SAE INTERNATIONAL

Executive Leadership Provided by: CNH INDUSTRIAL

COMVEC™

ON-HIGHWAY | OFF-HIGHWAY | DEFENSE

DIGITAL SUMMIT

Online September 15-17, 2020 & On-Demand

Update on EPA's Cleaner Trucks Initiative

Brian Nelson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Outline — Cleaner Trucks Initiative (CTI) Update

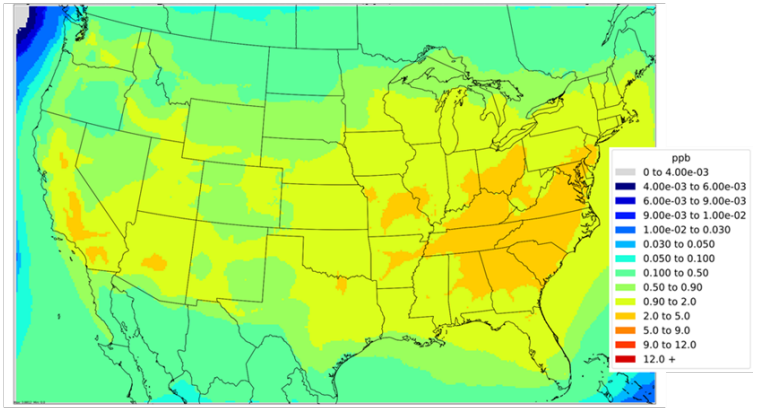
- Need for action
- Strategies to reduce emissions
- Low-NOx technologies
- Certification streamlining opportunities
- Timeline

CTI — Need for Action

- Heavy-duty (HD) NOx emissions contribute to air pollution, particularly ozone and PM2.5 (secondary PM)

- State & local air quality/public health agency comments on CTI include:
  - Challenges in achieving/maintaining National Ambient Air Quality Standards (NAAQS)
  - Some areas have already “bumped up” to higher classification for 2008 ozone standard
  - States can’t control NOx transport from other parts of the country
  - NOx reductions from HD vehicles are needed to improve air quality and meet NAAQS

Projected Seasonal Ozone Concentrations from Onroad Heavy-duty Diesel in 2025*



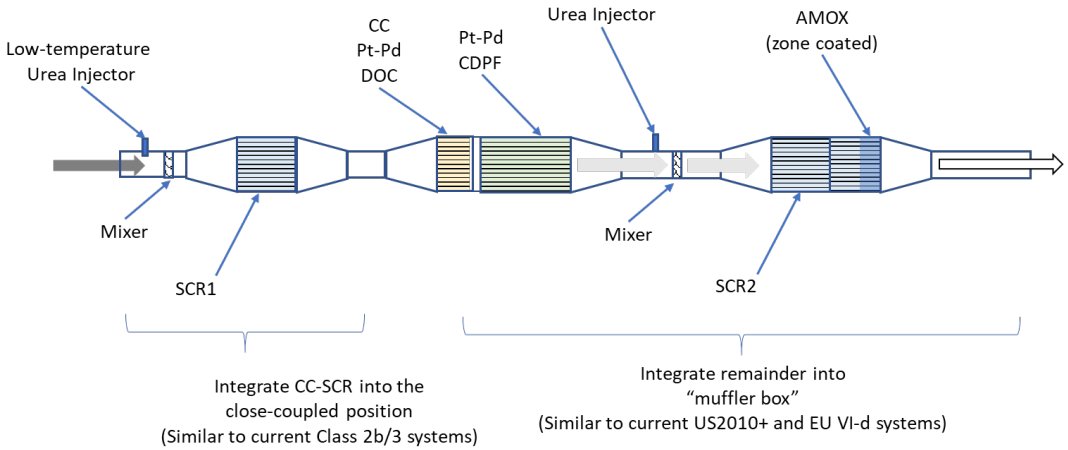
*8-hr maximum average; Zawacki et al, 2018. Mobile source contributions to ambient ozone and particulate matter in 2025. Atmospheric Environment, Vol 188, pg 129-141. Available online: https://doi.org/10.1016/j.atmosenv.2018.04.057.

