(b) This sample fuel economy calculation is applicable to 1988 and later model year automobiles.

(1) Assume that a gasoline-fueled vehicle was tested by the Federal Emission Test Procedure and the following results were calculated:

HC = .139 grams/mile.
CO = 1.59 grams/mile.
CO_2 = 317 grams/mile.

(2) Assume that the test fuel used for this test had the following properties:

SG = 0.745.
CWF = 0.868.
NHV = 18,478 Btu/lb.

(3) According to the procedure in §600.113–08, the city fuel economy or MPG_c, for the vehicle may be calculated by substituting the HC, CO, and CO_2 gram/mile values and the SG, CWF, and NHV values into the following equation:

$MPG_c = (5174 \times 10^4 \times CWF \times SG) / [((CWF \times HC) + (0.429 \times CO + (0.273 \times CO_2)) ((0.6 \times SG \times NHV) + 5471)]$

Example:

$MPG_c = (5174 \times 10^4 \times 0.868 \times 0.745) / [(0.868 \times .139 + 0.429 \times 1.59 + 0.273 \times 317)(0.6 \times 0.745 \times 18478 + 5471)]$

$MPG_c = 27.9$

(4) Assume that the same vehicle was tested by the Federal Highway Fuel Economy Test Procedure and a calculation similar to that shown in (b)(3) of this section resulted in a highway fuel economy of MPG_h of 36.9. According to the procedure in §600.210(c), the combined fuel economy (called MPG_{comb}) for the vehicle may be calculated by substituting the city and highway fuel economy values into the following equation:

$$MPG_{comb} = \frac{1}{\frac{0.55}{MPG_c} + \frac{0.45}{MPG_h}}$$

$$MPG_{comb} = \frac{1}{\frac{0.55}{27.9} + \frac{0.45}{36.9}}$$

$$MPG_{comb} = 31.3$$

[51 FR 37852, Oct. 24, 1986, as amended at 71 FR 77958, Dec. 27, 2006]

APPENDIX III TO PART 600—SAMPLE FUEL ECONOMY LABEL CALCULATION

Suppose that a manufacturer called Mizer Motors has a product line composed of eight car lines. Of these eight, four are available with the 3.0 liter, 6 cylinder, sequential multi-point fuel injection, 4-valve per cylinder, and 3-way catalyst engine. These four car lines are:

Ajax
Boredom III
Dodo
Castor (Station Wagon)

A. A car line is defined in subpart A (with additional guidance provided in EPA Advisory Circular 89) as a group of vehicles within a make or division which has a degree of commonality in construction. Car line does not consider any level of decor or opulence and is not generally distinguished by such characteristics as roofline, number of doors, seats, or windows. Station wagons and light duty trucks are, however, identified separately from the remainder of each car line. In other words, a Castor station wagon would be considered a different car line than the normal Castor car line made up of sedans, coupes, etc.

B. The engine considered here is defined as a basic engine in subpart A of this part (with additional guidance provided in EPA Advisory Circular 83A). A basic engine is a unique combination of manufacturer, engine displacement, number of cylinders, fuel system, catalyst usage and other engine and emission control system characteristics specified by the Administrator. A model type is a unique combination of car line, basic engine, and transmission class. Thus Ajax is a car line but Ajax 3.0 liter, 6 cylinder manual four-speed transmission is a model type whereas Ajax 3.0 liter, 6 cylinder automatic three-speed transmission is a different model type.

C. The following calculations provide an example of the procedures described in subpart C of this part for the calculation of vehicle configuration and model type fuel economy values. In order to simplify the presentation, only city fuel economy values are included (as determined by either the derived 5-cycle method or vehicle-specific 5-cycle based method). The procedure is identical for highway and combined fuel economy values.

Step I. Input data as supplied by the manufacturer or as determined from testing conducted by the Administrator.

Manufacturer—Mizer Motors

Basic Engine: (3.0 liter, 6 cylinder, sequential multi-point fuel injection, 4-valve per cylinder, 3-way catalyst).

Test vehicle carline	Engine code	Trans	Inertia weight	Axle ratio	Harmonically averaged. city MPG	Specific label MPG [1]	Vehicle config. sales
Ajax	1	M–4	3500	2.73	16.1001	16	15,000
Ajax	2	A–3	3500	2.56	15.9020	16	35,000
Boredom III	4	M–4	4000	3.08	14.2343	14	10,000
Ajax	3	M–4	4000	3.36	15.0000	15	15,000
Boredom III	8	A–3	4000	2.56	13.8138	14	25,000
Boredom III	5	A–3	4500	3.08	13.2203	13	20,000
Castor	5	A–3	5000	3.08	10.6006	11	40,000

[1] The vehicle configuration fuel economy values, rounded to the nearest mile per gallon, are the fuel economy values that would be used on specific labels for that vehicle configuration.

