

DEPARTMENT OF TRANSPORTATION**Federal Motor Carrier Safety Administration****49 CFR Parts 385, 386, 390, and 395****[Docket No. FMCSA–2004–19608]****RIN 2126–AB26****Hours of Service of Drivers****AGENCY:** Federal Motor Carrier Safety Administration (FMCSA), DOT.**ACTION:** Final rule.

SUMMARY: FMCSA revises the hours of service (HOS) regulations to limit the use of the 34-hour restart provision to once every 168 hours and to require that anyone using the 34-hour restart provision have as part of the restart two periods that include 1 a.m. to 5 a.m. It also includes a provision that allows truckers to drive if they have had a break of at least 30 minutes, at a time of their choosing, sometime within the previous 8 hours. This rule does not include a change to the daily driving limit because the Agency is unable to definitively demonstrate that a 10-hour limit—which it favored in the notice of proposed rulemaking (NPRM)—would have higher net benefits than an 11-hour limit. The current 11-hour limit is therefore unchanged at this time. The 60- and 70-hour limits are also unchanged. The purpose of the rule is to limit the ability of drivers to work the maximum number of hours currently allowed, or close to the maximum, on a continuing basis to reduce the possibility of driver fatigue. Long daily and weekly hours are associated with an increased risk of crashes and with the chronic health conditions associated with lack of sleep. These changes will affect only the small minority of drivers who regularly work the longer hours.

DATES: *Effective date:* February 27, 2012.

Compliance date: The rule changes that affect Appendix B to Part 386—Penalty Schedule; Violations and Monetary Penalties; the oilfield exemption in § 395.1(d)(2); and the definition of on-duty time in § 395.2 must be complied with on the effective date. Compliance for all the other rule changes is not required until July 1, 2013.

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I. Summary**A. Overview**

The goal of this rulemaking is to reduce excessively long work hours that increase both the risk of fatigue-related crashes and long-term health problems for drivers. A rule cannot ensure that drivers will be rested, but it can ensure that they have enough time off to obtain adequate rest on a daily and weekly basis. The objective of the rule, therefore, is to reduce both acute and chronic fatigue by limiting the maximum number of hours per day and week that the drivers can work.

The 2003 hours-of-service (HOS) rule shortened the driving window to 14 consecutive hours and increased the off-duty period from 8 to 10 hours, but increased driving time from 10 to 11 hours and allowed drivers to restart their duty time calculations whenever they took at least 34 consecutive hours off. Limiting the driving window and

increasing the daily off-duty period reduced the risk that a driver would be driving so long after the start of the duty day that acute fatigue would be extreme. It also moved drivers toward a 24-hour daily clock, which is people's normal pattern, reducing the risk of fatigue caused from continually changing sleep periods. The 2003 rule, however, allowed drivers to work 14 hours without a break and to work 80 or more hours a week, a substantial increase from the previous rule, which allowed about 60 hours in 7 days.

Since the 2003 rule was promulgated, new research studies have demonstrated that long work hours, both daily and weekly, lead to reduced sleep and, in the absence of sufficient recovery time, chronic fatigue. Fatigued drivers have slowed reaction times and a reduced ability to assess situations quickly. The research has also shown that commercial motor vehicle (CMV) drivers (like most other people) are unable to assess their own fatigue levels accurately and are, therefore, often unaware that their performance has degraded. When driving an 80,000-pound CMV at highway speeds, any delay in reacting to a potentially dangerous situation can be deadly. In addition to the safety concerns, recent research has linked long work hours and the resulting curtailment of sleep to a range of serious health effects, particularly when combined with a job that is basically sedentary, like truck driving. These health conditions—including obesity, high blood pressure, other cardiovascular diseases, diabetes, and sleep apnea—not only shorten drivers' lives, but also can result in substantial ongoing medical costs and put drivers' medical certifications at risk. CMV drivers suffer from these conditions at a higher rate than the population as a whole.

Today's rule will reduce the risk of fatigue and fatigue-related crashes and the harm to driver health in several ways. While the rule allows a driver flexibility in when to take a mandatory 30 minute break, it prohibits a driver from driving if more than 8 hours have passed since the driver's last off-duty or sleeper berth break of at least 30 minutes; research indicates that such breaks alleviate fatigue and fatigue-related performance degradation. Because research has shown that long weekly work hours are associated with a higher risk of crashes, sleep loss, and negative health effects, the rule also limits the use of the restart to once a week, which, on average, will cut the maximum work week from 82 to 70 hours. The provision allows drivers to work intensely for one week, but will

require them to compensate by taking more time off in the following week. Research has long demonstrated that daytime sleep is shorter in duration and lower in quality than nighttime sleep. The rule requires any driver working long enough to need a restart to take off at least 34 consecutive hours that include 2 periods between 1 a.m. and 5 a.m., the window of circadian low. This provision will give those drivers who both routinely work at night and put in very long work weeks an opportunity to overcome the chronic fatigue that can build up when working nights.

FMCSA has been engaged in long-term rulemaking related to its hours of service regulations for commercial truck drivers. Like the Federal Aviation Administration (FAA), FMCSA is working to address the universality of factors that lead to fatigue. However, the FAA has taken a different approach in addressing fatigue risk among pilots than FMCSA has with respect to commercial truck drivers. This is because the two industries operate differently both in terms of the likely number of days the affected individuals work per month and the respective operating environments. For example, pilots regularly cross multiple time zones in a very short period time—something that is simply not possible in other modes of transportation. Additionally, pilots may work several days that are very long, but then be off for an extended period of time, a practice that naturally imposes a non-regulatory restorative rest opportunity. Finally, the nature of commercial flying is such that under typical conditions, the actual operation is likely to require intense concentration primarily during take-offs and landings, with a constant, but generally predictable level of concentration required for other phases of flight.

In contrast, commercial truck drivers face an environment where they are required to share the highways with drivers who have not received specialized training nor are they subject to the same regulatory constraints that pilots are subject to. This environment could logically lead to a regulatory approach with different fatigue mitigators for daytime operations on congested highways, compared to nighttime operations, where the roads are less crowded but the risk of fatigue is greater.

In summary, the final rule will reduce the likelihood of driver fatigue, fatigue-related crashes, and fatigue-related health effects. Although crash rates have been falling, thousands of people are still injured and killed in truck crashes each year, including hundreds of truck

drivers. This rule will address one of the causes of those crashes. The Agency estimates that the benefits of the rule (reduction in crashes and improved driver health) will outweigh the costs. The cost of the rule represents a small fraction of one percent of trucking industry revenues and is the cost-equivalent of less than a 3 cent-a-gallon increase in the price of diesel fuel to the long-haul industry.

B. Proposed Rule

On December 29, 2010, FMCSA published a notice of proposed rulemaking (NPRM) to revise the HOS rules (75 FR 82170). The Agency sought comment on both a 10- and an 11-hour daily driving limit. The NPRM proposed to retain the 34-hour restart, but with two qualifications: The restart must include two consecutive periods between midnight and 6 a.m. and could be used only once every 168 hours (7 days). It also proposed that drivers be limited to 13 hours on duty in each 14-hour driving window. Many drivers would be required to take at least one half-hour break during their work shift. FMCSA also proposed that twice a week, drivers would be allowed to extend the driving window to 16 hours, but could not work more than a maximum of 13 hours in that time. FMCSA also proposed changing the definition of on-duty time to allow team drivers to log 2 hours in the passenger seat before or after an 8-hour period in the sleeper berth as off-duty time and to allow drivers resting in a parked CMV to count that time as off duty. FMCSA would also have clarified the oilfield exemption and proposed a provision to allow, but not require, FMCSA to impose maximum penalties if the driving-time limit was exceeded by 3 hours. The NPRM included a long discussion of the research on fatigue and on issues related to long hours, fatigue, and health.

On May 9, 2011, FMCSA reopened the comment period to accept comments on four studies related to the HOS proposal (76 FR 26681).

C. Final Rule

Although the NPRM proposed both a 10- and an 11-hour daily driving limit, the Agency stated that it favored a 10-hour limit. However, this final rule does not adopt any change in the limit on daily driving time; the current 11-hour limit therefore remains unchanged.

In the course of this rulemaking, FMCSA examined many studies on the relationship between work hours and health and safety, both in trucking and other industries; reviewed the comments and information submitted to

the docket, mostly in opposition to a 10-hour driving limit; and completed elaborate analyses in accordance with Presidential Executive Order 13563, issued January 18, 2011, "Improving Regulation and Regulatory Review," [76 FR 3821, January 21, 2011] of the costs and benefits to health and safety of 9-, 10-, and 11-hour driving limits.

1. *9-Hour Driving Limit.* The Agency found that a 9-hour driving limit generally has negative net benefits (*i.e.*, its costs exceed its benefits). In most cases the 11-hour limit has positive net benefits. For these reasons, the Agency has not adopted a 9-hour driving limit.

2. *10-Hour Driving Limit.* The 10-hour limit has positive benefits in approximately half the cases, with the 11-hour limit having substantially higher net benefits than the 10-hour limit in most cases. A 10-hour limit, on the other hand, might save more lives and prevent more crashes than an 11-hour limit, but at a higher cost.

The research literature on fatigue in the motor carrier industry generally shows that crash risk increases with work hours, both daily and weekly. The available data, however, are not sufficiently robust to yield a statistically significant distinction between the crash risk associated with any two adjacent hours of work.

In the absence of compelling scientific evidence demonstrating the safety benefits of a 10-hour driving limit, as opposed to an 11-hour limit, and confronted with strong evidence that an 11-hour limit could well provide higher net benefits, the Agency has concluded that adequate and reasonable grounds under the Administrative Procedure Act for adopting a new regulation on this issue do not yet exist and that the current driving limit should therefore be allowed to stand for now. This is not to say that FMCSA is foreclosing the possibility of action on this subject; future research may provide a basis for reconsidering the daily driving limit. Consistent with Executive Order 13563, which directs agencies to "measure, and seek to improve, the actual results of regulatory requirements," FMCSA is committed to conducting a comprehensive analysis of the relative crash risk by driving hour and the impact of the changes in the HOS provisions in today's final rule. The Agency plans to match data collected from driver logs with crash information to determine the level of crash risk by hours of driving. The Agency also plans to estimate, for similarly situated drivers, the difference between crash risk after restarts that include two nights and those that do not. Additionally, the Agency is committed to conducting

periodic driver surveys to longitudinally track how the changes in the HOS provisions, such as the two-night restart, have impacted sleep patterns and aspects of driver fatigue and performance. FMCSA will work with the Office of Management and Budget (OMB) on the methodologies of these new statistical data collections. These efforts will build on several planned and ongoing FMCSA driver fatigue-related studies such as the on-board monitoring field test/naturalistic data collection, split sleep study, driver recovery and napping study, and the planned new large truck crash causation study.

This decision also is consistent with the President's E.O. 13563 and his concurrent memorandum for the heads of executive departments and agencies entitled "Regulatory Flexibility, Small Business, and Job Creation" [76 FR 3827, January 21, 2011]. As the President stated in the latter document, "My Administration is firmly committed to eliminating excessive and unjustified burdens on small businesses, and to ensuring that regulations are designed with careful consideration of their effects, including their cumulative effects, on small businesses." This order is particularly important for the trucking industry, which has a higher percentage of small businesses than many other segments of the U.S. economy.

