State Diesel I/M Programs and Tampering: a comparison

Presentation by Seema Kakade & Michael Sammartino
University of Maryland Environmental Law Clinic
I. Survey state diesel emissions inspection and maintenance (I/M) programs

II. Evaluate I/M best practices and steps available to improve anti-tampering efforts through I/M

III. Introduce links between state I/M programs and emerging emissions control issues
I. Survey of State Diesel I/M Programs

The following information was obtained through a paper search of state regulations and statutes, state agency websites, and papers analyzing state I/M programs.
States with Light-Duty Diesel I/M Programs

Unshaded states have no diesel or gas I/M programs.
States with Heavy-Duty Diesel I/M Programs

Unshaded states have no diesel or gas I/M programs.
Unshaded states have no light-duty diesel I/M programs.
Vehicle Class Definition: Heavy-Duty

Unshaded states have no heavy-duty diesel I/M program.
Emissions System Tests: Light-Duty

Unshaded states have no diesel I/M program.
Unshaded states have no heavy-duty diesel I/M programs.
I/M Anti-Tampering Checks

Unshaded states do not incorporate any anti-tampering check into diesel or gas I/M.
Unshaded states have no diesel I/M programs.
I. Survey Takeaways: Program Scope

- Majority of states recognize only two vehicle classes: light-duty and heavy-duty
- Medium-duty vehicles are treated inconsistently
- Most programs exempt new vehicles up to 2 model years old
- Nationwide inconsistency on treatment of older vehicles
- Many heavy-duty programs exempt farm equipment and government vehicles from I/M
I. Survey Takeaways: Inspection Procedures

- OBD is most common test for light-duty programs
- Snap acceleration is most common inspection test for heavy-duties
- Comprehensive programs incorporate both OBD and opacity tests into I/M
- Majority of states require biennial emissions inspections
- Light-duty programs require inspection at test-only or test/repair facilities
- Heavy-duty programs are split between facility-based inspection and roadside inspection
I. Survey Takeaways: Enforcement

- All light-duty diesel I/M programs are linked to vehicle registration
  - Some states also grant regulators discretion to levy civil, criminal, or administrative penalties
- For heavy-duty diesel I/M:
  - Programs requiring periodic inspection enforce through registration denial and/or financial penalties for non-compliance.
  - Programs relying on roadside inspection enforce through financial penalties and potential registration holds.
II. Best Practices for Effective I/M and Improving Anti-Tampering Efforts
Best Practices for Effective I/M

- Expand I/M to heavy-duty vehicles
- Adapt current I/M programs to accommodate newer technologies and younger vehicle fleets
- Refine pass/fail test criteria based on local impact studies and tailored by vehicle technology or certification level
- Combine I/M with complementary measures such as remote sensing programs
- Expanding OBD based I/M to include heavy-duty vehicles

Best Practices for Effective I/M

- Conduct inspections at test-only or test/repair facilities
- Link I/M to registration
- Require periodic vehicle inspections at least every 2 years
- Dedicate resources to public outreach and awareness
- Improve and expand program “maintenance capacity”

II. Summary of Effective I/M Best Practices

- Comprehensive vehicle coverage
- Facility-based inspection program
- Evolving program standards tied to changes in technology
- Registration-based compliance
- Developed maintenance capacity
- Dedicated public outreach
- Tampering-specific inspections
Improving Anti-Tampering Efforts Through I/M
Improving Anti-Tampering Efforts Through I/M

- State laws and I/M programs are generally outdated in context of emissions control device tampering
- Data gathered on emissions test results is generally insufficient to identify and record instances of tampering
- Majority of state programs do not require enforcement collaboration between air regulators and motor vehicle divisions
- **Bottom Line**: Few states have been successful in using their I/M programs to curb vehicle tampering
Improving Anti-Tampering Efforts Through I/M

First steps:
- Enhance data collection on diesel emissions test failures and registration denials
- Improve outreach to consumers and incentivize reporting on tampering

Advanced steps:
- Expand scope of diesel I/M programs
- Incorporate visual and anti-tampering checks into emissions testing
- Tighten consumer protection laws to include tampering as a deceptive trade practice
III. Emerging Issues
Legal and Political Challenges

