Impact Of Federal Aftermarket Catalytic Converter Policy

NACAA

Colorado Department of Public Health and Environment

Legal Catalyst Replacement Options

- Original equipment;
- Aftermarket catalyst (federal rules);
- Aftermarket catalyst (CARB rules);
- Used/remanufactured OE catalyst.

Federal A/M Catalyst Rule

- Selective Enforcement Policy, August, 1986
- Replacement converter meets policy if:
  - Properly labeled;
  - Warranted to meet performance and shell durability standards;
  - Properly installed.

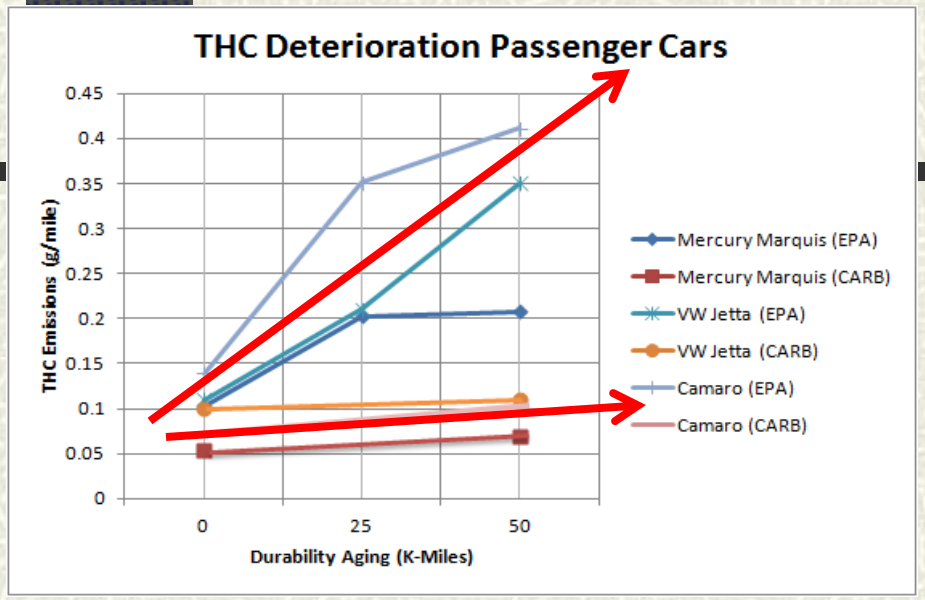
Federal A/M Catalyst Rule

- Performance Standard
  - Conversion efficiency of 70/70/30% ($HC/CO/NO_X$).
  - Performance standard is 25,000 miles.
- Catalyst manufacturer determines if converter meets the requirements.