3. *Thirty-Minute Break.* In response to commenters' concerns, FMCSA adopts a slightly modified form of the break proposed in the NPRM. Research with drivers and in other industrial sectors indicates that the risk of accidents falls substantially after a break, with off-duty breaks providing the greatest reduction in risk. The final rule requires that if more than 8 consecutive hours on duty—compared to 7 hours in the NPRM—have passed since the last off-duty (or sleeper-berth) period of at least half an hour, a driver must take a break of at least 30 minutes before driving. For example, if the driver started driving immediately after coming on duty, he or she could drive for 8 consecutive hours, take a half-hour break, and then drive another 3 hours, for a total of 11 hours. Alternatively, this driver could drive for 3 hours, take a half-hour break, and then drive another 8 hours, for a total of 11 hours. In other words, this driver could take the required break anywhere between the 3rd and 8th hour after coming on duty. A driver who plans to drive until the end of the 14th hour and wants to take only one break will need to take a break between the 6th and 8th hour after coming on duty. Drivers will have great flexibility in deciding when to take the break. By postponing the

latest point at which the break can be taken from the 7th to the 8th hour, the rule will make it significantly easier for team drivers to fit the break into their schedules. To address an issue raised by commenters, FMCSA has also added an exception for drivers of CMVs carrying Division 1.1, 1.2, or 1.3 explosives to allow them to count on-duty time spent attending the CMV, but doing no other on-duty work, toward the break.

4. *14-Hour Driving Window.* The maximum driving window will continue to be 14 consecutive hours after coming on duty. To address commenters' concerns about complexity, FMCSA has dropped the proposed 13-hour limit for on-duty time within the 14 hours to simplify the rule. Because of the break provision, drivers will be able to work 13.5 hours in the 14 hour period (if they are driving after the 8th hour on duty).

5. *Mandatory Off-Duty Requirement at the End of the Driving Window.* FMCSA has not adopted the proposal that drivers be required to go off-duty at the end of the 14th hour. Neither the costs nor the benefits of the provision could be adequately analyzed.

6. *Twice Weekly Extension of the Driving Window.* FMCSA did not adopt the proposed extension of the duty period to 16 hours twice a week. The same new research on drivers since the NPRM was completed indicates this provision should not be adopted. (See Section IV. "Discussion of All Comments" D. "New Research Studies" below.) Driving in the 16th hour after coming on duty entails a sharply higher risk of crashes than driving in early hours of a duty day. In addition, industry commenters were divided on the provision and generally skeptical that the provision would be useful.

The final rule retains provisions in paragraphs (e)(2) and (o) of § 395.1, which apply to local and regional operations. The NPRM sought comments on eliminating these paragraphs because they might have caused confusion with the proposed 16-hour provision. Because FMCSA has dropped the proposed 16-hour provision, the concerns about confusion are moot.

7. *Restart Provisions.* The final rule adopts the restart provision with one variation. The restart must cover at least 34 consecutive hours and include at least two periods between 1 a.m. and 5 a.m., not two periods between midnight and 6 a.m. as proposed in the NPRM. Although both alternatives cover most estimates of when the window of circadian low occurs, the 4-hour period addresses concerns drivers raised in the comment period by giving drivers

greater flexibility in ending and beginning the restart than the proposed 6-hour period. This provision does not affect day drivers, who always get two such periods in a 34-hour restart, but ensures that night drivers have an opportunity for 2 nights of restorative sleep when they are working longer hours. The 2-night provision does not affect drivers who are not using the restart to work extra hours. The Agency believes the costs are low compared to other provisions considered in this rulemaking. Only drivers who drive nights and work more than 60 or 70 hours in a week will be impacted. The nighttime operations of the major Less-than-Truckload (LTL) carriers should be minimally impacted, as their drivers generally receive 2 days off duty a week. Drivers who will be impacted by this provision work heavy and irregular schedules that include some nighttime driving.

FMCSA adopts the proposed provision to limit the use of the restart to once every 168 hours (7 days); this allows drivers to work long hours (81 hours) in 1 week but requires them to compensate in the subsequent week by taking extra time off. The limitation reduces maximum time during which a driver may drive up to an average of 70 hours in 7 days, a decrease from the 82-hour average allowed under the 2003 rule. The purpose of the rule change is to limit work to no more than 70 hours a week on average. Working long daily and weekly hours on a continuing basis is associated with chronic fatigue, a high risk of crashes, and a number of serious chronic health conditions.

This final rule adopts the definition of on-duty time as proposed except to add a reference to § 397.5. The final rule also adopts the clarification of the oilfield exemption and penalty provisions.

A more in-depth rationale for each of these provisions is presented in the responses to comments in Section IV "Discussion of All Comments" of this preamble.

D. Summary of Economic Impacts

The Regulatory Impact Analysis (RIA) analyzed three options beyond the baseline (no change) option. Option 3 has an 11-hour driving-time limit; it would require the driver to take a rest break during the day and reduce the weekly maximum driving and on-duty time theoretically achievable. Options 2 and 4 are identical to Option 3 in all respects except for the amount of driving time allowed. Option 2 has an 10-hour driving-time limit, while Option 4 has a 9-hour driving-time limit. Option 2 (10 hours) would have a productivity impact of approximately

2.7 percent. That is, we estimate that productivity in the industry would be reduced by 2.7 percent due to adoption of this option. Option 3 (11 hours) would have a productivity impact of 1.2 percent. The Agency's cost estimate for Option 3 is less than one third of one percent of industry revenues. Option 4 (9 hours) would involve much higher costs. Tables 1 and 2 provide a summary of the estimated costs, benefits, and net benefits at 3 and 7 percent discount rates. The RIA is discussed in Section VI "Required Analyses" A. "Executive Order 12866 and Executive Order 13563" of this preamble and is available in the docket.

The RIA also estimated the impacts of the HOS rule components individually. To estimate the impacts of the rule provisions, we consider the overlapping effects of the individual rule components to ensure that the impacts of one provision are not also attributed to a second provision. Because this analysis accounts for the individual impact of the rule provisions, the sum of the individual provisions is greater than the combined impact of the rule

provisions. Table 3 summarizes these differences, rounded to the nearest million to demonstrate the similarity in net benefits for some of these alternatives. Option 3, with all three provisions analyzed as a package, is shown to have net benefits of \$205 million. This calculation does not include the \$40 million FMCSA has estimated for reprogramming costs. That package with the 2 night provision removed (that is, including only the 7 day restart provision and the 30 minute break) appears to have marginally greater net benefits, at \$206 million. Not shown in the table, however, are the substantial unmonetized benefits the 2 night provision is expected to have due to the circadian advantages of nighttime sleep. As noted in Section 6.4 of the RIA, these additional benefits were too complex to be quantified and monetized reliably, but could only be beneficial both to driver health and to highway safety. They would almost certainly be large enough, though, to ensure that the net benefits of the rule are improved by the inclusion of the 2 night provision. Similarly, the net benefits of a package

that excluded the 30 minute break provision appears to be slightly greater than the net benefits of the Option 3 package, at \$206 million. Again, the 30 minute break provision is expected to provide very substantial crash reduction benefits that could not be included in the analysis. These benefits, as noted in Section 6.4, are related to the short-term reductions in crashes provided by the break's restorative effects on alertness. If these short-term benefits could be monetized and added to the break's effects on cumulative fatigue, they would almost certainly show it to be a cost-beneficial addition to the rule. Table 3 also presents the difference for each option when the provisions are considered separately or as a package.

These tables also make clear that under most assumptions about current sleep levels, moving to 10-hour driving time would result in lower net benefits, relative to an 11-hour driving time. Comparing Option 2 to Option 3, allowing only 10 hours of driving would increase costs substantially, without a commensurate increase in benefits.

TABLE 1—SUMMARY OF ANNUALIZED COSTS AND BENEFITS FOR RULE OPTIONS (7 PERCENT DISCOUNT RATE)
[Millions 2008\$]

	Option 2: 10 hours of driving allowed	Option 3: 11 hours of driving allowed	Option 4: 9 hours of driving allowed
Total Costs	\$1,000	\$470	\$2,290
Benefits with Low Sleep	1,410	910	2,240
Benefits with Medium Sleep	980	630	1,500
Benefits with High Sleep	550	350	770
Net Benefits with Low Sleep	400	440	— 50
Net Benefits with Medium Sleep	— 20	160	— 790
Net Benefits with High Sleep	— 450	— 120	— 1,520

Note: Totals do not add due to rounding.

TABLE 2—SUMMARY OF ANNUALIZED COSTS AND BENEFITS FOR RULE OPTIONS (3 PERCENT DISCOUNT RATE)
[Millions 2008\$]

	Option 2: 10 hours of driv- ing allowed	Option 3: 11 hours of driv- ing allowed	Option 4: 9 hours of driv- ing allowed
Total Costs	\$1,000	\$470	\$2,290
Benefits with Low Sleep	1,690	1,130	2,620
Benefits with Medium Sleep	1,110	750	1,630
Benefits with High Sleep	530	370	630
Net Benefits with Low Sleep	690	660	340
Net Benefits with Medium Sleep	110	280	660
Net Benefits with High Sleep	— 470	— 90	— 1,650

Note: Totals do not add due to rounding.

TABLE 3—COMPONENT AND INTERACTION COSTS, BENEFITS AND NET BENEFITS FOR OPTION 3 (11-HOUR DRIVING ALLOWED)
[Millions 2008\$]

Change from current rule baseline	Costs *	Safety benefits (13 percent fatigue)	Health benefits (medium sleep level, 7 percent discounting)	Net benefits *
7-day restart alone	\$342	\$227	\$318	\$204
2-night restart alone	51	35	38	22
30-minute break alone	94	72	94	72
Sum of Option 3 provisions, taken separately	487	334	450	297
Option 3 analyzed as a package	426	282	349	205
Overlap among Option 3 provisions (difference between sum of separate provisions and package)	62	52	102	92
Sum of 7 day and 2 night provisions, taken separately	393	262	356	225
7 day and 2 night provisions, analyzed as a package	393	260	340	206
Overlap between 7 day and 2 night provisions (difference between sum of separate provisions and package)	0	2	17	19
Sum of 7 day and 30 minute provisions, taken separately	436	299	412	276
7 day and 30 minute provisions, analyzed as a package	374	253	328	206
Overlap between 7 day and 30 minute provisions (difference between sum of separate provisions and package)	62	47	84	69
Sum of 2 night and 30 minute provisions, taken separately	145	107	132	94
2 night and 30 minute provisions, analyzed as a package	145	95	127	76
Overlap between 2 night and 30 minute provisions (difference between sum of separate provisions and package)	0	12	5	17

* Does not include the \$40 million in reprogramming costs.

Note: Totals do not add due to rounding.

E. Overview of Major Comments and Agency Responses

FMCSA held a public listening session and an online comment and question forum from noon to midnight on February 17, 2011, and accepted comments, until June 8, 2011, on the NPRM and on four studies later posted

to the docket. The Agency received about 21,100 unique comments, mostly from drivers, carriers, and industry associations. After FMCSA reopened the comment period on May 9, 2011, it received 14 comments on the four studies discussed in that notice. A summary of the comments and the Agency's responses are presented in

Section IV "Discussion of All Comments" of this preamble. Table 4 presents the data on the number and type of commenters. Table 5 presents the number of comments on each issue. As indicated in the table, no single rule provision drew comments from a majority of commenters.

TABLE 4—ANALYZED SUBMISSIONS BY COMMENTER TYPE

Commenter type	Number of unique submissions	Number of form letter copies	Total number of submissions
Drivers	18,875	2,209	21,084
Owner-Operators	273	3	276
Carriers	846	238	1,084
Individual Citizens	740	334	1,074
Other Industry	65	6	71
Trucking Associations	59	1	60
Other Trade Associations	62	1	63
Federal Agency	5	0	5
Federal Elected Official	21	2	23
State Government	4	0	4
Law Enforcement	5	0	5
Safety Advocacy Group	10	0	10
Other Advocacy Group	3	0	3
Anonymous	113	10	123
Other	25	2	27
Total	21,106	2,806	23,912

Note: Totals do not include 546 non-germane, non-responsive, or duplicate submissions.

