



EVALUATION OF CONNECTICUT'S INSPECTION/MAINTENANCE PROGRAM

2023 ANNUAL REPORT

2022-2023 BIENNIAL REPORT

Prepared For

Connecticut Department of Energy and Environmental Protection
Connecticut Department of Motor Vehicles

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1. Introduction

1.1. Executive Summary

As required by the Clean Air Act Amendments of 1990, the Connecticut Department of Energy and Environmental Protection (DEEP) in partnership with the Connecticut Department of Motor Vehicles (DMV) conducts periodic evaluations of its enhanced Motor Vehicle Inspection and Maintenance (I/M) Program. This report is written and submitted in fulfillment of the requirement to provide annual I/M reports per 40 CFR 51.366 to the U.S. Environmental Protection Agency (EPA). This report addresses data collected from January 1, 2023 through December 31, 2023. As evidenced by the high compliance rate, limited fraud and low waiver rate, this report demonstrates that Connecticut's I/M program effectively achieves the expected air quality benefits. The reported I/M statistics in this report comply with EPA's 2020 guidance on reporting inspection results.

The EPA provided a checklist, which identified the data elements to be included in this report. Required data and reports for 2022 and earlier years have been submitted to EPA. The 2023 data elements are compiled in the main body and Appendix A of this report and correspond to the indexing system used in EPA's checklist. The requirements of EPA's checklist that are not applicable due to the structure of Connecticut's I/M program are addressed at the end of each applicable section of this report.

1.2. Major Findings

This report focuses on the current effectiveness of Connecticut's I/M program. Key program highlights include:

- Connecticut's I/M program correctly fails non-complying vehicles and strictly enforces I/M requirements:
 - Approximately 8.1% of vehicles failed their initial emissions test and 5.4% of these vehicles also failed their first retest in 2023. These are similar to failure rates in centralized, test-only programs, which EPA considers a benchmark.
 - DMV and its contractor, Opus, perform extensive quality assurance checks on the program. Evaluation of these quality assurance data demonstrates that the program performs accurate inspections.
- Connecticut's anti-fraud efforts are models for other I/M programs. Connecticut audits all stations as part of an extensive anti-fraud program. For example, Connecticut conducted 582 video surveillance audits and 364 covert audits during 2023. Covert and video audits address On-Board Diagnostics (OBDII), Pre-Conditioned Two Speed Idle (PCTSI) and diesel opacity inspection performance. In addition, DMV and Opus run extensive trigger reports. Less than 0.02% of the inspections in Connecticut are suspect, which is far lower than the "suspect test" rate in most other states' I/M programs where suspect inspection rates can be 1% or higher.
- In 2015, Connecticut implemented a new registration system – Connecticut Integrated Vehicle and Licensing System (CIVLS). CIVLS automated checking for I/M compliance makes it impossible for motorists to renew their registration via US Mail, in person or on the DMV website without first complying with I/M requirements. The DMV also checks each registration request for compliance with I/M requirements. DMV provided data on registration renewal requests mailed to the Department – 98% of the registration requests were in compliance with I/M requirements

when mail renewals were processed. Ultimately, 100% of the vehicles renewed are in compliance with I/M requirements.

Connecticut's ongoing analysis of inspection and enforcement data continues to demonstrate the program effectively produces air pollutant reductions. DEEP and DMV will continue to evaluate opportunities to improve the program and increase cost effective air quality benefits.

2. Program Overview

2.1. Introduction

The I/M program is an important part of Connecticut's overall clean air strategy to ensure the state is positioned to attain and maintain the National Ambient Air Quality Standard (NAAQS) for Ozone (i.e., smog). Ozone is formed by photochemical reactions between volatile organic compounds (VOCs) and oxides of nitrogen (NOx). Connecticut's I/M program, which dates back to 1983, has a long history of effectively reducing vehicle VOC and NOx emissions.

Connecticut's I/M program identifies vehicles that emit pollutants that exceed standards set by EPA and require such vehicles to be repaired in a timely manner to comply with emission standards. DMV oversees the I/M program operated by a private contractor; DEEP advises DMV on I/M standards and ensures that the program achieves the air quality benefits as outlined in Connecticut's State Implementation Plan (SIP) for Air Quality.

The emission reductions from the I/M program are an essential element of Connecticut's clean air strategy. On June 3, 2016, having determined that both the Greater Connecticut and the New York-Northern New Jersey-Long Island (NY-NJ-CT) nonattainment areas failed to attain the 2008 ozone standards by the July 20, 2015 attainment date, EPA reclassified those areas from marginal nonattainment to moderate nonattainment. This reclassification required the two areas to attain the 2008 standard by July 20, 2018. Neither area measured attainment as of that date and, as such, Connecticut was reclassified by EPA as serious nonattainment for 2008 standard as of September 2019. Thus, EPA changed the attainment date for the 2008 standard to July 21, 2021. Additionally, on October 1, 2015 EPA strengthened the 2015 Ozone NAAQS to 70 parts per billion (ppb) from 75 ppb. Effective August 3, 2018, the Greater Connecticut nonattainment area is classified as marginal nonattainment (attainment date August 3, 2021) and the New York-Northern New Jersey-Long Island (NY-NJ-CT) nonattainment area is classified as moderate nonattainment (attainment date August 3, 2024). Given their role in ozone formation, Connecticut will need to achieve even greater emission reductions from motor vehicles.

As part of the next ozone attainment demonstration, DEEP will need to evaluate additional measures to reduce emissions from the transportation sector as this sector accounts for about 67% of NOx emissions in Connecticut. These strategies may include, but are not limited to: adopting the California aftermarket catalytic converter rule, promoting electric and alternative fueled vehicles by expanding the availability of electric vehicle charging stations and alternative fuel refueling stations, adopting programs that encourage the replacement of older diesel on and off road equipment with equipment that complies with the newest emission standards, and expanding the I/M program to include more medium and heavy duty trucks. Failing to effectively reduce transportation emissions to meet federal air quality standards in a timely manner may result in the need for additional control measures in the future.

Therefore, the existing I/M program should be viewed against the backdrop of potential additional control programs necessary to achieve Connecticut's short term and long-term air quality goals.

2.2. Emissions Tests Administered

Vehicles that are between 5 and 24 years old with a gross vehicle weight of 10,000 pounds or less are inspected in Connecticut by the following procedures on a biennial basis.

Gasoline Powered Vehicles (Including CNG, Propane and Hybrid Vehicles)

Below is a brief description of the criteria used to determine if a gasoline powered vehicle passes or fails inspection.

Pass/Fail Criteria

Pre-Conditioned Two-Speed Idle (PCTSI) Inspection (1997 to 2007 vehicles > 8500 pounds gross vehicle weight): Vehicles fail if they exceed Connecticut's cut points or emissions standards. For the PCTSI test, HC and CO emissions are evaluated. Connecticut uses EPA's recommended cut points for the PCTSI¹ tests.

OBDII Inspection: 1996 and newer MY light-duty vehicles (< 8500 pounds gross vehicle weight) and 2008 and newer medium-duty vehicles with a GVWR between 8,501 LBS to 10,000 lbs. are subject to an OBDII inspection. The emissions test system is plugged into the OBDII connector and information on the status of the vehicle's OBDII system is downloaded. Vehicles fail the OBDII inspection if they have any of the following problems:

- Malfunction Indicator Lamp (MIL²) is commanded-on;
- MIL not working (Termed Key-On Engine-Off, KOEO, failure³);
- The number of readiness monitors that are not ready exceed EPA's limit⁴:
 - 1996-2000 MY light-duty vehicles: Two monitors are allowed to be not ready.
 - 2001 and later MY light-duty vehicles: One monitor is allowed to be not ready.
- OBDII Diagnostic Link Connector (DLC) damaged; or
- Vehicle could not communicate with the Connecticut inspection system.

1 *Two speed idle test—EPA 81, 40 CFR 85.2214*

2 MIL is a term used for the light on the instrument panel, which notifies the vehicle operator of an emission-related problem. The MIL is required to display the phrase "check engine" or "service engine soon" or the ISO engine symbol. The MIL is required to illuminate when a problem has been identified that could cause emissions to exceed a specific multiple of the standards the vehicle was certified to meet.

3 The Key-On Engine-Off (KOEO) determines if the MIL bulb is working. The bulb should illuminate when the vehicle is in the ON/RUN position but not started.