- Federal preemption of State anti-tampering lawsuits
  - VW petition pending before Supreme Court seeks federal preemption of State enforcement authority over post-sale manufacturer-installed emissions control software updates
  - A Supreme Court ruling in VW’s favor would effectively foreclose any judicial enforcement of state anti-tampering provisions against vehicle manufacturers

- Interagency Conflicts
  - I/M and anti-tampering enforcement authority is generally divided between state environmental agencies and state motor vehicle regulators (DMVs)
  - Different enforcement priorities (i.e., vehicle safety vs. pollution control) and lack of coordination between agencies frustrates overall I/M program effectiveness and state efforts to curb tampering
Transportation Justice

- Transportation justice concerns the disparate impacts of on-road diesel emissions
  - Minority and low-income populations face greater exposure to diesel emissions\(^1\)
  - Low-income households are more likely to keep older cars\(^2\)
  - NOx emissions in diesel passenger cars worsen with age\(^3\)

- Improving I/M programs would have a meaningful and significant impact in addressing environmental justice issues and lessening disparities in diesel emissions exposure

Electric Vehicles

- Average vehicle age is increasing by 0.4% per year for trucks and decreasing by 2.2% per year for passenger vehicles\(^4\)
- Combustion-engine powered vehicles will still comprise most of the vehicle fleet through 2050\(^5\)
- While EV sales are growing it is unclear whether and when EV sales will exceed sales of internal combustion engine (ICE) powered-vehicles\(^6\)
- **Bottom Line:** Increased EV sales will not offset the need for robust I/M programs for the foreseeable future

6. Id.
Remote Sensing of On-road Diesel Emissions

- Best used to supplement and improve I/M program efficiency
- Flexible deployment; can test for a variety of pollutants
- Current research is promising, but more is needed on effectiveness of remote sensing devices (RSD) in evaluating diesel vehicle emissions

Case Studies
- Colorado RapidScreen
- Hong Kong

8. Id.
Conclusion

- Opportunity exists to improve and modernize I/M enforcement by incorporating identified best practices into diesel I/M programs
- Retooling certain I/M program aspects can significantly improve state anti-tampering efforts
- States should consider certain emerging legal, political, and technological issues when reevaluating efficacy of diesel I/M
Additional Information

Additional Resources:


- Susan C. Anenberg et al., Impacts and mitigation of excess diesel related NO\textsubscript{x} emissions in 11 major vehicle markets, 545 Nature 467 (2017).


Contact Information

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Appendix
# Program Scope: Vehicle Classes

<table>
<thead>
<tr>
<th>Light Duty</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>&lt;8,500lbs</td>
<td>&lt;10,000lbs</td>
<td>&lt;10,500lbs</td>
<td>&lt;14,000lbs</td>
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<tr>
<td>13 AZ, CA*, DE, ID, MA, MO, NH, NY, NJ, OR, RI, VT, VI</td>
<td>2 OH, CT</td>
<td>1 TN</td>
<td>4 CO, NV, UT, WI</td>
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<table>
<thead>
<tr>
<th>Medium Duty</th>
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<tbody>
<tr>
<td>8,500lbs—14,000lbs</td>
<td>8,500lbs—18,000lbs</td>
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</tr>
<tr>
<td>2 CA*, MA</td>
<td>1 NJ</td>
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<table>
<thead>
<tr>
<th>Heavy Duty</th>
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<th></th>
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<tbody>
<tr>
<td>&gt;6,000lbs</td>
<td>&gt;8,500lbs</td>
<td>&gt;10,000lbs</td>
<td>&gt;14,000lbs</td>
<td>&gt;16,000lbs</td>
<td>&gt;18,000lbs</td>
<td>&gt;26,000lbs</td>
</tr>
<tr>
<td>1 CA*</td>
<td>3 AZ, NY, WI</td>
<td>2 MD, NH</td>
<td>4 CA*, CO, MA, UT*</td>
<td>1 IL</td>
<td>2 ME, NJ</td>
<td>1 CT</td>
</tr>
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</table>
### Program Scope: Vehicle Exemptions

<table>
<thead>
<tr>
<th></th>
<th>&lt;1 MY</th>
<th>2 MY</th>
<th>&lt;3 MY</th>
<th>&lt;4 MY</th>
<th>&lt; 5 MY</th>
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<tr>
<td><strong>New Vehicle Exemptions</strong></td>
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<tr>
<td>&lt;1 MY</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>MA, MO, NH, VT, TN</td>
<td>MA, MO, NH, VT, TN</td>
<td>NY*, NV, RI, UT</td>
<td>WI</td>
<td>CA, CT, CO, OH, OR, VA*</td>
<td>AZ, DE, ID NJ</td>
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</table>
## Program Scope: Vehicle Exemptions