TABLE 5—ISSUES ADDRESSED BY COMMENTERS

Issue	Number of unique submissions
Generally agree or disagree with the proposed rule:	
Agree (w/o substantive comment)	601
Disagree (w/o substantive comment)	8,028
Driving time	4,633
Breaks	2,569
Duty time	3,112
Driving window	598
Restart	4,776
On-duty definition:	
Support change to definition	109
Oppose change to definition	23
Other comments on definition of on-duty	30
Sleeper berth:	
Oppose current rule (want shorter splits)	594
Oppose current rule (oppose any splits)	14
Other comments on sleeper berth use	186
Penalties	66
Changes in § 395.1(e)(2) and (o):	
§ 395.1(e)(2)	13
§ 395(o)	4
Compliance dates	9
Cost-benefit analyses	388
Impacts on the economy	10,343
Comments on fatigue research presented	84
Comments on additional fatigue studies posted on May 6, 2011	14
Comments on health research presented	24
Comments beyond the scope of the rule:	
Parking	1,028
Payment by mile	184
Shippers	550
Electronic On-Board Recorders (EOBRs)	499
Other out-of-scope issues	785
Other comments	679
Request extension of comment period	2
Request public meetings/outreach	3
Oilfield exemption	44
10-hour off-duty time (shorter, longer)	205
One-size-fits-all (different rules for teams, locals, <i>etc.</i>)	442

The National Transportation Safety Board (NTSB), the National Institute of Occupational Safety and Health (NIOSH), and safety advocacy groups generally supported the rule, as did many of the citizens who commented. The industry, however, almost uniformly opposed the proposed changes. The industry commenters made two overarching arguments in opposing the provisions. First, they argued that the industry has never been safer, as indicated by the declines in crashes and crash rates and, therefore, that the 2003 rule has at least not made the industry less safe. Second, they stated that the rule changes would impose substantial costs on the industry, make night deliveries difficult, increase congestion, and lower driver incomes.

The industry also took the position that the 11th hour of driving time is used far less than FMCSA assumed in its economic analysis, that most drivers use the 34-hour restart provision to

make recordkeeping easier and for flexibility, not to work the maximum number of hours, and that drivers already take breaks. The industry stated that the data do not support the claim that the 11th hour of driving represents a higher risk than the 10th.

FMCSA acknowledged the decline in crashes and crash rates in the NPRM, but stated then, and reiterates now, that the decline in crashes and crash rates for both trucks and cars started in the late 1970s and has continued for both types of vehicles. The declines tend to be sharper during periods of economic recession, but other factors, such as improved vehicle and road design, are generally considered to have contributed to reductions. Furthermore, the significant decrease in truck crashes may not necessarily translate into significant decreases in fatigue-related crashes. FMCSA believes that the 2003 rule, which limited the duty period and lengthened the off-duty period, has certainly not diminished safety, but the

recent declines in crashes cannot be specifically attributed to that rule. More importantly, despite the improvement, 3,380 people were killed in truck crashes in 2009 (including 503 CMV drivers) and 74,000 were injured. Based on preliminary reports from the National Highway Traffic Safety Administration (NHTSA), the number of fatalities for truck-related crashes in 2010 rose by 8.7 percent to 3,675. Although historically low, the numbers are still far too high.

On the economic impact of the rule, industry comments and claims were internally contradictory (see Section IV. "Discussion of All Comments," B. "Economic Impacts" of this preamble for a detailed discussion). The American Trucking Associations (ATA), other industry associations, carriers, and the economic analysis commissioned by ATA (Edgeworth)¹ argued that

¹References to studies, reports, or other publications mentioned in this final rule use only
Continued

FMCSA's economic analysis had overstated the use of the 11th hour and restart provisions. ATA and other industry commenters argued that the low use of the provisions meant that fatigue was not a problem, but that changing the provisions would impose high costs. The Edgeworth study submitted by ATA, however, recognized that if the use of the provisions was less than FMCSA had estimated, both the costs and benefits of the rule would also be lower than FMCSA had estimated.

In September 2010, ATA submitted data to the HOS docket based on analyses of duty time for drivers. In the first sample, ATA looked at records for 3 months for over 118,000 drivers, mostly from the truckload sector; the data indicated that drivers were averaging 43.6 hours on duty in 7 days. In a smaller data set (149 drivers and records for 1 month), ATA reported that the drivers averaged 57.5 hours on duty in 8 days (which is the equivalent to 50.3 hours in 7 days). ATA concluded that drivers were using the restart not to maximize hours, but rather to take extended off-duty periods.² If drivers are working as little as the ATA data and other comments indicate, the changes to the restart provision will have little impact because the provision only affects drivers who are working longer hours week after week. The restart does not simplify bookkeeping. Unless a driver knows that he is working less than 60 hours a week (e.g., a regular 10-hour day, 5 days a week), he must keep a running 7- or 8-day total of on-duty hours to be sure he is within the limits regardless of the restart provision or the changes this rule makes to it. If a driver takes 34 hours or more off, he simply has a new point from which to keep the total, but he still needs to keep track of his total hours if he could be pressing the limits. Many drivers do these calculations in their heads without needing to write them down. FMCSA believes that this provision will not result in a paperwork burden increase. If drivers are not using the restart to gain hours of work, their productivity will not be affected by today's rule. No one needs the restart to take the "extended off-duty period" cited by ATA; the restart is only useful for drivers who are trying to minimize

their off-duty time. Even those drivers will not have their work seriously curtailed in a single week. Under today's rule, a driver will still be able to work up to 81 hours in a single week and will be able to average 70 hours of work a week over time.

Industry claims that the 2-night requirement for drivers would affect nighttime deliveries and increase congestion are also unsupported. Given ATA's data, the substantial majority of drivers do not need the restart and would not be subject to the requirement. These drivers can continue to work their usual schedules, including making deliveries at night 7 days a week. Even drivers who are working maximum schedules will still be able to drive and make deliveries at night 5 days a week.

In general, although many industry commenters stated that they would suffer substantial economic impacts, they submitted no data or explanations. The rule will reduce maximum weekly driving time by no more than 5 percent for the few drivers who drive longer hours. It is difficult to see how these provisions, if they are used as little as industry stated, could produce reductions in revenues of 10 to 40 percent as some commenters claimed, particularly given that drivers who do work the longest hours rarely are able to do so on a continuing basis. On the issue of driver incomes, only those drivers working the longest hours will lose income and then only if they have been able to drive long hours in consecutive weeks.

On the health benefits of the rule, ATA submitted the opinion of one researcher who disputed the Agency's use of data in a study that the researcher co-authored dealing with the effect on mortality of improvements in sleep (Cappuccio). The lead author of the same study, however, supported FMCSA's analysis and considered it conservative (Ferrie). Industry commenters did not otherwise attempt to address the issue of the health impacts of long work hours and sleep loss. FMCSA notes that the industry chose to ignore an ever increasing body of research that links long hours of work to sleep loss and an increased risk of obesity, diabetes, and cardiovascular diseases.

Similarly, on the risk of long hours in general, the industry dismissed the many studies, including the new research discussed below, that have found that risk increases with hours worked. Industry did not submit any statistically usable data on their own crash rates. NIOSH drew attention to the considerable body of research in other sectors that has also found that risk

increases with hours worked. Like workers in other sectors, drivers are susceptible to fatigue, and, therefore, these other studies should be considered in weighing the evidence for increasing risk.

In summary, the motor carrier industry did not provide evidence to support the dire economic consequences it claimed would flow from the Agency's HOS proposal. FMCSA believes that the changes adopted today are clearly supported by the evidence on the risk of fatigue and fatigue-related crashes associated with long daily and weekly hours, on the loss of sleep associated with long work hours, and the health effects associated with sleep loss.

II. Legal Basis

This rule is based on the authority of the Motor Carrier Act of 1935 and the Motor Carrier Safety Act of 1984 (1984 Act). The Motor Carrier Act of 1935 provides that "The Secretary of Transportation may prescribe requirements for (1) qualifications and maximum hours of service of employees of, and safety of operation and equipment of, a motor carrier; and, (2) qualifications and maximum hours of service of employees of, and standards of equipment of, a motor private carrier, when needed to promote safety of operation" (section 31502(b) of Title 49 of the United States Code (49 U.S.C.)).

The HOS regulations promulgated today concern the "maximum hours of service of employees of * * * a motor carrier" (49 U.S.C. 31502(b)(1)) and the "maximum hours of service of employees of * * * a motor private carrier" (49 U.S.C. 31502(b)(2)). The adoption and enforcement of such rules were specifically authorized by the Motor Carrier Act of 1935. This rule rests on that authority.

The 1984 Act provides concurrent authority to regulate drivers, motor carriers, and vehicle equipment. It requires the Secretary of Transportation to "prescribe regulations on commercial motor vehicle safety. The regulations shall prescribe minimum safety standards for commercial motor vehicles." Although this authority is very broad, the 1984 Act also includes specific requirements: "At a minimum, the regulations shall ensure that (1) commercial motor vehicles are maintained, equipped, loaded, and operated safely; (2) the responsibilities imposed on operators of commercial motor vehicles do not impair their ability to operate the vehicles safely; (3) the physical condition of operators of commercial motor vehicles is adequate to enable them to operate the vehicles

the lead author's last name or another short descriptive reference that may be used by the reader to reference the material in the "Bibliography" in Section VII at the end of this preamble. The lead author's professional titles or degrees are not shown. For example, Edgeworth references a data source described fully in the bibliography section later in this final rule.

² Stephenson, B., ATA, email to Tom Yager, FMCSA, September 8, 2010. FMCSA-2004-19608-4026.

safely; and (4) the operation of commercial motor vehicles does not have a deleterious effect on the physical condition of the operators” (49 U.S.C. 31136(a)). This rule would improve both highway safety and the health of CMV drivers.

This rule is also based on the authority of the 1984 Act and addresses the specific mandates of 49 U.S.C. 31136(a)(2), (3), and (4). Section 31136(a)(1) mainly addresses the mechanical condition of CMVs, a subject not included in this rulemaking. To the extent that the phrase “operated safely” in paragraph (a)(1) encompasses safe driving, this rule also addresses that mandate.

Before prescribing any regulations, FMCSA must also consider their “costs and benefits” (49 U.S.C. 31136(c)(2)(A) and 31502(d)). Those factors are also discussed in this rule.

III. Background and Description of the Trucking Industry

The history of the HOS regulations has been discussed at length in previous rulemakings and will not be repeated here. See the May 2, 2000, NPRM for a detailed history of the earlier provisions (65 FR 25540) and the December 29, 2010, NPRM of this final rule for the more recent history (75 FR 82170).

FMCSA held a total of five public listening sessions prior to publishing the NPRM as well as one session after publication to gather information and opinions. These listening sessions were webcast, the Agency accepted calls during the sessions, and the Agency held an online comment and question forum on February 17, 2011, from noon to midnight to give more people a chance to participate. Transcripts of the listening sessions and the online comment and question forum are in the docket.³ As noted above, more than 21,000 comments were submitted to the docket. Each comment was read and the positions of commenters on each issue they addressed were logged.

³ Transcripts of the listening sessions and the online comment and question forum may be found in the online docket on www.regulations.gov at:

a. January 19, 2010 Listening Session—FMCSA—2004–19608–3854.

b. January 22, 2010 Listening Session—FMCSA—2004–19608–3860.

c. January 25, 2010 Listening Session—FMCSA—2004–19608–3855.

d. January 28, 2010 Listening Session—FMCSA—2004–19608–3856.

e. March 26, 2010 Listening Session—FMCSA—2004–19608–3904.

f. February 17, 2011 Listening Session and Online Comment and Question Forum—FMCSA—2004–19608–9393.

Trucking Industry

The trucking industry is comprised of hundreds of thousands of carriers and millions of drivers moving goods locally or in long hauls between cities. The industry is diverse, and different sectors have different operational characteristics. The industry can be divided in a number of ways: Private versus for-hire; truckload versus less than truckload (LTL); long-haul versus short-haul. Private carriers are not trucking firms; they are manufacturers, distributors, or retailers that move their own goods among factories, distribution centers (warehouses), and retail outlets. Their drivers generally operate on a regular basis over routes set by the locations of their own facilities and those of their customers. For-hire carriers are in the transport business; they move goods for their customers. An LTL carrier usually picks up and delivers small shipments in a local area served by one of its terminals. Shipments are consolidated into loads for large trucks that make long (line-haul) runs to the firm’s terminals in other areas. Moves between terminals are almost always overnight on regular routes. The goods moved overnight are delivered the next day by the local drivers at the destination terminal. The dominant pattern for line-haul drivers in LTL operations is driving five nights a week with the weekend (or at least 2 consecutive days) at home. Some firms will have one group of drivers working Monday through Friday nights and another group working Sunday through Thursday nights. Daytime driving sometimes occurs when, for example, a trailer is to be moved to a terminal that cannot be reached in a single, overnight run.