4 OBDII systems have up to 11 diagnostic monitors, which run periodic tests on specific systems and components to ensure that they are performing within their prescribed range. OBDII systems must indicate whether the onboard diagnostic system has monitored each component. Components that have been diagnosed are termed "ready", meaning they were tested by the OBDII system.

Diesel Powered Vehicles

Diesel-powered vehicles with a GVWR of 10,000 lbs. or less are also tested in Connecticut's I/M program. Vehicles equipped with OBDII systems receive OBDII tests. Otherwise, the vehicle receives a test designed to identify excessive exhaust smoke opacity. EPA regulations do not require the testing and reporting of diesel-powered vehicles.

Below is a brief description of the criteria used to determine if a vehicle passes or fails inspection.

Pass/Fail Criteria

Modified Snap Acceleration (MSA) Test (2007 and older medium-duty vehicles): With this test, the throttle is "snapped" (i.e., accelerator is quickly pressed and then released) and exhaust smoke opacity is measured. This test is performed with the vehicle being in "neutral". The average of three snaps is calculated, and compared to the standard recommended by the Society of Automotive Engineers (SAE).

OBDII Inspection: 1997 and newer model year diesel vehicles with a GVWR of 8,500 lbs. or less and 2007 and newer medium-duty vehicles with a GVWR between 8,501 LBS to 10,000 lbs. are subject to OBDII inspection. The emissions test system is plugged into the OBDII connector and information on the status of the vehicle's OBDII system is downloaded. Diesel-powered vehicles will fail the OBDII inspection if they have any of the following problems:

- Malfunction Indicator Lamp (MIL) is commanded-on;
- MIL not working (Termed Key-On Engine-Off, KOEO, failure);
 - The number of readiness monitors that are not ready exceed EPA's limit of one monitor.
- OBDII Diagnostic Link Connector (DLC) damaged; or
- Vehicle could not communicate with the Connecticut inspection system.

3. Test Data Report

3.1. Vehicles Tested

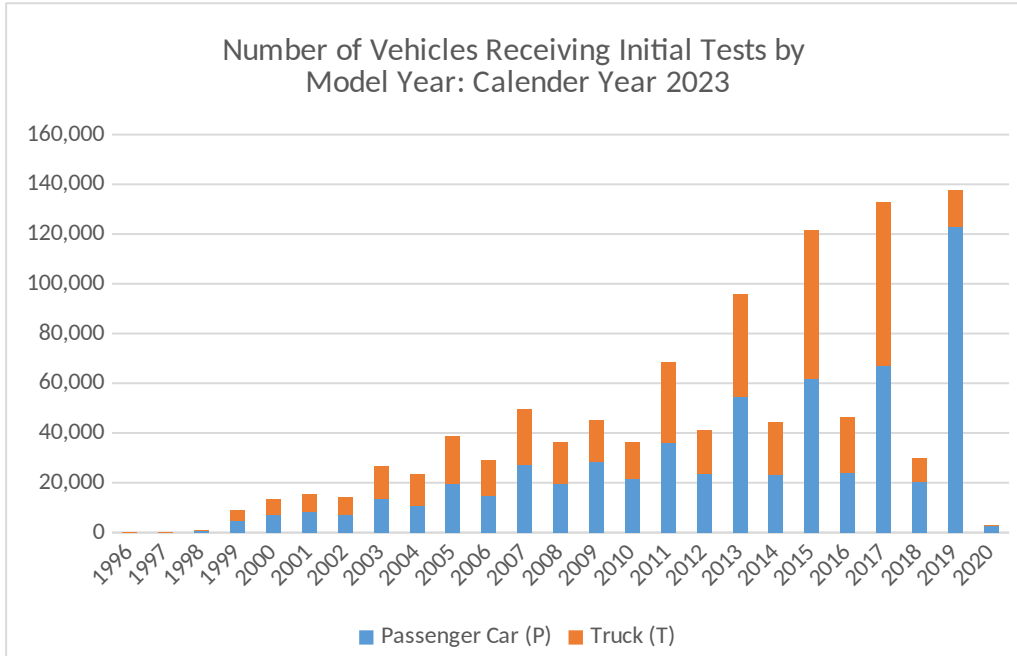
40 CFR 51.366 (a)(1): The number of vehicles tested by model year and vehicle type

Table 1 and Figure 1 present the number of passenger cars and trucks that were inspected at public and fleet stations. Overall, Connecticut has about 2.9 million registered vehicles, which are tested every two years, with a four-year exemption for new vehicles. In 2023, 1,058,831 vehicles were inspected; the total number of vehicles inspected **represents approximately 37% of the registered fleet**. In 2023, there were more vehicles tested with odd model years than even model years. The 1,010 vehicles reported for vehicle years 1996 thru 1998 were all test attempts that were aborted.

TABLE 1 - (A)(1) NUMBER OF VEHICLES TESTED BY MODEL YEAR AND VEHICLE TYPE
 INCLUDES INITIAL TESTS AND RETESTS

Model Year	Passenger Car (P)	Truck (T)	Total
1996	16	7	23
1997	87	84	171
1998	441	375	816
1999	4,580	4,293	8,873
2000	7,411	6,089	13,500
2001	8,328	7,199	15,527
2002	7,091	7,085	14,176
2003	13,610	13,028	26,638
2004	10,682	12,808	23,490
2005	19,299	19,337	38,636
2006	14,802	14,327	29,129
2007	27,165	22,257	49,422
2008	19,306	16,874	36,180
2009	28,578	16,686	45,264
2010	21,545	14,735	36,280
2011	35,969	32,561	68,530
2012	23,385	17,599	40,984
2013	54,733	41,318	96,051
2014	23,275	21,016	44,291
2015	61,654	59,739	121,393
2016	24,258	22,216	46,474
2017	67,055	65,570	132,625
2018	20,469	9,344	29,813
2019	122,832	14,812	137,644
2020	2,744	157	2,901
Grand Total	619,315	439,516	1,058,831

FIGURE 1 – NUMBER OF INITIAL TESTS BY VEHICLE TYPE AND MODEL YEAR (NETWORK TESTS)



3.2. Test Results

40 CFR 51.366 (a)(2): By model year and vehicle type, the number and percentage of vehicles:

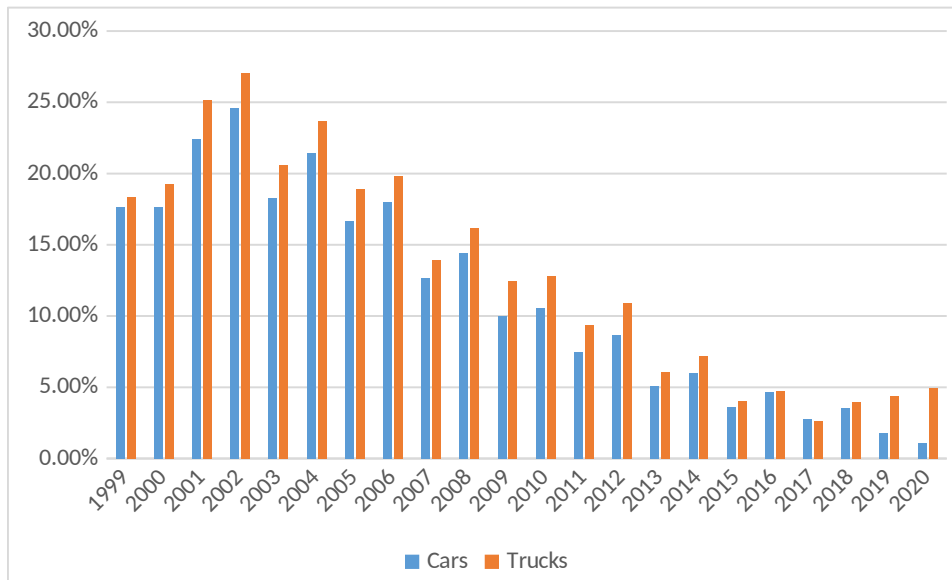
- (i) Failing initially, per test type;
- (ii) Failing the first retest per test type;
- (iii) Passing the first retest per test type
- (iv) Initially failed vehicles passing the second or subsequent retest per test type
- (v) Initially failed vehicles receiving a waiver
- (vi) Vehicles with no known final outcome (regardless of reason)

Table 2 presents the failure rate by test type and vehicle type. The failure rates in 2023 are very similar to the rates in 2022 and earlier years. As shown on Figure 2, due to more stringent pass/fail criteria for the OBD test, failure rates jump up in 2001. Appendix A presents details on failure rate trends by model year, test type, and vehicle type.

