

Chapter 13: LIGHT-DUTY VEHICLES

This chapter describes the minimum criteria and requirements for Carl Moyer Program light-duty vehicle projects.

A. Projects Eligible for Funding

Two types of light-duty vehicle projects are eligible for Carl Moyer Program funding: voluntary accelerated vehicle retirement (VAVR) and voluntary repair of vehicles (VRV). Air districts may choose either or both projects to administer. The Bureau of Automotive Repair (BAR) also administers vehicle repair and retirement projects under their Consumer Assistance Program (CAP). Both the Carl Moyer Program and CAP projects are administered and operated in a consistent manner but accept vehicles at different times within the Smog Check cycle. Generally, the Carl Moyer Program accepts vehicles that have passed their last Smog Check test while CAP accepts vehicles that have either passed *or* failed their most recent Smog Check test.

1. VAVR: VAVR projects scrap older, more-polluting vehicles earlier than their expected lifetime that are still operational and have a useful remaining life. Two types of VAVR projects are allowed: conventional and high-emitting vehicles.
2. VRV: VRV projects achieve surplus emission reductions by funding repairs that would not have occurred otherwise or by accelerating repairs so they occur early. To qualify, a vehicle must be outside of its biennial Smog Check window and must be identified as a high-emitting vehicle, avoiding the creation of a disincentive for routine vehicle maintenance.

To be eligible for high-emitting vehicle VAVR or VRV projects, a vehicle's Smog Check test must exceed the pass/fail emission standard for the vehicle's model year and class. Vehicles with emissions below the pass/fail standards may still be retired and receive emission reductions through a conventional VAVR project. Retirement of a high-emitting vehicle results in emission reductions above those generated by a conventional program.

B. Maximum Eligible Funding Amounts

Light-duty vehicle retirement projects are subject to the Moyer Program cost-effectiveness threshold and must meet all other relevant criteria in Section D of this chapter. Air districts have the authority to set more stringent project requirements.

C. Regulatory Background

Light-duty vehicle retirement projects are subject to the requirements of the Voluntary Accelerated Vehicle Retirement Regulation (VAVR Regulation), Cal. Code Regs., tit. 13, §§ 2601 et seq. Air districts may choose to act as the enterprise operator in lieu of

contracting out this work to a third party. However, costs incurred by the District to perform the duties of the enterprise operator shall be considered administrative costs.

Light and medium-duty vehicle projects funded through AB923 are authorized by Health and Safety Code Section 44229 which states in subsection (b)(4) that these projects must be in compliance with guidelines adopted by ARB. This chapter constitutes ARB's adopted guidelines for light-duty projects.

D. Project Criteria

These criteria provide the minimum requirements for Carl Moyer Program light-duty vehicle projects. All projects must also conform to Chapter 2: General Criteria, as well as the project application, contract, reporting, and other requirements as described in Chapter 3: Program Administration. Participating air districts retain the authority to impose additional or more restrictive requirements to address local concerns.

Vehicle Eligibility Requirements

1. Participation shall be entirely voluntary for vehicle owners.
2. The vehicle must be a diesel or gasoline-powered passenger car or light-duty truck up to 10,000 pounds gross vehicle weight.
3. The vehicle must be currently registered with the Department of Motor Vehicles (DMV) as an operating vehicle and must have been registered for at least 24 consecutive months prior to the date of the sale to a VAVR enterprise or the date of repair to an address, or addresses, within the air district in which the VAVR enterprise or VRV program is operated. Smog Checks must be performed as required by DMV in order for the vehicle to be considered registered. Currently, diesel-powered vehicles are exempt from Smog Check and are not required to pass a Smog Check test to be eligible.
 - (A) A vehicle may also be eligible if the owner of the vehicle placed the vehicle in planned non-operational status per Vehicle Code sections 4604 et seq., for up to two months during the 24 month registration period and occurring at least three months immediately prior to its sale to the VAVR enterprise or repair date.
 - (B) It may also be eligible if the registration has lapsed for a period not to exceed six months during the previous 24 months and all appropriate registration fees and late penalties have been paid to DMV, provided that the vehicle is registered for at least three months immediately prior to its sale date to a VAVR enterprise or repair date.
4. The vehicle shall be driven to the VAVR enterprise purchase site to be retired or to the VRV repair station for repair under its own power.