Step II. Group vehicle fuel economy and sales data according to base level combinations within this basic engine.

Base level	Transmission class	Inertia weight	Miles per gallon	Projected vehicle configuration sales
A	Manual-4	3,500	16.1001	15,000
B	Automatic-3	3,500	15.9020	35,000
C	Manual-4	4,000	14.2343	10,000
C	Manual-4	4,000	15.0000	15,000
D	Automatic-3	4,000	13.8138	25,000
E	Automatic-3	4,500	13.2203	20,000
F	Automatic-3	5,000	10.6006	40,000

Step III. Determine base level fuel economy values.

A. For all the base levels except the base level which includes 4,000 pound, manual four-speed transmission data, the base level fuel economy is as noted in Step II since only one vehicle configuration was tested within each of these base levels.

3,500 lb/M4 transmission.	16.1001 mpg.
3,500 lb/A3 transmission.	15.9020 mpg.
4,000 lb/A3 transmission.	13.8138 mpg.
4,500 lb/A3 transmission.	13.2203 mpg.
5,000 lb/A3 transmission.	10.6006 mpg.

B. Since data from more than one vehicle configuration are included in the 4,000-pound, manual four-speed transmission base level, this fuel economy is harmonically averaged in proportion to the percentage of total sales of all vehicle configurations tested within that base level represented by each vehicle configuration tested within that base level.

$$\text{Base level fuel economy} = \frac{1}{\left[\begin{array}{l}\text{Fraction of total sales of configurations}\\ \text{tested represented by}\\ \text{configuration No. 1 sales}\end{array}\right]\left[\begin{array}{l}\frac{1}{\text{Configuration}}\\ \text{No. 1 fuel economy}\end{array}\right] + \left[\begin{array}{l}\text{Fraction of total sales}\\ \text{of configurations tested}\\ \text{represented by configuration}\\ \text{No. 2 sales}\end{array}\right]\left[\begin{array}{l}\frac{1}{\text{Configuration}}\\ \text{No. 2 1 fuel economy}\end{array}\right]}$$

Base level: M4 transmission, 4000 pounds:

$$\frac{1}{\left[\frac{10000}{25000}\right]\frac{1}{14.2343}+\left[\frac{15000}{25000}\right]\frac{1}{15.0000}} = 14.6840 \text{ miles per gallon}$$

Therefore, the 4000 pound, M4 transmission fuel economy is 14.6840 miles per gallon.

Note that the car line of the test vehicle using a given engine makes no difference—only the weight and transmission do.

Step IV. For each model type offered by the manufacturer with that basic engine, determine the sales fraction represented by each inertia weight/transmission class combination and the corresponding fuel economy.

Ajax	M4	0.4000 at 3,500 lb	16.1001
		0.6000 at 4,000 lb	14.6840
	A3	0.3000 at 3,500 lb	15.9020
		0.7000 at 4,000 lb	13.8138
Dodo	M4	0.4000 at 3,500 lb	16.1001
		0.6000 at 4,000 lb	14.6840
	A3	0.3000 at 3,500 lb	15.9020
		0.7000 at 4,000 lb	13.8138
Boredom III	M4	1.0000 at 4,000 lb	14.6840
	A3	0.2500 at 4,000 lb	13.8138
		0.7500 at 4,500 lb	13.2203
Castor	A3	0.2000 at 4,500 lb	13.2203
		0.8000 at 5,000 lb	10.6006

Step V. Determine fuel economy for each model type (that is, car line/basic engine/transmission class combination).

