4. COST OF CHANGES IN OPERATIONS

This chapter presents the approach to estimating the costs of the changes in productivity described in Chapter 3. The methodology used in estimating the costs in this study follow the same procedures used in the Regulatory Impact Analysis (RIA) conducted for the 2003 rule. As a result, this chapter first presents an overview of the methodology used in the 2003 RIA and summarizes the important cost estimates used in this analysis. This is followed by a discussion on the additional cost components expected to have a small impact on the total costs of the rule options.

4.1 COST COMPONENTS FROM PREVIOUS RIA

The analysis considered two main types of costs – employment costs for hiring new drivers due to the loss in productivity for the existing drivers and costs for purchasing new tractor-trailers and other support services for the new drivers. This section provides a summary of these costs. For more details about the methodology, refer to chapter 6 of the 2003 RIA.

4.1.1 Driver Labor Costs

A significant portion of the cost was estimated to be driver-related labor cost changes. Changes in the number of hours drivers can work or drive under the different HOS rule options were first translated to changes in driver's labor productivities using the simulation model explained elsewhere in this RIA. These changes were then used to calculate changes in the number of drivers needed over the baseline (we assumed 1.5 million drivers each in long- and short-hauls based on the industry profile presented in chapter 3 of the 2003 RIA).

Changes in the number of drivers were then translated into labor cost changes using the estimated wage-hours worked functional relationship for truck drivers. This functional relationship was estimated based on an ordinary least squares (OLS) regression model expressing truck driver wages as a function of various job attributes (e.g., hours worked per week, occupational experience, and their squared terms) and other worker characteristics (e.g., age, educational level attained, marital status, sex, etc). We used data from the Bureau of Labor Statistics Current Population Survey to estimate the wage equation for the non-union segment of the trucking industry. Refer to Exhibit 6-1 in the 2003 RIA for the estimated coefficients and other details about the regression results.

Based on the regression results, we estimated the predicted wages for truck drivers for different weekly work schedules and the average and marginal wage relationships as a function of hours worked. These relationships were then used to calculate both the additional wage costs (savings) for the *existing* drivers as they were allowed to drive more (fewer) hours under the different HOS rule options, as well as the incremental wage costs for the *new* drivers required under the different options (or cost savings if there was an increase in labor productivity under an option). The wages required for drivers under the different options were also determined by the elasticity of the market labor supply curve for all truck drivers. Based on an extensive review of the labor economics literature for blue collar workers, in general, and truck drivers, in particular, we estimated the elasticity of market labor supply curve to be 5 and used it in conjunction with the average and marginal wage curves to estimate the overall labor costs for the different rule options.

4.1.2 Other Non-driver Costs

Another part of the direct costs were related to the non-driver changes necessary as a result of the changes in the number of drivers. Several categories of non-driver costs were estimated. More details about these are provided in Sections 6.4 and 6.6 in the 2003 RIA:

- **Non-driver Labor –** Costs associated with overhead labor categories that are directly proportional to the number of drivers (e.g., driver managers, load planners, etc.) Thus, hiring more drivers for the 2003 HOS options implied there was a need to hire more overhead labor, leading to non-driver labor costs. We assumed companies spent an additional 4 percent of their total labor cost calculated above on these overhead labor categories.

- **Trucks –** Costs associated with purchasing tractors and trailers for the new drivers.

- **Parking –** Construction and maintenance costs for providing additional parking spaces at terminals.

- **Insurance –** Additional tractor-trailers represent increased capital stock with associated insurance costs (even if firm-level VMT is assumed to be constant).

- **Maintenance –** Additional tractor-trailers also require increased maintenance costs for regular safety inspections and other routine maintenance requirements.

- **Recruitment –** Costs associated with recruiting new drivers.

Using the driver labor and other non-driver cost components, the total cost of the FMCSA option (i.e., 2003 rule) for the long-haul was estimated to be a cost savings of a little over $1 billion for a 3.9 percent increase in driver labor productivity (2000$). See Exhibit 9-2 in the 2003 RIA for the breakdown of this total cost into the different components. This implied that a 1 percent change in labor productivity translated to approximately $275 million (2000$) in incremental *unit* costs.

For the present analysis, we updated this unit cost to 2004$ based on GDP deflator data from the Bureau of Economic Analysis' National Income and Product Accounts (NIPA), presented in Exhibit 4-1 below.

Exhibit 4-1: GDP Deflator - (Base Year 2000=100)

Year	GDP Deflator
2000	100
2001	102.40
2002	104.09
2003	106.00
2004	108.24

Source: BEA NIPA tables

Thus, a 1 percent change in labor productivity for truck drivers translated to $298 million (2004$) in incremental unit costs. Note that converting the total cost changes to a "unit cost" number, as is done here, is possible because our analysis showed that there was a linear relationship between changes in driver labor productivity and the associated costs.