5. Vehicles whose emission control systems have been tampered with as defined in Cal Code Regs., tit. 16, § 3340.41.5. are not eligible until such tampering has been completely corrected.
6. Only vehicles identified as potential high emitters through a technology operated in accordance with the VAVR Regulation and approved by ARB are eligible for VRV projects or to receive extra emission reduction credit for VAVR projects. Diesel-powered vehicles are not eligible for high emitting vehicle VAVR or VRV projects.
7. For high-emitting vehicle projects, the vehicle must receive a confirmatory Smog Check test to establish its baseline emissions, and the emissions must exceed the pass/fail emission standard for the model year and vehicle class as defined in Cal Code Regs., tit. 16, §3340.
 - (A) Certain vehicles, such as four-wheel and all-wheel drive vehicles, cannot be tested by the Acceleration Simulation Mode (ASM) Smog Check test, for safety or other mechanical reasons. In those limited cases, the Two Speed Idle (TSI) test may be used. The TSI test must be performed in strict compliance with BAR protocols and the emission rate calculation methodology described in “Techniques for Estimating IM240 and FTP Emission Rates from Two-Speed Idle Emissions Concentrations”, May 10, 2001, Technical Notes, Bureau of Automotive Repair.
 - (B) If a vehicle’s emissions are below the ASM pass/fail emission standards, the vehicle is not a high emitter and does not qualify for high emitter projects but may be retired for default emission reductions through a conventional VAVR project.
 - (C) For pre-1974 model years, the pass/fail emission standards for the 1974 model year may be used to qualifying vehicles for the project.
 - (D) Smog Check tests must be full tests and not “fast pass” tests. The test must only be conducted by BAR-licensed technicians according to BAR regulations and procedures and completed as close to the retirement or repair time as reasonably possible.

E. Additional Vehicle Eligibility Requirements for VAVR Only

1. The vehicle to be retired shall not be operating under a Smog Check repair cost waiver or economic hardship extension.
2. If a vehicle volunteered for retirement is within 60 days of its next required Smog Check inspection, the vehicle shall pass the inspection without receiving a repair cost waiver or economic hardship extension prior to acceptance by a VAVR enterprise operator.

3. If a vehicle volunteered for retirement is within 61-90 days of its next required Smog Check inspection, the air district shall verify that the vehicle has not failed a Smog Check inspection during this time frame.
4. The vehicle shall pass functional and equipment eligibility inspections as specified in the VAVR Regulation.

F. Additional Vehicle Eligibility Requirements for VRV Only

1. All repairs must be completed at least 91 days prior to the vehicle's next biennial Smog Check test.
2. Vehicles covered under their manufacturer's warranty period are not eligible. Warranty requirements are found in Cal Code Regs., tit. 13, §§ 1961 and 2035 et seq..
3. Vehicles registered to non-profit organizations, fleets, or businesses are not eligible.
4. A vehicle may only be repaired once in its lifetime through a VRV project.

G. VRV Project Requirements

1. Only emission-related repairs are fundable through a VRV project.
2. To receive emission reduction credit, the repair must bring the vehicle's emissions into compliance with the Smog Check emissions standards for the vehicle's model year and class. If a vehicle's emissions exceed the standards after the repairs, no repair costs are creditable or fundable.
3. The vehicle's legal owner must provide advanced written approval authorizing the diagnosis and all repairs. The owner must be provided a final invoice detailing the cost of parts, labor, and tax for the repair consistent with the Automotive Repair Act.
4. Smog Check technicians and stations must comply with all California laws and regulations governing automotive repairs, and vehicles must only be diagnosed and repaired by Smog Check technicians at Smog Check stations both licensed by BAR.
5. If tampering is discovered during the pre-repair test or diagnosis, the technician must stop the test, diagnosis, or repair and inform the air district of the tampering. Tampered vehicles are not eligible for VRV projects until the tampering is completely corrected.

6. Service technicians must follow a systematic diagnostic approach according to standard industry protocols that obtains relevant data about the vehicle's engine and emission control system based on the type of emission-related Smog Check failure.
 - (A) A systematic approach includes a diagnostic routine that provides sufficient data to diagnose and repair emission failures in a cost-effective and efficient manner. Data may include, but not limited to, compression readings, leak down percentages, intake manifold vacuum readings, scan tool data, condition of grounds, other electrical connections along with wiring, oxygen sensor testing, and other industry accepted factory testing procedures. Vehicle manufacturer diagnostic and repair procedures take precedence over generic procedures.
 - (B) The diagnosis must ensure that the vehicle's engine is in good mechanical condition before repairing and include an inspection of basic engine operation (i.e., fuel control, individual cylinder contribution, cylinder seal, internal engine noises, oil burning, etc.) and a complete visual inspection. All defects must be noted.
 - (C) Diagnostic strategies must maximize emission reductions for repair funds spent. Technicians must not perform diagnostic strategies and repairs that would result in short term or minimal emission reductions.
7. The technician must document all serviceable and defective emission related parts and systems found during the diagnosis and repair process and must provide the documentation to the air district. The air district must retain a copy. An example of a standardized diagnostic form is provided in Figure 13-1. Other tests may be required to completely diagnose emission failures.
8. If a vehicle repair requires catalytic converter replacement, the replacement must either be a new aftermarket catalytic converter certified by ARB for use on OBDII-equipped vehicles or an original equipment manufacturer (OEM) catalytic converter. No used, recycled, salvaged, rebuilt, or remanufactured aftermarket or OEM catalytic converter may be installed under a VRV project.
9. The repair invoice must detail each repair and associated cost, in accordance with all applicable automotive repair laws and regulations, before the invoice is paid.
10. The air district must designate a qualified staff person or third party unaffiliated with the Smog Check station to process disagreements that may arise between the vehicle owner and the repair station. The contact information for that person must be made available to all vehicle owners who participate in the project.

