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January 31, 1995

U.S. Environmental Protection Agency  
Office of Air and Radiation  
Office of Mobile Sources

For the reasons set out in the preamble, part 86 of title 40 of the Code of Federal Regulations is amended as follows:

**PART 86--CONTROL OF AIR POLLUTION FROM NEW AND IN-USE MOTOR VEHICLES AND NEW AND IN-USE MOTOR VEHICLE ENGINES: CERTIFICATION AND TEST PROCEDURES**

1. The authority citation for part 86 is revised to read as follows:

Authority: Secs. 202, 206, 208, and 301 of the Clean Air Act as amended by the Clean Air Act Amendments of 1990 (42 U.S.C. 7521, 7525, 7542, and 7601)

2. Section 86.098-8 is proposed to be revised to read as follows:

Sec. 86.098-8 Emission standards for 1998 and later model year light-duty vehicles.

\* \* \* \* \*

(e) Exhaust emissions from 1998 and later model year light-duty vehicles shall not exceed the following standards.

(1) Standards--(i) Except for the provisions of paragraphs (e)(1) (ii) and (iii) of this section, the applicable standards shall be those designated with the applicable fuel type in paragraph (a)(1)(i) of this section. The provisions of paragraph (a)(1)(ii) of this section shall also apply.

(ii) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type in paragraph (a)(i)(i) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(iii) The standards for particulate matter (PM) shall not apply.

(2) The standards set forth in paragraphs (e)(1) (i) and (ii) of this section refer to a composite sample of exhaust emissions emitted over the Supplemental Federal Test Procedure as set forth in subpart B of this part and collected and calculated in accordance with those procedures.

(3)(i) A minimum of the percentage shown in Table A98-01 of a manufacturer's sales of the applicable model year's light-duty vehicles shall be tested under the procedures in subpart B of

this part indicated for 1998 and later model years, and shall not exceed the standards described in paragraph (e)(1) of this section.

Table A98-01.--Implementation Schedule for Light-Duty Vehicle Supplemental Federal Test Procedure Emission Testing

Model year	Sales percentage
1998	40
1999	80
2000 and subsequent	100

(ii) Small volume manufacturers, as defined in Sec. 86.094-14(b) (1) and (2), are exempt from the implementation schedule of Table A98-01 of this section for model years 1998 and 1999. For small volume manufacturers, the standards of paragraph (e) of this section, and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. This exemption does not apply to small volume engine families as defined in Sec. 86.094-14(b)(5).

(f) [Reserved]

\* \* \* \* \*

3. Section 86.098-9 is proposed to be added to read as follows:

Sec. 86.098-9 Emission standards for 1998 and later model year light-duty trucks.

\* \* \* \* \*

(d)(1) Exhaust emission standards for the Supplemental Federal Test Procedure. (i) Light light-duty trucks. (A) Exhaust emissions from 1998 and later model year light light-duty trucks shall not exceed the following standards.

(1) Except for the provisions of paragraph (d)(1)(i)(A)(2) of this section, the applicable standards shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(i)(A) of this section. The provisions of paragraph (a)(1)(i)(B) of this section shall also apply.

(2) The applicable standards for oxides of nitrogen shall be

those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(i)(A) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(3) The standards for particulate matter (PM) shall not apply.

(B)(1) A minimum of the percentage shown in Table A98-06 of this section of a manufacturer's sales of the applicable model year's light light-duty trucks shall be tested under the procedures in subpart B of this part indicated for 1998 and later model years, and shall not exceed the standards described in paragraph (d)(1)(i)(A) of this section.

Table A98-06.--Implementation Schedule for Light Light-Duty Truck Supplemental Federal Test Procedure Emission Testing

Model year	Sales percentage
1998	40
1999	80
2000 and subsequent	100

(2) Small volume manufacturers, as defined in Sec. 86.094-14(b) (1) and (2), are exempt from the implementation schedule of Table A98-06 of this section for model years 1998 and 1999. For small volume manufacturers, the standards of paragraph (d)(1)(i) of this section, and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. This exemption does not apply to small volume engine families as defined in Sec. 86.094-14(b)(5).

(ii) Heavy light-duty trucks. (A) Exhaust emissions from 1998 and later model year heavy light-duty trucks shall not exceed the following standards. These standards shall apply to certification, newly assembled, and in-use vehicles.

(1) Except for the provisions of paragraph (d)(1)(ii)(A)(2) of this section, the applicable standards shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in (a)(1)(ii)(A) of this section. The provisions of paragraph (a)(1)(ii)(B) of this section shall also apply.

(2) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in (a)(1)(ii)(A) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant

figures it shall be rounded down to the nearest significant figure.

(3) The standards for particulate matter (PM) shall not apply.

(B)(1) A minimum of the percentage shown in Table A98-07 of this section of a manufacturer's sales of the applicable model year's heavy light-duty trucks shall be tested under the procedures in subpart B of this part indicated for 1998 and later model years, and shall not exceed the standards described in paragraph (d)(1)(ii)(A) of this section.

Table A98-07.--Implementation Schedule for Heavy Light-Duty Truck Supplemental Federal Test Procedure Emission Testing

Model year	Sales percentage
1998	40
1999	80
2000 and subsequent	100

(2) Small volume manufacturers, as defined in Sec. 86.094-14(b) (1) and (2), are exempt from the implementation schedule of Table A98-07 of this section for model years 1998 and 1999. For small volume manufacturers, the standards of paragraph (d)(1)(ii) of this section, and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. This exemption does not apply to small volume engine families as defined in Sec. 86.094-14(b)(5).

(2) The standards set forth in paragraphs (d)(1) (i) and (ii) of this section refer to a composite sample of exhaust emissions emitted over the Supplemental Federal Test Procedure as set forth in subpart B of this part and collected and calculated in accordance with those procedures.

(e) through (f) [Reserved]

\* \* \* \* \*

5. Section 86.098-21 is proposed to be amended to read as follows:

Sec. 86.098-21 Application for certification.

\* \* \* \* \*

(b)(1)(i)(C) The manufacturer must submit a Statement of Compliance in the application for certification which attests to the fact that they have assured themselves that the engine family is designed to be within the intermediate temperature cold testing and air-conditioning supplemental FTP defeat device guidance as described in Sec. 86.098-16.

\* \* \* \* \*

(b)(2) Projected U.S. sales data sufficient to enable the Administrator to select a test fleet representative of the vehicles (or engines) for which certification is requested, and data sufficient to determine projected compliance with the standards implementation schedules of Secs. 86.098-8 and 86.098-9. The data shall also include the altitude of intended sale. Volume projected to be produced for U.S. sale may be used in lieu of projected U.S. sales.

\* \* \* \* \*

6. Section 86.098-23 is proposed to be amended to read as follows:

Sec. 86.098-23 Required data.

\* \* \* \* \*

(1)(v) These reports shall include the information required under Sec. 86.094- 7(h)(1). The information shall be organized in such a way as to allow the Administrator to determine compliance with the standards implementation schedules of Secs. 86.098-8 and 86.098-9, and the in-use emission standards implementation schedules of Secs. 86.708-94 and 86.709-94.

\* \* \* \* \*

7. Section 86.098-24 is proposed to be amended to read as follows:

Sec. 86.098-24 Test vehicles and engines.

\* \* \* \* \*

(b)(1)(i) Vehicles are chosen to be operated and tested for emission data based upon engine family groupings. If more than 33 percent of the carline can be expected to be equipped with air conditioning, only vehicles with air conditioning engine code calibrations will be considered. Within each engine family, one test vehicle is selected. The Administrator selects as the test vehicle the vehicle with the heaviest equivalent test weight (including options) within the family. If more than one vehicle meets this criterion, then within that vehicle grouping, the Administrator selects, in the order listed, the highest road-load power, largest displacement, the transmission with the highest numerical final gear ratio (including overdrive), the highest numerical axle ratio offered in that engine family, and the maximum fuel flow calibration.

(ii) The Administrator selects one additional test vehicle from within each engine family. The additional vehicle selected is the vehicle expected to exhibit the highest emissions (would normally be expected to include an air conditioning engine code) of those vehicles remaining in the engine family. If all vehicles within the engine family are similar, the Administrator may waive the requirements of this paragraph.

\* \* \* \* \*

8. Section 86.098-28 is proposed to be amended to read as follows:

Sec. 86.098-28 Compliance with emission standards.

\* \* \* \* \*

(a)(4)(i) Separate emission deterioration factors shall be determined from the exhaust emission results of the durability-data vehicle(s) for each engine- system combination. These deterioration factors will also apply to the Supplemental FTP test emissions. Separate evaporative and/or refueling emission deterioration factors shall be determined for each evaporative/refueling emission family-emission control system combination from the testing conducted by the manufacturer (gasoline-fueled and methanol-fueled vehicles only). Separate refueling emission deterioration factors shall be determined for each evaporative/refueling emission family-emission control system combination from the testing conducted by the manufacturer (petroleum-fueled diesel cycle vehicles not certified under the provisions of paragraph (g) of this section only).

\* \* \* \* \*

(a)(7)(i) Separate deterioration factors shall be determined from the exhaust emission results of the durability data vehicles for each emission standard applicable under Sec. 86.098-8, for each engine family group. The deterioration factors calculated for use with FTP emissions will also be applicable to Supplemental FTP emissions. The evaporative and/or refueling emission deterioration factors for each evaporative/ refueling family will be determined and applied in accordance with paragraph (a)(4) of this section.

\* \* \* \* \*

9. Section 86.099-8 is proposed to amended to read as follows:

Sec. 86.099-8 Emission standards for 1999 and later model year light-duty vehicles.

\* \* \* \* \*

(e) Exhaust emissions from 1999 and later model year light-duty vehicles shall not exceed the following standards.

(1) Standards--(i) Except for the provisions of paragraph (e)(1)(ii) of this section, the applicable standards shall be those designated in paragraph (a)(1)(i) of this section. The provisions of paragraph (a)(1)(ii) of this section shall also apply.

(ii) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type in paragraph (a)(1)(i) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(iii) The standards for particulate matter (PM) shall not apply.

(2) The standards set forth in paragraphs (e)(1) (i) and (ii) of this section refer to a composite sample of exhaust emissions emitted over the Supplemental Federal Test Procedure as set forth in subpart B of this part and collected and calculated in accordance with those procedures.

(3)(i) A minimum of the percentage shown in Table A99-01 of a manufacturer's sales of the applicable model year's light-duty

vehicles shall be tested under the procedures in subpart B of this part indicated for 1999 and later model years, and shall not exceed the standards described in paragraph (e)(1) of this section.

Table A99-01--Implementation Schedule for Light-Duty Vehicle Supplemental Federal Test Procedure Emission Testing

Model year	Sales percentage
1999	80
2000 and subsequent	100

(ii) Small volume manufacturers, as defined in Sec. 86.094-14(b) (1) and (2), are exempt from the implementation schedule of Table A99-01 of this section for model year 1999. For small volume manufacturers, the standards of paragraph (e) of this section, and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. This exemption does not apply to small volume engine families as defined in Sec. 86.094-14(b)(5).

((f) [Reserved]

\* \* \* \* \*

10. Section 86.099-9 is proposed to be amended to read as follows:

Sec. 86.099-9 Emission standards for 1999 and later model year light-duty trucks.

\* \* \* \* \*

(d)(1) Exhaust emission standards for the Supplemental Federal Test Procedure. (i) Light light-duty trucks. (A) Exhaust emissions from 1999 and later model year light light-duty trucks shall not exceed the following standards.

(1) Except for the provisions of paragraph (d)(1)(i)(A)(2) of this section, the applicable standards shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(i)(A) of this section. The provisions of paragraph (a)(1)(i)(B) of this section shall also apply.

(2) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(i)(A) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(3) The standards for particulate matter (PM) shall not apply.