CTI—Strategies to Reduce Emissions

- Tailpipe NOx emissions under low-load/low-speed conditions are responsible for significant percentage HD truck pollution
- Technologies are available to reduce low-load NOx:
  - Close-coupled SCR (*warm up quickly*)
  - Cylinder deactivation (*stay warm* by reducing air-fuel ratio at low load)
- New certification test cycles and in-use test procedures can:
  - Expand focus beyond steady-state, high-load operation to include control under low-load operation
  - Require technologies and control strategies that ensure NOx reduction under low-load conditions – addition of a Low-Load Cycle (LLC)
  - Ensure in-use NOx control under all conditions – replace Not to Exceed (NTE) method with “3-Bin” approach – *Idle, Low-to-Mid, and High Load*

CTI—Technologies to Reduce NOx Emissions (testing @ EPA's NVFEL)

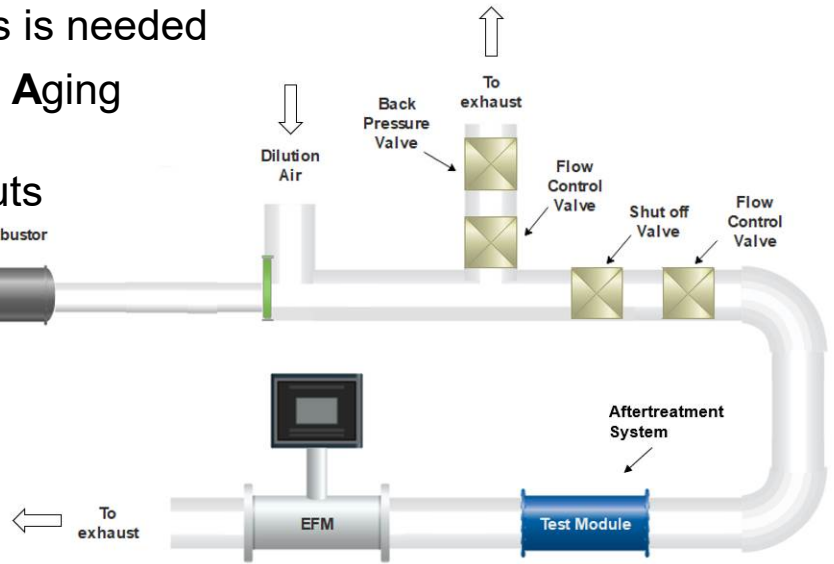
- Close-coupled SCR



- Cylinder deactivation

CTI—Streamlining Process for Aftertreatment System Aging

- Increasing emissions useful life beyond 435K miles = increased time to dyno age parts, which has impact on certification:
  - Time (risks stifling technology advancement)
  - Cost (unnecessary burden if a cheaper—*yet representative*—alternative exists)
- CARB and EPA agree that a new aging process is needed
- EPA is validating a **D**iesel **A**ftertreatment **R**apid **A**ging **P**rotocol (DARAP) as a method for generating durability cycles based on operational data inputs
  - Adapts to any engine platform
  - Target is a 10X acceleration
- DARAP is being validated for mix of engine- and burner-based approaches, providing mfrs. maximum flexibility



CTI–Timeline

- Jan. 2020 – EPA published an Advance Notice of Proposed Rule (ANPR)
  - Sought comment on all elements of CTI
  - Indicated that Notice of Proposed Rulemaking (NPRM) would be followed by a Notice of Data Availability (NODA) for air quality modeling analysis and other technical information … *a two-step process*
  - EPA was targeting NPRM signature for late-Summer 2020
- July 2020 – due to COVID-related delays, EPA decided to:
  - Combine two steps (NPRM and NODA) into one action
  - Continue engagement with stakeholders that was put on hold due to COVID
  - Target NPRM signature for 1st Quarter of 2021

Thank You!

Brian Nelson

Director, Heavy-Duty Onroad and Nonroad Center
Assessment and Standards Division/Office of Transportation and Air Quality
United States Environmental Protection Agency
2000 Traverwood Drive, Ann Arbor MI 48105
734-214-4278
nelson.brian@epa.gov