H. Emissions Measured by the Two Speed Idle Test

1. Certain vehicles, such as four-wheel and all-wheel drive vehicles, cannot be tested by the ASM Smog Check for safety or other mechanical reasons. In those limited cases, the TSI test may be used. The TSI test must be performed in strict compliance with BAR protocols and the emission rate calculation methodology described in "Techniques for Estimating IM240 and FTP Emission Rates from Two-Speed Idle Emissions Concentrations," May 10, 2001, Technical Notes, Bureau of Automotive Repair.
2. Consistent with the model's limitations, TSI test results and the BAR protocol may only be used to predict ROG emissions, as the TSI test does not directly measure either PM or NOx. For high emitting vehicles that are retired, default evaporative ROG, NOx, and PM emission reductions may be claimed.

I. Air District Project Plan Requirements

1. An air district shall submit a detailed VAVR and/or VRV project plan to ARB for approval and must receive written approval from ARB's Executive Officer (EO) prior to implementing a VAVR and/or a VRV project. The project must follow the plan, and any substantive changes must be pre-approved by ARB in writing.
2. The air district project plan shall include the following:
 - (A) The name, title, and telephone number of the air district project contact.
 - (B) An evaluation of environmental justice considerations including, but not limited to, outreach addressing community needs.
 - (C) An estimate of the number of vehicles to be retired and/or repaired and an estimate of the cost-effectiveness with all assumptions and calculations used.
 - (D) Copies of contracts with VAVR enterprise operations, repair stations, consultants, and any other contractor(s) participating in the project.
 - (E) A description of and timetable for monitoring and auditing enterprise operations, repair stations, consultants, and other contractors.
 - (F) A copy of the statement of certification that a VAVR enterprise operator has demonstrated compliance with all applicable provisions of the VAVR regulation.
 - (G) The protocol for verifying vehicle eligibility including confirmation of compliance with any Smog Check requirements and for informing the public of the availability of vehicles eligible to retire.

- (H) A sample of the records that will be required of the VAVR enterprise operator and/or repair stations.
 - (I) A description of project elements stricter than the ARB minimum requirements.
3. For high emitter programs, the air district project plan shall also include the following:
- (A) A detailed description of the operation of the technology including software used to identify high emitting vehicles including, but not limited to, set up, typical operation, location and location criteria, calibration, and maintenance.
 - (B) A copy of the standard operating procedures for that technology including software maintenance and the criteria to be used to identify a high emitting vehicle with documentation that operating personnel are trained and qualified.
 - (C) A detailed description of the methodology used to calculate extra emission reductions, including changes to the ARB-recommended method.
 - (D) If an air district intends to include an evaporative emissions testing element, the plan must specify the test equipment and include a copy of the test protocol.
 - (E) If an air district intends to include a PM measuring element, the plan must specify the test equipment and include verification that the methodology for measuring PM is scientifically valid, documentation that the results are reproducible, and a complete copy of the methodology.
 - (F) A scope of work for businesses performing vehicle testing and repairs including the diagnosis and repair protocols for cost-effective and durable repairs. (VRV only)
 - (G) An itemized breakdown of estimated project costs including, but not limited to, funds allocated to: identifying high emitters; vehicle retirement with the number of vehicles to be retired; vehicle repair with the number of vehicles to be repaired; data analysis; and outreach to and solicitation of vehicle owners.

J. Recordkeeping and Reporting

1. For each vehicle retired or repaired, the air district shall retain the following records for inclusion in the annual report to ARB.
 - (A) Vehicle Identification Number and License Plate Number
 - (B) Vehicle odometer reading
 - (C) Vehicle make and model
 - (D) Name, address, and phone number of legal vehicle owner(s)
 - (E) Name and business address of the VAVR enterprise operator or repair business
 - (F) Emission reductions claimed
 - (G) Total air district cost to retire or repair each vehicle
 - (H) Date of vehicle purchase and retirement by the enterprise operator (VAVR only)
 - (I) Date of repair and amount paid for and nature of each repair (VRV only)
 - (J) Pre and post-repair Smog Check test results (VRV only)
 - (K) Data identifying vehicles as potential high emitters along with confirmatory Smog Check test results and date of Smog Check test (High Emitter VAVR or VRV)
 - (L) Due date of next biennial Smog Check test (VRV only)

2. For VAVR programs, the enterprise operator shall maintain the following records. These records are not required for the annual report but must be made available to ARB for review.
 - (A) Reproduction of California Certificate of Title and registration, as signed-off by the seller at time of final sale to the VAVR enterprise.
 - (B) Reproduction of the applicable certificate of functional and equipment eligibility.
 - (C) Reproduction of the applicable Notice to Dismantler (DMV Registration 42 form).
 - (D) Reproduction of written documentation from DMV verifying that a vehicle meets the vehicle registration requirements of ARB's VAVR Regulation.
 - (E) If a retired vehicle is within 60 days of its next required Smog Check inspection, a reproduction of documentation that the vehicle passed its Smog Check inspection.