(B)(1) A minimum of the percentage shown in Table A99-05 of this section of a manufacturer's sales of the applicable model year's light light-duty trucks shall be tested under the procedures in subpart B of this part indicated for 1999 and later model years, and shall not exceed the standards described in paragraph (d)(1)(i)(A) of this section.

Table A99-05--Implementation Schedule for Light Light-Duty Truck Supplemental Federal Test Procedure Emission Testing

Model year	Sales percentage
1999	80
2000 and subsequent	100

(2) Small volume manufacturers, as defined in Sec. 86.094-14(b) (1) and (2), are exempt from the implementation schedule of Table A99-05 of this section for model year 1999. For small volume manufacturers, the standards of paragraph (d)(1)(i) of this section, and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. This exemption does not apply to small volume engine families as defined in Sec. 86.094-14(b)(5).

(ii) Heavy light-duty trucks. (A) Exhaust emissions from 1999 and later model year heavy light-duty trucks shall not exceed the following standards.

(1) Except for the provisions of paragraph (d)(1)(ii)(A)(2) of this section, the applicable standards shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(ii)(A) of this section. The provisions of paragraph (a)(1)(ii)(B) of this section shall also apply.

(2) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(ii)(A) of this section multiplied by a factor of 1.15 and rounded to two significant

figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(3) The standards for particulate matter (PM) shall not apply.

(B)(1) A minimum of the percentage shown in Table A99-06 of this section of a manufacturer's sales of the applicable model year's heavy light-duty trucks shall be tested under the procedures in subpart B of this part indicated for 1999 and later model years, and shall not exceed the standards described in paragraph (d)(1)(ii)(A) of this section.

Table A99-06--Implementation Schedule for Heavy Light-Duty Truck Supplemental Federal Test Procedure Emission Testing

Model year	Sales percentage
1999	80
2000 and subsequent	100

(2) Small volume manufacturers, as defined in Sec. 86.094-14(b) (1) and (2), are exempt from the implementation schedule of Table A99-06 of this section for model year 1999. For small volume manufacturers, the standards of paragraph (d)(1)(ii) of this section, and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. This exemption does not apply to small volume engine families as defined in Sec. 86.094-14(b)(5).

(2) The standards set forth in paragraphs (d)(1) (i) and (ii) of this section refer to a composite sample of exhaust emissions emitted over the Supplemental Federal Test Procedure as set forth in subpart B of this part and collected and calculated in accordance with those procedures.

(e) through (f) [Reserved]

\* \* \* \* \*

11. Section 86.000-8 is proposed to be added to read as follows:

Sec. 86.000-8 Emission standards for 2000 and later model year light-duty vehicles.

\* \* \* \* \*

(e) Exhaust emissions from 2000 and later model year light-duty vehicles shall not exceed the following standards.

(1) Standards--(i) Except for the provisions of paragraph (e)(1)(ii) of this section, the applicable standards shall be those designated with the applicable fuel type in paragraph (a)(1)(i) of this section. The provisions of paragraph (a)(1)(ii) of this section shall also apply.

(ii) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type in paragraph (a)(1)(i) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(iii) The standards for particulate matter (PM) shall not apply.

(2) The standards set forth in paragraphs (e)(1) (i) and (ii) of this section refer to a composite sample of exhaust emissions emitted over the Supplemental Federal Test Procedure as set forth in subpart B of this part and collected and calculated in accordance with those procedures.

(f) [Reserved]

\* \* \* \* \*

12. Section 86.000-9 is proposed to be added to read as follows:

Sec. 86.000-9 Emission standards for 2000 and later model year light-duty trucks.

\* \* \* \* \*

(d)(1) Exhaust emission standards for the Supplemental Federal Test Procedure. (i) Light light-duty trucks. (A) Exhaust emissions from 2000 and later model year light light-duty trucks shall not exceed the following standards.

(1) Except for the provisions of paragraph (d)(1)(i)(A)(2) of this section, the applicable standards shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(i)(A) of this section. The provisions of paragraph (a)(1)(i)(B) of this section shall also apply.

(2) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(i)(A) of this section

multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(3) The standards for particulate matter (PM) shall not apply.

(ii) Heavy light-duty trucks. (A) Exhaust emissions from 2000 and later model year heavy light-duty trucks shall not exceed the following standards.

(1) Except for the provisions of paragraph (d)(1)(ii)(A)(2) of this section, the applicable standards shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(ii)(A) of this section. The provisions of paragraph (a)(1)(ii)(B) of this section shall also apply.

(2) The applicable standards for oxides of nitrogen shall be those designated with the applicable fuel type and applicable Loaded Vehicle Weight in paragraph (a)(1)(ii)(A) of this section multiplied by a factor of 1.15 and rounded to two significant figures. If this calculation is exactly mid-way between two significant figures it shall be rounded down to the nearest significant figure.

(3) The standards for particulate matter (PM) shall not apply.

(2) The standards set forth in paragraphs (d)(1) (i) and (ii) of this section refer to a composite sample of exhaust emissions emitted over the Supplemental Federal Test Procedure as set forth in subpart B of this part and collected and calculated in accordance with those procedures.

(e) through (f) [Reserved]

\* \* \* \* \*

13. Section 86.106-98 is proposed to be added to read as follows:

Sec. 86.106-98 Equipment required; overview.

\* \* \* \* \*

(a)(3) Fuel, analytical gas, and driving schedule specifications. Fuel specifications for exhaust and evaporative emissions testing and for mileage accumulation for petroleum-fueled and methanol-fueled vehicles are specified in Sec. 86.113. Analytical gases are specified in Sec. 86.114. The EPA Urban

Dynamometer Driving Schedule (UDDS), US06, AC866, and SC01 driving schedules; for use in exhaust emission tests, and the New York City Cycle (NYCC), for use with the UDDS in running loss tests, are specified in Sec. 86.115 and appendix I of this part.

\* \* \* \* \*

14. Section 86.108-98 is proposed to be added to read as follows:

Sec. 86.108-98 Dynamometer.

(a) The dynamometer shall simulate the road load force and inertia specified for the vehicle being tested, and shall determine the distance traveled during each phase of the test procedure.

(b) The dynamometer shall have a single roll with a nominal diameter of 1.20 to 1.25 meters (48 inches).

(c) Other dynamometer configurations may be used for testing if it can be demonstrated that the simulated road load power and inertia are equivalent, and if approved in advance by the Administrator.

15. Section 86.118-98 is proposed to be added to read as follows:

Sec. 86.118-98 Dynamometer calibration.

(a) The dynamometer performance shall be verified at least once each week and then calibrated as required.

(b) For each vehicle test sequence, the dynamometer adjustment setting shall be verified by comparing the force imposed during dynamometer operation with actual road load force.

16. Section 86.127-98 is proposed to be added to read as follows:

Sec. 86.127-98 Test procedures; overview.

\* \* \* \* \*

(f) The Supplemental Federal Test Procedure for use emissions related to air conditioning emissions (see Sec. 86.149-98) is designed to determine gaseous THC, NMHC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and

NOx emissions from gasoline-fueled and methanol-fueled Otto-cycle vehicles as well as methanol and formaldehyde from methanol-fueled Otto-cycle vehicles while simulating urban driving behavior with the air conditioner operating. The test consists of engine startups and vehicle operation on a chassis dynamometer through specified driving cycles. This test is conducted at an ambient air temperature of 95 deg F with the air conditioner operating at specified settings. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler. This exhaust emission test includes the following elements:

- (1) The AC866 urban dynamometer driving schedule.
- (2) A 10 minute soak with the engine turned off
- (3) The SC01 urban dynamometer driving schedule.

(g) The Supplemental Federal Test Procedure for exhaust emissions related to high speed and high acceleration (see Sec. 86.148-98) is designed to determine gaseous THC, NMHC, CO, CO2, CH4, and NOx emissions from gasoline-fueled and methanol-fueled Otto-cycle vehicles as well as methanol and formaldehyde from methanol-fueled Otto-cycle vehicles while simulating urban driving speeds and accelerations that are not represented by the simulated trips of the exhaust emission tests in paragraphs (b) and (f) of this section . The test consists of vehicle operation on a chassis dynamometer through a specified driving cycle. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

17. Section 86.127-01 is proposed to be added to read as follows:

Sec. 86.127-01 Test procedures; overview.

\* \* \* \* \*

(f) The Supplemental Federal Test Procedure for exhaust emissions related to air conditioning use and for emissions following a 60-minute soak (see Sec. 86.149-98) is designed to determine gaseous THC, NMHC, CO, CO2, CH4, and NOx emissions from gasoline-fueled and methanol-fueled Otto-cycle vehicles as well as methanol and formaldehyde from methanol-fueled Otto-cycle vehicles while simulating urban driving behavior with the air conditioner operating and following a 60 minute key-off soak. The test consists of engine startups and vehicle operation on a

chassis dynamometer through specified driving cycles. This test is conducted at an ambient air temperature of 95 deg F with the air conditioner operating at specified settings. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler. This exhaust emission test includes the following elements:

- (1) The AC866 urban dynamometer driving schedule.
- (2) A 60 minute soak with the engine turned off.
- (3) The SC01 urban dynamometer driving schedule.

(g) The Supplemental Federal Test Procedure for exhaust emissions related to high speed and high acceleration emissions (see Sec. 86.148-98) is designed to determine gaseous THC, NMHC, CO, CO2, CH4, and NOx emissions from gasoline-fueled and methanol-fueled Otto-cycle vehicles as well as methanol and formaldehyde from methanol-fueled Otto-cycle vehicles while simulating urban driving speeds and accelerations that are not represented by the simulated trips of the exhaust emission tests in paragraphs (b) and (f) of this section . The test consists of vehicle operation on a chassis dynamometer through a specified driving cycle. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

18. Section 86.128-98 is proposed to be added to read as follows:

Sec. 86.128-98     Transmissions.

\* \* \* \* \*

(d) The vehicle shall be driven with appropriate accelerator pedal movement to maintain the desired speed.

\* \* \* \* \*

19. Section 86.129-98 is proposed to be added to read as follows:

Sec. 86.129-98     Road load power test weight and inertia weight class determination.

(a) For each test vehicle, the manufacturer shall determine the road load force required for vehicle operation on a smooth level road, during calm winds, with no precipitation, at an ambient temperature of 20 °C, and atmospheric pressure of 98.21 kPa. This determination shall be made for vehicle speeds between 15 and 115 km/hr, road load force for low speed may be extrapolated. An acceptable procedure for Road Load Measurement Using Onboard Anemometry and Coastdown Techniques is described in SAE Recommended Practices J2263. SAE J2263 is incorporated by reference. [Note: The final version of this report has not been published. It is anticipated that a draft copy can be included in the docket. This reference statement will be modified at a latter date.]

