective towards only compliance
- Significant HDIUT amendments through HD Low NOx omnibus rulemaking
  - Moving Average Window (for full duty cycle of PEMS testing), removal of intake-manifold/aftertreatment temperature exclusion, lowering of in-use emissions threshold, test plan preapproval, etc.

# HD/Light-Duty (LD) Laboratory Audits

- HD/LD Laboratory audits performed at manufacturer or manufacturer contractor laboratories throughout the U.S.
  - Audits performed to assure labs follow 40 CFR 86, 1065, 1066, and/or CCR, as required
  - Audits performed for both HD and LD laboratory testing, as necessary
  - Laboratories found to be in noncompliant are brought into compliance
  - In some cases, CARB and EPA stopped accepting from laboratories until they were compliant



# Reporting Overview

- Manufacturers must report warranty claim information on a quarterly basis
- Multiple levels of reporting require manufacturers to investigate issues further and report findings to CARB

Reporting Summary Table	Reporting Threshold	Critical Required Information
Emission Warranty Information Report	1% or 25 unscreened claims (whichever is greater)	Unscreened warranty claims rate
Field Information Report	4% or 50 unscreened claims (whichever is greater)	Failure mode information and screened failure rate
Emissions Information Report	4% or 50 failures (whichever is greater)	Impact that failure will have on emissions

- **Manufacturers not in compliance with warranty reporting requirements may be subject to penalties**

# Emission Warranty Information Report (EWIR)

- The EWIR requires manufacturers to submit unscreened warranty information for components once the number of unscreened claims exceed 1% of the total population of the engine family or 25 claims, whichever is greater
- The cumulative number of warranty claims and claim rate is reported for individual components on a quarterly basis
- This informs CARB when there may be a systemic issue with a component and allows for monitoring of the situation



# Field Information Report (FIR)

- Once the unscreened warranty claims rate exceeds the 4% or 50 unscreened warranty claims, whichever is greater, threshold a manufacturer must submit an FIR
- FIRs must include information regarding various failure modes that parts are experiencing and their root causes
- Manufacturers are given the opportunity to screen warranty claims to determine the valid failure rate
- This information is collected by analyzing returned warranty claim parts

# Emission Information Report (EIR)

- Manufacturers are required to submit an EIR once the valid failure rate for a component exceeds the 4% or 50 failures, whichever is greater, threshold
- This is the final report manufacturers must submit prior to taking corrective action
- Manufacturers must submit data related to the impact that the failure of the component will have on emissions
- This information is critical and is used to help CARB determine the appropriate level and type of corrective action that manufacturers must take

# Corrective Action Requirements

- Manufacturers must take corrective action, typically in the form of a recall or extended warranty, once the valid failure rate exceeds 4% or 50 valid failures.
- CARB reviews corrective action plans prior to implementation to ensure that they will be successful and effectively address the in-use issue.

Component	Cumulative Claim Rate	Model Year
Turbo	>15%	2013
Exhaust Manifold	>20%	2014
Injector	>15%	2014
EGR Cooler	>40%	2014
DPF	>10%	2013
Catalytic Converter	>10%	2013

Examples of components that have had exceedingly high failure rates can be seen in the table.

# Contact Information

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# Questions

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