3. Air districts and enterprise operators shall retain these records for the life of the project plus an additional 2 years.

K. Minimum Project Application Requirements

Air districts must ensure project applications include the specific information needed to determine project eligibility and populate the Clean Air Reporting Log, including the information needed to track the project and calculate project cost-effectiveness.

L. Offering Vehicles/Parts to the Public (VAVR only)

1. Enterprise operators must inform the air district of the vehicles ready for dismantling, and the air district must provide an easily accessible and detailed description of the vehicles to interested parties including collectors and enthusiasts.
2. The enterprise operator must wait a minimum of 10 days before submitting a Notice to Dismantle to DMV, and if an interested person contacts the enterprise operator, the enterprise operator must hold the vehicle for at least another seven days.
3. Engine, emission-related parts, transmission, and drive train parts must be removed from the vehicle and destroyed after the 10 day waiting period but prior to offering the remaining parts for sale, as defined in the VAVR regulation.
4. If a vehicle or its emission-related or drive train parts are sold instead of retired, no emission reductions will be generated, and no Carl Moyer Program funds may be used for retiring the vehicle; however, non-emission-related and non-drive train parts from the vehicle may be sold at the sole discretion of the enterprise operator.

M. Emission Benefits

Emission reductions from conventional VAVR projects are calculated using the VAVR Regulation methodology. They are equal to the retired vehicle's emission rates minus those of the replacement vehicle with the difference multiplied by the average vehicle miles traveled by light duty vehicles in the year of vehicle retirement and by the three year project life. The retired vehicle's emission rates are equal to those for gasoline-powered, light-duty vehicles for the model year of the retired vehicle in the year of vehicle retirement. Replacement vehicle emissions are the fleet average emissions for all gasoline-powered light-duty vehicles for model years 1990 through the year of vehicle retirement. Emission rates and average vehicle miles traveled are generated by ARB's motor vehicle emissions model. NOx, ROG, CO, and PM emission reductions over the three year project life by vehicle model year are located in Tables 13-1 through 13-7 below. These tables will be updated on an as needed basis through a mail-out to reflect revisions to the motor vehicle emissions model and/or to include additional years.

**Table 13-1
Retired Vehicle Emission Reductions, CY 2011 (lbs/3yr)**

MY	ROG			CO	NOx	PM10
	Exhaust	Evap	Total	Exhaust	Exhaust	Exhaust
pre 1968	285.7	232.7	518.4	3241.1	176.8	0.72
1968	293.2	236.8	530.0	3328.7	181.3	0.73
1969	300.8	240.0	540.8	3417.6	186.5	0.75
1970	307.4	172.6	480.0	3534.1	192.5	0.77
1971	321.8	169.8	491.5	3543.1	194.6	0.79
1972	336.8	166.6	503.4	3561.3	197.0	0.80
1973	344.7	168.8	513.5	3590.1	198.7	0.82
1974	344.2	134.3	478.5	3515.7	188.9	0.84
1975	290.5	123.5	414.1	3527.3	184.0	1.05
1976	216.3	113.8	330.1	4117.4	193.0	1.15
1977	216.5	92.1	308.6	4165.6	195.9	1.17
1978	122.0	92.8	214.7	2871.5	129.2	1.32
1979	110.5	91.0	201.4	2135.9	119.3	1.42
1980	98.0	69.3	167.3	1855.5	115.6	1.35
1981	83.8	64.8	148.6	1438.5	91.4	1.66
1982	76.4	60.4	136.8	1376.8	92.6	1.64
1983	60.4	57.3	117.7	1176.8	91.4	1.45
1984	57.5	51.1	108.5	1180.4	95.9	1.27
1985	47.6	46.8	94.4	864.0	91.2	1.39
1986	45.2	42.6	87.9	812.2	91.1	1.43
1987	42.4	59.1	101.5	743.9	87.3	1.34
1988	37.0	67.6	104.6	645.9	83.5	1.30
1989	39.9	61.0	101.0	709.4	74.2	1.29
1990	40.4	55.5	95.9	717.8	62.9	1.22
1991	40.7	43.8	84.5	718.9	68.5	1.24
1992	41.0	42.1	83.1	715.0	70.0	1.23
1993	34.5	40.5	75.0	529.2	66.9	1.23
1994	25.8	38.0	63.9	335.1	56.8	1.20
1995	20.9	32.1	53.0	225.3	42.8	1.12
1996	16.1	24.3	40.4	198.7	31.2	1.04
1997	14.4	17.1	31.5	197.1	28.1	0.98
1998	9.3	2.6	11.8	165.3	20.9	0.88
1999	4.5	1.3	5.8	135.2	13.5	0.73
2000	0.1	0.0	0.1	104.4	6.8	0.58