(b) The dynamometer equivalent test weight values are as follows:

Test weight basis /1/	Equivalent test weight (pounds)	Inertia weight class (pounds)
Up to 1,062	1,000	1,000
1,063 to 1,187	1,125	1,000
1,188 to 1,312	1,250	1,250
1,313 to 1,437	1,375	1,250
1,438 to 1,562	1,500	1,500
1,563 to 1,687	1,625	1,500
1,688 to 1,812	1,750	1,750
1,813 to 1,937	1,875	1,750
1,938 to 2,062	2,000	2,000
2,063 to 2,187	2,125	2,000
2,188 to 2,312	2,250	2,250
2,313 to 2,437	2,375	2,250
2,438 to 2,562	2,500	2,500
2,563 to 2,687	2,625	2,500
2,688 to 2,812	2,750	2,750
2,813 to 2,937	2,875	2,750
2,938 to 3,062	3,000	3,000
3,063 to 3,187	3,125	3,000
3,188 to 3,312	3,250	3,000
3,313 to 3,437	3,375	3,500
3,438 to 3,562	3,500	3,500
3,563 to 3,687	3,625	3,500
3,688 to 3,812	3,750	3,500
3,813 to 3,937	3,875	4,000
3,938 to 4,125	4,000	4,000
4,126 to 4,375	4,250	4,000

4,376 to 4,625	4,500	4,500
4,626 to 4,875	4,750	4,500
4,876 to 5,125	5,000	5,000
5,126 to 5,375	5,250	5,000
5,376 to 5,750	5,500	5,500
5,751 to 6,250	6,000	6,000
6,251 to 6,750	6,500	6,500
6,751 to 7,250	7,000	7,000
7,251 to 7,750	7,500	7,500
7,751 to 8,250	8,000	8,000
8,251 to 8,750	8,500	8,500
8,751 to 9,250	9,000	9,000
9,251 to 9,750	9,500	9,500
9,751 to 10,000	10,000	10,000

/1/ For model year 1994 and later heavy light-duty trucks not subject to the Tier 0 standards of Sec. 86.094-9 of subpart A, test weight basis is as follows: for emissions tests, the basis shall be adjusted loaded vehicle weight, as defined in Sec. 86.094-2 of subpart A; and for fuel economy tests, the basis shall be loaded vehicle weight, as defined in Sec. 86.082-2 of subpart A, or, at the manufacturer's option, adjusted loaded vehicle weight as defined in Sec. 86.094-2 of subpart A. For all other vehicles, test weight basis shall be loaded vehicle weight, as defined in Sec. 86.082-2 of subpart A.

(c) The dynamometer must be capable of providing the dynamometer inertia adjustments specified in Sec. 86.148-98(b) of this subpart.

\* \* \* \* \*

20. Section 86.130-98 is proposed to be added to read as follows:

Sec. 86.130-98 Test sequence; general requirements.

\* \* \* \* \*

(e) The supplemental tests for exhaust emissions related to air conditioning use and high speed and high acceleration are conducted as stand-alone tests as described in Secs. 86.147-98 through 86.151-98. These tests may be performed in any sequence that maintains the appropriate preconditioning requirements for these tests as specified in Sec. 86.132-98.

21. Section 86.130-01 is proposed to be added to read as follows:

Sec. 86.130-01 Test sequence; general requirements.

\* \* \* \* \*

(e) The supplemental test for air conditioning and 60 minute soak exhaust emissions and the supplemental test for high speed and high acceleration emissions are conducted as stand-alone tests as described Secs. 86.147-01 through 86.151-01. These tests may be performed in any sequence that maintains the appropriate preconditioning requirements for these tests as specified in Sec. 86.132-98.

22. Section 86.132-98 is proposed to be added to read as follows:

Sec. 86.132-98 Vehicle preconditioning.

\* \* \* \* \*

(c) **For FTP testing.** Between 12 and 36 hours (or, at the Administrator's option, between 6 and 36 hours) after being refueled, the vehicle shall be placed, either by being driven or pushed, on a dynamometer and operated through one Urban Dynamometer Driving Schedule (UDDS), specified in Sec. 86.115 and appendix I of this part. The test vehicle may not be used to set dynamometer horsepower.

\* \* \* \* \*

(e) **For FTP testing.** The Administrator may also choose to conduct or require to be conducted additional preconditioning to ensure that the evaporative emission control system is stabilized in the case of gasoline-fueled and methanol-fueled vehicles, or to ensure that the exhaust system is stabilized in the case of petroleum- and methanol-fueled diesel vehicles. The preconditioning shall consist of one of the following:

\* \* \* \* \*

(f) **For FTP testing.** Within five minutes of completion of the preconditioning drive, the vehicle shall be driven off the dynamometer and parked. For gasoline- and methanol-fueled

vehicles, drain the fuel tank(s) and fill with test fuel, as specified in Sec. 86.113, to the "tank fuel volume" defined in Sec. 86.082-2. The vehicle shall be refueled within 1 hour of completion of the preconditioning drive. The fuel cap(s) shall be installed within 1 minute after refueling.

(g) **For FTP testing.** The vehicle shall be soaked for not less than 12 hours nor more than 36 hours between the end of the refueling event and the beginning of the cold start exhaust emission test.

(h) **For FTP testing.** During the soak period for the three-diurnal test sequence described in Sec. 86.130-96, evaporative canisters, if the vehicle is so equipped, shall be preconditioned according to the following procedure. For vehicles with multiple canisters, each canister shall be preconditioned separately. In addition, for model year 1998 and later vehicles equipped with refueling canisters, these canisters shall be preconditioned for the three-diurnal test sequence according to the procedure in Sec. 86.132-96 (j)(1). If a vehicle is designed to actively control evaporative or refueling emission without a canister, the manufacturer shall devise an appropriate preconditioning procedure subject to the approval of the Administrator.

\* \* \* \* \*

(n) *For the air-conditioning and 60-minute intermediate soak portions of the Supplemental FTP testing.* Between 12 and 36 hours (or, at the Administrator's option, between 6 and 36 hours) after being refueled, the vehicle shall be placed, either by being driven or pushed, on a dynamometer and operated through a preconditioning procedure as discussed in the following sections. If the Supplemental FTP testing follows the exhaust portions of the FTP testing, the refueling step may be deleted and the vehicle may be preconditioned using the fuel remaining in the tank.

(1) If the soak period since the last exhaust testing element is less than or equal to two hours, preconditioning will consist of the first 505 seconds of the UDDS run at the climate conditions and the air-conditioning operation specified in Sec. 86.149-98 of this subpart.

(2) If the soak period since the last exhaust testing element is greater than two hours, preconditioning will consist of the full UDDS run at the climate conditions and the air-conditioning operation specified in Sec. 86.149-98 of this subpart.

(3) Following the preconditioning specified in paragraphs (n) (1) and (2), the vehicle will idle for an additional 1 to 2 minutes before commencing with the US06 test.

(o) *For the US06 portion of the Supplemental FTP testing.* Between 12 and 36 hours (or, at the Administrator's option, between 6 and 36 hours) after being refueled, the vehicle shall be placed, either by being driven or pushed, on a dynamometer and operated through a preconditioning procedure as discussed in the following sections. If the Supplemental FTP testing follows the exhaust portions of the FTP testing, the refueling step may be deleted and the vehicle may be preconditioned using the fuel remaining in the tank.

(1) If the soak period since the last exhaust testing element is less than or equal to two hours, preconditioning will consist of one of the following elements:

- (i) The first 505 seconds of the UDDS;
- (ii) The AC866;
- (iii) The US06; or
- (iv) The SC01.

(2) If the soak period since the last exhaust testing element is greater than two hours, preconditioning will consist of the full UDDS.

(3) Following the preconditioning specified in paragraphs (o) (1) and (2), the vehicle will idle for an additional 1 to 2 minutes before commencing with the US06 test.

23. Section 86.147-98 is proposed to be added to read as follows:

Sec. 86.147-98 Supplemental Federal Test Procedures; overview. The procedures described in this and subsequent sections constitute the Supplemental Federal Test Procedures. These test procedures (and the associated standards set forth in subpart A of this part) are applicable to light-duty vehicles and light-duty trucks. These test procedures consist of two separable test elements, a sequence of vehicle operation and parking that tests exhaust emissions with the air conditioner operating, and a driving schedule (US06) that tests exhaust emissions under high speeds and accelerations.

(a) Vehicles are tested for any or all of the following emissions:

(1) Gaseous exhaust THC, CO, NO<sub>x</sub>, CO<sub>2</sub> (for petroleum-fueled vehicles), plus CH<sub>3</sub>OH and HCHO for methanol-fueled vehicles, plus CH<sub>4</sub> (for vehicles subject to the NMHC and OMNMFCE standards). (Measurement of CH<sub>3</sub>OH and HCHO may be omitted for 1990 through

1994 model year methanol-fueled vehicles provided a HFID calibrated on methanol is used for measuring THC plus CH<sub>3</sub>OH.)

(b) Each test procedure follows the vehicle preconditioning specified in Sec. 86.132-98 of this subpart.

(c) The test procedure for emissions with the air conditioner operating (see Sec. 86.149-98) is designed to determine gaseous exhaust emissions from light-duty vehicles and light-duty trucks while simulating an urban trip at an ambient temperature of 95 deg F on a chassis dynamometer. The full test consists of a start with the vehicle already warmed up and running following the vehicle preconditioning, operation over the AC866 driving schedule, engine shutdown and a soak period of the appropriate length applicable to the model year of the test vehicle, engine startup and operation over the SC01 driving schedule, and final engine shutdown. A proportional part of the diluted exhaust is collected continuously during the AC866 and SC01 phases of this test for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

(d) The test procedure for emissions on the US06 driving schedule (see Sec. 86.148-98) is designed to determine gaseous exhaust emissions from light-duty vehicles and light-duty trucks while simulating high speed and acceleration on a chassis dynamometer. The full test consists of a start with the vehicle already warmed up and running, following vehicle preconditioning, and operation over the US06 driving schedule. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

(e) The emission results from the test procedures in Secs. 86.148-98 of this subpart and 86.149-98 of this subpart are combined with the emission results from the Federal Test Procedure "transient cold start" test according to the calculation and weighting methodology in Sec. 86.150-98 of this subpart. The results of the calculation (in grams per mile) are compared to the applicable emission standards in subpart A of this part.

(f) These test procedures may be run in any sequence that maintains the applicable preconditioning elements specified in Sec. 86.132-98 of this subpart.

24. Section 86.148-98 is proposed to be added to read as follows:

Sec. 86.148-98 Exhaust emission test procedures for US06 emissions

(a) *Overview.* The dynamometer run consists of a single, 600 second test on the US06 driving schedule, as described in Appendix I of this part. The vehicle is preconditioned, in accordance with Sec. 86.132-98 of this subpart, to bring it to a hot, stabilized condition. The preconditioning is followed by a 1 to 2 minute idle period and then directly into the US06 driving schedule during which continuous proportional samples of gaseous emissions are collected for analysis during the test phase. For gasoline-fueled Otto-cycle vehicles, the composite samples collected in bags are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. For petroleum-fueled diesel-cycle vehicles (optional for methanol-fueled diesel-cycle vehicles), THC is sampled and analyzed continuously according to the provisions of Sec. 86.110. Parallel samples of the dilution air are similarly analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. For methanol-fueled vehicles, bag samples are collected and analyzed for THC (if not sampled continuously), CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. Methanol and formaldehyde samples are taken for both exhaust emissions and dilution air (a single dilution air formaldehyde sample, covering the total test period may be collected). Parallel bag samples of dilution air are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>.

(b) *Dynamometer inertia adjustments.* The manufacturer shall submit to EPA for each test vehicle the ratio of the vehicle weight to peak power:

Ratio of weight to peak power,  $R_{wp} = W/P$

where,

W= equivalent test weight (ETW)

P= engine peak horsepower

(1) For manual transmission vehicles, if the  $R_{wp}$  is greater than 31, then the dynamometer inertia setting is reduced using the following equation:

revised inertia= original inertia\*(31/ $R_{wp}$ )

(2) For automatic transmission vehicles, if the  $R_{wp}$  is greater than 34, then the dynamometer inertia setting is reduced using the following equation:

revised inertia= original inertia\*(34/ $R_{wp}$ )

(3) The revised dynamometer inertia settings are dynamically incorporated into the US06 driving schedule as identified in the table below:

Adjustment point: Location in US06:

1	seconds 53 thru 59
2	seconds 85 thru 92
3	seconds 138 thru 143
4	seconds 318 thru 331
5	seconds 570 thru 577

(4) Vehicles classified as heavy light-duty trucks, as defined in Sec. 86-094-2, shall be tested with a dynamometer inertia weight of loaded vehicle weight as defined in Sec. 86-082-2(b).

(c) For light-duty vehicles with  $R_{wp} < 21$ , manufacturers shall submit data to EPA which demonstrates stoichiometric air-fuel control for wide open throttle events of two seconds or less.

