

Efforts to Identify and Quantify the Prevalence and Emissions Impact of Medium- and Heavy-Duty Vehicles



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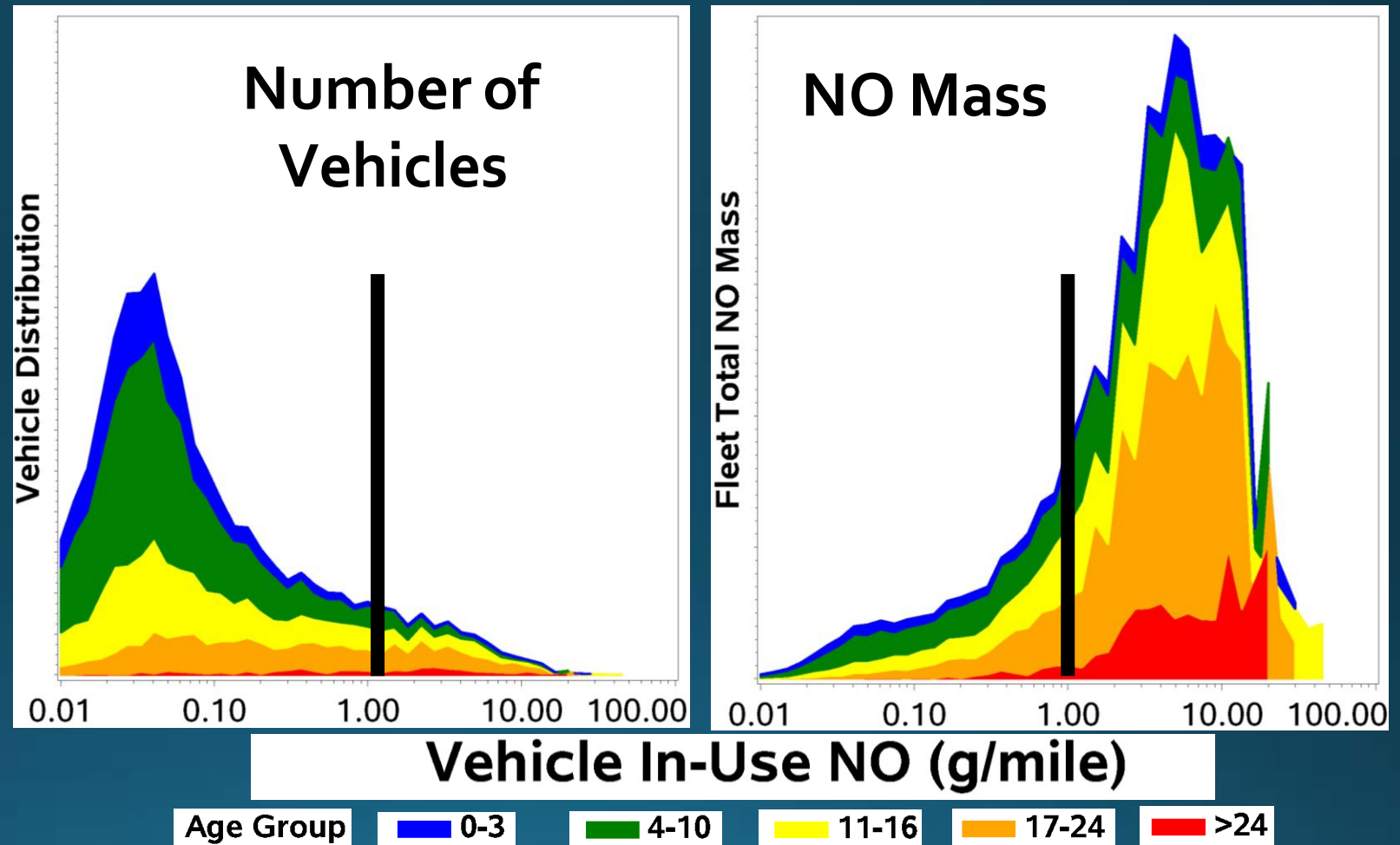
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Outline

- Background & Study Objective
- Review of 2024 CRC Presentation of Tool Development
- Previous Findings
- 2024 Test Programs
- Potential Additional Data Sources
- Next Steps

Background

- Remote Sensing Data¹ shows that a small number of high emitting vehicles contribute a significant portion of the emissions inventory (example shown for LD vehicles)
- EPA observed that Class 2b/3 diesel trucks emitted **30 to 300 times higher NO_x** and **15 to 40 times higher PM** when all emissions controls are removed or disabled²