Source: EMFAC2007 V2.3 Nov 1, 2006

**Table 13-2
Retired Vehicle Emission Reductions, CY 2012 (lbs/3yr)**

MY	ROG			CO	NOx	PM10
	Exhaust	Evap	Total	Exhaust	Exhaust	Exhaust
pre 1969	291.4	233.4	524.8	3300.2	180.0	0.71
1969	298.8	236.6	535.4	3386.1	185.0	0.72
1970	305.3	171.5	476.8	3501.5	191.0	0.74
1971	319.9	168.6	488.5	3511.3	193.0	0.76
1972	335.3	165.3	500.5	3530.9	195.4	0.78
1973	343.2	167.3	510.5	3557.3	197.1	0.79
1974	345.9	134.5	480.4	3496.5	189.4	0.81
1975	292.1	123.7	415.9	3527.6	185.5	1.01
1976	213.9	113.5	327.5	4060.4	190.8	1.11
1977	214.9	92.4	307.2	4112.7	193.9	1.13
1978	120.6	92.9	213.6	2842.1	128.0	1.30
1979	108.9	90.9	199.7	2101.5	118.0	1.39
1980	96.0	68.8	164.8	1819.3	113.9	1.31
1981	82.1	64.4	146.4	1412.6	90.3	1.62
1982	74.1	59.8	133.9	1344.7	91.1	1.61
1983	59.5	56.8	116.3	1159.9	90.8	1.43
1984	56.1	50.6	106.7	1158.2	94.9	1.28
1985	47.2	46.7	93.9	858.0	90.8	1.40
1986	44.6	42.4	87.0	804.6	90.3	1.44
1987	42.1	59.8	101.9	740.6	86.9	1.36
1988	36.8	69.5	106.3	647.3	83.3	1.32
1989	39.1	64.8	103.9	703.9	73.2	1.31
1990	40.6	59.2	99.8	721.8	63.8	1.26
1991	41.0	46.7	87.7	725.2	69.9	1.28
1992	41.4	45.3	86.8	722.5	71.5	1.28
1993	34.9	43.7	78.5	537.6	68.3	1.29
1994	26.3	41.2	67.5	347.1	58.5	1.25
1995	21.6	35.0	56.6	240.0	44.6	1.18
1996	17.1	26.7	43.7	214.9	32.9	1.10
1997	15.3	19.1	34.4	212.4	29.7	1.06
1998	10.2	3.9	14.1	181.1	22.6	0.97
1999	5.4	2.7	8.1	151.8	15.3	0.82
2000	1.2	1.4	2.6	123.3	8.9	0.68

Source: EMFAC2007 V2.3 Nov 1, 2006

**Table 13-3
Retired Vehicle Emission Reductions, CY 2013 (lbs/3yr)**

MY	ROG			CO	NOx	PM10
	Exhaust	Evap	Total	Exhaust	Exhaust	Exhaust
pre 1970	297.0	233.2	530.2	3357.4	183.6	0.70
1970	303.2	170.3	473.4	3469.1	189.4	0.72
1971	317.8	167.5	485.4	3478.4	191.4	0.73
1972	333.4	164.2	497.6	3498.2	193.7	0.75
1973	341.6	166.1	507.7	3526.0	195.5	0.76
1974	346.6	134.1	480.8	3472.1	189.6	0.78
1975	293.4	123.8	417.2	3523.6	186.7	0.98
1976	211.8	113.0	324.8	4012.7	188.8	1.08
1977	213.4	92.4	305.8	4060.4	192.0	1.10
1978	119.4	93.2	212.6	2816.0	127.0	1.26
1979	107.7	91.2	198.9	2079.8	116.9	1.37
1980	94.9	68.7	163.6	1798.4	113.0	1.29
1981	80.4	64.2	144.6	1388.6	89.2	1.58
1982	72.7	59.3	132.0	1322.2	90.2	1.57
1983	57.5	56.7	114.2	1131.2	89.4	1.40
1984	55.4	50.3	105.6	1143.8	94.3	1.27
1985	46.3	46.7	93.0	846.5	89.8	1.40
1986	44.3	42.1	86.4	800.7	90.0	1.45
1987	41.6	60.5	102.1	735.6	86.4	1.37
1988	36.6	71.1	107.7	647.1	83.0	1.34
1989	38.9	68.5	107.3	704.0	73.2	1.34
1990	39.7	62.9	102.6	715.9	62.9	1.28
1991	41.2	49.7	90.9	730.6	71.1	1.32
1992	41.7	48.5	90.2	729.2	72.9	1.32
1993	35.3	47.1	82.4	547.4	69.9	1.34
1994	26.8	44.6	71.4	359.4	60.1	1.31
1995	22.1	38.1	60.1	252.7	46.2	1.25
1996	17.9	29.3	47.2	229.9	34.6	1.17
1997	16.3	21.2	37.5	228.1	31.4	1.13
1998	11.1	5.2	16.3	196.1	24.2	1.05
1999	6.3	4.0	10.3	167.4	16.9	0.92
2000	2.1	2.7	4.8	139.7	10.7	0.77