(d) During dynamometer operation, a fixed speed cooling fan shall be positioned so as to direct cooling air to the vehicle in an appropriate manner with the engine compartment cover open. In the case of vehicles with front engine compartments, the fan shall be squarely positioned within 12 inches (30.5 centimeters) of the vehicle. In the case of vehicles with rear engine compartments (or if special designs make the above impractical), the cooling fan shall be placed in a position to provide sufficient air to maintain vehicle cooling. The fan capacity shall normally not exceed 5300 cfm (2.50 m<sup>3</sup>/s). If, however, the manufacturer can show that during field operation the vehicle receives additional cooling, and that such additional cooling is needed to provide a representative test, the fan capacity may be increased or additional fans used if approved in advance by the Administrator.

(e) The flow capacity of the CVS shall be large enough to virtually eliminate water condensation in the system.

(f) The vehicle speed as measured from the dynamometer rolls shall be used. A speed vs. time recording, as evidence of dynamometer test validity, shall be supplied on request of the Administrator.

(g) Practice runs over the prescribed driving schedule may be performed at test point, provided an emission sample is not taken, for the purpose of finding the appropriate throttle action to maintain the proper speed-time relationship, or to permit sampling system adjustment.

(h) The drive wheel tires may be inflated up to a gauge pressure of 45 psi (310 kPa) in order to prevent tire damage. The drive wheel tire pressure shall be reported with the test results.

(i) The driving distance, as measured by counting the number of dynamometer roll or shaft revolutions, shall be determined for the test.

(j) Four-wheel drive vehicles will be tested in a two-wheel drive mode of operation. Full-time four-wheel drive vehicles will have one set of drive wheels temporarily disengaged by the vehicle manufacturer. Four-wheel drive vehicles which can be manually shifted to a two-wheel mode will be tested in the normal on-highway two-wheel drive mode of operation.

(k) *Test run.* The dynamometer run consists of a single test which is directly preceded by a vehicle preconditioning in accordance with 86.132-98. Following the vehicle the preconditioning, the vehicle is idled for not less than one minute and not more than two minutes. The complete dynamometer test consists of a drive of 8.0 miles (1.29 km).

(1) The following steps shall be taken for each test:

(1) Immediately after completion of the preconditioning, idle the vehicle. The idle period is not to be less than one minute or not greater than two minutes.

(2) For all vehicles, with the sample selector valves in the "standby" position, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(3) For methanol-fueled vehicles, with the sample selector valves in the "standby" position, insert fresh sample collection impingers into the methanol sample collection system, the formaldehyde sample collection system, and fresh impingers (or capsules for formaldehyde) into the dilution air sample collection systems for methanol and formaldehyde (may be omitted for 1990 through 1994 model years).

(4) Start the CVS (if not already on), the sample pumps (except the particulate sample pump, if applicable), the temperature recorder, the vehicle cooling fan, and the heated THC analysis recorder (diesel-cycle only). (The heat exchanger of the constant volume sampler, if used, petroleum-fueled diesel-cycle THC analyzer continuous sample line and filter, methanol-fueled vehicle THC, methanol and formaldehyde sample lines, if applicable, should be preheated to their respective operating temperatures before the test begins).

(5) Adjust the sample flow rates to the desired flow rate and set the gas flow measuring devices to zero.

(i) For gaseous bag samples (except THC samples), the minimum flow rate is 0.17 cfm (0.08 l/sec).

(ii) For THC samples, the minimum FID (or HFID in the case of diesel-cycle and methanol-fueled Otto-cycle vehicles) flow rate is 0.066 cfm (0.031 l/sec).

(iii) For methanol samples, the minimum flow rate is 0.14 cfm (0.067 l/sec).

(iv) For formaldehyde samples, the minimum flow rate is 0.036 cfm (0.017 l/s) with capsule collector and 0.14 cfm (0.067 l/s) with impinger.

Note: CFV sample flow rate is fixed by the venturi design.

(6) Attach the exhaust tube to the vehicle tailpipe(s).

(7) Start the gas flow measuring device, position the sample selector valves to direct the sample flow into the exhaust sample bag, the methanol exhaust sample, the formaldehyde exhaust sample, the dilution air sample bag, the methanol dilution air sample and the formaldehyde dilution air sample (turn on the petroleum-fueled diesel-cycle THC analyzer system integrator, mark the recorder chart, and record both gas meter or flow measurement instrument readings, if applicable).

(8) Place vehicle in gear after starting the gas flow measuring device, but prior to the first acceleration. Begin the first acceleration 5 seconds after starting the measuring device.

(9) Operate the vehicle according to the US06 driving schedule. For manual transmission vehicles, downshifting is not allowed unless the vehicle is unable to stay within the speed tolerances of the driving schedule in the existing gear. For further guidance on transmissions see Sec. 86.128-98 of this subpart.

(10) At the end of the deceleration which is scheduled to occur at 594 seconds, simultaneously turn off gas flow measuring device No. 1 (and the petroleum-fueled diesel hydrocarbon integrator No. 1, mark the petroleum-fueled diesel hydrocarbon recorder chart and turn off the No. 1 particulate sample pump, if applicable) and position the sample selector valve to the "standby" position. (Engine shutdown is not part of the test sample period.) Record the measured roll or shaft revolutions (and the No. 1 gas meter reading or flow measurement instrument).

(11) As soon as possible, transfer the exhaust and dilution air bag samples to the analytical system and process the samples according to Sec. 86.140 obtaining a stabilized reading of the bag exhaust sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period (if it is not possible to perform analysis on the methanol and formaldehyde samples, within 24 hours, the samples should be stored in a dark cold (c0 deg.C) environment until analysis).

(12) Disconnect the exhaust tube from the vehicle tailpipe(s) and drive the vehicle from dynamometer.

(13) The CVS or CFV may be turned off, if desired.

25. Section 86.149-98 is proposed to be added to read as follows:

Sec. 86.149-98 Test procedures for exhaust emissions related to air conditioning use.

(a) Overview. This test procedure consists of two exhaust tests: a test over the cycle designated as the "AC866," followed by an engine shutoff period of 10 minutes, which is then followed by an exhaust test over the SC01 driving schedule (see Appendix I to Part 86). This sequence follows the preconditioning requirements specified in Sec. 86.132-98. The entire test, including the preconditioning driving, is conducted in a 95 deg F test cell. The air conditioner is operated for the duration of the test procedure (except when the vehicle is off), including the preconditioning. The exhaust emissions are diluted with ambient air in the dilution tunnel as shown in Figure B94-5 and Figure B94-6. Continuous proportional samples of gaseous emissions are collected for analysis during each of the two test phases. For gasoline-fueled Otto-cycle vehicles, the composite samples collected in bags are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. For petroleum-fueled diesel-cycle vehicles (optional for methanol-fueled diesel-cycle vehicles), THC is sampled and analyzed continuously according to the provisions of Sec. 86.110. Parallel samples of the dilution air are similarly analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. For methanol-fueled vehicles, bag samples are collected and analyzed for THC (if not sampled continuously), CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. Methanol and formaldehyde samples are taken for both exhaust emissions and dilution air (a single dilution air formaldehyde sample, covering the total test period may be collected). Parallel bag samples of dilution air are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>.

(b) Test procedure requirements. (1) A large fixed speed cooling fan shall be positioned so as to direct cooling air to the vehicle in an appropriate manner with the engine compartment cover open. In the case of vehicles with front engine compartments, the fan shall be squarely positioned within 12 inches (30.5 centimeters) of the vehicle. In the case of vehicles with rear engine compartments (or if special designs make the above impractical), the cooling fan shall be placed in a position to provide sufficient air to maintain vehicle cooling. The fan capacity shall normally not exceed 15,000 cfm.

(2) Test cell ambient temperature.--(i) Manufacturer's data submittal. The ambient temperature of the test cell shall be set to 95 ± 5 deg F.

(ii) Testing by the Administrator. The ambient temperature shall be between 68 deg F and 100 deg F.

(3) The vehicle window on the driver's side shall be fully open for the duration of the test, and all other windows shall be fully closed for the duration of the test.

(4) The length of the engine-off soak period between the AC866 and the SC01 shall be  $10 \pm 1$  minutes.

(5) Deviations from the test procedure requirements specified in paragraphs (b)(1) through (b)(3) of this section may occur in the following instances:

(i) The manufacturer may petition the Administrator for approval to improve upon the simulation with better representations of solar load and/or humidity.

(ii) Alternatively, the manufacturer may elect to perform this test procedure in a test facility with complete environmental simulation capabilities, with the following minimum requirements:

(A) The ambient temperature shall be set to  $95 \pm 5$  deg F.

(B) The relative humidity shall be set to  $40 \pm 5$  percent.

(C) The solar load on the vehicle as measured and centered at the base of the windshield shall be at least 850 Watts per square meter.

(D) The wind speed at the front of the vehicle shall be equivalent to vehicle speed as measured by the dynamometer.

(E) All windows shall be fully closed for the duration of the test.

(c) The provisions of 86.135-98 (c) through (g) apply.

(d) The driving distance, as measured by counting the number of dynamometer roll or shaft revolutions, shall be determined for the AC866 and SC01 phases of the test. The revolutions shall be measured on the same roll or shaft used for measuring the vehicle's speed.

(e) The provisions of 86.135-98 (i) shall apply.

(f) Engine starting and re-starting. The provisions of Sec. 86.136-90 apply.

(g) Air conditioner settings. The air conditioner controls shall be set to the following settings for the duration of the emission test:

(1) For vehicles equipped with a manually controlled air conditioning system, the settings shall be as follows:

(i) The air conditioner mode switch shall be set to the coldest position.

(ii) The temperature control switch shall be set to the coldest position.

(iii) The fan speed shall be set to the third of four speeds, or the second of three speeds, or the second of two speeds.

(iv) The air source shall be set to the position that recirculates the air in the vehicle cabin.

(v) The cold air discharge location shall be set to the dashboard vents.

(2) For vehicles equipped with automatic climate control air conditioning systems, the settings shall be as follows:

(i) The desired temperature shall be set to 72 deg F.

(ii) The fan speed shall be set to automatic, if applicable. If the fan speeds are set manually, the settings specified in 86.149 (g)(1)(iii) of this section shall be used.

(iii) The air source should be set to the position that recirculates the air in the vehicle cabin.

(iv) If manually controlled, the cold air discharge location shall be set to the dashboard vents.

(3) If the applicable specifications in paragraph (g)(1) or (g)(2) of this section can not be practically applied to the test vehicle the manufacturer shall submit a request to the Administrator to use alternative air conditioning system settings. The Administrator will approve alternative settings based on a judgement that such settings provide substantially the same effect on the air conditioner system as those specified in paragraph (g)(1) or (g)(2) of this section.

(h) The requirements of paragraphs (b) and (g) of this section also apply to the vehicle preconditioning specified in Sec. 86.132-98 of this subpart.

(i) The vehicle shall begin the following test procedure after no less than one minute and no more than two minutes of idle have elapsed since the final deceleration of the preconditioning driving schedule specified in Sec. 86.132-98 of this subpart.

(1) For all vehicles, with the sample selector valves in the "standby" position, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(2) For methanol-fueled vehicles, with the sample selector valves in the "standby" position, insert fresh sample collection impingers into the methanol sample collection system, the formaldehyde sample collection system, and fresh impingers (or capsules for formaldehyde) into the dilution air sample collection systems for methanol and formaldehyde.

(3) Start the CVS, the sample pumps (except the particulate sample pump), the temperature recorder, the vehicle cooling fan, and the heated THC analysis recorder (diesel-cycle only). (The heat exchanger of the constant volume sampler, if used,

petroleum-fueled diesel-cycle THC analyzer continuous sample line and filter, methanol-fueled vehicle THC, methanol and formaldehyde sample lines, if applicable, should be preheated to their respective operating temperatures before the test begins).

