5.2.2 Vehicle Trade Cycle

Calculating the cost of owning and operating a vehicle requires knowing the miles driven and how long the car is owned. In the automobile industry, these two factors are known collectively as a vehicle's ''trade cycle.'' The trade cycle is stated as a length of time (in months or years) and the total number of miles driven in that time period. This information is used in the model to compute annual costs related to fuel, oil, tires, maintenance, and depreciation.

As with the previous living-cost analyses, JFA used a four-year, 60,000-mile trade cycle in all areas. This was based upon the following information:

—The Internal Revenue Service uses this trade cycle to compute the allowable cents-per-mile reimbursement rate for persons who drive their personal vehicle for business purposes;

—The four-year time period coincides with the typical length of a vehicle loan; and

—U.S. Department of Energy statistics for 1988 show that the annual average for number of vehicle miles driven in the United States was 18,595 per household and 10,246 miles per vehicle.

5.2.3 Fuel Performance and Type

All vehicles included in this study used regular unleaded fuel. JFA surveyed self-service cash prices of unleaded regular gasoline at name-brand gas stations in each area.

To establish average fuel-performance ratings, the COLA model uses the ''city driving'' figures published by the U.S. Environmental Protection Agency (EPA). The ''city'' instead of ''highway'' figures are used because all locations contained considerable stop-and-go driving conditions.

As in previous COLA surveys, JFA included in its analysis the following fuel-performance factors: temperature, road surface, and gradient. These factors are based on research previously conducted for OPM. This research and the factors are discussed below.

5.2.3.1 Impact of Temperature Upon Fuel Performance

Gas mileage is affected by temperature. The lower the temperature, the fewer miles-per-gallon achieved and vice versa. According to the EPA's *Passenger Car Fuel Economy: EPA and Road*, the temperature at which no adjustments to fuel performance occur is 77°F. Below that temperature, miles-per-gallon achieved drops; above 77° miles-per-gallon achieved improves. The model uses the average monthly temperatures for each allowance area and the Washington, DC, area as reported in *The Weather Almanac*, published by Ruffner and Blair.

For each location and month, the model uses the appropriate factor from the EPA study based on the average monthly temperature for the area. These factors are then averaged to derive a single overall factor for each location. The results of these calculations are shown in section 5.2.3.4.

5.2.3.2 Impact of Road Surface Upon Fuel Performance

For the model, it is assumed that Federally controlled roadways are typically composed of concrete and/or highload asphalt and that locally controlled roadways are typically composed of low-load asphalt. EPA's research indicates that cars are generally more fuel-efficient on the firmer, high-load surfaces than on the softer, low-load surfaces.

Although traffic patterns and road usage vary among areas, previous research conducted for OPM produced no relevant findings regarding this issue. Therefore, the model uses the assumption that Federally controlled roadways generally support twice the traffic of, or are used at least twice as much as, locally controlled roadways.

In each allowance area, the total mileage falling into either the Federal or local categories was collected. For example, Hawaii contains 1,456 miles of Federally controlled roads and 2,606 miles of locally controlled roads. The usage assumption increased Federal road mileage by a factor of two.

The average low-load asphalt factor (which reflects dry, wet, and snowy conditions) is applied to the local mileage percentage, and the average concrete and/or high-load asphalt factor is applied to the Federal mileage percentage to produce a weighted average factor for each area. The weighted factor is 0.98 for the allowance areas. The Washington, DC, area is assigned a factor of 1.00 on the premise that the vast majority of traffic in that area travels on dry, high-load surfaces. The application of these factors is described in section 5.2.3.4.

5.2.3.3 Impact of Gradient Upon Fuel Performance

The effect of gradient on gas mileage is also estimated from EPA's *Passenger Car Fuel Economy: EPA and Road*. Local topography (i.e., gradient) affects fuel efficiency. EPA provides mileage factors based upon various gradients ranging from less than 0.5% (essentially flat) to greater than 6% (steep).

In research previously conducted for OPM, the contractor reviewed the topographic features of each area and found a wide range of road conditions. However, the contractor was unable to find relevant information on the types of terrain drivers typically encounter in each area or the number of miles drivers travel in each type of terrain. Lacking such information, the contractor assumed that drivers in the allowance areas generally traveled roads having approximately the same gradients that are found on average in the United States.

Applying the information from EPA's research, a fuel-performance factor of 0.981 was computed for this type of driving. This factor was assigned to each allowance area. For the Washington, DC, area, a factor of 1.00 was used on the premise that the vast majority of traffic in that area travels on major freeways and highways that are relatively flat. The application of these factors is described in the next section.

5.2.3.4 Overall Impact Upon Fuel Performance

JFA applied the factors described above to make adjustments to the average gas mileage ratings for each type of automobile surveyed for each allowance area and for the Washington, DC, area. The adjustment factors compound—that is, the total adjustment is the result of multiplying the three individual factors together for each area.

In the table below, the factor 1.00 means that no adjustment to EPA fuel performance is appropriate. A factor of less than 1.00 means that the estimated gasoline mileage in the area is less than the EPA average. For example, the total adjustment factor for Guam is 0.95. This means that the estimated gasoline mileage in Guam is 95% of the EPA estimated average. Note that the adjustment factor for the DC area (0.94) indicates that average gasoline mileage in that area is also below the EPA estimate.