The truckload carriers typically pick up a full load from a shipper and move it directly to the receiver of the goods. Some of their business is regular and predictable under contracts or less formal agreements. Much of their business is almost random in nature, transportation from one place to another being booked and sold on a daily basis. Drivers in random service may not know where they will be at the end of each day. Their runs are often made by day, but many also require nighttime driving. Short-haul drivers operate within a local area; most are not exclusively nighttime drivers. Their routes may vary day by day, but they are always in the same general area. They may spend a good part of each day loading and unloading at multiple locations. Although there are exceptions, most long-haul drivers do not load or unload the cargo.

The various sectors are affected by different parts of the HOS rules. Most short-haul carriers do not use all of the allowable driving hours because they spend a good part of each day loading and unloading the truck to make local deliveries. These drivers also generally work 5 days per week and less than 12 hours a day, which makes the restart unnecessary. The local part of LTL operations has a similar work pattern. The line-haul LTL runs are between terminals located at the outer edges of metropolitan areas or in smaller cities. Like local drivers, except in peak season, they usually work 5 days a week. Private carriage is almost always limited to trips of less than 500 miles or 10 hours of driving. There are far more long runs in the truckload sector, but even this sector moves much of its cargo less than 500 miles. The carriers most affected by the HOS rules are the truckload carriers that operate most or all of the time on a random basis, picking up a load for delivery without knowing where the next load will be.

IV. Discussion of All Comments

FMCSA received more than 20,000 comments, but no single provision of the NPRM drew responses from a majority of the commenters. About 4,000 commenters addressed driving time and the restart; about 3,000 addressed breaks and duty time limits (most of these wanted a return to the pre-2003 cumulative duty time); approximately 200 commented on the on-duty definition, and about 100 commented on the penalty provision. Most people who took the time to comment opposed some part of the proposal. About 8,000 comments expressed general opposition to the rule.

The primary arguments made by the commenters were limited and applied to the three main provisions of the NPRM—driving time, the restart, and breaks. To avoid redundancy, in this section the overarching arguments will be discussed first, incorporating specific points related to the provisions. The arguments that apply to a single provision will then be presented. Comments on the economic analysis are addressed in Section VI “Required Analyses” of this preamble.

The motor carrier industry argued that the declining fatality rate for truck-involved crashes since 2004 demonstrates that the current HOS rule is safe and should not be changed. The main industry argument, however, was that changing the rule would produce serious economic consequences for carriers, drivers, shippers, receivers, and consumers. On other issues, the industry generally disagreed with the

notion that drivers are not getting sufficient sleep and that chronic fatigue is a problem. The industry's only argument on driver health benefits was to claim that the study used to estimate increased mortality had been misapplied, a claim that the study's lead author refuted in a comment to the docket. NTSB, NIOSH, and safety advocacy groups, all submitted comments to support the proposal in general, contradict industry arguments, and provide additional research. FMCSA asked for data on crash experience under the current rule, costs of the proposed rule, and related matters, but no carrier or association submitted information that proved to be useful.

A. Safety

Industry commenters made two principal arguments on safety. The first was a general statement on the improving crash rates of CMVs; the second was specific to the 11-hour driving limit. This section presents the comments and response to improving the crash rates. Section IV."Discussion of All Comments" E. "Driving Time Limit" discusses the 11-hour issue.

Comments. Many industry associations, carriers, and drivers stated that the 2003 rule has improved (or at least not reduced) safety and pointed, as proof, to the decline in truck crash rates that occurred from 2004 to 2009. ATA stated that truck vehicle miles traveled (VMT) increased during that period, countering any argument that the economy was the cause of the decline in crashes. Some carriers stated that their crash rates (variously reported as preventable, recordable, injury, or all crash rates) declined over similar periods. Two commenters noted that HOS compliance has improved as seen in roadside inspection data.

Advocates *et al.*,⁴ the Insurance Institute for Highway Safety (IIHS), and another commenter pointed out that the crash rates began falling well before 2004 and that the passenger vehicle fatality rate has fallen faster than the truck fatality rate in recent years. IIHS stated that there was no apparent change in the long-term trend coincident with the 2003 rule change. IIHS also noted that there had been a general downward trend in CMV driver deaths, but that the number rose between 2003 and 2006, before dropping in 2007 and 2008.

FMCSA Response. Crash rates for trucks and passenger vehicles have been

falling since the late 1970s. The reasons for the decline are complex and cannot be attributed to any single factor. It is very likely that improved vehicle safety design for cars and improved road design have contributed to the reduction. Injuries and fatalities have also decreased with greater use of seat belts by car and truck drivers. The rates have been steadily declining over a long period, well before the HOS rules changed.

Economic conditions do play a part in the number of crashes. The large decrease in truck-related fatality rates from 2007 to 2009 is not unprecedented; similar year-to-year percentage decreases in fatal crash rates occurred in 1980, 1982, 1991, 1992, and other periods of recession. ATA argued that the recent recession could not explain the decline in fatality rates because truck VMT actually increased despite the recession. The increase in truck VMT cited by ATA and others, however, is an artifact of a change in the definition⁵ of "truck" used by the Federal Highway Administration (FHWA) in estimating VMT, which resulted in an addition of almost 1.9 million vehicles (about 370,000 combination vehicles and 1.5 million straight trucks) and their associated VMT to the "truck" population. In estimating the number of trucks, FHWA has defined that term to mean any vehicle other than a bus with a gross vehicle weight rating greater than 10,000 pounds. The population of "trucks," therefore, now includes mobile homes, large pickups, cab chassis, and various other larger vehicles, most of which are not used by motor carriers, except for short-haul pickups and deliveries.⁶ The changed definition increased the number of combination trucks by 17 percent and the number of single-unit trucks by about 22 percent (for 2008). The change increased 2008 VMT for combination trucks by about 28 percent and VMT for single-unit trucks by about 50 percent. FHWA revised VMT estimates for previous years to reflect its new methodology and allow year-to-year comparisons. These revised VMT numbers show that combination truck VMT peaked in 2007, fell slightly in 2008, and fell sharply in 2009. This

pattern obviously reflects the decline in demand for transportation associated with the recent recession.

These drops in VMT are consistent with other data that reflect VMT for trucks. Diesel fuel sales for over-the-road-vehicles, which are primarily for trucks, dropped 14 percent from 2007 to 2009, according to data from the Energy Information Administration. The Census Bureau's Annual Survey of the Service sector indicated that the trucking industry revenues dropped by about 19 percent from 2008 to 2009 and VMT for for-hire carriers by 15 percent.⁷ ATA's own trucking activity index (year 2000=100) lists the mileage index for truckload carriers in December 2003 as 100.4 seasonally adjusted; the index fell slightly (less than 10 percent) until the middle of 2008 when it began to fall sharply, reaching a low point of 71.3 in April 2009.⁸

A study conducted by the National Highway Traffic Safety Administration showed that large fatality declines (for all vehicles) tended to coincide with areas with higher increases in the unemployment rate, which limits driving, particular long-distance driving (Longthorne). A similar study conducted by the University of Michigan Transportation Research Institute attributed the decline to a number of factors (Sivak). The study noted that crashes (for all vehicles) had fallen more sharply on rural interstates than on other roads, which they stated was consistent with a decline in long-distance leisure travel. Similarly, crashes during rush hours dropped more than crashes at other times, consistent with reduced traffic. They noted that the decline in truck crashes was consistent with the decline in freight traffic.

The assumption in the industry argument is that fatigue-related crashes, which are the target of the HOS rules, have declined as sharply as crashes as a whole. The data from the Trucks Involved in Fatal Accident reports, however, indicated that the trend in fatigue-coded fatal crashes has not been as consistent as the decline in crashes. The highest percentage of fatigue-coded fatal crashes occurred before the 2003 rule in 1999 and 2000 (both 2.1 percent) followed by 2 percent in 1994 and 2007, before and after the rule; the lowest rate

⁵ The FHWA 2009 VMT estimates and its revision of the estimates for 2000–2008 were posted in April 2011 in Table VM–1 of Highway Statistics (annual editions) (<http://www.fhwa.dot.gov/policyinformation/statistics.cfm>).

⁶ A combination vehicle is any vehicle towing a trailer. Semi-trailers are combination trucks as are pick-ups, cars, or straight trucks towing a trailer; for example, a sport utility vehicle towing a boat is considered a combination vehicle.

⁷ U.S. Census Bureau, "Truck Transportation, Messenger Services, and Warehousing—NAICS 48/49" (http://www2.census.gov/services/sas/data/48/2009_NAICS48.pdf).

⁸ ATA, Economic Statistics Group, ATA Trucking Activity Report Historical Truckload Sector Database as of March 2011. Available online at <http://www.atabusinesssolutions.com/p-24-ata-trucking-activity-report-trac.aspx>.

⁴ Comments for Advocates for Highway and Auto Safety, Public Citizen, Truck Safety Coalition, and the International Brotherhood of Teamsters, filed jointly.

occurred before the rule (1.4 percent in 2001) followed by 1.5 percent in 2002, 2004, and 2006, before and after the rule.

While the declines in crashes are welcome, they are not sufficient. The IIHS commented that driver deaths increased after the 2003 rule was implemented. FMCSA notes that drivers are far more likely to die in single-vehicle crashes than in multi-vehicle crashes and single-vehicle crashes are more often associated with driver fatigue. The more recent sharp drop in driver deaths may be the result of less general traffic and lower demand for trucking services, which may have reduced fatigue and trucks on the road, or other factors, such as carriers laying off their riskier drivers and significantly higher truck driver use of seat belts. It remains the case, however, that almost 300 CMV drivers died and 6,000 were injured in single-vehicle crashes in 2009. As noted above, 3,380 people died in truck crashes and 74,000 were injured in 2009. These numbers may be low historically, but they are still too high. Furthermore, preliminary reports from NHTSA indicate 3,675 people were killed in truck-related crashes in 2010, an increase of 8.7 percent over 2009.

B. Economic Impacts

Economic arguments formed the core of the comments on the proposed rule. This section discusses those arguments, both the general statements and the specific claims about individual provisions.

Comments on General Economic Impacts. Industry associations, carriers, and drivers stated in general that the rule as proposed would do the following:

- Reduce productivity of carriers.
- Reduce driver incomes.
- Affect shippers, receivers, and consumers.
- Increase demand for more drivers and put more inexperienced drivers on the road.
- Increase congestion.

The majority of commenters on these issues stated that the NPRM—particularly the 10-hour driving time, the 2-night requirement for, and the weekly availability of, the 34-hour restart—would have serious negative financial impacts on carriers and affect the reliability of the industry. Many commenters believed these provisions would reduce operating resources (drivers' hours) and increase the cost of goods sold (adding drivers, equipment, and operating costs), which could also result in delays in deliveries to customers and loss of business. Many

commenters seemed to assume that the two-night limit on the restart would eliminate nighttime deliveries.

Commenters generally claimed that, to accomplish the same amount of productivity, the proposed regulations would require carriers to add more equipment and drivers to offset the decrease in available hours per driver, which would also lead to increased fuel and maintenance costs. Carriers predicted varying degrees of loss—from 4.72 percent reduction in utilization to 25 to 33 percent decline in revenues—and increased costs ranging from \$10,000 to \$25,000 per truck. Carriers said that they would have to hire new drivers and buy new trucks; their estimates of the effect on revenues ranged from considerably less than 1 percent to 25 percent or more. Shippers and shipper associations emphasized the impact on supply chains, the need to reconfigure schedules and routes, and the costs associated with those changes.