(4) Adjust the sample flow rates to the desired flow rate and set the gas flow measuring devices to zero.

(i) For gaseous bag samples (except THC samples), the minimum flow rate is 0.17 cfm (0.08 l/sec).

(ii) For THC samples, the minimum FID (or HFID in the case of diesel-cycle and methanol-fueled Otto-cycle vehicles) flow rate is 0.066 cfm (0.031 l/sec).

(iii) For methanol samples, the minimum flow rate is 0.14 cfm (0.067 l/sec).

(iv) For formaldehyde samples, the minimum flow rate is 0.036 cfm (0.017 l/s) with capsule collector and 0.14 cfm (0.067 l/s) with impinger.

Note: CFV sample flow rate is fixed by the venturi design.

(5) Attach the exhaust tube to the vehicle tailpipe(s).

(6) Start the gas flow measuring device, position the sample selector valves to direct the sample flow into the "AC866" exhaust sample bag, the "AC866" methanol exhaust sample, the "AC866" formaldehyde exhaust sample, the "AC866" dilution air sample bag, the "AC866" methanol dilution air sample and the "AC866" formaldehyde dilution air sample (turn on the petroleum-fueled diesel-cycle THC analyzer system integrator, mark the recorder chart, and record both gas meter or flow measurement instrument readings, if applicable), turn the key on, and start cranking the engine.

(7) Fifteen seconds after the engine starts, place the transmission in gear.

(8) Twenty seconds after the engine starts, begin the initial vehicle acceleration of the AC866 driving schedule.

(9) Operate the vehicle during the AC866 driving schedule according to the provisions of Sec. 86.115-98.

(10) Turn the engine off 2 seconds after the end of the last deceleration of the AC866.

(11) Five seconds after the engine stops running, simultaneously turn off the gas flow measuring device and, if applicable, turn off the hydrocarbon integrator, mark the hydrocarbon recorder chart, and position the sample selector valves to the "standby" position. Record the measured roll or shaft revolutions (both gas meter or flow measurement instrumentation readings), and re-set the counter. As soon as possible, transfer the "AC866" exhaust and dilution air samples to the analytical system and process the samples according to Sec. 86.140, obtaining a stabilized reading of the exhaust bag

sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period.

(12) Immediately after the end of the sample period, turn off the cooling fan and close the engine compartment cover.

(13) Turn off the CVS or disconnect the exhaust tube from the tailpipe(s) of the vehicle.

(14) Repeat the steps in paragraphs (i)(1) through (i)(7) of this section for the "SC01" test. The step in paragraph (i)(6) of this section shall begin between 9 and 11 minutes after the end of the sample period for the AC866 test.

(15) Eighteen seconds after the engine starts, begin the initial vehicle acceleration of the SC01 driving schedule (see Appendix I to Part 86).

(16) Operate the vehicle through the driving schedule according to the provisions of paragraphs 86.115-98 (b) through (c).

(17) At the end of the final deceleration of the SC01 driving schedule, simultaneously turn off the gas flow measuring device (and the petroleum-fueled diesel hydrocarbon integrator, mark the petroleum-fueled diesel hydrocarbon recorder chart) and position the sample selector valve to the "standby" position. (Engine shutdown is not part of the "SC01" test sample period.) Record the measured roll or shaft revolutions (and the gas meter reading or flow measurement instrument).

(18) As soon as possible, transfer the "SC01" exhaust and dilution air bag samples to the analytical system and process the samples according to Sec. 86.140, obtaining a stabilized reading of the bag exhaust sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period (if it is not possible to perform analysis on the methanol and formaldehyde samples within 24 hours, the samples should be stored in a dark cold (approx. 0 deg.C) environment until analysis).

(19) The exhaust tube may be disconnected from the vehicle tailpipe(s) and the vehicle may be driven from the dynamometer, if desired.

(20) The CVS or CFV may be turned off, if desired.

26. Section 86.149-01 is proposed to be added to read as follows:

Sec. 86.149-01 Test procedures for exhaust emissions related to air conditioning use.

(a) Overview. This test procedure consists of two exhaust tests: a test over the cycle designated as the "AC866," followed by an engine shutoff period of 60 minutes, which is then followed by an exhaust test over the SC01 driving schedule (see Appendix I to Part 86). This sequence follows the preconditioning requirements specified in Sec. 86.132-98. The entire test, including the preconditioning driving, is conducted in a 95 deg F test cell. The air conditioner is operated for the duration of the test procedure (except when the vehicle is off), including the preconditioning. The exhaust emissions are diluted with ambient air in the dilution tunnel as shown in Figure B94-5 and Figure B94-6. Continuous proportional samples of gaseous emissions are collected for analysis during each of the two test phases. For gasoline-fueled Otto-cycle vehicles, the composite samples collected in bags are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. For petroleum-fueled diesel-cycle vehicles (optional for methanol-fueled diesel-cycle vehicles), THC is sampled and analyzed continuously according to the provisions of Sec. 86.110. Parallel samples of the dilution air are similarly analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. For methanol-fueled vehicles, bag samples are collected and analyzed for THC (if not sampled continuously), CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>. Methanol and formaldehyde samples are taken for both exhaust emissions and dilution air (a single dilution air formaldehyde sample, covering the total test period may be collected). Parallel bag samples of dilution air are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, and NO<sub>x</sub>.

(b) Test procedure requirements. (1) A large fixed speed cooling fan shall be positioned so as to direct cooling air to the vehicle in an appropriate manner with the engine compartment cover open. In the case of vehicles with front engine compartments, the fan shall be squarely positioned within 12 inches (30.5 centimeters) of the vehicle. In the case of vehicles with rear engine compartments (or if special designs make the above impractical), the cooling fan shall be placed in a position to provide sufficient air to maintain vehicle cooling. The fan capacity shall normally not exceed 15,000 cfm.

(2) Test cell ambient temperature. (i) Manufacturer's data submittal. The ambient temperature of the test cell shall be set to 95 ± 5 deg F.

(ii) Testing by the Administrator. The ambient temperature shall be between 68 deg F and 100 deg F.

(3) The vehicle window on the driver's side shall be fully open for the duration of the test, and all other windows shall be fully closed for the duration of the test.

(4) Engine-off soak period--(i) Manufacturer's data submittal. The length of the engine-off soak period between the AC866 and the SC01 shall be  $60 \pm 1$  minutes.

(ii) Testing by the Administrator. The length of the engine-off soak period between the AC866 and the SC01 shall be between 10 and 60 minutes.

(5) Deviations from the test procedure requirements specified in paragraphs (b)(1) through (b)(4) of this section may occur in the following instances:

(i) The manufacturer may petition the Administrator for approval to improve upon the simulation with better representations of solar load and/or humidity.

(ii) Alternatively, the manufacturer may elect to perform this test procedure in a test facility with complete environmental simulation capabilities, with the following minimum requirements:

(A) The ambient temperature shall be set to  $95 \pm 5$  deg F.

(B) The relative humidity shall be set to  $40 \pm 5$  percent.

(C) The solar load on the vehicle as measured and centered at the base of the windshield shall be at least 850 Watts per square meter.

(D) The wind speed at the front of the vehicle shall be equivalent to vehicle speed as measured by the dynamometer.

(E) All windows shall be fully closed for the duration of the test.

(iii) The manufacturer may submit a written request to the Administrator to be waived from the requirements of paragraph (b)(4) of this section. In support of such a request the Agency will accept an alternative demonstration (on the basis of previous emission tests, development tests, technical justification, or other relevant information) that the test vehicle will comply with the requirements of paragraph (b)(4) of this section. The written request shall include a statement to the effect that all data, analyses, test procedure evaluations, and other documents upon which the request is based, will be made available to the Administrator upon request. If such a waiver is granted, the applicable soak period shall be not less than 9 minutes and not more than 11 minutes. The Administrator reserves the right to test waived vehicles to verify compliance with the requirements of paragraph (b)(4) of this section.

(c) The provisions of 86.135-98 (c) through (g) apply.

(d) The driving distance, as measured by counting the number of dynamometer roll or shaft revolutions, shall be determined for the AC866 and SC01 phases of the test. The revolutions shall be measured on the same roll or shaft used for measuring the vehicle's speed.

(e) The provisions of 86.135-98 (i) shall apply.

(f) Engine starting and re-starting. The provisions of Sec. 86.136-90 apply.

(g) Air conditioner settings. The air conditioner controls shall be set to the following settings for the duration of the emission test:

(1) For vehicles equipped with a manually controlled air conditioning system, the settings shall be as follows:

(i) The air conditioner mode switch shall be set to the coldest position.

(ii) The temperature control switch shall be set to the coldest position.

(iii) The fan speed shall be set to the third of four speeds, or the second of three speeds, or the second of two speeds.

(iv) The air source shall be set to the position that recirculates the air in the vehicle cabin.

(v) The cold air discharge location shall be set to the dashboard vents.

(2) For vehicles equipped with automatic climate control air conditioning systems, the settings shall be as follows:

(i) The desired temperature shall be set to 72 deg F.

(ii) The fan speed shall be set to automatic, if applicable. If the fan speeds are set manually, the settings specified in 86.149 (g)(1)(iii) of this section shall be used.

(iii) The air source should be set to the position that recirculates the air in the vehicle cabin.

(iv) If manually controlled, the cold air discharge location shall be set to the dashboard vents.

(3) If the applicable specifications in paragraph (g)(1) or (g)(2) of this section can not be practically applied to the test vehicle the manufacturer shall submit a request to the Administrator to use alternative air conditioning system settings.

(h) The requirements of paragraphs (b) and (g) of this section also apply to the vehicle preconditioning specified in Sec. 86.132-98 of this subpart.

(i) The vehicle shall begin the following test procedure after no less than one minute and no more than two minutes of idle have elapsed since the final deceleration of the preconditioning driving schedule specified in Sec. 86.132-98 of this subpart. The vehicle may be removed from the dynamometer between the "AC866" and "SC01" phases of the test procedure, provided that the vehicle is not started at any point prior to the exhaust emission test and that the vehicle continues to be

exposed to conditions consistent with the test cell environment requirements of this section.

(1) For all vehicles, with the sample selector valves in the "standby" position, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(2) For methanol-fueled vehicles, with the sample selector valves in the "standby" position, insert fresh sample collection impingers into the methanol sample collection system, the formaldehyde sample collection system, and fresh impingers (or capsules for formaldehyde) into the dilution air sample collection systems for methanol and formaldehyde.

(3) Start the CVS, the sample pumps (except the particulate sample pump), the temperature recorder, the vehicle cooling fan, and the heated THC analysis recorder (diesel-cycle only). (The heat exchanger of the constant volume sampler, if used, petroleum-fueled diesel-cycle THC analyzer continuous sample line and filter, methanol-fueled vehicle THC, methanol and formaldehyde sample lines, if applicable, should be preheated to their respective operating temperatures before the test begins).

(4) Adjust the sample flow rates to the desired flow rate and set the gas flow measuring devices to zero.

(i) For gaseous bag samples (except THC samples), the minimum flow rate is 0.17 cfm (0.08 l/sec).

(ii) For THC samples, the minimum FID (or HFID in the case of diesel-cycle and methanol-fueled Otto-cycle vehicles) flow rate is 0.066 cfm (0.031 l/sec).

(iii) For methanol samples, the minimum flow rate is 0.14 cfm (0.067 l/sec).

(iv) For formaldehyde samples, the minimum flow rate is 0.036 cfm (0.017 l/s) with capsule collector and 0.14 cfm (0.067 l/s) with impinger.

Note: CFV sample flow rate is fixed by the venturi design.

(5) Attach the exhaust tube to the vehicle tailpipe(s).