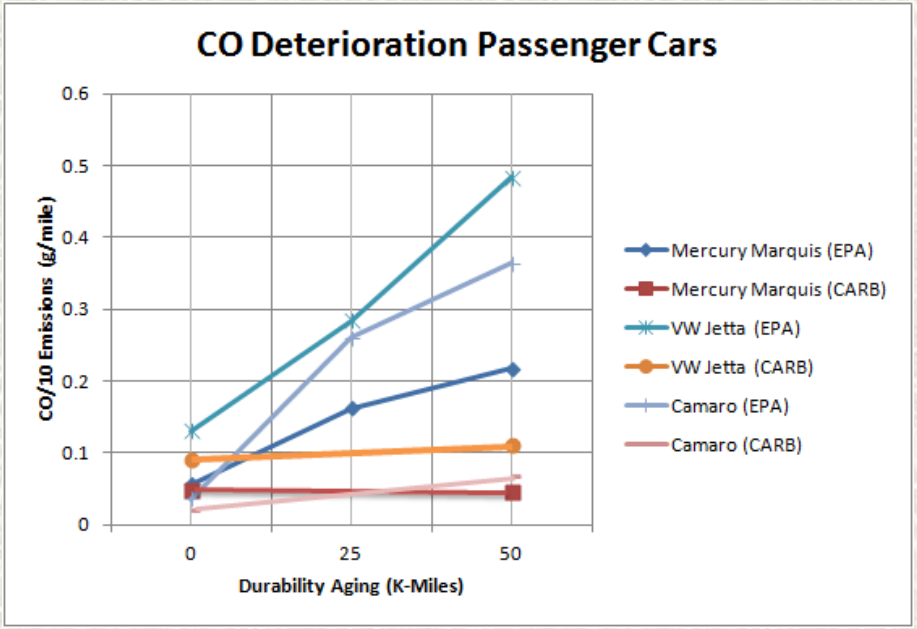
California Aftermarket Catalyst Rule

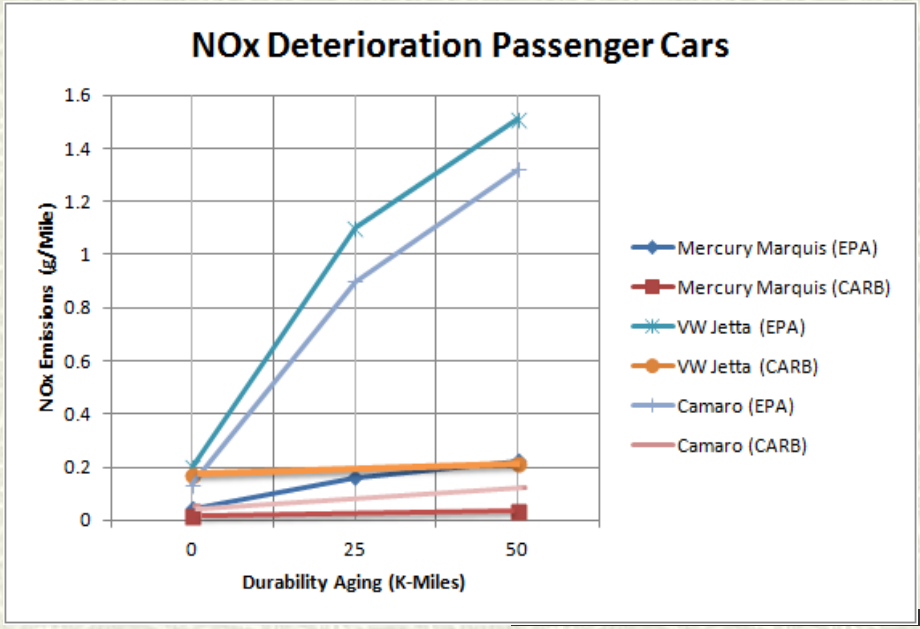
- Must conform to a *mass emissions* threshold
- MIL must remain off
- Shell *and* performance warranty is 50,000
- Warranty must include full replacement cost (parts and labor)