TABLE 2 - (A)(2)(i) INITIAL TEST FAIL RATE BY TEST TYPE AND MODEL YEAR

Test Type	Cars			Trucks		
	Fail	Pass	% Fail	Fail	Pass	% Fail
OBD Gasoline	42,137	545,513	7.17%	38,482	371,028	9.40%
OBD Diesel	396	2,456	13.88%	753	2,913	20.54%
OBD Hybrid	959	18,472	4.94%	158	3,199	4.71%
PCTSI	14	112	11.11%	643	8,403	7.11%
MSA	3	26	10.34%	287	1,976	12.68%
Grand Total	43,509	566,579	7.13%	40,323	387,519	9.42%

FIGURE 2 - OVERALL INITIAL TEST FAIL RATE BY VEHICLE TYPE AND MODEL YEAR



Failure rates for the first retest and second and later retests are shown in Tables 3 and 4.

TABLE 3 - (A)(2)(ii,iii) FIRST RETEST FAIL RATE BY TEST TYPE

Test Type	Cars			Trucks		
	Fail	Pass	% Fail	Fail	Pass	% Fail
OBD Gasoline	1,393	26,136	5.06%	1,404	24,326	5.46%
OBD Diesel	9	233	3.72%	17	419	3.90%
OBD Hybrid	42	616	6.38%	10	111	8.26%
PCTSI	2	7	22.22%	56	427	11.59%
MSA	0	2	0.00%	70	114	38.04%
Grand Total	1,446	26,994	5.08%	1,557	25,397	5.78%

TABLE 4 - (A)(2)(IV) SECOND AND LATER RETEST FAIL RATE BY TEST TYPE

Test Type	Cars			Trucks		
	Fail	Pass	% Fail	Fail	Pass	% Fail
OBD Gasoline	55	781	6.58%	41	871	4.50%
OBD Diesel	0	3	0.00%	0	13	0.00%
OBD Hybrid	0	28	0.00%	0	6	0.00%
PCTSI	0	2	0.00%	9	27	25.00%
MSA	0	0	0.00%	11	39	22.00%
Grand Total	55	814	6.33%	61	956	6.00%

The number and percent of vehicles receiving waivers are shown on Table 5. The overall waiver rate is very low; 0.19% of the failed vehicles receive waivers.

TABLE 5 - (A)(2)(V). WAIVERS ISSUED

Model Year	Passenger Car (P)	Truck (T)	Total # of Waivers	# of Failed Vehicles	% of Failed Vehicles Receiving Waivers
1999	4	0	4	1,480	0.27%
2000	3	1	4	2,287	0.17%
2001	3	7	10	3,296	0.30%
2002	4	4	8	3,226	0.25%
2003	7	1	8	4,778	0.17%
2004	4	11	15	4,757	0.32%
2005	17	10	27	6,426	0.42%
2006	6	4	10	4,964	0.20%
2007	6	11	17	6,232	0.27%
2008	4	5	9	5,265	0.17%
2009	8	3	11	4,852	0.23%
2010	3	3	6	4,026	0.15%
2011	6	3	9	5,683	0.16%
2012	2	6	8	3,846	0.21%
2013	3	2	5	5,338	0.09%
2014	2	0	2	2,905	0.07%
2015	2	0	2	4,696	0.04%
2016	2	0	2	2,184	0.09%
2017	1	0	1	3,599	0.03%
2018	0	0	0	1,120	0.00%
2019	0	0	0	2,832	0.00%
2020	0	0	0	40	0.00%
Total	87	71	158	83832	0.19%

Table 6 presents the estimated percent of vehicles without a passing result. This table presents the total number of initial failing tests and passing retests. The number of passing retests include waivers. Overall, 32% of initially failing vehicles do not have a passing result or waiver. Per EPA guidance, these results are

through the first four months of 2023. DMV investigated the 26,972 vehicles that had no known final outcome (NKFO). Following is a breakdown of the results of DMV’s investigation:

- Unregistered or expired registration – 20%
- Waiver or time extensions – 1%
- Late fees never accessed and notice never sent (procedures have been corrected) – 22%
- Status unknown as of May 21, 2024 – 57%

TABLE 6 - (A)(2)(VI) VEHICLES WITH NO FINAL PASS

Model Year	Cars			Light Trucks			ALL
	# Fail Initial Tests	# Pass Retests (Includes Waivers)	% of Initially Failed Vehicles with No Final Pass	# Fail Initial Tests	# Pass Retests (Includes Waivers)	% of Initially Failed Vehicles with No Final Pass	% of Initially Failed Vehicles with No Final Pass
1999	774	391	49.5%	706	371	47.5%	48.5%
2000	1,263	728	42.4%	1,024	624	39.1%	40.9%
2001	1,761	1,081	38.6%	1,535	955	37.8%	38.2%
2002	1,612	940	41.7%	1,614	1,003	37.9%	39.8%
2003	2,404	1,508	37.3%	2,374	1,549	34.8%	36.0%
2004	2,145	1,284	40.1%	2,612	1,596	38.9%	39.5%
2005	3,104	2,025	34.8%	3,322	2,207	33.6%	34.1%
2006	2,509	1,518	39.5%	2,455	1,547	37.0%	38.3%
2007	3,350	2,149	35.9%	2,882	1,879	34.8%	35.4%
2008	2,656	1,645	38.1%	2,609	1,698	34.9%	36.5%
2009	2,817	1,904	32.4%	2,035	1,437	29.4%	31.1%
2010	2,193	1,432	34.7%	1,833	1,196	34.8%	34.7%
2011	2,640	1,867	29.3%	3,043	2,173	28.6%	28.9%
2012	1,961	1,324	32.5%	1,885	1,310	30.5%	31.5%
2013	2,787	2,089	25.0%	2,551	1,971	22.7%	23.9%
2014	1,399	999	28.6%	1,506	1,085	28.0%	28.3%
2015	2,192	1,671	23.8%	2,504	1,984	20.8%	22.2%
2016	1,120	772	31.1%	1,064	831	21.9%	26.6%
2017	1,839	1,413	23.2%	1,760	1,514	14.0%	18.7%
2018	742	562	24.3%	378	300	20.6%	23.0%
2019	2,212	1,931	12.7%	620	520	16.1%	13.5%
2020	29	28	3.4%	11	10	9.1%	5.0%
All	43,509	29,261	32.7%	40,323	27,760	31.2%	32.0%

40 CFR 51.366 (a)(2): By model year and vehicle type, the number and percentage of vehicles:
 (xi) Passing the on-board diagnostic check
 (xii) Failing the on-board diagnostic check

Table 7 presents the percent of vehicles that that continue to fail the on-board diagnostic (OBD) test. Testing data shows 2.3% of passenger vehicles and 3.0% of light trucks continue to fail the OBD test through the first four months of 2023. These vehicles cannot be registered until they pass. Please reference Appendix A, (a) (2) (xi, xii) for specific data.

TABLE 7 - (A)(2)(xi, xii) PERCENT CONTINUING TO FAIL OBD TESTS ALL FUELS

Model Year	% Fail Cars	% Fail Light Trucks
1999	8.8%	8.8%
2000	7.5%	7.7%
2001	8.7%	9.7%
2002	10.3%	10.3%
2003	6.9%	7.1%
2004	8.6%	9.4%
2005	5.9%	6.5%
2006	7.1%	7.3%
2007	4.6%	4.9%
2008	5.5%	5.7%
2009	3.3%	3.7%
2010	3.6%	4.5%
2011	2.2%	2.7%
2012	2.8%	3.4%
2013	1.3%	1.4%
2014	1.8%	2.1%
2015	0.9%	0.9%
2016	1.5%	1.1%
2017	0.6%	0.4%
2018	0.9%	0.9%
2019	0.2%	0.7%
2020	0.0%	0.7%
ALL	2.3%	3.0%

40 CFR 51.366 (a)(2): By model year and vehicle type, the number and percentage of vehicles:
(xix) MIL is commanded on and no codes are stored
(xxi) MIL is commanded on and codes are stored
(xxii) MIL is not commanded on and codes are not stored
(xxiii) Readiness status indicates that the evaluation is not complete for any module supported by on-board diagnostic systems

MIL light illumination, or lack of readiness, results in an automatic failure of the I/M test. As such MIL "command on" and "not ready" status is reported. In 2023, 3.4% of the vehicles had MILs commanded on with DTCs and 0.01% had MILs commanded on with no codes stored. In 0.28% of the tests, the test system could not communicate with the OBD system. Specific data can be found in Appendix A, 40 CFR 51.366 (a) (2) (xix, xxi, xxii).