Source: EMFAC2007 V2.3 Nov 1, 2006

**Table 13-4
Retired Vehicle Emission Reductions, CY 2014 (lbs/3yr)**

MY	ROG			NOx Exhaust	PM10 Exhaust
	Exhaust	Evap	Total		
pre 1971	256.7	177.0	433.7	188.9	2.57
1971	258.4	175.1	433.5	192.3	2.64
1972	259.6	173.9	433.4	195.1	2.70
1973	262.9	173.9	436.8	198.2	2.75
1974	258.7	129.1	387.9	195.6	2.81
1975	212.8	118.3	331.0	193.2	3.09
1976	199.9	106.4	306.3	217.0	3.13
1977	209.6	83.2	292.8	229.4	3.08
1978	106.5	83.3	189.8	131.6	3.17
1979	102.1	81.7	183.8	127.1	3.17
1980	101.7	64.8	166.5	130.0	3.08
1981	90.2	60.7	150.9	104.1	1.22
1982	82.0	55.0	137.0	102.5	1.23
1983	69.0	52.8	121.8	103.0	1.20
1984	64.5	45.5	110.0	111.5	1.23
1985	57.0	42.2	99.2	108.8	1.24
1986	53.0	37.8	90.8	108.7	1.27
1987	48.9	43.7	92.5	103.6	1.29
1988	36.5	57.3	93.8	92.3	1.33
1989	38.7	58.1	96.9	79.6	1.33
1990	39.2	71.5	110.7	69.3	1.33
1991	39.9	55.0	95.0	83.6	0.70
1992	41.0	54.1	95.0	87.4	0.71
1993	35.6	52.6	88.1	82.7	0.73
1994	28.9	50.4	79.3	74.4	0.74
1995	23.2	42.7	66.0	57.0	0.74
1996	18.1	33.2	51.4	39.7	0.14
1997	17.2	24.7	41.9	37.9	0.16
1998	12.7	7.8	20.5	30.4	0.16
1999	9.5	6.6	16.1	27.0	0.16
2000	5.3	5.4	10.6	19.5	0.16
2001	4.2	4.1	8.3	17.4	0.16
2002	3.9	2.9	6.8	17.0	0.17

Source: EMFAC2011LDV

**Table 13-5
Retired Vehicle Emission Reductions, CY 2015 (lbs/3yr)**

MY	ROG			NOx Exhaust	PM10 Exhaust
	Exhaust	Evap	Total		
pre 1972	253.9	175.2	429.2	189.2	2.59
1972	255.3	173.9	429.2	192.1	2.65
1973	258.4	174.4	432.8	195.0	2.70
1974	255.6	130.1	385.7	193.9	2.76
1975	207.6	119.6	327.2	192.2	3.03
1976	191.4	107.4	298.8	209.2	3.08
1977	201.8	83.8	285.6	221.1	3.03
1978	103.9	83.9	187.9	128.5	3.12
1979	99.7	82.3	182.0	124.3	3.12
1980	98.4	65.7	164.1	126.7	3.04
1981	87.5	61.5	149.0	101.8	1.20
1982	80.0	55.5	135.4	100.8	1.21
1983	68.1	52.9	121.0	102.0	1.18
1984	63.8	45.4	109.2	110.7	1.21
1985	56.2	42.4	98.6	108.0	1.22
1986	52.5	37.7	90.2	107.9	1.25
1987	48.7	42.2	90.9	103.9	1.27
1988	36.7	57.5	94.1	93.3	1.32
1989	38.9	60.9	99.8	80.7	1.32
1990	39.4	77.2	116.6	70.7	1.32
1991	40.1	58.8	98.9	85.5	0.69
1992	41.1	58.3	99.4	89.6	0.71
1993	36.0	57.1	93.1	85.4	0.72
1994	30.0	55.1	85.1	78.3	0.74
1995	24.2	47.1	71.4	60.4	0.73
1996	18.9	36.7	55.6	41.8	0.14
1997	17.9	27.5	45.4	40.0	0.16
1998	13.6	9.3	22.9	32.4	0.16
1999	10.5	8.1	18.7	29.1	0.16
2000	6.2	6.9	13.0	21.5	0.16
2001	5.1	5.7	10.7	19.3	0.17
2002	4.7	4.4	9.2	18.8	0.17
2003	3.9	2.9	6.8	18.4	0.17