Study Objective

- To continue gathering efforts to better identify and quantify the prevalence and emissions impact from possible tampered HDVs
 - EPA wants to better understand the in-use emissions from the diesel fleet since the implementation of the MY2007/2010 regulations;
 - What fraction of the fleet consists of high emitting vehicles, across engine manufacturers and/or vehicle types within the fleet?
 - Continue evaluation of the performance of tampered detection tools against proven reference methods
- **“Tampered”** – For purpose of this study, means vehicles where the emission control hardware is electronically and/or physically disabled and OBD software functions related to these systems were disabled or otherwise bypassed.
 - Primarily evaluated the exhaust gas recirculation (EGR) system, diesel oxidation catalyst (DOC), diesel particulate filter (DPF), and selective catalytic reduction (SCR) system.

2024 CRC Presentation

- 2024 Presentation Summary:
 - “Developing Tools to Quickly Find Potentially High Emitting Heavy Duty Vehicles”
 - Study was performed to evaluate commercial (or pre-commercial) tools to “automatically” detect vehicles with potentially high emissions in less than 2-3 minutes
 - Approximately 75 Model Year (MY) 2007+, OBDII compliant types of medium- and heavy-duty vehicles were tested, covering a variety of manufacturers, vehicle types, and OBDII (SAE J1979) or HD OBD (SAE J1939), of which 17 were possibly tampered
 - The tools evaluated in the program were found to effectively identify tampering in their respective target fleets, with minimal false identifications with a 94% success rate to determine a tampered vehicle

HEM Data Mini Streamer with OBD Inspector Software



Note: Streamer uses WiFi and is designed for HD OBD SAE J1939 protocol but can use converter cable to evaluate OBD-II SAE J1979 protocol

Disclaimer: EPA does not endorse any of these products and is only making the public aware of their existence for possible use.



1:59 PM Fri Mar 7

89%

Restart

Disconnected

Stop

Coolant Temperature	69.8 f
Engine Hours	470.5 h
Engine Power	
Engine Rated Power	601.2 HP
Engine off! PLEASE TURN ON ENGINE.	0.0 rpm
High Res Distance	10852.3 mi
High Res Distance #2	10852.3 mi
Oil Pressure	0.0 psi
Serial Number	I N T*Partnumber*Stoneridge*3.50
Soot Load	6.0 %
Total Distance	10852.1 mi
Total ECU Distance	
Total Hours	
VIN	3HSNUAPR1GN221961

Progress J1939

OBD-II

Parameters

Uploads

DMs

Previous Findings

Tampered Software Sales

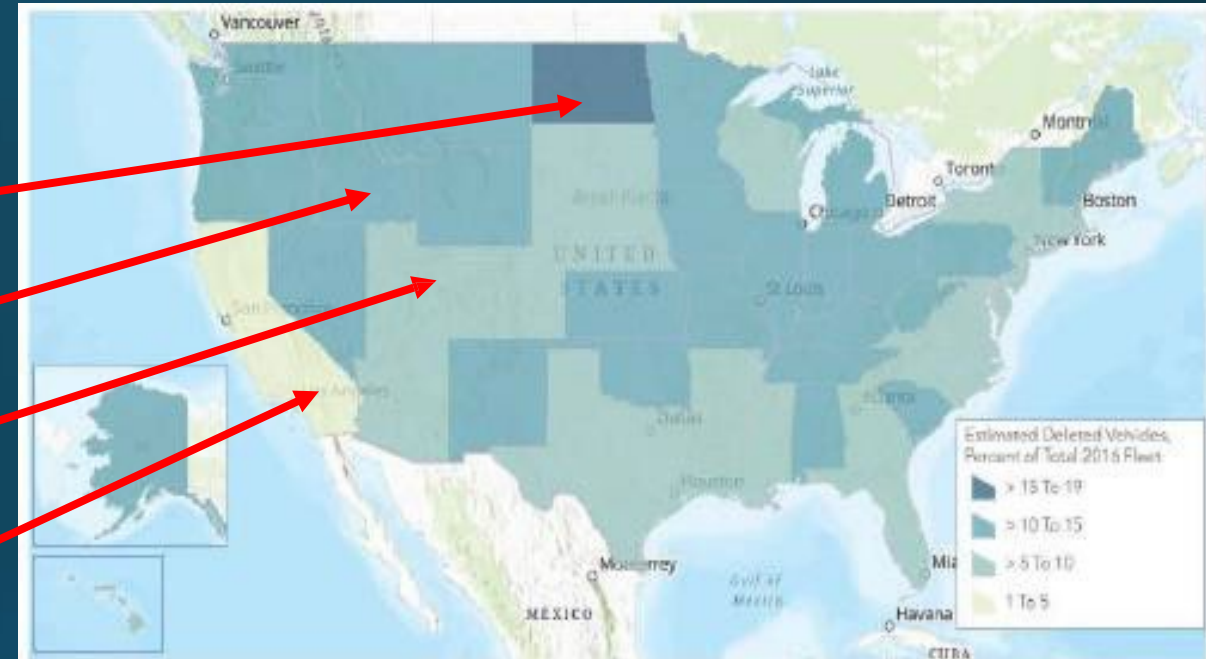
EPA has previously evaluated tampering software sales between 2009 and 2019 to estimate the impact on the Class 2b/3 fleet