Passenger Car Aftermarket Converter Deterioration Curves

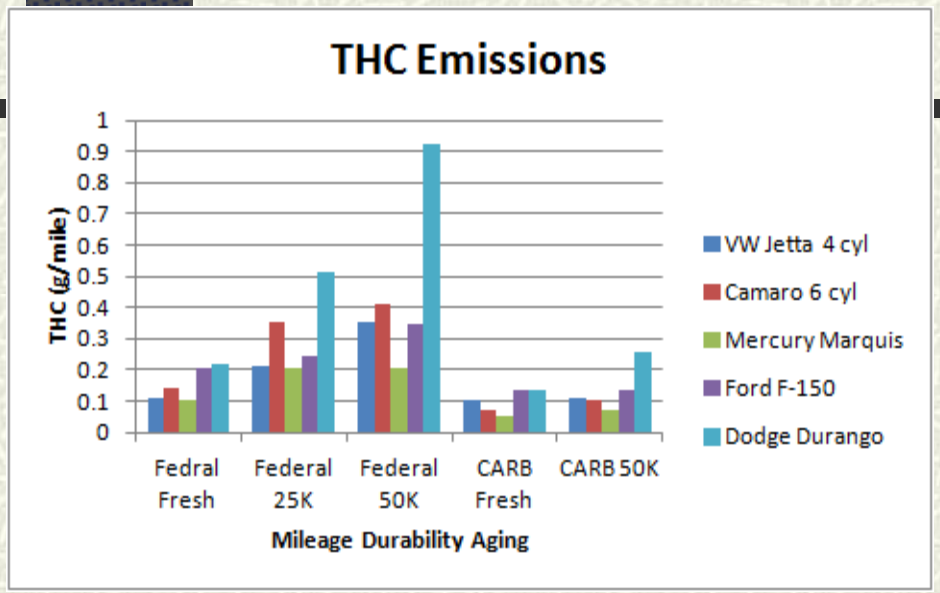


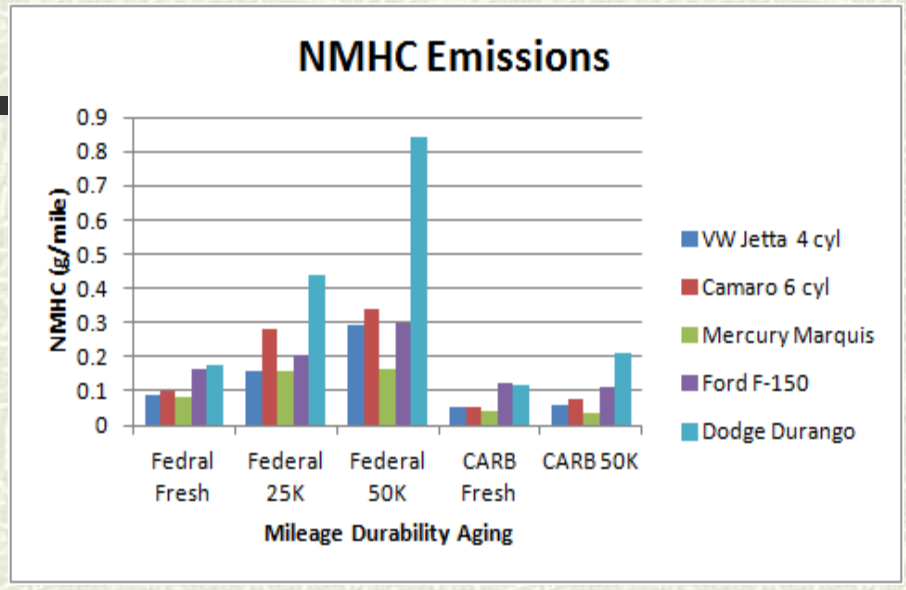
Source: SAE 2013-01-1298 (MECA)