FMCSA Response. The Agency relied on published data and reports from a range of sources for the NPRM and this final rule. These documents did not include any information indicating that the adverse economic outcomes described above were likely to occur. The Agency estimates that this rule would reduce productivity by 2.7 percent with a 10-hour driving limit, and by 1.2 percent with an 11-hour limit. In either case, this estimate is significantly lower than that of many industry commenters, but given that the Final Rule is functionally equivalent to Option 3 (11 hours), the lower impact of 1.2 percent applies. It is true that some carriers, depending on their operations, may experience greater impacts, but others will experience more moderate impacts. Our estimate for the total costs of the rule are also much lower than those claimed by the industry: we estimate that the total cost of the rule would equate to roughly one-third of one percent of industry revenue, not the 25 to 33 percent declines stated by the industry. To put this figure into context, a 3 cent rise in the price of diesel fuel would impose greater costs on the long-haul segment of the industry than this rule. Data submitted by ATA to the docket, while not complete enough to be used to re-estimate the costs of the rule, indicates that drivers may be working less intensely than the Agency assumed in conducting the analysis. If that is the case, the costs (and benefits) would be lower than the Agency estimates, as ATA's consultant acknowledged in its analysis.

Although commenters made a wide range of claims for the cost of the NPRM, they provided little data to

support those claims and few explanations of how the rule changes could affect their operations to the degree claimed. A number of publicly traded motor carriers submitted cost estimates that, when compared to their reported revenues, were found to represent a small fraction of 1 percent of their revenues, which is much less than FMCSA had estimated in its economic analysis. None of the commenters provided an explanation of how a reduction in weekly driving hours of about 5 percent for those working the longest hours could produce revenue declines of the magnitude claimed.

Most of the claims seem to imply that every truck and driver is working the maximum hours every day. Commenters addressing other issues (including many of the same commenters) indicated that use of the 11th hour of driving is considerably lower than FMCSA estimated (on about 10 percent of the runs compared to the 21 percent FMCSA had estimated) and that restarts are generally longer than 34 to 40 hours. The critique of the RIA submitted by ATA and cited by many industry commenters claimed that FMCSA had overstated the number of drivers working long hours. Data submitted by ATA based on more than 118,000 drivers indicate average work weeks of less than 44 hours; a smaller sample of drivers that ATA submitted still averaged less than 58 hours in 8 days (or about 50 hours in 7 days). The industry, in effect, made two contradictory arguments—that the long hours allowed by the current rule are rarely used so that fatigue is not a problem and rule changes are not necessary, and that any reduction in those hours will have serious economic impacts. Both arguments cannot be true.

Any driver who is working less than 60 to 70 hours a week does not need a restart and thus is unaffected by the limitations on the restart requirement in this final rule. Revenues generated by those drivers will not be affected. The restart does not simplify bookkeeping. Unless a driver knows that he is working less than 60 hours a week (*e.g.*, a regular 10-hour day, 5 days a week), he must keep a running 7- or 8-day total of on-duty hours to be sure he is within the limits regardless of the restart provision or the changes this rule makes to it. If a driver takes 34 hours or more off, he simply has a new point from which to keep the total, but he still needs to keep track of his total hours if he could be pressing the limits. Many drivers do these calculations in their heads without needing to write them down. This calculation, at any rate, is

both simple (subtracting one day's hours from the running total, then adding another day's hours to the result) and can be conducted during waiting or refueling time, and so would result in de minimis effort and cost to the driver. Furthermore, any driver who only takes a restart once a week would not have to keep a tally of hours back beyond the previous restart, because that restart would reset the driver's cumulative available hours under the new rule, as it does under the current rule. Any driver who works relatively moderate hours would be unlikely to take multiple restarts in a week, or have to worry about violating the cumulative weekly hour limit.

The two-night requirement will not stop overnight deliveries; even a driver who is working maximum hours and needs a restart could still make nighttime deliveries 5 days a week. Drivers who are not working longer hours can continue to make nighttime deliveries every working night because they do not need a restart and are not subject to the 2-night requirement. This group of drivers includes local delivery drivers whose schedules may start in the early hours of the morning and LTL line-haul drivers. Long-haul truckload drivers, who may prefer to drive at night because there is less traffic, have schedules set by shippers and receivers and may not routinely drive at night. J.B. Hunt stated that 32 percent of its drivers occasionally drove at night; these drivers did so on average only 6 nights a month.

Industry comments claimed that the reliability of service would be affected, but provided no explanation of why this would occur. Reliability is the ability to predict when a shipment will arrive. Differing limits on work time may alter arrival times, but would not affect the ability to estimate an arrival time.

Carriers and drivers reiterated in comments on the NPRM that long-haul truckload drivers spend anywhere from 10 to 50 percent of their time each week waiting to be loaded and unloaded, time for which the drivers are not usually paid. The National Small Shipments Traffic Conference admitted that the 2003 rule's 14-hour consecutive duty limit had caused some receivers to unload the product before they needed the product for the store shelves or production line rather than letting the shipments sit in the truck until needed. In essence the association was confirming the drivers' claim that they are treated as moving (and free) warehouses. Carriers stated that the shortening of wait time or detention that occurred after the 2003 rule has eroded and that wait times have increased

again. If the drivers and carriers are correct,⁹ the supply chain includes inefficiencies that regularly absorb more of drivers' on-duty time than all of the changes adopted in this final rule. The relatively small impacts of the rule could be offset and the utilization of trucks and drivers improved if shippers and receivers set and kept appointments for loading and unloading instead of expecting drivers to put in long unpaid hours waiting. FMCSA has no obligation to allow drivers to work excessively long hours a week to compensate for delays in the supply chain.

Comments on Impact on the Number of Trucks. Commenters argued that taking an hour away from daily driving time would result in more trucks being used to move the same amount of freight. They stated that more trucks on the road would increase costs to carriers, and that those cost increases would be passed to shippers and ultimately to consumers in the form of higher prices. The National Association of Manufacturers, a trucking association, and a carrier noted that reducing the daily driving limit to 10 hours would also increase costs to manufacturers and retailers, as they would have to carry additional inventory, at additional costs, to ensure that they have products on their store shelves, since reliability of service could be interrupted. Commenters, including the Owner Operator Independent Drivers Association (OOIDA), also argued that changing the 11-hour driving time limit would increase transit time and reduce productivity and on-time deliveries because current distribution centers and routes are built around the current HOS rules. Five commenters that ship products with a limited shelf life or peak ripeness argued that the reduction of daily driving time to 10 hours would severely strain their ability to get fresh product to their customers by increasing days of transit time. A carrier that transports livestock expressed concern over increased livestock deaths that may result with a decrease in daily drive

time, due to drivers being forced to stop to take their break without being able to provide the animals with water or relief from the summer heat. Commenters also argued that reducing daily driving time would reduce drivers' incomes.

FMCSA Response. FMCSA sees no reason why changing the daily driving limit from 11 hours to 10 hours, a limit that was in effect for more than 60 years before 2003, would reduce the reliability of motor carrier service. Reliability depends on the carrier's ability to estimate accurately how long a trip will take, which they can do regardless of the driving time limit. However, FMCSA acknowledges that some businesses have built their distributions systems to optimize driving times under the 11-hour limit and that they might face significant costs to maintain their current delivery times if limits were reduced. As discussed above, the Agency has not adopted a 10-hour limit at this time.

The concerns expressed by livestock haulers that a mandatory rest break of at least 30 minutes would increase the risk of livestock deaths seem overstated. Federal law allows carriers transporting animals to keep them confined for up to "28 consecutive hours without unloading the animals for feeding, water, and rest" (49 U.S.C. 80502(a)(1)), and there are exceptions even to that standard (§ 80502(a)(2)). This statute is obviously intended to protect animals during transportation. Under these circumstances, it is difficult to see how a half-hour break taken no later than 8 hours after the driver comes on duty—and presumably not much longer than that after the animals were loaded—could have dire consequences.

Comments on Congestion and Parking. Many commenters stated that a 10-hour driving limit would place more trucks on the road, increase congestion, and worsen an already existing truck parking shortage at truck stops. They also argued that the 11-hour driving limit is very important to them because they use the 11th hour to find safe parking where they can take their 10 hours off duty. Other commenters argued that the 11th driving hour is rarely used, but that it provides much-needed flexibility allowing drivers time to get home or find parking after unforeseen events during their shift, such as congestion, inclement weather, or the needs/demands of shipper, receiver, carrier or dispatch. Commenters also implied that night drivers would switch to day driving to shorten their restarts, which would increase congestion. Commenters stated that the proposed 2-night midnight to 6 a.m. period for restarts would result in

⁹ See "Commercial Motor Carriers: More Could Be Done to Determine Impact of Excessive Loading and Unloading Wait Times on Hours of Service Violations," U.S. Government Accountability Office, January 2011, Report No. GAO-11-198, <http://www.gao.gov/new.items/d11198.pdf> and the letter report, "U.S. Department of Transportation Statement on Government Accountability Office (GAO) Report" for Report No. on GAO-11-198, May 23, 2011, available in the docket. The DOT letter report was sent to the Office of Management and Budget (OMB) and four Congressional committees, stating that FMCSA is planning to examine the extent to which detention time contributes to drivers violating hours of service requirements and that it plans to initiate the study in Fiscal Year 2012, contingent on resource availability, in response to the GAO report.

more trucks entering the traffic stream at 6 a.m., thereby increasing congestion.

FMCSA Response. It is difficult to see how the change in the driving limit or the 2-night requirement would seriously affect the number of trucks on the road and, therefore, how the changes would increase congestion or the shortage of parking. Because the Agency is retaining the 11-hour driving limit, the commenters' concerns about increased congestion related to a need for more trucks will not be realized. An increase in rush hour traffic because of the 2-night provision is unlikely. Most drivers who routinely work at night (LTL and local delivery) do not work enough hours to require a restart and, therefore, would not need to change schedules. Truckload drivers do not drive at night regularly and have more ability to adjust start and stop time to minimize the impact of the provision on their operations. FMCSA has also narrowed the required period for those who are affected by the provision to allow earlier starts, which will further reduce effects on rush hours.

Most drivers who routinely drive at night are either LTL line-haul operators or work for local private carriers making deliveries. Neither of these is likely to switch to day driving nor is there any reason why they would need to. Drivers need to take a restart, and thus two full nights off, only if they have worked more than the cumulative hours allowed under the weekly duty limit (60 hours in 7 days or 70 hours in 8 days). Most of these drivers work few enough hours per week (less than 60) that, although nominally "using the restart provision" by virtue of taking off a day or a full weekend, they are not using the restart to gain any additional hours beyond the 60 hours that they would be allowed without the restart provision. Because they do not use the restart to increase the hours they are allowed to use, these drivers can maintain their preferred schedule while still complying with the HOS rule. In particular, they are not required to have 2 consecutive nights off (although they usually do). Long-haul truckload drivers may prefer to drive at night, but their schedules are irregular and determined by their appointment times. Even these drivers, according to ATA, do not routinely work enough hours to trigger the need for the restart. When they do work maximum hours, they can still drive at night 5 nights a week.

Congestion can, at times, be unexpected, but most congestion is predictable; any driver who will be driving around a major city during the rush hours knows he will encounter congestion and must therefore plan for

it. Unforeseen weather conditions are covered by § 395.1(b), which can be used to take extra time.

Comments 34-Hour Restart Economic Impacts. On the restart, many commenters said that the NPRM provision would reduce productivity. In contrast, Schneider National said the proposal likely would not have a significant negative effect on productivity, because most drivers take breaks that are longer than the required off-duty period. However, it said the 2-night requirement would add costs for the carrier and inefficiencies for the supply chain, because many drivers will choose not to restart while on the road, requiring additional "empty miles" to get them home. A number of shipper associations stated that the provision would limit the ability to make deliveries overnight. Commenters, such as ATA, the National Solid Waste Management Association, United Parcel Service (UPS), and others, stated that the proposal would deprive drivers and carriers of scheduling and operational flexibility. ATA commented that flexibility under the current rule was especially important for long-haul and irregular route drivers who may not know their schedules in advance and have little control over scheduling. Carriers in the construction and fuel delivery industry also stated they would be adversely affected.