>15-19%

>10-15%

>5-10%

0-5%



- Report indicates³:
 - Estimated percentage of MY2003 and newer Class 2b/3 vehicles with tampering ranged between **2.7 – 25.6%**, average over all states **14.7%**
 - Based on over 350,000 aftermarket delete software invoices

2024 Tampering Test Program

- Auction Site in Longmont, Colorado during July 2024
 - Note that Colorado Statute §25-7-144 prohibits tampering with motor vehicle emissions control systems and it is illegal to: Sell, lease, rent, offer for sale, or transfer title of a tampered vehicle
- Methods: EPA used commercial off-the-shelf (COTS) tools, physical inspections, ERG data collection and logging, subsequent analytics as reference methods
- All 67 medium- and heavy-duty vehicles at the site were tested, unlike the 2023 program where we targeted potentially tampered vehicles
- Results:

Location	OBD Type	# of Possibly Tampered Trucks	Total # Trucks	% Possibly Tampered	Tool Used
Longmont, Colorado	J1939	1	48	2.1	HEM Logger & Streamer
Longmont, Colorado	J1979	2	19	10.5	HEM Logger & Streamer

State Supported Testing

- Further development to try to quantify tampering across the country on all HDVs
- Three locations:
 - New Jersey: NJ staff collected roadside data at a scale house in South Jersey. This gave NJ the best opportunity to gather in use vehicles from around the country.
 - Colorado: Performed truck testing as part of their Diesel Opacity Inspection Program (their periodic diesel test program self administered by the fleets).
 - Washington, D.C.: Performed by the Department of Motor Vehicles as part of their safety/emissions inspections. Started testing in January 2025.
- **Methods**: COTS Tools and independent collection and analytics

State Supported Testing Results

Findings to Date

Location	OBD Type	# of Possibly Tampered Trucks	Total # Trucks	% Possibly Tampered Trucks	Tool Used
Colorado	J1939	2	19	10.5	HEM Streamer
Colorado	J1979	3	91	3.3	HEM Streamer
New Jersey Spring 2024	J1939	10	51	19.6	HEM Streamer
New Jersey Fall 2024	J1939	3	23	13.0	HEM Logger
New Jersey Spring 2024	J1979	1	19	5.3	HEM Streamer
New Jersey Fall 2024	J1979	TBD	2	TBD	HEM Logger

Opportunity for Additional Tampering Data

- HEM Dashboard Data
 - All data acquired using HEM Data's **OBD Inspector™** app
- **Data Sources:**
 - Primary sources: Vehicles being resold by auction companies; repossession by banks; and end of vehicle lease
 - Secondary sources: Vehicles detected in tampering test programs by EPA and State agencies
- Primarily Class 6-8 heavy-duty vehicles, covering a variety of manufacturers
- EPA plans to investigate the fraction of tampered vehicles and percentage of vehicles with DPF and/or SCR disabled

Next Steps

- EPA has developed and is expanding its protocols and methodologies to identify tampered vehicles and can provide equipment loans to partners.
- EPA needs more data to determine the fraction of high emitting vehicles within the national fleet and is looking for partners to help gather this across the USA.
- We are seeking:
 - New Auction Sites
 - Additional State pilot programs
 - Other partners

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- Washington, D.C.

Sources

¹ Preliminary results from 14,000 measurement taken over one week in Westminster, CO. “Denver On-Road Running Loss Trends by Remote Sensing” presented at CRC Real World Emissions Workshop 2022

^{2,3} U.S. EPA. “Tampered Diesel Pickup Trucks: A Review of Aggregated Evidence from EPA Civil Enforcement Investigations.” Figure 6. November 2020. Available at <https://www.epa.gov/sites/default/files/2021-01/documents/epaaedletterreportontampereddieselpickups.pdf>

Extra Slides

Field Testing: Data Gathering



Physical Vehicle Inspections for this Study

Field Testing: Data Gathering