Overall, 4.9% of the vehicles had diagnostic monitors that were not ready on their initial test. Model year vehicles from 1996 to 2000 are allowed to have two monitors not ready; 2001 and newer models are allowed to have one monitor not ready. Due to the more stringent readiness requirement starting with 2001 model year vehicles (one monitor vs two allowed to be not ready), the percent of vehicles that are not ready increases for that model year. Specific data can be found in Appendix A, (a) (2) (xxiii).

40 CFR 51.366 (a)(3): The initial test volume by model year and test station
(a)(4): The initial test failure rate by model year and test station

Appendix A, 40 CFR 51.366 (a)(3&4) contains a breakdown of initial test volume and fail rate by model year and test station.

3.3. Inapplicable Requirements

The following requirements from 40 CFR 51.366 (a) regarding test data reports are not applicable to Connecticut's I/M program:

- 40 CFR 51.366 (a)(2)(xiii-xv)
- 40 CFR 51.366 (a)(2)(xvi-xviii)
- 40 CFR 51.366 (a)(2)(xx)
- 40 CFR 51.366 (a)(5)

4. Quality Assurance Report

4.1. Inspection Stations

40 CFR 51.366 (b)(1): The number of inspection stations and lanes:
 (i) Operating throughout the year
 (ii) Operating for only part of the year

Table 8 presents the number of inspection stations that operated in 2023.

TABLE 8 - (B)(1) QUALITY ASSURANCE 2023 – NUMBER OF INSPECTION STATIONS

	Beginning of Year	Left Program	Added to Program	End of Year
No. of Inspection stations/lanes operating throughout 2023	240	19	17	238

4.2. Inspectors

40 CFR 51.366 (b)(5): The number of inspectors licensed or certified to conduct testing

Table 9 presents the number of certified test inspectors (CTIs) that were active in 2023.

TABLE 9 – (B)(5) QUALITY ASSURANCE – NUMBER OF CERTIFIED TEST INSPECTORS (CTIs) 2023

Total CTIs Testing	1,824
---------------------------	-------

4.3. Overt performance audits

40 CFR 51.366 (b)(2): The number of inspection stations and lanes operating throughout the year:
 (i) Receiving overt performance audits in the year
 (ii) Not receiving overt performance audits in the year

EPA requires that overt audits be performed twice per year per station. DMV meets these requirements through use of the Emission Test Monitoring Report (ETMR). Connecticut prepares ETMRs more frequently than required by EPA. Every three months, at least one ETMR is performed on each station. In addition, Opus also performs overt audits. Connecticut also checks more items than required by EPA, such as the operational status of test equipment and peripherals (e.g., cameras). Connecticut is continuing to evaluate the auditing process to build upon the program’s success. Table 10 summarizes the results of overt performance audits.

TABLE 10 - (B)(2) QUALITY ASSURANCE – OVERT AUDITS – 2023

Parameter	<u>2023 Value</u>
Receiving overt performance audits in 2023	244

Not Receiving overt performance audits in 2023	0
2023 Overt Audits - Emissions Test Monitoring Report (ETMR)	
<u>Parameter</u>	<u>2023 Value</u>
Total Overt Audits Performed	1961
No. of Stations Audited	251
No. of Times Each Station Was Audited (range)	1 thru 14
No. of Stations That Had No Violations for the Entire Year	195
Total Number of Audits for which One or More Violations Were Reported	96
No. of stations at which violations were reported	56
No. of stations at which one (1) violation was reported	34
No. of stations at which two (2) violations were reported	22
<u>Motor Vehicle Agents</u>	<u>2023 Value</u>
No. of Agents That Performed Overt Audits During the Course of the Year	8
No. of Overt Audits per Agent (range)	1 thru 447
No. of Station Issues Reported per Agent (range)	1 to 40

4.4. Digital Checks / Trigger audits / Camera / Video

Based on the results of trigger audits, Connecticut is a model for other states in how to enforce proper I/M test procedures. Connecticut actively looks for cases where inspectors may be performing improper inspections and passing vehicles that otherwise should fail. The following is a summary of how Connecticut ensures that stations perform proper inspections.

Trigger Audits

DMV and Opus run extensive trigger audits to assure that inspection stations follow proper test procedures. DMV requires Opus to maintain quality assurance measures, which they meet by conducting additional audits. Specifically, Opus performs such audits and QA reviews on a daily, weekly, and monthly basis. Many of the reports are automated by the Opus vehicle inspection database (VID), and distributed, via email, to DMV and Opus QA staff. In addition, the reports are available on the program dashboard for review at any time, and they are available for any time frame.

Trigger audits look for anomalies in data recorded during inspection. Reporting the outcome of these audits help DMV to identify if stations are performing fraudulent or inaccurate inspections. Trigger audits focus on finding the following types of fraud:

- Clean Scanning: Performing an OBDII test on a fault-free vehicle instead of the vehicle that should be tested;
- Clean Piping: Performing a tailpipe test on a passing vehicle instead of the vehicle that should be tested.

These reports are generated frequently to identify stations performing improper inspections. Connecticut promptly investigates all significant cases of possible inspection fraud. Following is a list of some of the trigger reports:

- OBDII Testing Triggers:
 - PID/PCM Mismatch;
 - Monitor Mismatch;
 - All OBDII Monitors Unsupported;
 - A/C Monitor Ready or Not Ready;
 - OBDII Short Time Test, less than 30 minutes;
 - OBDII VIN Mismatch;
- Other Triggers:
 - VIN Entry Type;
 - Inspector ID Entry;
 - Offline Percentage;
 - RPM Bypass;
 - No Saturday/Holiday Testing; and
 - Missing Video/Test Image.

Opus' VID also generates the following automated alerts:

- Weather (temperature, humidity, pressure);
- EDBMS Offline;
- CDAS Offline;
- Test Center Not Testing; and
- Failed/Expired Calibrations Report.

Camera Audits

There are three video cameras connected to the emissions analyzer. If anyone of them fails or are unplugged, the emissions analyzer will set a lockout to prevent the use of the workstation. In addition, the Opus VID will generate a non-compliance report for any emissions test transmitted with a missing test and video file. However, during the normal operations at the test centers, cameras may become misaligned or obstructed. Using the program dashboard, Opus and DMV perform camera audits of all three cameras, at each test center. Each camera is turned on to ensure it operates as it should, the viewing angle is verified with no obstructions and a test video is recorded. If an issue is identified that requires an onsite visit at the test center, a service ticket is generated and dispatched to the Opus field service.

Fraudulent Test Rate

A key parameter that's recorded during an OBD test is the OBD VIN – the vehicle identification number (VIN) that's part of the OBD test record. The percent of tests in Connecticut where the OBD VIN did not match the DMV VIN for the vehicle under test was calculated to be 0.01%. This mismatch could be due to clean scanning (substituting a problem free vehicle for the vehicle under test), changing the vehicle's onboard computer, or a data entry error in the DMV VIN. Connecticut has historically had low VIN mismatch rates and no individual stations in Connecticut had high OBD VIN mismatch rates.

Not all vehicles provide OBD VINs as part of the test record, so mismatches between expected and recorded communication protocol were also analyzed. OBD systems can use one of seven protocols; tests where the recorded protocol mismatches expected protocol are considered suspect. Only 0.02% of the tests (39 tests⁵) are suspect in Connecticut. No stations had high protocol mismatch rates.

This analysis indicates that inspection fraud is not a serious problem in Connecticut.

4.5. Covert audit process overview

EPA requires that covert audits be performed at least once per year per station. The requirements and frequency for covert audits are detailed in 40 CFR 51.363(a)(4) and include remote visual observation of inspector performance, site visits using covert vehicles, and documentation of the audits. DMV performs video surveillance audits on a periodic and random basis. It's easier to perform video audits clandestinely, since the inspector usually does not know an audit is being performed. During 2023, DMV performed 364 covert audits and 582 video surveillance audits.