FMCSA Response. After considering numerous comments, FMCSA shortened the two nighttime periods that must be included in the restart to 1 a.m. to 5 a.m., which is the core portion of the window of circadian low for almost everyone. This will provide greater flexibility than the proposed rule while ensuring that drivers have the opportunity to obtain 2 nights of sleep while allowing drivers to stop an hour later than proposed at the beginning of the restart period and to start an hour earlier than proposed after the restart period. FMCSA acknowledges that this revised restart provision will slightly reduce the flexibility available under the previous rule, but recent research has suggested that 2 consecutive nights off duty would be necessary to ensure that the drivers who take a restart are adequately rested when they resume driving.

Schneider National argued that its drivers would not take a restart with 2 nights on the road and stated that its drivers' restarts averaged 62 hours, which is more than enough time to cover 2 nights. Perhaps the largest group of regular night drivers is the LTL line-haul drivers, who generally work a 5-day week and whose weekend would

normally cover two consecutive nights as a matter of course.

As for general productivity impacts, drivers are still subject to the 60-hour and 70-hour limits but will still be able to use a 34-hour restart once a week. A driver working the longest hours will be able to use a restart to work those hours, but will then have to take more time off in the next week to compensate. Although this will limit his or her ability to work maximum hours every week, the commenters suggest that very few drivers do this. Local fuel delivery drivers are probably not working enough hours to need a restart as most local drivers work 5-day weeks. The construction industry is not subject to the restrictions because it observes a statutorily mandated 24-hour restart (49 CFR 395.1(m)).

Comments on Economic Impact of Breaks. ATA and others stated that because there is little or no evidence that drivers are not taking breaks during the course of the workday, requiring breaks at specific times only reduces flexibility and productivity. Drivers, carriers, the American Moving and Storage Association (AMSA), and others, argued that the break provision can decrease efficiency and productivity, prevent on-time deliveries, and create a longer workday; commenters cited the difficulty of finding a place to park. FedEx commented that a 30-minute rest break by the 7th hour after coming on duty would further hinder local package pickup and delivery drivers operating under § 395.1(e)(1).

FMCSA Response. After considering numerous comments about the breaks, primarily from team drivers, the Agency extended by one hour the window in which a break must be taken. The final rule provides that driving is not permitted if more than 8 consecutive hours on duty—compared to 7 hours in the NPRM—have passed since the last off-duty (or sleeper-berth) period of at least 30 minutes, a driver must take a break of at least 30 minutes before driving. For example, if the driver started driving immediately after coming on duty, he or she could drive for 8 consecutive hours, take a half-hour break, and then drive another 3 hours, for a total of 11 hours. Conversely, this driver could drive for 3 hours, take a half-hour break, and then drive another 8 hours, for a total of 11 hours. In other words, this driver could take the required break anywhere between the 3rd and 8th hour after coming on duty. A driver who plans to drive until the end of the 14th hour and wants to take only one break will need to take a break between the 6th and 8th hour after

coming on duty. Drivers will have great flexibility in deciding when to take the break. By postponing the latest point at which the break can be taken from the 7th to the 8th hour, the rule will make it significantly easier for team drivers to coordinate their sleeper-berth periods and may enable drivers who do not drive late into their work shift to dispense with a break altogether. FMCSA has also added an exception for drivers of CMVs carrying Division 1.1, 1.2, or 1.3 explosives to allow them to count on-duty time spent attending the CMV as required by § 397.5 but doing no other on-duty work, toward the break.

If, as the data ATA and others submitted indicated, drivers are averaging less than 50 hours of driving a week, it is difficult to understand how a half hour break that can be taken sometime between the 2nd and 8th hour in a 10-hour day could cause any delays unless the industry is saying that these drivers never stop for a meal or a rest break during that time. FedEx stated that its drivers average less than 9 hours of driving a day except in peak periods when the average is slightly less than 10 hours. It seems unlikely that drivers work essentially non-stop. FMCSA recognizes that drivers on the road may have to find a safe place to park, but even the drivers working to the end of the 14-hour window have a 2-hour window in which to take a break (between the 6th and 8th hour after coming on duty), assuming they take just one. Drivers working shorter days have progressively longer windows in which to take the break and meet the requirement. That should be adequate time to find a safe place to park.

Comments on Economic Impact on Drivers. A large number of commenters stated that the NPRM would reduce drivers' incomes because they would be able to drive fewer miles and would lose loads. ATA claimed that it could cause an income loss of 20 percent in peak season. Carriers estimated driver losses at anywhere from 8 percent to 40 percent. Two large carriers, however, indicated that the result would be an increase in driver pay rates to offset the lost hours.

FMCSA Response. A driver who is regularly working the longest hours will lose hours under the final rule; that is the intention of the rule changes. Drivers will still be able to average 70 hours a week, however, which is longer than most people work and, if the industry data are accurate, longer than most drivers are working. A driver on the 70-hour/8-day schedule working the maximum hours allowed under the 2003 rule would lose one shift every 2

weeks (11 instead of 12 14-hour shifts in 14 days). According to the ATA data, very few drivers are working that hard; those few who do so are apparently not doing it consistently. The income of drivers who are averaging less than 60 hours a week, let alone less than 50 hours, will not be affected by the provisions of this final rule. For the drivers working the longest hours, a reduction in waiting time could enable the drivers to have more opportunities to drive weekly. The rule reduces the maximum number of on-duty hours more than it reduces the maximum number of driving hours (a maximum of 82 hours on duty on average to 70 hours versus a maximum of about 74 hours of driving time to 70 hours).

An underlying assumption in many of these claims of lost income is that most shipments are time-critical and that shippers will shift to teams to ensure delivery. The long waiting times that shippers and receivers often impose (2–18 hours according to drivers) indicate that this is not true, as do reports from drivers and others that drivers will generally try to arrive the night before a pick-up or delivery so they can be sure to make their appointment times. Teams represent a relatively small part of the industry, which indicates that most shippers do not believe the arrival time is so critical that they are willing to pay the higher rates associated with teams. Shipper surveys indicate that reliability, not transit time, is more important to shippers. A 2009 report on trucking stated that “freight buyers are more willing now to sacrifice a day or three in transit, at a lower cost, as long as they and their customers know when shipments will arrive” (O'Reilly (2009)). For the 2010 survey, 90 percent of surveyed shippers identified reliability as their most important criterion when selecting carriers (O'Reilly (2010)).

Finally, as two carriers stated and as the industry has been saying in press reports and, for publicly held companies, reported in their SEC filings, regardless of the rule changes, driver wage rates are likely to have to rise to attract new drivers to the industry and to retain the current workforce. A National Transportation Institute survey found that 80 percent of the carriers that responded expected to increase driver pay (Cassidy (2010); Isidore). Pay increases may partially or wholly offset income losses for the limited number of drivers working the longest hours. FMCSA concedes that the hardest working drivers may lose income if they drive fewer miles under the revised rule.

Comments on the Economic Impact on Consumer Prices. Some commenters

expressed concern that the proposed regulations would lead to consumers paying a higher price for shipped goods, including food products, because higher costs to carriers would be passed on to receivers and customers. Other commenters cited concerns about higher prices from the costs of adjusting scheduling systems and training staff.

FMCSA Response. If carriers have to raise rates to cover additional costs, those costs will eventually be passed on to consumers. FMCSA notes, however, that transportation costs represent a relatively small part of the cost of any consumer item and that the largest contributor to variability in transportation costs is the price of diesel fuel. As stated in the NPRM and Regulatory Impact Analysis (RIA), the cost of the rule changes to the industry is the equivalent of an increase of less than \$0.03 per gallon of diesel for the long-haul segment of the industry. The U.S. Department of Agriculture indicates that transportation represents only 2 to 6 percent of each food and beverage dollar, a percentage which has declined over time (USDA Economic Research Service). Even if the rule increased transportation costs by 10 percent, that would add less than a penny per dollar to food and beverage costs. If, as the RIA projects, transportation costs will increase by less than 0.25 percent, the increase in the price of each food item will be a very small fraction of a penny. The one-time costs of adjusting scheduling systems and related items will not add to the long-term cost of consumer items.

Comments on the Driver Shortage. Commenters stated that the rule changes would require carriers to hire more drivers at a time when carriers cannot fill positions and that more inexperienced drivers, who are less safe, would be on road.

FMCSA Response. FMCSA recognizes that the rule may lead to more driver positions. Whether the driver shortage that commenters cited is real is a matter of considerable debate in the industry. OOIDA has been quoted as saying “The industry purged itself of 30 percent of its drivers in the last two years. They're everywhere, but they are not coming back to work for you if you're not going to pay them anything” (Dills). An *etrucker.com* survey asked about the causes of the driver shortage; 40 percent of respondents attributed it to low pay, but 24 percent said there was no shortage (Dills). Industry press reports indicate that carriers have many more applications than they have positions.

FMCSA is aware that new drivers have a higher crash rate than more experienced drivers, but the industry

adds a large number of new drivers every year. The number added because of today's rule will be relatively small in comparison to the annual influx for an industry where turnover, until the recent recession, was 100 percent or more in the truckload sector. The real issue for the industry is that many of the new drivers leave the industry within a few months because of long hours, the weeks away from home, and low pay (Burks (2007)).

C. Sleep Loss and Chronic Fatigue

Comments. A number of commenters, including the major trucking associations, questioned FMCSA's assumption that drivers are not obtaining adequate sleep. They stated that 10 consecutive hours a day off duty should provide sufficient rest. ATA stated that FMCSA's data indicate that drivers get 6.2 to 7 hours of sleep a day, which is enough. The Minnesota Trucking Association argued that 6.5 to 7.5 hours of sleep is enough. The National Association of Manufacturers said manufacturers did not agree that sleep between midnight and 6 a.m. is different from sleep at any other period. Others, including drivers, claimed that they were naturally able to stay up all night and sleep during the day. One carrier reported that its night drivers said they maintained their daytime sleep patterns on days off. ATA and others argued that the 34-hour restart, without restrictions, provides sufficient rest to restore performance.

FMCSA Response. The claim that 6.2 to 7 hours of sleep is enough is not supported by sleep research. As discussed in the NPRM, a study by Belenky (2003) found that drivers getting less than 7 hours in bed a night suffer degraded performance. The research indicated that someone who is totally deprived of sleep for one night recovers more quickly than someone who chronically obtains 6 to 7 hours of sleep. The VTTI study (Hanowski (2007)) did not show that drivers were getting even 6.2 hours of sleep on work days; that figure was the weekly average including 2 days off. On working days, sleep averaged below 6 hours for drivers who were not, in general, working the longest hours, but who were mostly night drivers. The sleep data in the 2005 fatigue management study (slightly less than 7 hours) was self-reported sleep, which has been generally found to be overstated by 30 to 60 minutes; this study also focused on a population of drivers who often drove at night.

Sleep research has for decades shown that humans find it difficult to get enough sleep during daylight hours even if put in dark, quiet rooms. Few

people can obtain as much as 6 hours of sleep during the day and that sleep is of lower quality than nighttime sleep; Åkerstedt (2003) found day sleep of night shift workers was 2 to 4 hours shorter than night sleep of day shift workers. The one group studied that seemed to overcome this problem worked in enclosed spaces with no external indications of day or night. Truck drivers do not fit that pattern.

The window of circadian low varies somewhat among individuals. Some people, if they can choose their own times, routinely sleep between 9 p.m. and 5 a.m. while others may sleep from 2 a.m. to 10 a.m., but virtually every healthy person is sleepy between 1 a.m. and 5 a.m. Sleep at that time is longer, less prone to interruptions, deeper, and more restorative (Van Dongen & Dinges (2005)).