(6) Start the gas flow measuring device, position the sample selector valves to direct the sample flow into the "AC866" exhaust sample bag, the "AC866" methanol exhaust sample, the "AC866" formaldehyde exhaust sample, the "AC866" dilution air sample bag, the "AC866" methanol dilution air sample and the "AC866" formaldehyde dilution air sample (turn on the petroleum-fueled diesel-cycle THC analyzer system integrator, mark the recorder chart, and record both gas meter or flow measurement instrument readings, if applicable), turn the key on, and start cranking the engine.

(7) Fifteen seconds after the engine starts, place the transmission in gear.

(8) Twenty seconds after the engine starts, begin the initial vehicle acceleration of the AC866 driving schedule.

(9) Operate the vehicle during the AC866 driving schedule according to the provisions of Sec. 86.115-98.

(10) Turn the engine off 2 seconds after the end of the last deceleration of the AC866.

(11) Five seconds after the engine stops running, simultaneously turn off the gas flow measuring device and, if applicable, turn off the hydrocarbon integrator, mark the hydrocarbon recorder chart, and position the sample selector valves to the "standby" position. Record the measured roll or shaft revolutions (both gas meter or flow measurement instrumentation readings), and re-set the counter. As soon as possible, transfer the "AC866" exhaust and dilution air samples to the analytical system and process the samples according to Sec. 86.140, obtaining a stabilized reading of the exhaust bag sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period.

(12) Immediately after the end of the sample period, turn off the cooling fan and close the engine compartment cover.

(13) Turn off the CVS or disconnect the exhaust tube from the tailpipe(s) of the vehicle.

(14) Repeat the steps in paragraphs (i)(1) through (i)(7) of this section for the "SC01" test. The step in paragraph (i)(6) of this section shall begin no less than 59 minutes and no more than 61 minutes after the end of the sample period for the AC866 test, unless waived from this requirement according to the provisions of paragraph (b)(5)(iii) of this section, in which case the step in paragraph (i)(6) of this section shall begin no less than 9 minutes and no more than 11 minutes after the end of the sample period for the AC866 test.

(15) Eighteen seconds after the engine starts, begin the initial vehicle acceleration of the SC01 driving schedule (in Appendix I to Part 86).

(16) Operate the vehicle through the driving schedule according to the provisions of paragraphs 86.115-98 (b) through (c).

(17) At the end of the final deceleration of the SC01 driving schedule, simultaneously turn off the gas flow measuring device (and the petroleum-fueled diesel hydrocarbon integrator, mark the petroleum-fueled diesel hydrocarbon recorder chart) and position the sample selector valve to the "standby" position. (Engine shutdown is not part of the "SC01" test sample period.)

Record the measured roll or shaft revolutions (and the gas meter reading or flow measurement instrument).

(18) As soon as possible, transfer the "SC01" exhaust and dilution air bag samples to the analytical system and process the samples according to Sec. 86.140, obtaining a stabilized reading of the bag exhaust sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period (if it is not possible to perform analysis on the methanol and formaldehyde samples within 24 hours, the samples should be stored in a dark cold (approx. 0 deg.C) environment until analysis).

(19) The exhaust tube may be disconnected from the vehicle tailpipe(s) and the vehicle may be driven from the dynamometer, if desired.

(20) The CVS or CFV may be turned off, if desired.

27. Section 86.151-98 is proposed to be added to read as follows:

Sec. 86.150-94 Supplemental FTP Calculations; exhaust emissions.

The final reported test results shall be computed by use of the following formula:

(a) For light-duty vehicles and light-duty trucks, mass emissions for THC, OMHCE, NMHC, OMNMHCE are:

$$Y_{wm1} = \frac{.21 * (Y_{ct})}{(D_{ct})} + \frac{.24 * (Y_{ac866})}{(D_{ac866})} + \frac{.27 * (Y_{sc01})}{(D_{sc01})} + \frac{.28 * (Y_{us06})}{(D_{us06})}$$

Where:

(1)  $Y_{wm}$ =Weighted mass emissions in grams per vehicle mile.

(b) For light-duty vehicles and light-duty trucks, mass emissions for CO and Nox are:

$$Y_{wm2} = \frac{.15 * (Y_{ct})}{(D_{ct})} + \frac{.37 * (Y_{ac866})}{(D_{ac866})} + \frac{.20 * (Y_{sc01})}{(D_{sc01})} + \frac{.28 * (Y_{us06})}{(D_{us06})}$$

(1)  $Y_{w2}$ =Weighted mass emissions in grams per vehicle mile.

(2)  $Y_{ct}$ =Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

(3)  $Y_{ac866}$ =Mass emissions as calculated from the air-conditioning 866 test, in grams per test.

(4) Ysc01=Mass emissions as calculated from the air-conditioning SC01 test, in grams per test.

(5) Yus06=Mass emissions as calculated from the US06 test, in grams per test.

(6) Dct=The measured distance from the "transient" phase of the cold start test, in miles.

(7) Dac866=The measured distance from the air-conditioning 866 test, in miles.

(8) Dsc01=The measured distance from the air-conditioning SC01 test, in miles.

(9) Dus06=The measured distance from the US06 test, in miles.

(c) The provisions of paragraphs 86.144-94 (b) and (c) apply to this section.

28. Appendix I to Part 86 is proposed to be amended by adding the following paragraphs:

(g) EPA US06 Driving Schedule for Light-Duty Vehicles and Light-Duty Trucks.

EPA US06  
DRIVING SCHEDULE  
(Speed versus Time Sequence)

Time (sec)	Speed (mph)
0	0.0
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.2
7	0.7
8	1.1
9	1.7
10	6.0
11	13.9
12	20.5
13	25.7
14	25.0
15	28.4
16	32.3
17	34.6

18	36.5
19	38.4
20	39.9
21	42.2
22	43.8
23	44.2
24	43.4
25	42.6
26	40.3
27	39.2
28	38.4
29	38.4
30	39.2
31	38.8
32	38.8
33	36.5
34	32.3
35	27.6
36	22.3
37	17.3
38	11.5
39	5.8
40	1.2
41	0.0
42	0.0
43	0.0
44	0.0
45	0.0
46	0.0
47	0.0
48	0.0
49	0.8
50	9.2
51	14.9
52	18.2
53	22.2
54	27.2
55	31.4
56	33.8
57	37.2
58	40.8
59	44.0
60	46.3
61	47.6
62	49.5
63	51.2

64	53.0
65	54.4
66	55.6
67	56.4
68	56.1
69	56.2
70	55.8
71	55.1
72	54.4
73	54.2
74	54.4
75	54.2
76	53.5
77	52.3
78	52.0
79	51.9
80	51.8
81	51.9
82	52.0
83	52.5
84	53.4
85	54.9
86	56.8
87	58.8
88	60.6
89	62.3
90	64.2
91	66.2
92	67.8
93	69.4
94	70.4
95	70.6
96	70.7
97	70.3
98	68.2
99	66.5
100	64.9
101	63.7
102	62.5
103	61.0
104	59.3
105	57.7
106	56.0
107	54.5
108	52.8
109	51.2

110	49.5
111	48.0
112	46.3
113	44.0
114	41.1
115	38.8
116	37.7
117	36.6
118	35.3
119	30.0
120	24.4
121	19.8
122	15.5
123	10.8
124	6.3
125	3.2
126	2.1
127	1.2
128	0.0
129	0.0
130	0.0
131	0.0
132	0.0
133	0.0
134	0.0
135	0.0
136	2.7
137	9.2
138	16.1
139	22.7
140	29.2
141	34.2
142	38.8
143	43.0
144	45.3
145	46.8
146	48.0
147	49.5
148	50.3
149	51.5
150	52.2
151	52.6
152	53.0
153	53.8
154	53.8
155	53.8

156	54.6
157	56.3
158	56.9
159	58.1
160	58.4
161	59.6
162	59.9
163	60.2
164	60.5
165	59.7
166	58.3
167	58.1
168	57.8
169	57.3
170	57.5
171	56.6
172	57.0
173	56.6
174	56.5
175	56.2
176	56.4
177	56.6
178	56.4
179	56.1
180	56.0
181	55.9
182	54.8
183	54.2
184	54.6
185	52.2
186	54.7
187	55.7
188	57.0
189	58.0
190	58.1
191	59.4
192	59.9
193	61.0
194	61.4
195	61.9
196	62.5
197	62.5
198	62.7
199	62.2
200	62.5
201	63.1

202	62.7
203	62.8
204	63.0
205	64.1
206	63.9
207	64.1
208	64.3
209	64.5
210	64.9
211	65.3
212	66.0
213	66.0
214	66.4
215	64.1
216	63.6
217	63.9
218	64.1
219	63.7
220	64.3
221	64.2
222	63.9
223	64.2
224	63.4
225	64.0
226	63.9
227	64.0
228	63.8
229	64.0
230	63.3
231	63.4
232	63.9
233	64.0
234	64.3
235	64.8
236	65.1
237	64.0
238	64.2
239	63.1
240	63.7
241	63.1
242	63.7
243	63.5
244	63.0
245	63.1
246	63.0
247	63.3

248	63.4
249	63.3
250	62.5
251	62.5
252	62.9
253	62.8
254	62.2
255	62.4
256	62.3
257	62.3
258	62.4
259	62.1
260	62.5
261	62.8
262	62.3
263	62.3
264	62.4
265	61.9
266	62.8
267	62.8
268	62.3
269	62.8
270	62.4
271	62.1
272	61.9
273	61.8
274	62.1
275	62.1
276	62.1
277	62.0
278	62.4
279	62.2
280	62.2
281	62.4
282	62.7
283	62.6
284	63.7
285	64.3
286	64.8
287	65.1
288	65.9
289	66.1
290	67.0
291	67.2
292	67.5
293	68.3

294	68.3
295	68.8
296	69.1
297	69.4
298	71.7
299	72.1
300	74.9
301	72.6
302	72.2
303	72.2
304	72.0
305	72.5
306	72.8
307	72.7
308	71.8
309	71.4
310	71.1
311	71.1
312	70.9
313	71.0
314	71.0
315	71.2
316	72.1
317	72.6
318	73.6
319	74.8
320	75.7
321	77.3
322	78.4
323	79.3
324	78.2
325	76.0
326	75.6
327	76.4
328	77.6
329	78.0
330	79.1
331	79.5
332	79.9
333	79.9
334	80.3
335	80.3
336	79.5
337	79.5
338	79.1
339	78.7

340	77.6
341	76.5
342	74.3
343	72.6
344	70.8
345	67.6
346	66.4
347	66.7
348	66.1
349	65.9
350	66.2
351	66.1
352	67.1
353	67.4
354	68.3
355	68.3
356	68.7
357	68.2
358	68.1
359	68.0
360	67.1
361	66.4
362	66.1
363	65.7
364	66.0
365	66.4
366	66.0
367	66.3
368	67.0
369	67.5
370	67.9
371	68.1
372	68.5
373	68.9
374	68.6
375	69.4
376	69.4
377	69.4
378	70.0
379	70.4
380	70.6
381	70.9
382	70.3
383	70.6
384	70.3
385	69.7

386	69.9
387	70.1
388	69.6
389	69.3
390	69.9
391	69.7
392	69.5
393	69.9
394	70.2
395	70.2
396	70.2
397	71.0
398	70.8
399	70.9
400	70.7
401	70.9
402	71.2
403	71.3
404	70.8
405	71.2
406	71.7
407	71.9
408	72.6
409	72.3
410	72.3
411	72.1
412	72.0
413	71.9
414	72.6
415	72.8
416	73.2
417	72.1
418	71.5
419	70.9
420	70.4
421	70.5
422	70.9
423	70.2
424	71.0
425	70.2
426	70.3
427	69.1
428	68.8
429	68.2
430	68.3
431	68.2