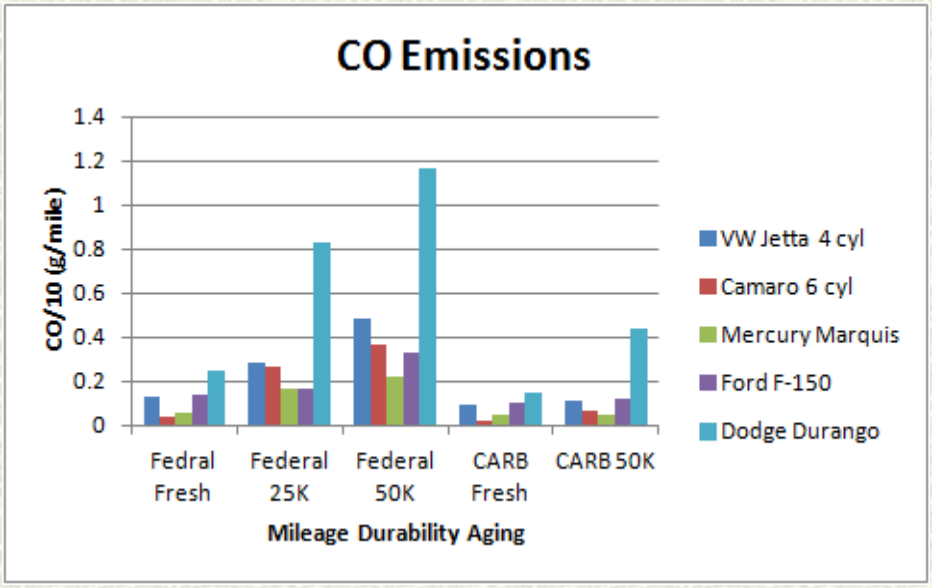


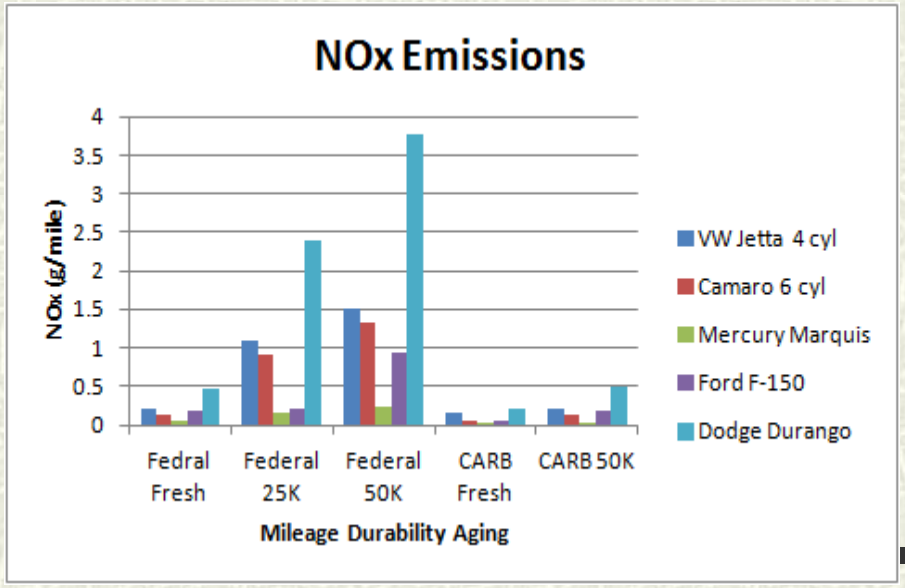


Aftermarket Converter Emissions Results









MECA Test Program Conclusions

- In some cases fresh Federal and CARB converters delivered similar emission reductions
- Deterioration of federal converters was significantly higher even at 25K miles
- At the 25K mile durability points the emissions benefits of a CARB versus Federal converter is on average 77% NOx, 60% HC, 63% CO lower for the five vehicles.

Rough Estimate of 49 State Emission Benefits

- In California ARB estimated reductions of 5.3 tpd HC and 31.3 tpd Nox.
- Simple ratio of California versus federal fleet populations (10%) would predict a potential 49 state benefit of:
  - 47.7 tpd HC and 282 tpd NOx, Added potential benefit of 462 tpd CO
- OTC estimated a potential reduction of 60.3 tpd NOx in OTR from revised federal program

ECS Study Protocol

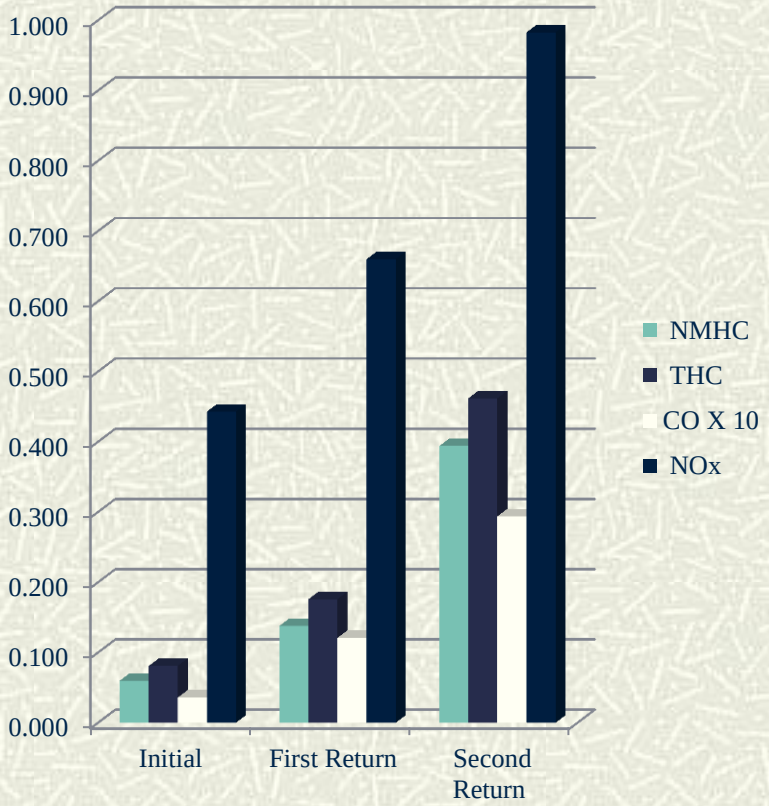
- Recruit vehicles recently failed (within days) for:
  - IM240
  - OBD
  - Both
- After owner agrees to participate:
  - Pre-inspection (no tampering)
  - Lane-grade IM240 & OBD test series
  - FTP test series
  - Repair
  - Repeat IM240, OBD, FTP series

Catalyst Study Summary

- Total of 44 vehicles to date required catalyst replacement.
  - 9 vehicles received OE
  - 35 vehicles received aftermarket converters; both 49-state and California certified
- Total of 14 have returned for follow-up FTP tests.