As several commenters noted, someone who gets 10 hours of rest a day should not build up sleep debt, but 10 hours off duty does not translate to 10 hours of rest. Research on drivers and others has shown that people who work 14 hour days do not get adequate sleep; 10 hours off usually produces less than 7 hours of sleep, often less than 6 hours because the drivers generally attend to family matters, eating, and showering for the other time the drivers spend off duty. And for the reasons discussed above, those attempting to sleep during the day usually only get 4 to 6 hours of poor quality sleep. The shorter sleep that night workers obtain may explain the higher risk of crashes and lower productivity that Åkerstedt and Wright (2009) found when comparing night shifts with day and swing shifts. Drivers who sleep during the day on their days off would not be getting adequate recovery sleep. A driver who sleeps during the day every day is building up sleep debt from week to week.

The drivers who are working the long daily and weekly hours needed to make a restart necessary may build a sleep debt that the limited time off allowed by the restart might reduce only slightly. These drivers are more likely to be chronically fatigued, with the performance deficits associated with fatigue, and are subject to a range of health effects linked to sleep loss.

D. New Research Studies

As discussed in the overview in Section I, on May 9, 2011, FMCSA posted to the docket four studies that had been recently completed and that addressed some of the issues of concern to this rulemaking. Fourteen organizations submitted comments on the studies. Advocates and New York State Department of Transportation

(NYDOT) stated that the studies supported the proposed rule.

Blanco

In April 2011, Virginia Tech Transportation Institute (VTTI) completed a naturalistic driving study, *i.e.*, a study of actual over-the-road drivers and operations, that examined the activities performed in the 14-hour workday and investigated the relationship between safety-critical events (SCEs) (such as driver errors and lane tracking deviations) and driving hours, work hours, and breaks (referenced here as Blanco). The study's methodology was similar to that which VTTI has employed in other studies conducted in support of HOS rulemaking and driver fatigue research. The data acquisition system was composed of five main components: An encased unit that housed the computer and external hard drive; dynamic sensors; vehicle network; incident box; and five video cameras. VTTI developed a custom state-of-the-art lane-tracking system and included it in the data acquisition system. The lane-tracking system consisted of a single analog black-and-white camera, a personal computer with a frame grabber card, and an interface-to-vehicle network for obtaining road speed. The system reported the distance from center of truck to left and right lane markings (average error less than 2 inches). The system accurately and reliably measured and stored data when the vehicle crossed the dashed or solid highway lines. Lane tracking has historically been shown in the research to be a good measure of functional impairment due to driver fatigue.

VTTI's previous naturalistic driving research had not shown a time-on-task effect; these studies looked exclusively at driving time. Blanco looked at both driving and duty time and found a statistically significant positive relationship between driving time and the number of SCEs. The Blanco study supports the time on task function that the Agency used in the RIA. Blanco showed that naturalistic driving research no longer contradicts other types of driving time research conducted using different methodologies. The studies are all now consistent in showing that as the number of driving hours increases, there is a general upward trend in the number of crashes or SCEs. However, the study also compared the risk of driving in the 11th hour and failed to find a statistically significant difference between the 11th hours and the 7th, 8th, 9th, or 10th hours.

Blanco also showed that when non-driving activities (both work- and rest-related) were introduced during the driver's shift—creating a break from the driving task—these breaks significantly reduced the risk of being involved in a SCE during the 1-hour window after the break. The benefits of breaks from driving ranged from a 30 percent reduction in the risk of SCEs up to a 50-percent reduction (depending on the type of break from driving), with the greatest benefit occurring for off-duty (non-working) breaks.

Blanco evaluated driving hours based on whether the hour occurred at the beginning, middle, or end of an on-duty shift. The first 5 hours after coming on duty were categorized as the beginning of the on-duty shift. By definition, any hour after the 5th hour of driving could not fall within this work period. Hours 6–9 were categorized as the middle shift hours, and hours 10–14 were categorized as the end of shift hours. Driving hours 10 and beyond could occur only during end of shift hours, by definition. The first hours of driving (hours 1–5) could occur in any shift period depending on how much on-duty not driving and break time a driver incorporated into a day. For example, if a driver spent 7 hours loading a truck at the beginning of a day, the 1st hour of driving would be in the middle shift hours; if that driver drove 3 hours, the third hour would be in the end of shift hours.

Analysis of SCEs showed that, in general, the same hour of driving had more SCEs if it occurred at the end of a shift than if it occurred at the beginning or middle of a shift. For example, if the 5th hour of driving occurred at the beginning of a shift, it had 0.11 SCEs per unit of exposure. This same hour of driving had 0.20 SCE per hour of exposure if it occurred in the middle of a shift, and 0.21 SCEs if it occurred at the end of a shift. If the 8th and 9th hours of driving occurred in the middle of a shift, they had 0.09 and 0.10 SCE per unit of exposure, respectively. At the end of the shift, by comparison, the 8th and 9th hours of driving had 0.22 SCE and 0.18 SCE per unit of exposure respectively. This finding indicates that the interaction of total shift length and driving time impairs safety performance later in the day, suggesting that safety would be negatively affected by duty periods in excess of 14 hours.

Jovanis (2011)

In April 2011, Pennsylvania State University (PSU) completed a quantitative study of the safety implications of driver HOS using a case-

control time-dependent logistic regression methodology (referred to here as Jovanis (2011)). It is important to note that alone, time-dependant logistic regression identifies an association, it does not prove causation. The PSU team completed a similar study in 2005. At that time, the Agency had concerns regarding the sample size, particularly in the 11th hour of driving. The new study was designed to address those concerns. The PSU study team collected data from the logs of drivers who were in crashes that involved either a fatality, an injury requiring medical treatment away from the scene of the crash, or a tow-away. The drivers' logs covered a period of 2 weeks prior to the crash and were compared to a random sample (two drivers) of non-crash-involved drivers selected from the same company, terminal, and month using a case-control logistic regression formulation. The team collected data from 1,564 drivers. The methodology employed by the team had been peer-reviewed in many previous research studies (*i.e.*, Jovanis (1991); Kaneko and Jovanis (1992); Lin (1993); and Lin (1994)). The team separated the data into truckload and LTL analyses because previous research indicated differences in the factors contributing to crashes for these two segments of the trucking industry. In total, the team analyzed 878 drivers (318 crash-involved and 560 controls) in truckload operations and 686 drivers (224 crash-involved and 462 controls) in LTL operations. The study produced counter-intuitive and somewhat contradictory findings. For the LTL operations, Jovanis (2011) found that as driving time increased so did the odds of being in a crash. Analysis of LTL data showed a strong and consistent pattern of increases in crash odds as driving time increases. The highest odds are in the 11th hour. For truckload drivers the study found no consistent trend relating crash odds to hours driving. The study team stated that the crash-odds increase in the last hour is in need of further analysis because the increase in odds may be attributable to the low sample size of observations (9 crashes of 318 truckload crashes in the data). Given the nature of the type of operations, one might expect truck load drivers to exhibit greater crash risk due to fatigue.

Two Sando Studies

In April 2011, the Agency placed in the docket two additional studies that it became aware of after publication of the NPRM. These two studies were conducted by the School of Engineering at the University of North Florida. The first study, Sando (2010a), examined the

influence of bus operator driving hours on the occurrence of preventable collisions by employing data from incident reports and operator schedules to evaluate the correlation between driving hours and operator involvement in collisions. The results showed a discernable pattern of an increased propensity for collision involvement with an increase in weekly driving hours. Based on the analysis, drivers involved in preventable collisions had driven an average of over 6 hours more per week than the general bus driving population.

The second study, Sando (2010b), examined the safety impacts of the existing State operator hours of duty policies in Florida. The researchers used questionnaire surveys, incident data archived by transit agencies, and bus driver schedules to determine the relationship between crash involvement and operator schedules. Factors of interest in this study were the influence of shift pattern (start and end time), schedule pattern (split or non-split schedule), and time spent driving. Split schedules occur when a driver works in the morning, takes a long break, then works again in the later afternoon or evening. The study revealed that operators working split schedules were more susceptible to fatigue than those working straight schedules. The group of operators working split schedules indicated less sleep time, long driving hours, and early starting/late ending schedule patterns. These are characteristics of a fatiguing work schedule. There was also a strong statistical significance attached to the association between crash occurrence and fatigue condition as measured by a fatigue assessment tool. The tool predicted the likelihood that a driver was fatigued on a given shift by analyzing driver multi-day schedules. The analysis of incident data and fatigue level found that total crash likelihood increased significantly for drivers who were coded as highly likely to be seriously fatigued.

Although transit bus operators are governed by different HOS rules than interstate CMV truck drivers, the Sando studies show that cumulative work begins affecting bus driver performance well within the limits of the current HOS rules for truck drivers. In addition, less than 3 percent of the transit operator sample worked on schedules that exceeded 14 hours from the start of a duty day to the end of the driver's last shift. In essence, the schedules of the vast majority of drivers studied were within the limits of the HOS rules that govern interstate truck drivers. The study showed that cumulative fatigue

begins affecting driver crash performance for drivers averaging more than 45–50 hours of total shift time per week, inclusive of split driving schedules. The study found that crash risk increased for drivers averaging 9 or more hours of driving per day. In addition, the study examined driver schedules and determined that longer working hours are associated with fewer hours of nightly sleep, on average.

It must be noted that transit bus operators work in a different environment from most over-the-road, but not local, truck drivers. Transit bus operators primarily drive on city streets in an urban environment, whereas over-the-road truck drivers spend far more of their time driving on interstate highways and rural roads. Nevertheless, these transit bus studies do examine safety performance in an occupation that involves long hours of driving. These studies corroborate the cumulative fatigue and work-sleep relationships used by the Agency in analyzing the impacts of the new HOS rules, providing further evidence that long daily and weekly working hours affect both the amount of sleep drivers get and their risk of crashing.

Comments on Blanco. The ATA submitted an analysis prepared at its request by Ronald Knipling that provided the following comments regarding the Blanco study:

- Naturalistic driving studies may not provide an adequate test bed for driver fatigue studies.
- The study would have been improved if the study team had disaggregated the data into fatigue related SCEs, at-fault vs. not-at-fault events, single-vehicle vs. multi-vehicle, and divided vs. undivided road ways.
- The study is based on SCEs such as unintentional lane deviations, but not “real harm.” Only 4 of the 2,197 SCEs in the study were actual crashes.
- A definitive link between critical incidents and crash risk has not yet been established.
- The few drivers who contributed disproportionately to the number of SCEs should have been excluded.
- The sample of drivers is not nationally representative of all CMV drivers.

FMCSA Response. The Blanco naturalistic driving study was focused on better understanding the activities drivers perform in the 14-hour workday, and investigating the relationship between SCEs and driving hours, work hours, and breaks. The Agency disagrees with ATA’s contention that naturalistic driving studies do not provide an adequate basis for conclusions about driver fatigue and crash risk.

Naturalistic driving studies are one of the best means to assess driver performance. By reviewing video records and other data from the instrumented vehicle, analysts are more likely to be able to pinpoint the actual cause of a crash than through any other research methodology.

FMCSA is unable to accept several aspects of the analysis of the Blanco study submitted by Knipling/ATA. This submission argues that drowsiness may actually reduce the number of distraction-related SCEs. This argument is based on a study that defined fatigue as visible signs of drowsiness. Only a small number of SCEs would have involved visible signs of fatigue, yet no one denies that long work hours lead to errors in judgment, lack of response, or degradation in lane tracking even if visible signs of fatigue are absent. In the long history of time-on-task research, many investigators have measured errors, or in this case SCEs, to study degradation of driver performance over many work days. The purpose of these studies is to gain a better understanding of the relationship between fatigue and work hours or driving time.