Source: EMFAC2011LDV

**Table 13-6
Retired Vehicle Emission Reductions, CY 2016 (lbs/3yr)**

MY	ROG			CO Exhaust	NOx Exhaust	PM10 Exhaust
	Exhaust	Evap	Total			
pre 1973	199.8	176.5	376.3	2256.1	141.8	2.21
1973	205.0	177.2	382.2	2320.3	146.1	2.28
1974	204.0	136.9	340.8	2354.3	147.3	2.35
1975	165.1	123.8	288.9	2388.5	146.3	2.37
1976	162.4	108.8	271.2	3377.2	182.9	2.43
1977	166.7	87.7	254.4	3577.3	194.7	2.40
1978	77.6	89.4	166.9	2140.6	107.5	2.41
1979	72.9	88.6	161.5	1742.7	102.8	2.44
1980	68.3	82.7	150.9	1602.4	106.1	2.38
1981	58.8	77.5	136.3	1210.8	83.7	0.94
1982	55.2	93.9	149.1	1176.6	84.3	0.95
1983	46.5	118.6	165.1	1032.4	85.0	0.92
1984	46.6	118.3	164.9	1064.0	90.5	0.94
1985	38.9	116.4	155.3	810.3	88.5	0.96
1986	37.3	129.1	166.4	775.2	89.4	0.98
1987	36.3	117.6	153.9	722.0	86.9	1.01
1988	32.0	114.8	146.8	594.2	85.0	1.04
1989	34.0	99.6	133.6	640.2	76.3	1.05
1990	34.7	88.4	123.1	637.4	66.0	1.04
1991	35.3	65.1	100.4	652.0	68.2	0.55
1992	36.2	62.9	99.2	657.0	71.7	0.57
1993	32.1	60.0	92.2	517.3	69.6	0.59
1994	26.8	57.2	84.0	379.2	63.9	0.60
1995	22.7	48.9	71.6	279.8	51.4	0.60
1996	17.8	38.8	56.6	236.7	38.4	0.13
1997	16.7	29.6	46.3	241.2	36.5	0.14
1998	12.7	10.8	23.5	218.6	30.5	0.14
1999	10.0	9.7	19.6	205.4	27.8	0.14
2000	6.2	8.3	14.5	180.7	21.5	0.14
2001	5.3	7.1	12.4	166.5	19.9	0.14
2002	5.0	5.8	10.9	166.1	19.8	0.14
2003	4.3	4.0	8.3	161.2	19.1	0.15

Source: EMFAC2014 V1.0.7

**Table 13-7
Retired Vehicle Emission Reductions, CY 2017 (lbs/3yr)**

MY	ROG			CO Exhaust	NOx Exhaust	PM10 Exhaust
	Exhaust	Evap	Total			
pre 1974	201.2	176.3	377.5	2272.1	143.3	2.24
1974	201.3	136.9	338.2	2310.5	144.9	2.30
1975	162.3	124.3	286.6	2343.5	144.6	2.32
1976	161.3	108.2	269.5	3343.0	182.1	2.38
1977	164.7	87.6	252.3	3519.9	192.2	2.36
1978	76.0	89.4	165.3	2095.9	105.4	2.36
1979	71.7	88.6	160.3	1717.1	101.2	2.39
1980	66.8	82.8	149.6	1572.3	103.9	2.34
1981	57.5	77.6	135.1	1184.0	82.0	0.92
1982	54.1	94.2	148.3	1151.8	82.6	0.93
1983	45.6	120.2	165.8	1013.3	83.5	0.90
1984	45.7	119.6	165.3	1043.5	88.9	0.92
1985	38.2	117.7	155.8	795.9	87.1	0.93
1986	36.6	131.0	167.6	762.4	88.1	0.96
1987	35.1	119.7	154.8	704.5	85.0	0.99
1988	31.6	117.4	149.0	589.3	84.3	1.02
1989	33.5	103.6	137.0	631.9	75.7	1.02
1990	34.5	92.9	127.4	632.4	66.4	1.02
1991	35.1	68.0	103.1	649.2	68.7	0.54
1992	36.1	66.2	102.3	654.3	72.3	0.56
1993	32.1	63.8	95.9	518.2	70.4	0.57
1994	26.8	61.4	88.2	383.6	64.8	0.59
1995	23.0	52.7	75.7	286.9	52.7	0.59
1996	18.4	42.0	60.4	245.8	39.7	0.13
1997	17.3	32.4	49.7	250.6	37.8	0.13
1998	13.3	12.3	25.6	226.8	31.7	0.13
1999	10.5	11.2	21.7	213.1	29.0	0.13
2000	6.9	9.9	16.7	189.6	22.8	0.13
2001	6.0	8.7	14.7	177.3	21.4	0.14
2002	5.7	7.4	13.1	176.8	21.1	0.14
2003	4.9	5.6	10.6	172.3	20.5	0.14

Source: EMFAC2014 V1.0.7

1. Emission reductions for diesel-powered vehicles were estimated using a similar methodology. Because of very limited data and only minor differences in emission rates from one year to another, average emission reductions were only estimated for two model year ranges for all four calendar years. Replacement vehicle emission rates were the same as those used for gasoline-powered vehicles. Average NOx, ROG, and PM emission reductions over the three year project life by model year range are located in Tables 13-8 and 13-9. There are no evaporative emission reductions for retiring a diesel-powered vehicle.