432	67.7
433	67.3
434	67.5
435	67.6
436	67.6
437	67.2
438	67.0
439	66.3
440	66.6
441	66.2
442	66.4
443	65.9
444	66.1
445	65.5
446	62.2
447	62.2
448	61.4
449	61.1
450	61.4
451	61.1
452	61.4
453	61.4
454	61.8
455	61.8
456	61.8
457	61.8
458	62.2
459	61.8
460	62.2
461	62.6
462	62.2
463	62.6
464	62.2
465	62.6
466	62.6
467	63.0
468	62.6
469	62.2
470	61.1
471	59.5
472	58.8
473	56.8
474	55.7
475	54.1
476	51.5
477	49.2

478	48.8
479	47.6
480	44.9
481	41.5
482	37.2
483	34.6
484	33.0
485	29.2
486	22.3
487	17.7
488	17.3
489	14.0
490	10.0
491	6.0
492	2.0
493	0.0
494	0.0
495	0.0
496	0.0
497	0.0
498	0.0
499	0.0
500	0.0
501	0.2
502	4.4
503	10.1
504	15.6
505	20.8
506	25.1
507	27.7
508	28.2
509	26.8
510	24.8
511	22.4
512	17.1
513	11.3
514	6.9
515	7.5
516	11.1
517	15.4
518	19.9
519	24.2
520	27.1
521	28.5
522	28.2
523	25.6

524	21.7
525	17.3
526	12.1
527	7.5
528	5.8
529	2.4
530	1.2
531	1.9
532	6.7
533	11.8
534	16.8
535	21.7
536	25.9
537	27.7
538	28.0
539	27.1
540	24.4
541	20.2
542	15.2
543	9.3
544	5.0
545	2.9
546	2.4
547	8.4
548	13.5
549	17.8
550	22.2
551	26.2
552	30.0
553	29.8
554	26.0
555	21.3
556	16.2
557	11.4
558	6.6
559	2.6
560	0.0
561	0.0
562	0.0
563	0.0
564	0.0
565	0.0
566	0.0
567	0.0
568	0.3
569	6.4

570	12.7
571	19.2
572	23.8
573	28.2
574	34.9
575	37.5
576	40.3
577	45.0
578	49.9
579	51.6
580	51.2
581	50.6
582	49.9
583	47.8
584	44.6
585	41.2
586	37.8
587	33.4
588	28.0
589	23.7
590	18.8
591	12.9
592	6.2
593	2.2
594	0.0
595	0.0
596	0.0
597	0.0
598	0.0
599	0.0
600	0.0

(h) EPA AC866 Driving Schedule for Light-Duty Vehicles and Light-Duty Trucks.

EPA AC866

DRIVING SCHEDULE

(Speed versus Time Sequence)

Time	Speed
(sec.)	(mph)
0	0.0
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0

6	1.2
7	3.5
8	5.5
9	6.5
10	8.5
11	9.6
12	10.5
13	11.9
14	14.0
15	16.0
16	17.7
17	19.0
18	20.1
19	21.0
20	22.0
21	23.0
22	23.8
23	24.5
24	24.9
25	25.0
26	25.0
27	25.0
28	25.0
29	25.0
30	25.0
31	25.6
32	25.8
33	26.0
34	25.6
35	25.2
36	25.0
37	25.0
38	25.0
39	24.4
40	23.1
41	19.8
42	16.5
43	13.2
44	9.9
45	6.6
46	3.3
47	0.0
48	0.0
49	0.0
50	0.0
51	0.0

52	0.0
53	0.0
54	0.0
55	0.0
56	0.0
57	0.0
58	0.0
59	0.0
60	0.0
61	0.0
62	0.0
63	0.0
64	3.3
65	6.6
66	9.9
67	13.0
68	14.6
69	16.0
70	17.0
71	17.0
72	17.0
73	17.5
74	17.7
75	17.7
76	17.5
77	17.0
78	16.9
79	16.6
80	17.0
81	17.1
82	17.0
83	16.6
84	16.5
85	16.5
86	16.6
87	17.0
88	17.6
89	18.5
90	19.2
91	20.2
92	21.0
93	21.1
94	21.2
95	21.6
96	22.0
97	22.4

98	22.5
99	22.5
100	22.5
101	22.7
102	23.7
103	25.1
104	26.0
105	26.5
106	27.0
107	26.1
108	22.8
109	19.5
110	16.2
111	12.9
112	9.6
113	6.3
114	3.0
115	0.0
116	0.0
117	0.0
118	0.0
119	0.0
120	0.0
121	0.0
122	0.0
123	0.0
124	0.0
125	0.0
126	0.0
127	0.0
128	0.0
129	0.0
130	0.0
131	0.0
132	0.0
133	0.0
134	0.0
135	0.0
136	0.0
137	0.0
138	0.0
139	0.0
140	0.0
141	2.0
142	4.5
143	7.8

144	10.2
145	12.5
146	14.0
147	15.3
148	17.5
149	19.6
150	21.0
151	22.2
152	23.3
153	24.5
154	25.3
155	25.6
156	26.0
157	26.1
158	26.2
159	26.2
160	26.4
161	26.5
162	26.5
163	26.0
164	25.5
165	23.6
166	21.4
167	18.5
168	16.4
169	14.5
170	11.6
171	8.7
172	5.8
173	3.5
174	2.0
175	0.0
176	0.0
177	0.0
178	0.0
179	0.0
180	0.0
181	0.0
182	0.0
183	0.0
184	0.0
185	0.0
186	0.0
187	0.0
188	0.0
189	1.4

190	3.3
191	4.4
192	6.5
193	9.2
194	11.3
195	13.5
196	14.6
197	16.4
198	16.7
199	16.5
200	16.5
201	18.2
202	19.2
203	20.1
204	21.5
205	22.5
206	22.5
207	22.1
208	22.7
209	23.3
210	23.5
211	22.5
212	21.6
213	20.5
214	18.0
215	15.0
216	12.0
217	9.0
218	6.2
219	4.5
220	3.0
221	2.1
222	0.5
223	0.5
224	3.2
225	6.5
226	9.6
227	12.5
228	14.0
229	16.0
230	18.0
231	19.6
232	21.5
233	23.1
234	24.5
235	25.5

236	26.5
237	27.1
238	27.6
239	27.9
240	28.3
241	28.6
242	28.6
243	28.3
244	28.2
245	28.0
246	27.5
247	26.8
248	25.5
249	23.5
250	21.5
251	19.0
252	16.5
253	14.9
254	12.5
255	9.4
256	6.2
257	3.0
258	1.5
259	1.5
260	0.5
261	0.0
262	3.0
263	6.3
264	9.6
265	12.9
266	15.8
267	17.5
268	18.4
269	19.5
270	20.7
271	22.0
272	23.2
273	25.0
274	26.5
275	27.5
276	28.0
277	28.3
278	28.9
279	28.9
280	28.9
281	28.8

282	28.5
283	28.3
284	28.3
285	28.3
286	28.2
287	27.6
288	27.5
289	27.5
290	27.5
291	27.5
292	27.5
293	27.5
294	27.6
295	28.0
296	28.5
297	30.0
298	31.0
299	32.0
300	33.0
301	33.0
302	33.6
303	34.0
304	34.3
305	34.2
306	34.0
307	34.0
308	33.9
309	33.6
310	33.1
311	33.0
312	32.5
313	32.0
314	31.9
315	31.6
316	31.5
317	30.6
318	30.0
319	29.9
320	29.9
321	29.9
322	29.9
323	29.6
324	29.5
325	29.5
326	29.3
327	28.9

328	28.2
329	27.7
330	27.0
331	25.5
332	23.7
333	22.0
334	20.5
335	19.2
336	19.2
337	20.1
338	20.9
339	21.4
340	22.0
341	22.6
342	23.2
343	24.0
344	25.0
345	26.0
346	26.6
347	26.6
348	26.8
349	27.0
350	27.2
351	27.8
352	28.1
353	28.8
354	28.9
355	29.0
356	29.1
357	29.0
358	28.1
359	27.5
360	27.0
361	25.8
362	25.0
363	24.5
364	24.8
365	25.1
366	25.5
367	25.7
368	26.2
369	26.9
370	27.5
371	27.8
372	28.4
373	29.0

374	29.2
375	29.1
376	29.0
377	28.9
378	28.5
379	28.1
380	28.0
381	28.0
382	27.6
383	27.2
384	26.6
385	27.0
386	27.5
387	27.8
388	28.0
389	27.8
390	28.0
391	28.0
392	28.0
393	27.7
394	27.4
395	26.9
396	26.6
397	26.5
398	26.5
399	26.5
400	26.3
401	26.2
402	26.2
403	25.9
404	25.6
405	25.6
406	25.9
407	25.8
408	25.5
409	24.6
410	23.5
411	22.2
412	21.6
413	21.6
414	21.7
415	22.6
416	23.4
417	24.0
418	24.2
419	24.4

420	24.9
421	25.1
422	25.2
423	25.3
424	25.5
425	25.2
426	25.0
427	25.0
428	25.0
429	24.7
430	24.5
431	24.3
432	24.3
433	24.5
434	25.0
435	25.0
436	24.6
437	24.6
438	24.1
439	24.5
440	25.1
441	25.6
442	25.1
443	24.0
444	22.0
445	20.1
446	16.9
447	13.6
448	10.3
449	7.0
450	3.7
451	0.4
452	0.0
453	0.0
454	0.0
455	2.0
456	5.3
457	8.6
458	11.9
459	15.2
460	17.5
461	18.6
462	20.0
463	21.1
464	22.0
465	23.0

466	24.5
467	26.3
468	27.5
469	28.1
470	28.4
471	28.5
472	28.5
473	28.5
474	27.7
475	27.5
476	27.2
477	26.8
478	26.5
479	26.0
480	25.7
481	25.2
482	24.0
483	22.0
484	21.5
485	21.5
486	21.8
487	22.5
488	23.0
489	22.8
490	22.8
491	23.0
492	22.7
493	22.7
494	22.7
495	23.5
496	24.0
497	24.6
498	24.8
499	25.1
500	25.5
501	25.6
502	25.5
503	25.0
504	24.1
505	23.7
506	23.2
507	22.9
508	22.5
509	22.0
510	21.6
511	20.5

512	17.5
513	14.2
514	10.9
515	7.6
516	4.3
517	1.0
518	0.0
519	0.0
520	0.0
521	0.0
522	0.0
523	0.0
524	0.0
525	0.0
526	0.0
527	0.0
528	0.0
529	0.0
530	0.0
531	0.0
532	0.0
533	0.0
534	0.0
535	0.0
536	0.0
537	0.0
538	0.0
539	0.0
540	0.0
541	0.0
542	0.0
543	0.0
544	0.0
545	0.0
546	0.0
547	0.0
548	1.2
549	4.0
550	7.3
551	10.6
552	13.9
553	17.0
554	18.5
555	20.0
556	21.8
557	23.0

558	24.0
559	24.8
560	25.6
561	26.5
562	26.8
563	27.4
564	27.9
565	28.3
566	28.0
567	27.5
568	27.0
569	27.0
570	26.3
571	24.5
572	22.5
573	21.5
574	20.6
575	18.0
576	15.0
577	12.3
578	11.1
579	10.6
580	10.0
581	9.5
582	9.1
583	8.7
584	8.6
585	8.8
586	9.0
587	8.7
588	8.6
589	8.0
590	7.0
591	5.0
592	4.2
593	2.6
594	1.0
595	0.0
596	0.1
597	0.6
598	1.6
599	3.6
600	6.9
601	10.0
602	12.8
603	14.0

604	14.5
605	16.0
606	18.1
607	20.0
608	21.0
609	21.2
610	21.3
611	21.4
612	21.7
613	22.5
614	23.0
615	23.8
616	24.5
617	25.0
618	24.9
619	24.8
620	25.0
621	25.4
622	25.8
623	26.0
624	26.4
625	26.6
626	26.9
627	27.0
628	27.0
629	27.0
630	26.9
631	26.8
632	26.8
633	26.5
634	26.4
635	26.0
636	25.5
637	24.6
638	23.5
639	21.5
640	20.0
641	17.5
642	16.0
643	14.0
644	10.7
645	7.4
646	4.1
647	0.8
648	0.0
649	0.0

