

the basis of a laboratory study of performance on a driving simulator;

(6) Calibrated the results of the modeling of simulated crash risks to the real world using independent estimates of the total numbers and percentages of crashes attributable to fatigue; and

(7) Translated the estimated changes in fatigue-related crashes into dollar values for avoided crashes using existing estimates of the damages from fatal, injury, and property-damage only crashes.

Safety Benefits

The quantified and monetized benefits of the options derive from their

effects on truck crashes. Changes in work and sleep schedules induced by the HOS alternatives can be translated into relative changes in modeled fatigue-related crashes, can be calibrated to correspond to independent estimates of numbers of fatigue-related crashes, and the damages from fatigue-related crashes can be projected for each of the alternatives. First, the FMCSA shows changes for crash damages for long-haul and short-haul operations. Two other sources of benefits (or reductions in benefits) are then described: changes in damages resulting from the employment of different numbers of new drivers, and

changes in damages in long-haul operations resulting from shifts between truck and rail.

Changes in Crash Damages Due to Schedule Changes

The FMCSA found the benefits of the alternatives, in terms of the annual values of the crash reductions shown in Table 1 (RIA Exhibit 9–6), by subtracting the damages under each alternative from the damages for the current rules with 100 percent compliance.

TABLE 1.—VALUE OF CRASHES AVOIDED DUE TO OPERATIONAL CHANGES RELATIVE TO CURRENT RULES WITH FULL COMPLIANCE

[(Millions of dollars per year) (Number in parentheses equal cost of additional crashes)]

	PATT	ATA	FMCSA
Benefits of Avoided Long-haul Crashes	364	(267)	224
Benefits of Avoided Short-haul Crashes	36	(8)	10
Total Benefits	400	(275)	234

Source: RIA Exhibit 9–6.

Overall, the FMCSA predicts fatigue-related crashes to be significantly more of a problem in long-haul than short-haul operations. This fact can be attributed in part to the somewhat heavier work schedules of long-haul drivers, but also to the fact that long-haul operations appear more likely to subject drivers to irregular and rotating schedules. The FMCSA projected two of the alternatives, PATT and FMCSA, to reduce accidents substantially relative to the current rules with full compliance. Much of their effectiveness stems from the greater likelihood of moving towards a 24-hour work-rest cycle with decreased schedule rotation; they also allowed for increased sleep during the workweek. Reductions in short-haul crashes were much smaller than the reductions in long-haul crashes, both in relative and absolute terms.

Changes in Fatigue-related Fatalities Due to Schedule Changes

Beyond valuing the benefits of the alternatives, it is useful to present the changes in fatalities that they cause. Estimating fatigue-related fatalities and changes in them under each alternative can be done most easily by referring to the total annual number of fatalities in truck crashes, presented in RIA Exhibit 8–1, splitting that number between long-haul and short-haul operations using the data presented in RIA Exhibit 8–3, and then multiplying by the fatigue-related percentages by alternative shown in RIA Exhibit 8–14. Changes in fatalities can then be calculated by comparing the fatigue-related fatalities for the different alternatives.

RIA Exhibit 8–1 gives the total annual fatalities in truck crashes as 5,346; this is slightly larger than the number of fatal crashes because some crashes cause multiple fatalities. Of these, 61.8

percent or 3,304 are estimated to occur in long-haul operations, with the other 2,042 in short-haul operations. Among the long-haul fatalities, the FMCSA concentrated on the 85.4 percent or 2,821 that it estimated to occur in those portions of the long-haul sector that would be most affected by the rules (*i.e.*, excluding team-driver and LTL operations).

Multiplying the 2,821 long-haul fatalities and 2,042 short-haul fatalities by the fatigue-related percentages shown in RIA Exhibit 8–15 yields fatigue-related fatalities. For the Status Quo, these calculations yielded estimates of 316 for long-haul and 80 for short-haul, for a total of 396. For the alternatives, the estimates are shown below in Table 2 (RIA Exhibit 9–7). The table also shows the changes in fatalities relative to the current rules with full compliance.

TABLE 2.—ANNUAL FATIGUE-RELATED FATALITIES BY ALTERNATIVE

[Numbers in parentheses are negative]

	Current/ 100%	PATT	ATA	FMCSA
Long-haul:				
Fatalities in Crashes Attributable to Fatigue	240	176	287	201
Differences by Alternative Relative to Current/100%	NA	(64)	47	(39)
Short-haul:				
Fatalities in Crashes Attributable to Fatigue	77	71	78	75
Differences Relative to Current/100%	NA	(5)	1	(2)