Warnings are routinely issued for false passes if DMV finds that the CTI did not intentionally or negligently falsely pass a vehicle. Suspensions are usually associated with violations found from trigger reports and data audits. Most false passes are for minor procedural errors, such as failing to perform the visual MIL check correctly. Unless the station repeats these errors, they are issued warnings rather than being suspended.

As stated in the Opus contract, and in the Opus Station Agreement, a CTI is suspended (pending an investigation) when it is determined that the false pass was the result of “Intentionally improperly passing a failing vehicle.” Most errors identified by covert and video surveillance audits were determined to be unintentional and due to poor attention to detail. However, a second occurrence of an unintentional error, such as missing or incorrectly answering the MIL question, results in an automatic suspension.

4.6. Covert audit results

40 CFR 51.366 (b)(8): The total number of covert vehicles available for undercover audits over the year;
(b)(9): The number of covert auditors available for undercover audits.

40 CFR 51.366 (b)(2): The number of inspection stations and lanes operating throughout the year:
(iii) Receiving covert performance audits in the year;
(iv) Not receiving covert performance audits in the year;

40 CFR 51.366 (b)(3): The number of covert audits:
(i) Conducted with the vehicle set to fail per test type
(ii) Conducted with the vehicle set to fail any combination of two or more test types
(iii) Resulting in a false pass per test type
(iv) Resulting in a false pass for any combination of two or more test types

Table 11 summarizes the results of covert performance. Table 12 presents the results of video audits.

5

TABLE 11 - (B)(2)(III, IV) & (3,8,9) QUALITY ASSURANCE - COVERT AUDITS - 2023

Parameter	OBD and PCTSI	OBD Tests	Idle Tests	Opacity Tests
Number of Covert Audits (241)	364*	223	141	50
Stations Not Receiving Covert Audits**	42 Stations (Number of stations with no Covert OBD or Idle Test performed)	12 Stations (Number of stations with no Covert OBD test performed)	30 Stations (Number of stations with no Covert Idle test performed)	0 Stations
Total number of Covert vehicles available for undercover audits in 2023	3	-	-	-
Total number of Covert auditors available for undercover audits in 2023	4	-	-	-

* (116) of the recorded Covert visits did not result in generating a Pass/Fail test result for the vehicle presented.

** 6 stations did not receive covert audits.

TABLE 12 - 2023 VIDEO SURVEILLANCE RESULTS - OPUS AND DMV COMBINED

# of Video Audits	Passing audit	Failing Audit
5371	3465	1906

4.7. Inspector and Station Disciplinary Actions

40 CFR 51.366 (b) (4): The number of inspectors and stations:
 (i) That were suspended, fired, or otherwise prohibited from testing as a result of covert audits
 (ii) That were suspended, fired, or otherwise prohibited from testing for other causes

40 CFR 51.366 (b) (2): The number of inspection stations and lanes operating throughout the year
 (v) That have been shut down as a result of overt performance audits

One station was permanently suspended. This enforcement action was due to refusing to inspect vehicles, not failure of overt or covert audits.

4.8. Hearings

40 CFR 51.366 (b) (6): The number of hearings:
 (i) Held to consider adverse actions against inspectors and stations
 (ii) Resulting in adverse actions against inspectors and stations

When necessary, Opus administers hearings to resolve disputes regarding actions against inspection stations. Opus continually updates the Compliance Action Plan which defines fines for specific infractions. In 2023, no hearings were held due to revision of the Compliance Action Plan. Monetary assessments are based on substantive evidence, which Opus provides with the inspector's and test center's letters. This has helped to reduce the frivolous disputes. All rejected disputes are advised that they may seek external binding arbitration, at her or his expense.

4.9. Fines collected

40 CFR 51.366 (b)(4)(iii): The number of inspectors and stations... that received fines;

40 CFR 51.366 (b)(7): The total amount collected in fines from inspectors and stations by type of violation

Table 13 presents a summary of compliance actions that were assessed against inspectors and stations in 2023.

TABLE 13 - (b)(4), (7) COMPLIANCE ACTION ASSESSED AGAINST TESTING INSPECTOR OR STATIONS IN 2023

Number of Fines	\$ Fined
175	\$29,625

4.10. Inapplicable Requirements

The following requirements from 40 CFR 51.366 (b) regarding data analysis and reporting are not applicable to Connecticut's I/M program:

- 40 CFR 51.366 (b)(3)(ii)
- 40 CFR 51.366 (b)(3)(iv)
- 40 CFR 51.366 (b)(4)(iii)
- 40 CFR 51.366 (b)(6)
- 40 CFR 51.366 (b)(7)

5. Quality Control Report

5.1. Equipment Audits

40 CFR 51.366 (c): The program shall submit to EPA by July of each year a report providing basic statistics on the quality control program for January through December of the previous year, including:

- (1) The number of emission testing sites and lanes in use in the program;
- (2) The number of equipment audits by station and lane;
- (3) The number and percentage of stations that have failed equipment audits; and
- (4) Number and percentage of stations and lanes shut down as a result of equipment audits.

Equipment Audits Performed by Connecticut DMV

EPA requires that equipment audits be performed twice per year per station. DMV meets these requirements through the QA Audits. In addition, Opus also performs equipment audits. Connecticut checks more equipment items than required by EPA. While an audit may require a station to discontinue tailpipe testing, it can continue OBDII testing. Therefore, no stations were totally shut down due to a failed gas equipment audit. Results are presented in Table 14. In 2011, 67% of the stations failed equipment (gas) audits, while in 2023 this percentage dropped to 3%.

TABLE 14 - (C)(1,2,3,4) RESULTS OF EQUIPMENT AUDITS*

Parameter	2023 Result
No. of Inspection stations/lanes operating throughout 2023	238
Total Equipment Audits**	839
Total Stations that Failed Equipment Audit ***	98
Percentage of stations that failed an equipment (gas) audit	12%
Number of stations totally shut down as a result of a failed equipment (gas) audit	0
Percentage of stations shut down as a result of failed equipment (gas) audit	0.00%

* Every time an analyzer gas bench is changed, it is audited and is counted as an initial audit

** Initial gas audits only, not reinspections of failed audits

*** Failures of initial gas audits only

Final Technical Guidance (EPA 420-B-04-011, July 2004) provides that high-volume stations are required to be audited monthly. High volume stations are those that perform 4,000 or more emissions tests per year. The Connecticut Vehicle Inspection Program, by Federal guidance, does not have any emissions testing stations that perform the number of emissions tests necessary to be classified as high volume.

Equipment Audits Performed by Opus

DMV’s contractor, Opus, performs comprehensive overt and equipment audits biennially, at each facility that participates in the inspection program. These unannounced audits include:

- The visual inspection and physical condition of the testing equipment;
- Equipment integrity checks using traceable/certified audit equipment; and
- Observation of the proficiency of at least one inspector.

The contractor’s auditor evaluates the physical condition, functionality, and inventory of all the required emissions components and any ancillary safety items (restraining straps, wheel chocks, dynamometer tie down hooks, etc.). The emissions analyzer must pass calibrations (leak check, gas bench, dynamometer, gas cap, OBDII, and opacity, if equipped).

In addition, there are several system components that are audited using National Institute of Standards and Technology (NIST) certified and traceable audit equipment:

- Gas Bench(s) Audit - NIST traceable audit gas
- Opacity Audit - Reference filters (20%, 35%, 50%, and 75%)
- OBDII System Audit - EASE OBDII Verification Tester

In accordance with the Quality Assurance and Quality Control Plan, the contractor’s auditor uses a pre-printed checklist to inventory and record the physical condition of the test equipment. All non-conforming items are addressed immediately; the auditor’s van is equipped to replace missing station inventory at the time of the audit. If an issue is identified that cannot be addressed by the auditor, he or she will create a service ticket for Opus field service.