650	0.0
651	0.0
652	0.0
653	0.0
654	0.0
655	0.0
656	0.0
657	0.0
658	0.0
659	0.0
660	0.0
661	0.0
662	0.0
663	0.0
664	2.1
665	5.4
666	8.7
667	12.0
668	15.3
669	18.6
670	21.1
671	23.0
672	23.5
673	23.0
674	22.5
675	20.0
676	16.7
677	13.4
678	10.1
679	6.8
680	3.5
681	0.2
682	0.0
683	0.0
684	0.0
685	0.0
686	0.0
687	0.0
688	0.0
689	0.0
690	0.0
691	0.0
692	0.2
693	1.5
694	3.5
695	6.5

696	9.8
697	12.0
698	12.9
699	13.0
700	12.6
701	12.8
702	13.1
703	13.1
704	14.0
705	15.5
706	17.0
707	18.6
708	19.7
709	21.0
710	21.5
711	21.8
712	21.8
713	21.5
714	21.2
715	21.5
716	21.8
717	22.0
718	21.9
719	21.7
720	21.5
721	21.5
722	21.4
723	20.1
724	19.5
725	19.2
726	19.6
727	19.8
728	20.0
729	19.5
730	17.5
731	15.5
732	13.0
733	10.0
734	8.0
735	6.0
736	4.0
737	2.5
738	0.7
739	0.0
740	0.0
741	0.0

742	0.0
743	0.0
744	0.0
745	0.0
746	0.0
747	1.0
748	1.0
749	1.0
750	1.0
751	1.0
752	1.6
753	3.0
754	4.0
755	5.0
756	6.3
757	8.0
758	10.0
759	10.5
760	9.5
761	8.5
762	7.6
763	8.8
764	11.0
765	14.0
766	17.0
767	19.5
768	21.0
769	21.8
770	22.2
771	23.0
772	23.6
773	24.1
774	24.5
775	24.5
776	24.0
777	23.5
778	23.5
779	23.5
780	23.5
781	23.5
782	23.5
783	24.0
784	24.1
785	24.5
786	24.7
787	25.0

788	25.4
789	25.6
790	25.7
791	26.0
792	26.2
793	27.0
794	27.8
795	28.3
796	29.0
797	29.1
798	29.0
799	28.0
800	24.7
801	21.4
802	18.1
803	14.8
804	11.5
805	8.2
806	4.9
807	1.6
808	0.0
809	0.0
810	0.0
811	0.0
812	0.0
813	0.0
814	0.0
815	0.0
816	0.0
817	0.0
818	0.0
819	0.0
820	0.0
821	0.0
822	0.0
823	0.0
824	0.0
825	0.0
826	0.0
827	0.0
828	0.0
829	0.0
830	0.0
831	0.0
832	0.0
833	1.5

834	4.8
835	8.1
836	11.4
837	13.2
838	15.1
839	16.8
840	18.3
841	19.5
842	20.3
843	21.3
844	21.9
845	22.1
846	22.4
847	22.0
848	21.6
849	21.1
850	20.5
851	20.0
852	19.6
853	18.5
854	17.5
855	16.5
856	15.5
857	14.0
858	11.0
859	8.0
860	5.2
861	2.5
862	0.0
863	0.0
864	0.0
865	0.0
866	0.0
867	0.0

(i) EPA SC01 Driving Schedule for Light-Duty Vehicles and Light-Duty Trucks

EPA SC01  
DRIVING SCHEDULE  
(Speed versus Time Sequence)

Time (sec)	Speed (mph)
0	0.0
1	0.0
2	0.0

3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	0.0
13	0.0
14	0.0
15	0.0
16	0.0
17	0.0
18	0.0
19	0.9
20	3.0
21	2.9
22	3.3
23	3.5
24	2.2
25	1.4
26	0.0
27	0.0
28	0.0
29	0.0
30	0.0
31	0.0
32	0.0
33	0.4
34	3.3
35	6.0
36	8.0
37	8.7
38	10.0
39	12.4
40	13.8
41	14.7
42	14.8
43	16.6
44	18.3
45	19.0
46	19.2
47	19.3
48	19.7

49	20.5
50	21.0
51	21.2
52	21.6
53	22.2
54	23.8
55	24.6
56	24.3
57	23.3
58	22.7
59	21.4
60	20.4
61	19.5
62	17.9
63	15.6
64	11.7
65	7.8
66	7.2
67	9.3
68	12.9
69	15.8
70	16.2
71	16.9
72	18.3
73	20.3
74	21.6
75	22.4
76	23.0
77	22.8
78	22.1
79	21.2
80	19.5
81	17.1
82	14.1
83	10.5
84	7.6
85	7.5
86	10.0
87	13.1
88	14.1
89	16.4
90	19.6
91	22.4
92	24.7
93	26.1
94	25.8

95	26.6
96	27.8
97	28.5
98	28.9
99	29.3
100	29.5
101	29.4
102	29.4
103	29.8
104	30.3
105	30.6
106	30.5
107	30.5
108	30.1
109	29.3
110	28.4
111	27.6
112	26.8
113	25.5
114	23.7
115	21.7
116	19.3
117	16.7
118	14.4
119	11.5
120	7.9
121	6.6
122	9.4
123	12.4
124	14.8
125	16.1
126	19.3
127	22.6
128	25.5
129	26.4
130	26.7
131	27.8
132	29.4
133	31.1
134	32.5
135	33.6
136	34.6
137	35.4
138	36.1
139	37.0
140	37.7

141	38.1
142	38.3
143	38.1
144	37.8
145	36.6
146	34.8
147	33.2
148	32.4
149	32.3
150	32.3
151	32.4
152	32.4
153	32.4
154	32.5
155	33.3
156	34.4
157	35.5
158	36.6
159	37.4
160	38.0
161	38.4
162	38.5
163	38.6
164	38.4
165	38.2
166	37.5
167	36.9
168	36.3
169	34.8
170	33.0
171	31.4
172	30.7
173	30.3
174	30.0
175	29.3
176	27.4
177	25.1
178	21.8
179	17.2
180	12.5
181	8.1
182	4.5
183	2.0
184	1.0
185	0.6
186	0.0

187	0.0
188	0.0
189	0.0
190	0.0
191	0.0
192	0.0
193	0.0
194	0.0
195	0.0
196	0.0
197	0.0
198	0.0
199	0.0
200	0.0
201	0.0
202	0.0
203	0.0
204	0.0
205	1.0
206	0.5
207	2.6
208	7.7
209	12.3
210	15.8
211	17.3
212	19.4
213	23.3
214	27.2
215	31.0
216	33.6
217	34.2
218	35.8
219	37.3
220	38.3
221	39.2
222	40.1
223	40.9
224	41.0
225	40.4
226	39.7
227	39.1
228	38.1
229	36.7
230	35.9
231	35.9
232	35.7

233	34.9
234	33.9
235	32.6
236	31.9
237	31.1
238	30.6
239	30.3
240	30.1
241	29.9
242	29.8
243	29.8
244	29.8
245	29.8
246	29.7
247	29.7
248	29.6
249	28.4
250	25.8
251	22.8
252	19.0
253	14.0
254	8.6
255	4.1
256	1.3
257	0.0
258	0.0
259	0.0
260	0.1
261	4.5
262	9.1
263	13.6
264	18.2
265	22.6
266	26.2
267	29.3
268	32.1
269	34.5
270	36.8
271	38.4
272	40.0
273	41.2
274	41.9
275	42.2
276	42.7
277	43.0
278	43.3

279	43.5
280	43.7
281	44.3
282	45.4
283	45.9
284	46.8
285	47.6
286	48.2
287	48.6
288	48.7
289	48.6
290	49.0
291	49.8
292	50.5
293	51.2
294	52.1
295	52.7
296	53.4
297	52.4
298	54.5
299	54.8
300	54.8
301	54.7
302	54.3
303	54.0
304	53.8
305	53.5
306	53.3
307	52.9
308	52.6
309	52.0
310	51.6
311	51.0
312	50.3
313	49.3
314	48.1
315	46.5
316	43.6
317	40.7
318	37.2
319	34.4
320	31.4
321	28.6
322	24.2
323	18.1
324	12.3

325	8.1
326	4.8
327	2.6
328	2.1
329	0.0
330	0.0
331	0.0
332	0.0
333	0.0
334	0.0
335	0.0
336	0.0
337	0.0
338	0.0
339	0.0
340	0.0
341	0.0
342	0.0
343	0.0
344	0.0
345	0.0
346	0.0
347	0.0
348	0.0
349	0.0
350	0.0
351	0.0
352	0.0
353	0.0
354	0.0
355	0.0
356	0.0
357	0.0
358	0.0
359	0.0
360	0.0
361	0.0
362	0.0
363	0.0
364	0.0
365	0.0
366	0.0
367	0.0
368	0.0
369	0.0
370	0.0

371	0.0
372	0.0
373	3.4
374	6.9
375	9.7
376	11.6
377	14.3
378	17.4
379	20.1
380	22.4
381	24.1
382	25.8
383	27.3
384	28.4
385	29.8
386	31.1
387	32.4
388	33.5
389	34.3
390	35.0
391	35.8
392	36.4
393	36.9
394	37.2
395	37.2
396	37.1
397	36.9
398	36.5
399	36.2
400	35.8
401	35.5
402	35.3
403	35.5
404	36.0
405	36.8
406	37.4
407	37.8
408	38.2
409	38.1
410	38.0
411	37.6
412	36.8
413	37.0
414	36.8
415	36.7
416	36.6

417	36.5
418	36.4
419	36.5
420	36.7
421	36.8
422	37.1
423	37.3
424	37.5
425	37.6
426	37.6
427	38.0
428	38.0
429	38.3
430	38.2
431	38.2
432	37.7
433	37.5
434	37.0
435	36.6
436	35.5
437	34.3
438	32.8
439	31.6
440	30.7
441	29.1
442	27.4
443	26.2
444	25.2
445	25.1
446	25.2
447	24.6
448	22.7
449	19.7
450	17.7
451	16.6
452	15.8
453	16.0
454	16.4
455	17.5
456	19.5
457	21.8
458	24.3
459	27.0
460	29.2
461	30.6
462	32.0

463	33.0
464	33.4
465	33.4
466	32.5
467	31.6
468	28.4
469	23.6
470	19.6
471	17.2
472	15.1
473	12.6
474	8.6
475	5.3
476	7.1
477	10.4
478	13.5
479	17.1
480	20.4
481	22.8
482	25.2
483	27.3
484	29.3
485	31.1
486	33.0
487	35.0
488	36.9
489	38.5
490	39.7
491	40.2
492	40.5
493	40.4
494	40.3
495	40.3
496	40.2
497	41.0
498	41.2
499	40.5
500	39.3
501	37.5
502	35.0
503	32.4
504	29.9
505	27.0
506	25.6
507	25.3
508	25.3

509	25.1
510	24.5
511	22.3
512	21.6
513	21.3
514	21.2
515	21.8
516	23.1
517	24.0
518	25.1
519	25.6
520	26.5
521	27.7
522	28.4
523	28.3
524	27.5
525	26.6
526	24.2
527	21.5
528	19.1
529	17.4
530	17.2
531	18.6
532	20.5
533	22.6
534	24.7
535	26.5
536	28.0
537	29.3
538	30.2
539	31.1
540	31.6
541	32.0
542	32.0
543	32.1
544	32.2
545	32.2
546	32.1
547	31.8
548	31.0
549	29.6
550	26.8
551	22.7
552	17.3
553	11.3
554	8.1

555	6.6
556	5.1
557	3.9
558	2.6
559	1.4
560	0.8
561	0.3
562	0.6
563	1.7
564	3.2
565	4.1
566	4.1
567	2.2
568	0.0