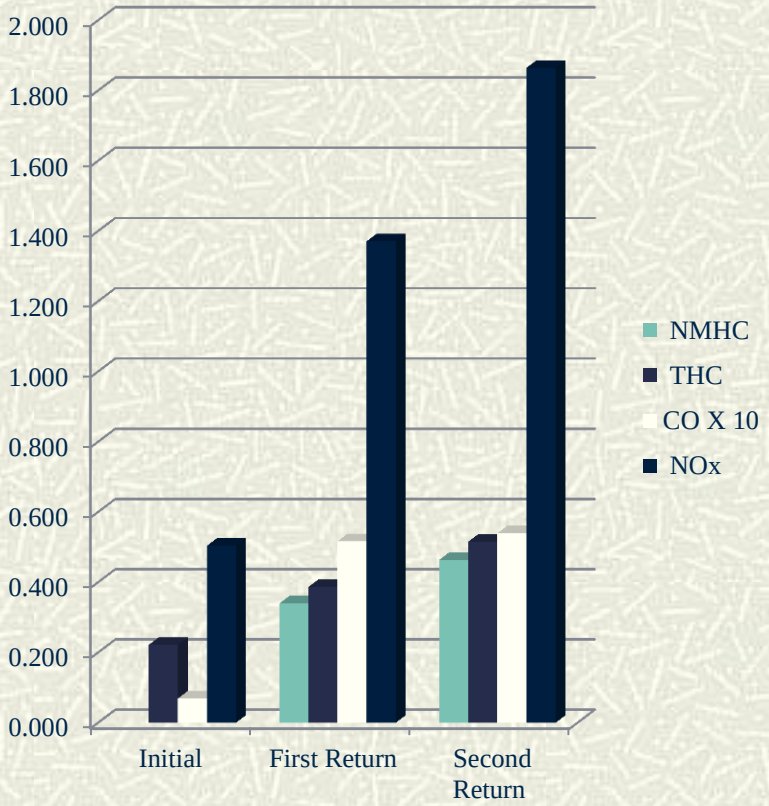
Saturn SL 1- Brand X Cat

- Initial test = 148,296 miles = “0” miles
- First return = 16,073 miles
- Second return = 27,970 miles (total)



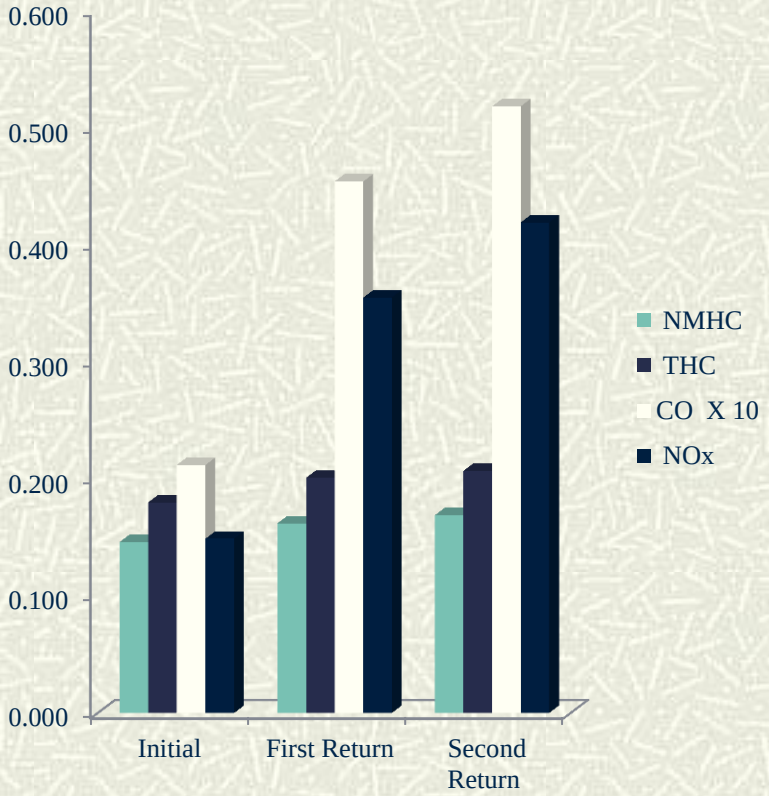
Mitsubishi Galant - Brand X Cat

- Initial test = 140,634 miles = “0” miles
- First return 10 months = 8,513 miles (P0420-catalyst)
- Second return 17 months = 19,511 miles (total)
- Replaced under warranty