6. Enforcement Report

6.1. Overview of I/M Enforcement in Connecticut

The Connecticut Integrated Vehicle and Licensing System (CIVLS), which has been in use since August 2015, checks for emissions compliance during every registration renewal transaction. This means that if the renewal is attempted by mail, website, or in person, the transaction cannot go forward unless the vehicle is in compliance with the emissions program. Compliance is confirmed during every renewal transaction via a real time data transfer from DMV CIVLS to the Opus Electronic Database system (EDBMS). Details of web, mail-in, and over the counter actions are presented below:

Mail in renewals: When a mail-in renewal is denied because of an emissions compliance issue, the registration fees are put into an escrow account. The motorist is mailed a letter stating that the payment has been received, but the transaction cannot be processed until the vehicle is emissions compliant. Once the vehicle has an emissions test and is in compliance, the funds are automatically taken out of escrow and the registration is renewed.

Web renewals: If the vehicle is not in compliance when a renewal is attempted online, the transaction is stopped and the motorist receives a screen message stating the vehicle is not emissions compliant.

In-Person renewals: Renewals are not allowed if, during the automatic compliance check, the status of the vehicle is that it is “not in emissions compliance.” Registration renewal is rejected and the customer is instructed to return after the vehicle is in compliance.

Before implementation of CIVLS the DMV examiner physically reviewed electronic records or paperwork provided by the motorist to confirm compliance.

6.2. Vehicles subject to inspection

40 CFR 51.366(d)(1)(i): An estimate of the number of vehicles subject to the inspection program, including the results of an analysis of the registration data base

Based on an analysis by DMV on the registration database, 1,091,998 vehicles were subject to I/M tests in 2023. This number includes vehicles that may no longer be operating in Connecticut.

6.3. Overall compliance with testing requirements

40 CFR 51.366 (d)(1)(ii): The percentage of motorist compliance based upon a comparison of the number of valid final tests with the number of subject vehicles

Percent of Vehicles Receiving Notifications That Were Tested

Table 15 presents the number of vehicles that received test notifications and the number of vehicles that were tested. Overall, 96% of the vehicles that received notifications were tested in 2023. A vehicle must pass inspection (or receive a waiver) before it can be registered in the state. This parameter is different than the program compliance rate which is based on outcomes of vehicles that have been tested.

TABLE 15 - (D)(1)(II) ESTIMATED NUMBER OF VEHICLES SUBJECT TO I/M THAT WERE TESTED

Parameter	2023 Value
# of Notification Letters	1,091,781
# of Vehicles Tested	1,058,831

% of Vehicles Tested	96%
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Waivers Issued

Another aspect related to enforcement is the number of waivers issued. Program effectiveness is inversely proportional to the waiver rate. As Table 6 in Section 3 showed, only 0.19% of the vehicles that failed received waivers, indicating that the waiver program is not being abused. Connecticut’s I/M SIP committed to a waiver rate of 1% or less.

6.4. Registration File Audits and Compliance with Deadlines

40 CFR 51.366 (d)(2)(ii): The number of registration file audits, number of registrations reviewed, and compliance rates found in such audits.

Connecticut’s SIP commits the State to achieve a 96% compliance rate for the vehicles subject to I/M requirements. Registration audits indicate that over 99% of the vehicles being registered comply with I/M requirements.

Registration Audits

Connecticut audits each registration for I/M compliance. Table 16 presents the number of registration applications that were mailed to DMV that were denied for failure to meet the requirement of the I/M program. In 2023, 284,784 renewal applications were sent to DMV and 6,278 were denied due to I/M compliance status. The result is a 98% compliance rate for vehicles that are being registered. Ultimately, 100% of the vehicles registered comply with I/M requirements.

TABLE 16 - (D)(2)(II) REGISTRATION AUDITS – 2023

2023	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Registrations Checked	14,492	32,831	55,938	24,803	23,392	21,183	21,152	25,089	19,728	18,112	14,541	13,523	284,784
Registration Renewal Denials	319	358	607	433	613	674	630	689	544	535	404	472	6,278
% Compliance	97.80%	98.91%	98.91%	98.25%	97.38%	96.82%	97.02%	97.25%	97.24%	97.05%	97.22%	96.51%	97.80%

6.5. Motorist Time extensions

40 CFR 51.366 (d)(1)(v): The number of time extensions and other exemptions granted to motorists

Table 17 presents the number of time extensions and late fee assessments in 2023. Table 18 presents a breakdown of tests relative to testing deadlines.

TABLE 17 - (D)(1)(v) TIME EXTENSIONS AND LATE FEES

Parameter	Annual Total
Time Extension and Other Exemptions	2,530
# of Late Fees Assessed	162,956
Late Fees (\$)	3,259,120

TABLE 18 - (D)(3)(i). # AND % OF SUBJECT VEHICLES THAT WERE TESTED BY THE INITIAL DEADLINE

Deadline	# of Vehicles	% of Vehicles
On Due date	149,303	14.69%
0-120 Days Early	513,362	50.50%
1-30 days late	85,535	8.41%
31-60 days late	74,763	7.35%
61-90 days late	29,950	2.95%
91-120 days late	15,860	1.56%
> 120 days late	147,834	14.54%

6.6. Station Compliance Documents

40 CFR 51.366 (d) (1) (iii): The total number of compliance documents issued to inspection stations
(iv) The number of missing compliance documents

The Compliance Action Plan (CAP) was updated and issued to all active inspection stations in 2023.

6.7. False registrations

40 CFR 51.366 (d)(2) Registration denial based enforcement programs shall provide the following additional information:
(i): Registration denial based enforcement programs shall provide a report of the program's efforts and actions to prevent motorists from falsely registering vehicles out of the program area or falsely changing fuel type or weight class on the vehicle registration, and the results of special studies to investigate the frequency of such activity
(ii): The number of registration file audits, number of registrations reviewed, and compliance rates found in such audits

Preventing Circumvention of Connecticut's, I/M Requirement

EPA requires states to implement measures that prevent motorists from avoiding I/M requirements by falsely registering vehicles out of the program area, or falsely changing fuel type or weight class on the vehicle registration. EPA also requires states to report on results of special studies to investigate the frequency of such activity. As shown below, it's very difficult for vehicle owners to circumvent Connecticut's I/M requirements.

- **Circumventing I/M Tests in Connecticut** - Circumventing I/M tests in Connecticut is nearly impossible. First, Connecticut implements the I/M program on a statewide basis. Second, Connecticut tests all fuel types, including hybrids, so motorists cannot avoid inspection by changing fuel type, unless the fuel type of the vehicle is inadvertently categorized as "electric". It may also be possible to avoid inspection by registering the vehicle with a GVWR greater than

10,000 lbs. The majority of vehicles registered with an incorrect GVWR are those where the vehicle owner registers the vehicle at a lower weight to avoid the added registration expense and would not be emission eligible (>10,000 lbs.) with their corrected weight.

- **Detection and enforcement against motorists that falsely change vehicle classifications to circumvent program requirements** – Historically, 99% of the vehicles subject to emissions testing in Connecticut are in the Passenger, Commercial or Combination classifications. Incidents of motorists falsely modifying a vehicle’s registration classification to an emissions exempt class are rare, most likely because of the added expense, documentation and inspection requirements.
- **Vehicles registered in Connecticut that are operated out-of-state** – DMV does not allow blanket extensions for vehicles registered in Connecticut that are operated out-of-state. Vehicles that are out-of-state at the time they are due for their emissions testing are allowed to apply for an extension. Applicants need to provide evidence that the vehicle is physically not present in Connecticut. This is done by means of a VIN verification form (CT form #AE-81) being completed by a law enforcement authority in the state where the vehicle is physically located. This completed VIN verification form along with a written request by the motorist is submitted to our office for processing for the appropriate time extension. Additionally, DMV accepts passing emission test results from states that operate an I/M program using the same pass/fail criteria.

As noted above in Section 6.4, Connecticut reviews every registration application for evidence that the motorist complies with inspection requirements. In 2023, 284,784 renewal applications were sent to DMV and 6,278 were denied due to I/M compliance status. This means that 98% of the registration requests complied with I/M requirements when mail renewals were processed. These compliance rates are similar to those reported in previous year’s reports.

6.8. Inapplicable Requirements

The following requirements from 40 CFR 51.366 (d) regarding enforcement reports are not applicable to Connecticut’s I/M program:

- 40 CFR 51.366 (d)(1)(vi)
- 40 CFR 51.366 (d)(3)
- 40 CFR 51.366 (d)(4)

7. Biennial Reporting Requirements / Program Changes in 2022-2023

40 CFR 51.366 (e): Programs shall submit to EPA by July of every other year, biennial reports addressing:

- (1) Any changes made in program design, funding, personnel levels, procedures, regulations, and legal authority, with detailed discussion and evaluation of the impact on the program of all such changes; and
- (2) Any weaknesses or problems identified in the program within the two-year reporting period, what steps have already been taken to correct those problems, the results of those steps, and any future efforts planned.