Exhibit 4-2 below presents the breakdown of these unit costs into the different components discussed above (for the long-haul):

Exhibit 4-2: Unit Costs for HOS Options

Change in Labor Demand	1%
Change in Number of Drivers	15,000
Driver Labor Cost	**$176**
Avoided Labor Wages	-$429
Avoided Labor Benefits	-$26
New Labor Wages	$482
New Labor Benefits	$149
Other Costs	**$121**
Non-driver Labor	$7
Trucks	$50
Parking	$15
Insurance	$11
Maintenance	$19
Recruitment	$20
Total	**$298**

4.2 ADDITIONAL COST COMPONENTS

4.2.1 Training Costs for HOS Options

Because several commenters for the 2005 HOS NPRM provided data on costs of re-training drivers and other personnel, we added this component to the other non-driver cost components discussed above. Using the total re-training costs provided by the commenters, we estimated a *cost per driver* based on the number of drivers for these companies. These "unit costs" varied between $75 and $150 per driver. The wide range is due to the variability in the level of detail provided by different companies. In particular, some companies did not make it clear whether the costs they estimated were only for driver re-training or if it included other non-driver staff re-training as well.

The lower end of the cost range was reported by a company (CR England) that appeared to have estimated only driver re-training costs. ICF decided that this may be too low if we consider re-training costs for both drivers and supporting staff. As a result, we decided to use $100 per driver as a reasonable point estimate for the re-training costs. Note that since these comments were for in response to the 2005 NPRM, we assume these costs to be in 2004$.

Using a 7-percent interest rate, 10 years as the amortization period, and 1.5 million total long-haul truck drivers (all standard assumptions used in the 2003 RIA), we calculated the annualized re-training costs for the long-haul segment to be $21 million (2004$). It should be noted here that while retraining costs may in fact vary somewhat by Alternative Option, the RIA for today's rule assumed these costs are constant. For example, under Option 2, while it might be the case that certain carriers would only retrain their long-haul drivers who currently use the sleeper berth provision, it may also be the case that some carriers would want to train their entire driver workforce (depending on how many drivers currently use the sleeper berth provision versus those who may use it in the future). As such, retraining costs for Option 2 could be considered conservative, in that they may over-represent the true retraining costs associated with this option.

4.2.2 Mode Shifts

As discussed above, restricting the hours truck drivers are allowed to drive (and work) reduces their productivity, thus requiring more drivers to maintain the same volume of business. Not only does this entail having to pay *all* drivers higher market wages to attract more drivers, this also means companies need additional equipment and non-driver labor. All this translates to higher costs for trucking companies and assuming a complete pass-through, implies higher rates for trucking as a result of the new options being considered. Consistent with the previous RIA, we assume that the probability of switching traffic from truck to rail is effectively zero for movements less than 250 miles. That is for hauls less than 250 miles, the demand for trucking is insensitive to changes in trucking rates.

However, for movements greater than 250 miles (considered to be the longest of the long hauls), we assume there is a non-trivial probability of mode shift due to the higher rates as these segments are more sensitive to price increases and are expected to lose some business due to a shift to rail.

In order to estimate the impact of mode shift on trucking volumes, we use results from the Logistics Cost Model (LCM) developed by Paul Roberts and used in the 2003 RIA. This model was exercised over a range of changes in truck prices from a 2.0 percent decrease to a 2.0 percent increase. Using the simulation results from these options we estimated a price elasticity of -1.4. This meant that, for a 1.0 percent change in trucking rates, there is a 1.4 percent change in trucking shipments, truck shipments increasing with a rate decrease and diminishing with a rate increase. This measure of elasticity was then used to estimate impacts on truck and rail traffic for each of the HOS rule options. Refer to Chapter 7 and Appendix D in the 2003 RIA for details about the model.

Exhibit 4-3 below summarizes the results of the mode shift effects for the FMCSA option in the 2003 RIA.

Exhibit 4-3
Mode Shift Results

	FMCSA
Direct HOS-Induced Costs, LH Only	-1,073
Percentage Change in Wages due to Driver Supply Elasticity	-0.3%
Change in LH Wage Bill due to Wage Increases	-206
Total Change in LH Costs	-1,279
Percentage Increase in LH Costs	-0.3%
Percentage Change in LH VMT due to Mode Shift	0.25%
Change in LH Drivers due to Mode Shift	3,820

Thus, a total cost savings of $1,279 million for the long-haul translated to a 0.3 percent increase in the total cost of all long-haul trucking. Using the appropriate cost adjustments for the long haul segments affected by mode shift, and a mode shift elasticity of -1.4, we estimated the percentage change in long-haul VMT due to mode shift to be 0.25 percent (for a 3.9 percent rise in labor productivity for the FMCSA option). Thus, a 1 percent change in labor productivity translates to a 0.064 percent change in VMT due to mode shift. Although this effect is small, we include it as a secondary effect when estimating the costs of the 2005 HOS rule options.