**Table 13-8
Retired Diesel-Powered Vehicle Emission Reductions***

Model Year Range	Pollutant	CY 2010-2013 (lb/3yr)
Pre 1984	ROG	11.1
	NOx	55.3
	PM	12.4
1984-1992	ROG	10.3
	NOx	43.6
	PM	9.2

* Source: EMFAC2014 V1.0.7

**Table 13-9
Retired Diesel-Powered Vehicle Emission Reductions***

Model Year Range	Pollutant	CY 2014-2017 (lb/3yr)
Pre 1984	ROG	11.6
	NOx	53.4
	PM	11.5
1984-1992	ROG	10.8
	NOx	42.8
	PM	8.4

* Source: EMFAC2014 V1.0.7

2. Please refer to Appendix C for a discussion of the methodology for estimating emission reductions and how to calculate cost-effectiveness.
3. Currently, none of the air district retirement programs have components for high emitter, repair, or Low Emission Vehicle (LEV) replacement projects. As such, the data for these special elements has been removed and the light duty vehicle Appendix D deleted to simplify the Guidelines. ARB will provide the methodology for any new plans which include special cases such as high emitter, repair, or LEV replacement.

Figure 13-1

Diagnostic Data Form¹

WRITE YES (Y), NO (N), OR A READING OR EXPLANATION. DO NOT JUST CHECK A BOX!

CAP ID#	Year / Make / Model	Vehicle License #	Technician #	Date
			Work order #	

Confirm basic engine condition:

Engine condition: Any smoking, knocking, head gasket leaks or any other degraded engine condition(s)? _____
 (*As needed*) compression test, cylinder balance test, leak down test results (whichever test was appropriate)
 #1 _____ #2 _____ #3 _____ #4 _____ #5 _____ #6 _____ #7 _____ #8 _____
 Base timing _____ Total timing advance _____ Coolant Temp _____ Vacuum readings _____

Ignition system:

Overall condition: Are there any misfires? (HC failures) What is the specific component of the ignition system that needs to be replaced / repaired? List below _____

Fuel pressure within specs? Y/N _____ results _____

Air Injection System: (if applicable) Is the AIS functioning correctly? Y/N _____ If no, why _____

EGR system: (if applicable)

Is the system functioning correctly? Y/N _____ Is the valve getting vacuum? Y/N _____
 Does the engine stumble/die when the valve is manually raised? Y/N _____ Is the EGR valve defective? Y/N _____
 Is system restricted? Y/N _____ Is system plugged? Y/N _____ Other: _____
 Are there any Factory Technical Service Bulletins (TSBs), recalls/warranties related to the emission failure? _____
 Are any Diagnostic Trouble Code(s) stored? Y/N _____ If Y, are they emission related? If so, record code(s) _____
 If the vehicle is OBDI, did you clear the codes? Y/N _____ Did they return? Y/N _____ If the vehicle is OBDII, what is recorded in "Freeze Frame Data"? _____

Is vehicle failing for monitors? Y/N _____ Explain: _____

Oxygen Sensor: Low Voltage: _____ mV High Voltage: _____ mV Rise time: _____ mS

NOTE: Record the min/max/rate of change measured while artificially manipulating the air/fuel mixture full rich & full lean.

Average voltage: _____ Is the O2 sensor functioning correctly? Y/N _____ Explain: _____

Is the vehicle in fuel control? Y/N _____ If N, is the O2 biased? Rich Y/N _____ Lean Y/N _____

Will the computer respond to an artificial O2 signal? Y/N _____ If no, why? _____

What are the fuel trim numbers under test conditions? _____

Cross-reference the failed emission(s) with the related failed test.

Final Diagnosis: What component(s) or system(s) need to be repaired or replaced and why? _____

CATALYTIC CONVERTER DIAGNOSTIC ROUTINE

FACTORY DIAGNOSTIC/TESTING PROCEDURES TAKE PRECEDENCE OVER GENERIC TESTS.

Cat tests are valid or useful to the extent the vehicle is in fuel control. CAT tests require certain conditions be created by upstream systems in order to be valid. Fuel control is not just a varying O2S and/or fuel metering device. Fuel control is defined as the vehicle's ability to control fuel in response to the O2S input signal keeping the air/fuel ratio at 14.7 to 1 (stoichiometric). CAT replacement is generally the last repair approved.

DO NOT REQUEST A CAT WITH OTHER REPAIRS ASSOCIATED WITH ITS EFFICIENCY.

DO NOT REQUEST A CAT ON A VEHICLE THAT IS NOT IN FUEL CONTROL.

RECORD ON THE WORK ORDER "THE VEHICLE IS IN FUEL CONTROL".

O2 snap test CO2 cranking test Pre CAT / Post CAT (intrusive test) Factory specific temperature test
 O2% _____ % HC: _____ ppm Pre CAT: _____ Post CAT: _____ temp in _____ temp out _____
 CO2: _____ CAT efficiency: _____ %

Two CAT tests are more conclusive than one. A generic temperature test alone is not acceptable. Temperature tests are best used to confirm another test. An intrusive test is optional to confirm the effectiveness of the catalyst's reduction portion.

¹ Source: BAR's training course for licensed Smog Check technicians. Not all fields may be relevant for VRV programs. These tests may not be required for all vehicles. Air districts may design other forms consistent with the content of this form.