7.1. Program Improvements in 2022

In 2022, the following improvements were made to Connecticut's I/M program:

1. Improvements to Certified Testing Inspector training
 - In 2021, online CTI Computer Based Training was implemented. In 2022, an online exam was made available.
 - Planning began to train students in the Automotive Program at CT Vocational Schools to become CTIs. Providing training in schools should improve the number of available inspectors and make the emissions inspection program more successful in future years.
 - 475 inspectors received online exams/certifications/training sessions.
 - On 12/08/2022, Opus, DMV, and CT Technical Education and Careers met and identified keys components and obstacles that needed to be addressed to ensure the program would be a success for all parties. Issues addressed include:
 - Minimum age requirement of 18 years old.
 - VIN Verification – Tech schools would prefer not having to do this
 - Tech schools not able to have a dedicated inspection bay
 - Tech schools not able to have a dedicated waiting room
 - Inspection days – Tech schools will only be able to test 180 days of the school year
 - Tech schools do not want to post any external signs
 - Inspections will only take place by appointment
 - No wait time requirement
 - Test Authorization purchases by PO from Opus
 - Tech schools current Insurance policies must be sufficient (They have workers comp for the teachers and Garage Keepers)
2. Opus began training DMV staff how to use Amazon Quicksight to query the emissions database, but training was suspended. In 2024, Opus plans to train DMV how to use another tool called DOMO.
3. When the program began in November 2021, all station automatic lockouts were turned off while stations learned how to use the new equipment. In January 2022, station lockouts were turned on. In 2022, 60 stations received a temporary lock. No stations were permanently locked out, i.e., terminated from the program.
4. Higher than normal oversight and monitoring of the new to Connecticut Opus program was done. Weekly meetings were held to discuss issues and solutions. Weekly program status reports were prepared by Opus for DMV.EPA Comments

7.2. Program Improvements in 2023

In 2023, the following improvements were made to Connecticut's I/M program:

1. 30% of the OBD covert audits were conducted pass/fail. Some OBD coverts were conducted with a vehicle set to fail.
2. Opus developed a new training program at the technical high schools. This program when it's rolled out to all the schools will significantly increase the number of certified inspectors. This will

help alleviate the current shortage of inspectors. More inspectors in the network will drastically reduce temporary closures due to staff shortages and ensure that motorists are getting the best service possible when they get their vehicles inspected.

- a. A new participation agreement designed specifically for training at CT Technical Schools was written by Opus.
- b. Pilot Program is scheduled to be implemented in 2024.
3. A mandatory Hands on CDAS training class was added to the CTI curriculum.
4. Reminder postcard design improved in 2023. Planned to be implemented in 2024. Larger size: was 3x4, now 6x9. New bright yellow background with red lettering.
5. New Connecticut I/M Program Facebook page designed in 2023. Scheduled to be implemented in 2024.
6. New Connecticut I/M Program State DMV internet page designed in 2023. Scheduled to be implemented in 2024.
7. New Connecticut I/M Program Twitter page designed in 2023. Scheduled to be implemented in 2024.
8. New Connecticut I/M Program Instagram page designed in 2023. Scheduled to be implemented in 2024.
9. Poster reminding customers to sign up for electronic reminders designed in 2023. Scheduled to be implemented in 2024.

7.3. Results of 0.5% Remote Sensing Tests

In 2023, Opus Inspection conducted a 0.5% on-road vehicle emissions survey as part of the Connecticut Vehicle Emissions Testing Program. Key results are summarized below:

Number of Valid RSD Tests – On-road survey data was collected on 3 days during the October 23 through October 25, 2023 period. Opus used three RSD-5000 on-road Remote Sensing Devices (RSD) that measured exhaust emissions of vehicles as they drove by. Emissions were successfully measured and plates were visible on 16,571 vehicles; vehicle information was found on 13,676 unique vehicles with Connecticut plates.

Average Emissions – The RSD-5000 system measures hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO) and smoke. Average emissions of the on-road light-duty vehicles matched to Connecticut registrations were 20 ppm HC, 0.10% CO and 59 ppm NO.

The results presented in Figure 3 and 4 show that older vehicles have higher emissions for HC and NO – the pollutants that contribute to the formation of ozone. On average, 2000 & older models were between 3 and 20 times dirtier than the 2011 and newer models.

Figure 3 - HC Emissions by Model Year

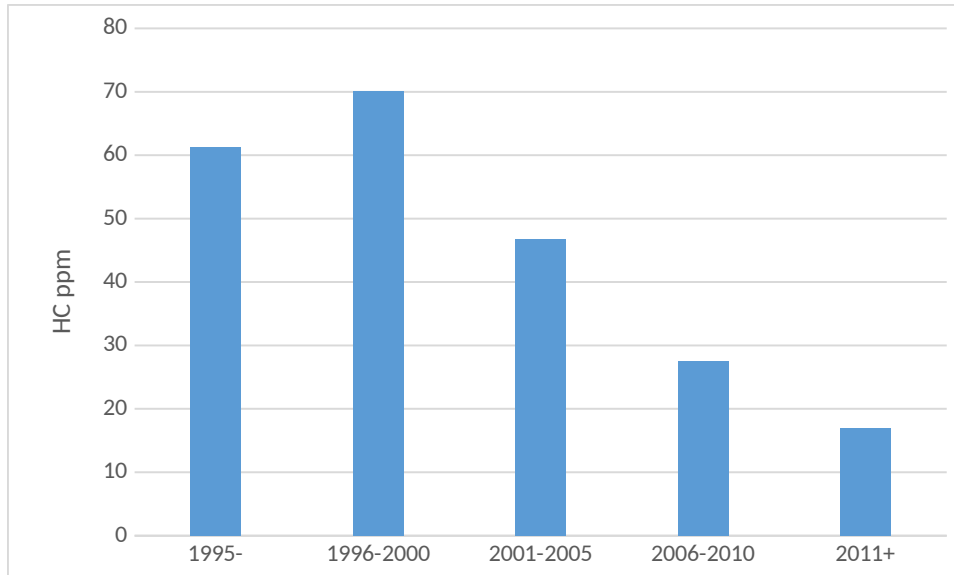
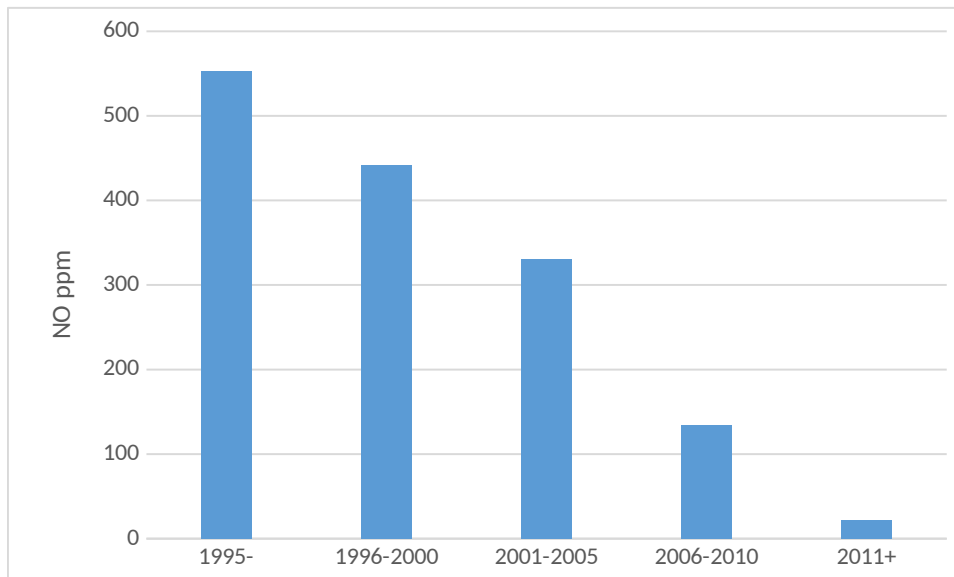