Ajax, 3.0 liter, 6 cylinder, A3 transmission, model type MPG is calculated as follows:

$$\frac{1}{\left[\frac{\text{The fraction of Ajax vehicles using the 3.0 liter, 6 cylinder engine which fall in the 3500 lb inertia weight class with an A3 transmission}}{\text{Fuel economy for 3.0 liter, 6 cylinder 3500 lb A3 transmission base level}}\right]+\left[\frac{\text{The fraction of Ajax vehicles using the 3.0 liter, 6 cylinder engine which fall in the 4000 lb inertia weight class with an A3 transmission}}{\text{Fuel economy for 3.0 liter 6 cylinder 4000 lb A3 transmission base level}}\right]}$$

$$= \frac{1}{\left[\frac{0.3000}{15.9020}\right]+\left[\frac{0.7000}{13.8138}\right]} = 14.3803 \text{ mpg, which rounds to 14 MPG}^{1}$$

Similarly, Ajax and Dodo 3.0 liter, 6 cylinder, M4 model type MPG is calculated as follows:

$$\frac{1}{\left[\frac{0.4000}{16.1001}\right]+\left[\frac{0.6000}{14.6840}\right]} = 15.2185, \text{ which rounds to 15 MPG}^{1}$$

Dodo 3.0 liter, 6 cylinder, A3 model type MPG is calculated as follows:

$$= \frac{1}{\left[\frac{0.3000}{15.9020}\right] + \left[\frac{0.7000}{13.8138}\right]} = 14.3803 \text{ mpg, which rounds to 14 MPG}^{1}$$

Boredom III 3.0 liter 6 cylinder M4 model type MPG = 14.6840 mpg, which rounds to 15 mi./gal[1]

Boredom III 3.0 liter, 6 cylinder, A3 model type MPG is calculated as follows:

$$\frac{1}{\left[\frac{0.2500}{13.8138}\right] + \left[\frac{0.7500}{13.2203}\right]} = 13.3638, \text{ which rounds to 13 MPG}^{1}$$

Castor 3.0 liter, 6 cylinder, A3 model type MPG is calculated as follows:

$$\frac{1}{\left[\frac{0.2000}{13.2203}\right] + \left[\frac{0.8000}{10.6006}\right]} = 11.0381, \text{ which rounds to 11 MPG}^{1}$$

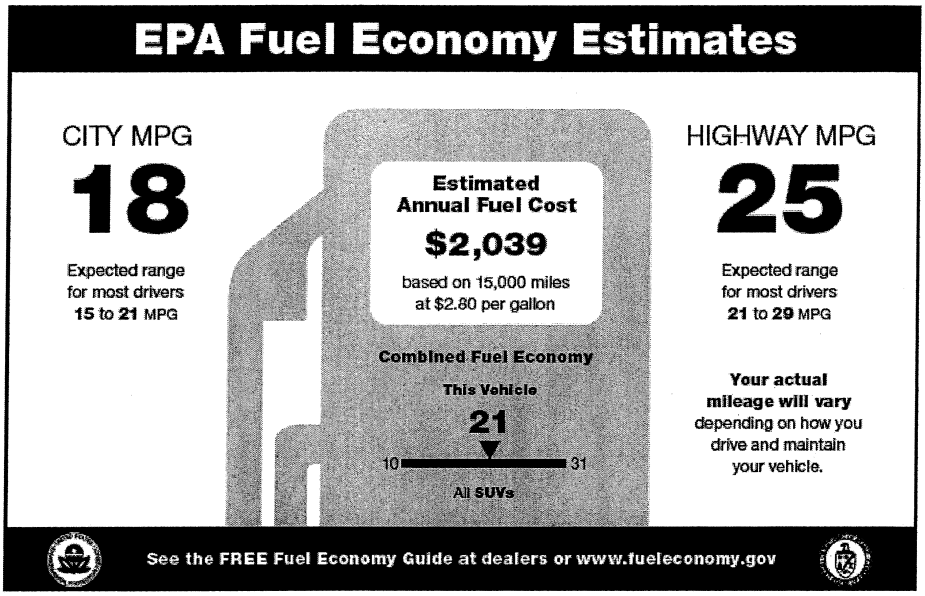
Note that even though no Dodo was actually tested, this approach permits its fuel economy figure to be estimated, based on the inertia weight distribution of projected Dodo sales within a specific engine and transmission grouping.

[71 FR 77958, Dec. 27, 2006]

[1]The model type fuel economy values rounded to the nearest mile per gallon, are the fuel economy values listed in the EPA Fuel Economy Guide and used on the general labels (window stickers) for production vehicles for that model year.

APPENDIX IV TO PART 600—SAMPLE FUEL ECONOMY LABELS FOR 2008 AND LATER MODEL YEAR VEHICLES

A. Gasoline (or diesel)-fueled vehicle label



B. Gasoline (or diesel)-fueled vehicle label (with transitional text statement for MY 2008 and 2009 vehicles only)