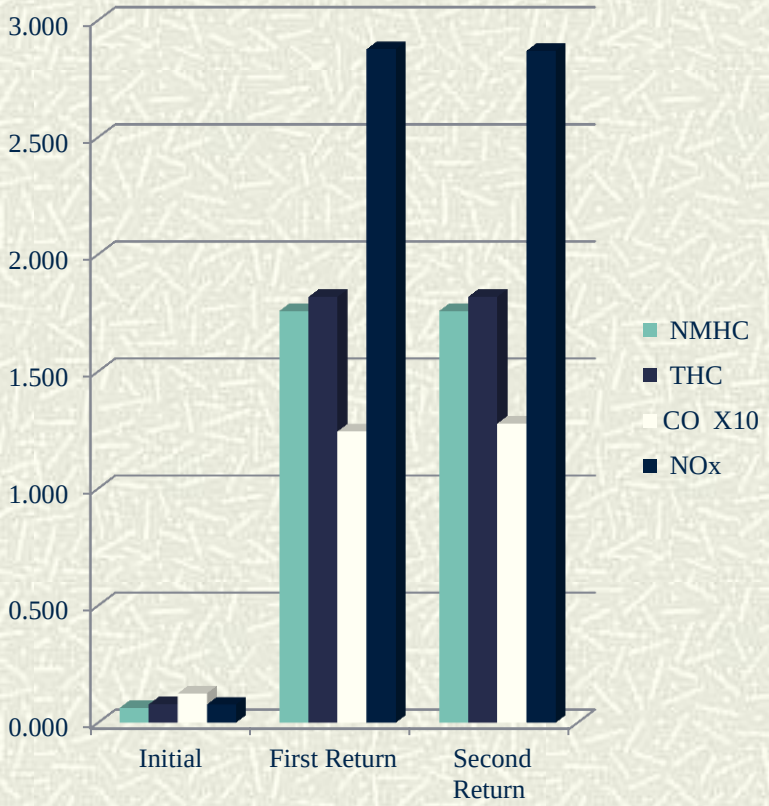
Chev Cavalier- Brand X Cat

- Initial test = 195,368 miles = “0” miles
- First return 5 months = 8,746 miles (P0420-catalyst)
- Second return = 17,022 miles (total)



Chev Venture- Brand Y Cat

- Initial test = 147,044 miles = “0” miles
- First return 7 months = 6,343 miles (P0420-catalyst)
- Second return 12 months = 9,315 miles (total)



Observations

- Of the 14 returned vehicles 3 have stored catalyst codes.
  - Avg accumulated mileage = 6,343 miles
- Of the 14 returned vehicles 7 failed the FTP on the first return.
  - Avg accumulated mileage = 5,108 miles

How Sensitive Must The OBD Monitor Be?

- 1996 LEV NMOG (HC) Standard is 0.225 g/m;
  - 150% = .3375 g/m;
  - Difference is .1125 g/m.
- For some LEV vehicles catalyst degradation of as little 3% require a MIL illumination and DTC.

Vehicles With Incoming Catalyst Codes

VEHID ECS	FTP ODOM	FTP NOx	FTP CO	FTP THC	VEHID CERT_CAT
ECS-013 INI	161994	1.406	9.876	1.283	Tier1
ECS-031 INI	167589	1.616	8.928	2.051	Tier1
ECS-036 INI	170500	2.666	8.961	0.461	Tier1
ECS-058 INI	160132	0.127	4.08	0.095	NLEV
ECS-061 INI	128828	2.36	10.026	1.184	ULEV
ECS-068 INI	137676	0.424	1.401	0.12	NLEV
ECS-070 INI	186057	1.152	6.412	0.251	Tier1
ECS-083 INI	146993	2.99	13.117	1.851	ULEV
ECS-087 INI	119999	0.404	1.878	0.189	CALEV
ECS-095 INI	195399	1.406	5.374	0.221	NLEV
ECS-100 INI	250395	0.903	5.409	0.528	NLEV
ECS-114 INI	112224	2.3	5.262	0.381	Bin5
ECS-128 INI	93159	1.223	5.804	0.265	Bin5
ECS-157 INI	97581	3.482	10.379	0.794	Tier1
ECS-159 INI	95569	0.358	2.152	0.154	Bin5

Colorado Lane Data

- Catalyst codes are generally one of the most common for OBD failure:
  - As an example, for Tier II vehicles in Colorado, >80,000 miles

Vehicle Model Year	Total
2004	692
2005	452
2006	289
2007	87
2008	49
2010	1
Total	**1570**

Summary

- The OBD fail threshold and outdated federal aftermarket catalyst policy are incompatible.
- We should provide support to MECA, OTC, and others asking EPA to change the rule.
- Section 177 states may consider adopting the California rules.