Figure 4 - NO Emissions by Model Year



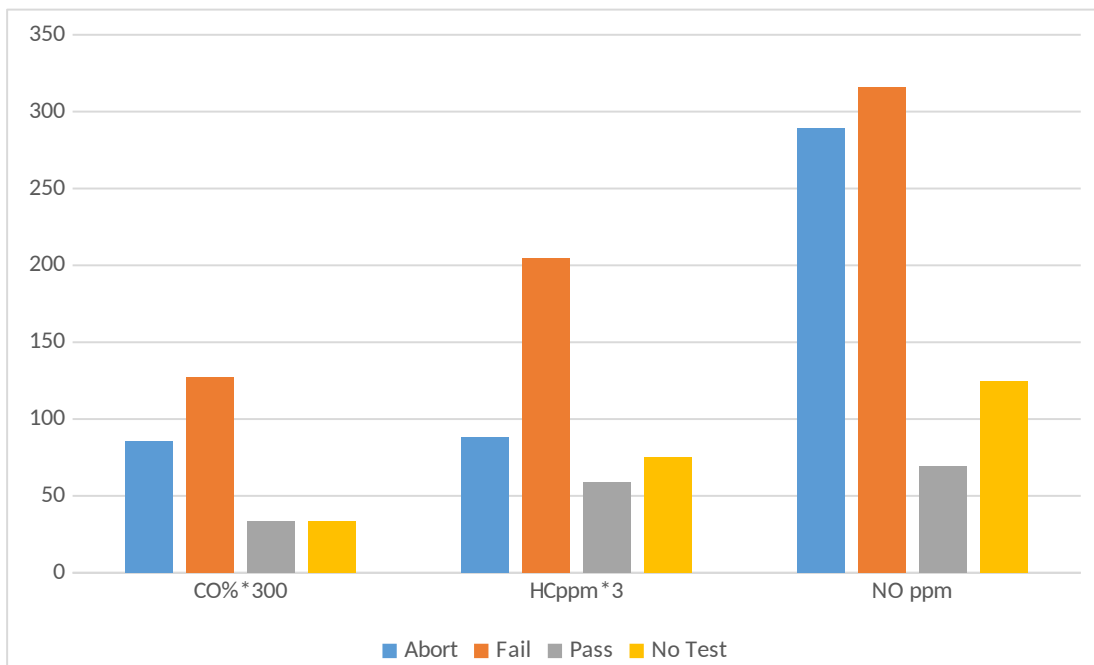
High Emitters - Typically, in a high emitter program, cutpoints are applied to vehicles that were seen more than once for added confidence. In addition, observations are limited to those where Vehicle Specific Power (VSP) is limited to 3-22, the range of VSP in the Federal Test Procedure (FTP). In Connecticut's RSD program, 258 vehicles with VSP between 3 and 22 were seen more than once. Maryland's high emitter cutpoints for 2007 and newer light-duty vehicles were applied to the minimum values in the subset of the sample that had more than one observation of a specific vehicle. These cutpoints are: CO: >1%, HC: >80 ppm, NO: >1450 ppm. No vehicles that had VSP between 3 and 22 and were seen 2 or more times exceeded these cutpoints; 615 vehicles (6.4%)

exceeded these cutpoints once. It should be noted that sites were repeated in this 0.5% campaign in order to capture multiple observances of vehicles, as is done in RSD screening programs.

RSD Tests Matched with I/M Results – Opus matched the registration records for vehicles with valid RSD readings with the latest I/M results. Overall, a valid I/M test was found for 92% of the 1998 to 2018 vehicles.

Average RSD emissions for 1998-2018 models broken down by their last I/M result are presented on Figure 5. Vehicles with a last I/M result of fail had much higher emissions than those with a result of pass. Vehicles with a last I/M result of abort also had much higher emissions than those with a result of pass. Most aborts are readiness retest failures which indicates that many of these vehicles still had a fault causing malfunction indicator light (MIL) illumination. Vehicles with no matching I/M tests had higher HC and NO emissions than passing vehicles, which indicates that many of these vehicles likely had OBD faults such as illuminated MILs.

Figure 5 – Average RSD Emissions by Last I/M Result – 1998-2018 Models



7.4. Summary of How Connecticut is Meeting EPA’s Program Evaluation Requirements

Following is a summary of how Connecticut is meeting the program evaluation requirements of 40 CFR 51.353(c):

- As indicated above, Opus performs 0.5% program evaluation tests every two years.
- Every two years, the Connecticut Department of Energy and Environmental Protection (CT DEEP) submits to EPA an Ozone Attainment Demonstration which includes MOVES modeling of Connecticut’s I/M Program.
- Every year, Connecticut submits to EPA Annual/Biennial evaluations of its I/M

program.

8. EPA Comments

The following addresses EPA's comments in a letter dated May 15, 2024 on Connecticut's 2022 Annual I/M Program Evaluation Report.

- 1) EPA encourages states to improve I/M program performance by reducing the number of vehicles with no known final outcome.

On page 13 of the annual report, Connecticut illustrates that nearly 32% of initially failed vehicles have no known final outcome. EPA continues to be concerned with I/M programs where the percentage of initially failed vehicles with no known final outcome exceeds the national average of approximately 18%.

EPA recommends that states with I/M programs consider developing a Vehicle Identification Number (VIN)-based database for vehicles that fail an I/M test and do not receive a final pass. This data may possibly already be collected and would just need to be filtered from the inspection database when the time comes. Furthermore, we suggest Connecticut explore sharing this data with other states. Potential reciprocity agreements that allow sharing data among states may further reduce the number of vehicles with no known outcome.

- a. **Response:** Connecticut DEEP and DOT have been working with the new program contractor Opus Inc. to identify measures to reduce the instances of "no known final outcome." These include enhanced messaging for individuals who fail their initial test. The new program provides reminders for retests, new text messaging reminder options and improved email reminders.

Together these changes along with performing an analysis of failure outcomes for the first four months of the following year following EPA's guidance and has improved efforts to educate drivers who fail their first test.

As for vehicles that may leave the state, Connecticut lacks the resources to identify vehicles that are registered out-of-state due to emissions non-compliance. Connecticut looks forward to EPA's leadership in developing partnerships with other jurisdictions to improve the program by addressing regional I/M non-compliance.

- 2) Report page 27 (section 6.6 of the report): EPA commends Connecticut for revising the Compliance Action Plan that helps resolve disputes and resulted in no hearings held in 2022 (as highlighted on page 20 of the report). However, Connecticut should provide statistics for consistency with the data reporting requirements of 40 CFR 51.366(d)(1)(iii) and (iv), regarding compliance documents, or window stickers, issued to inspection stations and missing.
 - a. **Response:** In addition to continually updating the Compliance Action Plan, Connecticut DMV's contractor, Opus Inspection, continually updates a summary of enforcement actions against inspection stations. Details on these actions are confidential. Table 13 presents the fines assessed. Window stickers are not used for enforcement in Connecticut.

- 3) For future biennial reports (the next biennial report due July 2024), EPA recommends

Connecticut include a summary of the testing results exhibited by Connecticut's implementation of its on-road testing program to meet the on-road testing requirements of 40 CFR 51.371. In addition, future biennial reports should also include a summary of how Connecticut is meeting the program evaluation requirements of 40 CFR 51.353(c).

- a. **Response:** A summary of the results of the on-road testing program and compliance with EPA's requirements for program evaluation are presented in Section 7.

9. Conclusions

Following are the key conclusions from this biennial review of Connecticut's I/M program:

- Connecticut's I/M program correctly fails non-complying vehicles and strictly enforces I/M requirements:
 - Approximately 8.1% of vehicles failed their initial emissions test and 5.4% of these vehicles also failed their first retest in 2023. This is similar to failure rates in 2022.
 - DMV and Opus perform extensive quality assurance checks on the program. Evaluation of these quality assurance data demonstrates that the program performs accurate inspections.
 - Connecticut's anti-fraud efforts are models for other I/M programs. Connecticut conducted audits at all stations as part of an extensive anti-fraud program. For example, Connecticut conducted 582 video surveillance audits and 364 covert audits during 2023. Covert audits addressed On-Board Diagnostics (OBDII), Pre-Conditioned Two Speed Idle (PCTSI) and diesel opacity inspection performance. In addition, DMV and Opus run extensive trigger reports.
- Opus meets EPA's requirements for program evaluation.