

Chairman's Seminar

March 27, 2019



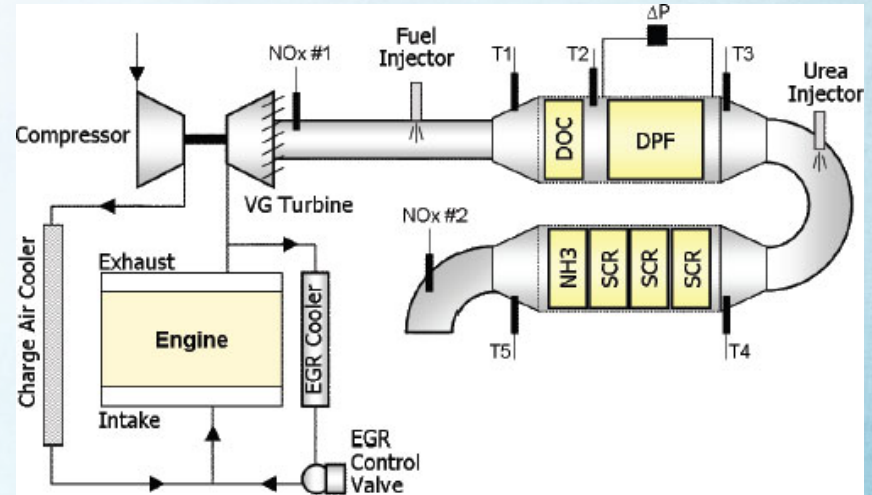
Certification and In-Use Testing for Heavy-Duty Diesel Engines to Understand High In-Use NO_x Emissions

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NOx emissions from Heavy-Duty Diesel Engines

- In-cylinder controls
 - Fuel injection system
 - Air handling technology
 - Exhaust Gas Recirculation (EGR)
- Aftertreatment system – Selective Catalytic Reduction (SCR)
 - Optimum catalyst temperature > 250°C

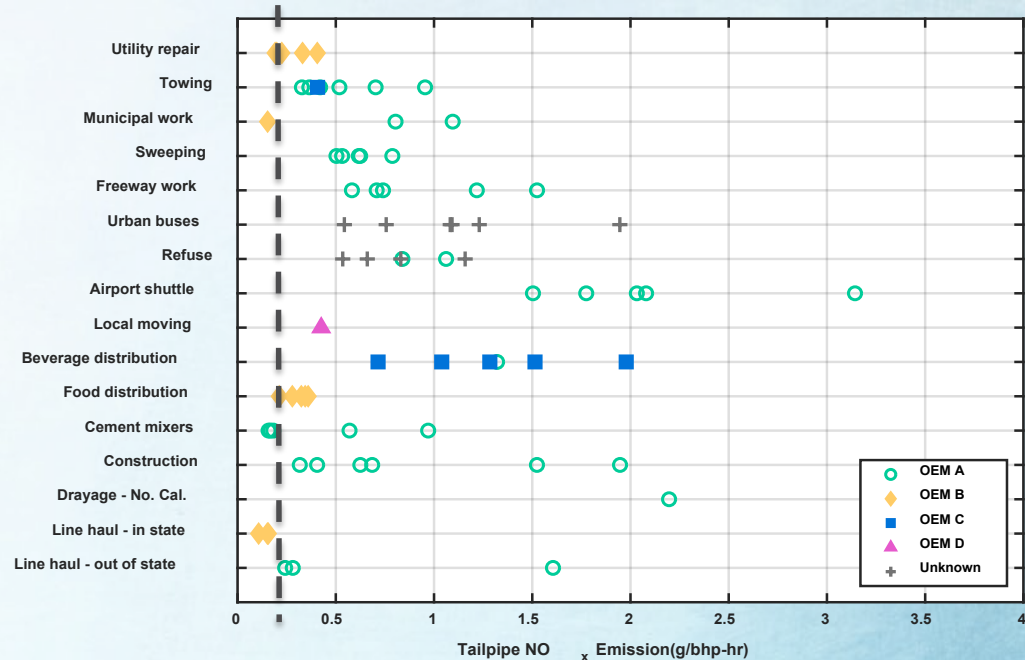


Heavy-Duty Diesel Vehicle Certification

- Heavy-Duty Diesel Engines are certified using engine dynamometer
 - Federal Test Procedure (FTP) & Supplemental Emission Test (SET)
 - NO_x emission should be less than the 0.20 g/bhp-hr standard or the applicable Family Emission Limit (FEL)
 - Laboratory-grade instrument
- In-use compliance
 - Engine-certified vehicles should meet the Not-To-Exceed (NTE) standard in real-world driving
 - Portable Emission Measurement System (PEMS)

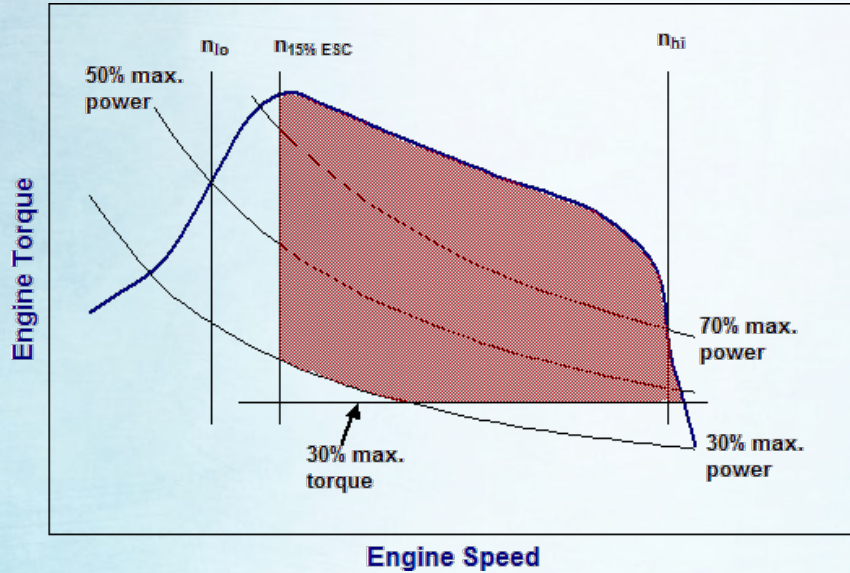
Certification vs. In-use Emissions

- Real-world observations showed that in-use NO_x emissions can be much higher than expected
- High in-use NO_x could be caused by many factors
 - Lab vs. real-world



Tan et al. (2019)

In-Use Compliance Testing



- NTE requirements were designed to help ensure that HDDE in-use emissions are properly controlled
- Low load exclusion
- Cold temperature exclusion

This study

- Objective
 - Measure and understand the differences between NO_x emissions under certification and in-use conditions for the same engine.
 - Evaluate current and proposed in-use compliance procedures
- Methods
 - Test two HDDEs certified to the 0.20 g/bhp-hr NO_x standard over chassis dynamometer cycles, real-world driving routes, and engine dynamometer cycles.

Additional Information

- Vehicle Emissions Research Program at CARB
 - <https://ww2.arb.ca.gov/our-work/programs/vehicle-emissions-research-program>
- Seminar and Project Links
 - <https://ww3.arb.ca.gov/research/seminars/durbin5/durbin5.htm>
 - https://ww3.arb.ca.gov/research/single-project.php?row_id=65254