### Older Vehicle Exemptions

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Exemptions</th>
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</thead>
<tbody>
<tr>
<td>&gt;MY 2007</td>
<td>2 MA, WI</td>
</tr>
<tr>
<td>&gt;16 MY</td>
<td>1 VT</td>
</tr>
<tr>
<td>&gt;MY 1997</td>
<td>2 CA, UT,</td>
</tr>
<tr>
<td>&gt;MY 1996</td>
<td>6 DE, MO, NH, NY, NJ, VA</td>
</tr>
<tr>
<td>&gt;25 MY</td>
<td>2 OH, TN,</td>
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<tr>
<td>&gt;MY 1981</td>
<td>1 ID,</td>
</tr>
<tr>
<td>&gt;MY 1976</td>
<td>3 AZ, CO, OR,</td>
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<tr>
<td>&gt;MY 1975</td>
<td>1 TN</td>
</tr>
<tr>
<td>&gt;MY 1968</td>
<td>1 NV</td>
</tr>
<tr>
<td>None</td>
<td>1 RI</td>
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</table>
## Program Scope: Vehicle Exemptions

<table>
<thead>
<tr>
<th>Heavy Duty Vehicle-Type Exemptions</th>
<th>Farm Vehicles</th>
<th>Commercial Vehicles*</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT, IL, MD, ME, NJ, UT, WI</td>
<td>7</td>
<td>1 MA*</td>
<td>5 CA, MD, NH, NJ, UT</td>
</tr>
</tbody>
</table>

* Commercial Vehicles include: MA
## Inspection Procedures

### Light Duty Emissions Control System Tests

<table>
<thead>
<tr>
<th>OBD + Opacity</th>
<th>OBD only</th>
<th>Opacity Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 AZ, CA, CT, ID, MA, NJ, NV, OH, OR, RI, TN, UT</td>
<td>7 VT, VA, WI, DE, NH, MO, NY</td>
<td>1 CO</td>
</tr>
</tbody>
</table>


# Inspection Procedures

## Heavy Duty Emissions Control System Tests

<table>
<thead>
<tr>
<th>OBD + Opacity</th>
<th>OBD only</th>
<th>Opacity Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 AZ, NY, MA, NJ, NY, UT</td>
<td>1 WI</td>
<td>8 CA, CO, CT, IL, MD, ME, NH, RI</td>
</tr>
</tbody>
</table>
## Inspection Procedures

### Visual Inspections

<table>
<thead>
<tr>
<th>Anti-Tampering*</th>
<th>Emissions Components Check</th>
<th>Gas Cap &amp; Catalytic Converter</th>
<th>Safety Inspections Only</th>
<th>N/A*</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 AZ, OH, TN, UT, WI</td>
<td>4 CA, CO, NV NY</td>
<td>4 CT, ID, NJ, VT</td>
<td>3 DE, NH, MO</td>
<td>4 OR, RI, MA, VA</td>
</tr>
</tbody>
</table>

* N/A = Not Applicable

#### States/Regions:
- 4: CA, CO, NV NY
- 3: DE, NH, MO
- 4: OR, RI, MA, VA
## Inspection Procedures

<table>
<thead>
<tr>
<th>Inspection Frequency</th>
<th>Annual</th>
<th>Biennial</th>
<th>Mixed*</th>
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<tbody>
<tr>
<td>IL*, MA, NH, NY, NV, TN, VT</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA, CT, DE, ID, MO, NJ, OH, OR, RI, VA, WI</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ, CO, UT</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
## Inspection Procedures

<table>
<thead>
<tr>
<th>Heavy Duty Inspection Location</th>
<th>Inspection Facility</th>
<th>Roadside</th>
<th>Fleet Self-Inspection</th>
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<tbody>
<tr>
<td></td>
<td>AZ, CO, IL, MA, NJ, NY, UT, WI</td>
<td>6 CA, CT, ME, MD, NH, RI</td>
<td>6 AZ, CA, CO, IL, NJ, NY</td>
</tr>
</tbody>
</table>