The conclusions on fatigue and distraction depended on a limited definition of fatigue—*i.e.*, that fatigue is only present when visible signs of difficulty staying awake are present. “Fatigue” is defined as “a non-pathologic state resulting in a decreased ability to maintain function or workload due to mental or physical stress” (Caldwell). The term is used to describe a range of experiences from sleepy, or tired, to exhausted. There are three major physiological phenomena that have been demonstrated to create fatigue: sleep loss, circadian rhythm disruption, and time-on-task. Time-on-task fatigue describes fatigue that is accumulated during the working period and affects performance at different times during the shift. Performance declines the longer a person is engaged in a task, gradually during the first few hours and more steeply toward the end of a long period at work. Some of the consequences of fatigue are visible. These include eyes going in and out of focus; involuntary eyelid closure and head bobs; and persistent yawning. Other consequences of fatigue are not visibly apparent, such as wandering or poorly organized thoughts, spotty near term memory, missed or erroneous performance of routine procedures, degradation of control accuracy, impaired judgment, and looking but not seeing.

While some recent studies have found that SCEs are not associated with visible fatigue, they may be associated with

non-visible manifestations of fatigue. In addition, there are several studies that have found that fatigue is associated with an increase in SCEs. A Synthesis Report prepared by the Transportation Research Board of the National Academies, of which Knipling was the principal author (Knipling (2004)), examined the literature relating driving risk to several different potential factors. In the fatigue section of that report, Knipling discusses a 2001 Dingus report on sleeper berth usage that found a moderate correlation between high drowsiness episodes and SCEs. In addition, in that same report Knipling also cited a Hanowski (2000) report which found a positive correlation between SCEs and fatigue. Several researchers, such as Mast (1989), found that lane-tracking ability decreases as the time on task increases. Skipper (1984) found that measures related to vehicle lane position could be used to detect drowsiness. Variables such as the number of lane deviations, the standard deviation of lane position, and the maximum lane deviation were found to be highly correlated with eye closures. According to Dingus (1987), lane deviation showed good potential as a drowsiness indicator. Stein (1995) studied the effect of impairment on driving performance in truck drivers. Using data from a simulator experiment, Stein found that the standard deviation of lane position increased remarkably after the driver was fatigued. Pilutti and Ulsoy (1997) performed experiments on the Ford driving simulator at the Ford Research Laboratory. The results, reported by the authors, indicated that lane position showed significant change and corresponded well with Percent of Eye Closure (PERCLOS) model. PERCLOS is the only validated measure of driver fatigue.

Within the context of the Blanco study, it is not particularly important whether fatigue or other factors cause a rise in SCEs late in the driving day—what matters is whether driving performance declines (for whatever reason) over the course of long hours of daily work. Whether this decline in performance is caused by fatigue or some other factor such as inattention or distraction does not change the basic conclusion that driving performance suffers later in the duty day. ATA suggested that the Agency should have parsed all of the SCEs detected by Blanco, and used only those SCEs where visible signs of fatigue were present. Knipling, however, did not provide any research citation where time-on-task research was conducted in this manner, and FMCSA knows of no such research.

The Agency does not believe that it is necessary to disaggregate SCEs by fault or by type of vehicle or by type of roadway. The main question that the Blanco study addressed was whether time-on-task effect exists in a truck environment, as it does in virtually every other work setting.

Additionally, ATA commented that there was no harm from certain types of SCEs, such as lane deviations and, therefore, they should not be included in the analysis. A well established fact in transportation safety research is that crashes are caused by the interaction and convergence of many factors. In Knippling's 2009 and previous work, Knippling used the term "crash trifecta" to explain the complex and convergent nature of crashes. The "crash trifecta" concept asserts that crash genesis can be traced to three separate, but converging events. These include unsafe pre-incident behavior, transient driver inattention, and an unexpected traffic event. Not every element in the trifecta occurs in every crash. However, the probability of a crash given the three crash-trifecta elements is greater than the probability of a crash given only one of the crash-trifecta elements. Unintentional lane deviations are unsafe driving practices that may not always result in crashes. However, based on the "crash trifecta" concept, an unintentional lane deviation when compounded by fatigue/transient driver inattention and an unexpected traffic event significantly escalates the risk of a crash. To discount or ignore unintentional lane deviations simply because they do not always result in crashes is a simplistic argument that belies the complex nature of crash causation. It is also a contradiction of a principle and concept that Knippling has always championed.

ATA commented that a definitive link between critical incidents and crash risk has not yet been established. FMCSA noted this issue in the NPRM and has sponsored a study that addresses it indirectly. A report entitled "Distraction in Commercial Trucks and Buses: Assessing Prevalence and Risk in Conjunction with Crashes and Near-Crashes" by Hickman, (2010), was placed in the docket of the Agency's NPRM on "Drivers of CMVs: Restricting the Use of Cellular Phones" [75 FR 80014, December 21, 2010, Docket No. FMCSA 2010-0096-0004]. ATA submitted detailed comments on that NPRM on February 22, 2011. FMCSA assumes ATA was aware of the Hickman study. The report, based on a combined dataset of 2,421 crashes, concluded that "[t]he results in this study were similar to the results found

by Olson (2009) regarding SCE risk and performing a tertiary task while driving." The Olson study evaluated odds risk ratios of driver distraction tasks by generally examining SCEs. When these events were compared to the Hickman study, the results did not differ significantly. These findings thus provide broad confirmation of the link between critical incidents and crash risk, making them a reasonable surrogate for crashes. In addition, the Agency has long argued that SCEs are an indication of decreases in driving performance and an indication of an increased crash risk. The question is not whether SCEs are related to crash risk, but how large an increase in crash risk is associated with a given increase in SCEs. For instance, if a particular factor increases the risk of SCEs by 30 percent, does this imply that crash risk also increases by 30 percent, or by a lesser or greater amount? The size of the link has not been established, although it is generally accepted that there is a link between driver performance, as measured by SCEs, and crash risk.

ATA also commented on whether drivers with a disproportionate risk of SCEs should have been omitted from the data. Knippling noted that "if the scientific goals of the VTTI study were narrow—determining the associations between work schedules parameters and SCEs—then this decision was correct." In addition, Knippling notes that he has "never encountered a study of driver risk that did not contain compelling evidence of extreme individual differences among drivers." Since these differences are common to all driver samples, it seems reasonable to conclude that drivers exhibiting high SCE risk differentials are not particularly rare within the larger CMV driver population. As a result, data describing the driving performance of these drivers should not be ignored or omitted if the goal is to examine work schedule parameters and how they affect rates of SCEs. The Agency agrees with Knippling that it was appropriate for Blanco to retain data for these drivers in their analysis.

ATA pointed out that the drivers in the VTTI study were not randomly selected and are not nationally representative of all CMV drivers. This is correct; the sample represents 97 drivers who volunteered to participate in the study and whose performance was tracked using instrumented vehicles for 4 weeks. The naturalistic driving data were collected from four for-hire trucking companies—long-haul and line-haul segments of the trucking industry. The final project data set consisted of approximately 735,000

miles of driving data. Study participants also completed a daily activity register that provided a detailed account of the tasks that CMV drivers performed during their workday. The combination of naturalistic driving data and activity registers makes this study one of the largest data sets ever collected for studying driver activities, behaviors, and fatigue. The study team acknowledged in its report that participants may not be representative of the entire population of commercial drivers, but the Agency knows of no systematic biases in the composition of the sample that would distort or invalidate the conclusions drawn by the researchers. Identifying and securing the cooperation of a large group of drivers who are truly representative of the extraordinarily diverse motor carrier industry would be cost prohibitive, even if it was feasible. The Blanco study represents that best science that is currently available to examine driver fatigue issues.

Comments on Jovanis (2011). ATA/Knippling provided the following comments regarding the Jovanis (2011) study:

- There was no description of crash characteristics (other than drivers' associated work schedules) provided;
- There was no distillation of the crash dataset to exclude non-preventable crashes;
- The researchers did not perform validation tests of study conclusions via disaggregation of the crash dataset by prominent fatigue-related factors; *i.e.*, single-vehicle vs. multi-vehicle crashes, or other crash characteristics;
- Inadequate attention was paid to time-of-day as a potential confound;
- The study employed an inter-subject design rather than intra-subject design;
- There were a relatively small number of 11th hour crashes and exposure hours;
- The study sample may be unrepresentative due to apparent inclusion of truck tractors not equipped with sleeper berths.

FMCSA Response. Knippling and the National Industrial Transportation League (NITL) stated that Jovanis provided no description of crash characteristics (other than their patterns of work schedules) and no distillation of the crash dataset to exclude non-preventable crashes. These comments are correct; the study team was tasked by the Agency to investigate the crash risk by hour of driving, not to investigate either fatigue-only crashes or crashes deemed preventable. The team was interested in all crashes and their association with driving hours of

service. The study did not adopt a "fatigue" or fault perspective used by others because the researchers did not want to inject personal judgment about individual crashes into the analysis.

Knipling commented that the Penn State team did not perform validation tests of study conclusions via disaggregation of the crash dataset by prominent fatigue-related factors (e.g., single-vehicle vs. multi-vehicle crashes and other crash characteristics). Again, this research was a study of the time-on-task effects as they relate to crash risk for evaluation of the drivers' hours of service. Disaggregation of the data into the various categories suggested by ATA is neither necessary nor warranted in the context of determining crash risk as a function of driving hour. The underlying methodology used for this study has been employed over the last 25 years, and related studies based on this methodology have appeared in peer-reviewed journals, papers and proceedings and presentations to the Transportation Research Board of the National Academies.

Knipling claimed that the Penn State team did not pay sufficient attention to time-of-day as a confounding factor. Time of day is discussed at great length in the report. The study carefully included multiday driving in the models, by grouping drivers with similar daily and weekly work and driving schedules together. Within each group, drivers started their duty day at approximately the same times on the same days, and drove for roughly the same number of hours. Drivers were also grouped based on where in the week their extended off-duty or restart fell. Because drivers in each schedule grouping drove at roughly the same time, and for the same duration, on a daily basis, their exposure at a particular time of day was similar. These groupings, therefore, partially controlled—although imperfectly—for time of day and circadian effects.

Knipling commented the study employed an inter-subject design rather than intra-subject design. That is, the study compared drivers who had a crash to two drivers who did not rather than comparing the crash driver to him- or herself over a period in which there was no crash. This is correct, and the study team did so for good reason: including only an intra-subject design removes all non-crash involved drivers from the analysis. The Agency believes it makes sense to build a model representing all drivers on the road, not just those involved in crashes in any one year.

Knipling noted that relatively few 11th-hour crashes and exposure hours were included in the study. This is also

true. One of the reasons the Agency commissioned this study was to collect data on a larger number of drivers who drove into the 11th hour. However, even with this larger data set, which combined the 2005 data set and new information collected specifically for this study, the Penn State team found that many drivers simply are not using the 11th hour of driving.

Comments on Relation of Blanco and Jovanis Results. OOIDA commented that the two new studies Blanco and Jovanis (2011) provided inconsistent results. ATA pointed out that the overall driving effects in the Blanco study were not significant.

FMCSA Response. OOIDA correctly pointed out that the Blanco study was done using a naturalistic driving study perspective, while the Jovanis (2011) research was based upon a review of driver logbooks and electronic on-board recorder (EOBR) records and involved a comparison between the portion of logs of drivers reflecting trips where a crash occurred and the logs of other drivers where no crash occurred. Using these two very different methodologies, both studies showed a statistically significant time-on-task effect—as the number of hours increased so did the number of SCEs (Blanco) or crashes (Jovanis (2011)). The study by Blanco significantly qualifies the previous work by Hanowski (2008), which detected no difference in the crash risk between the 10th and 11th hour of driving. Although the new study is still unable to pinpoint a statistical difference between those two hours or between the 11th hours and the 7th, 8th, 9th, or 10th hours, it shows a time-on-task effect that the more narrowly focused 2008 study did not. As a result, all major drive-time research is generally consistent in finding that longer work hours increase the risk of a crash. The primary reason for this development is that the latest VTTI study was able to reliably capture lane deviations. With any impairment such as fatigue or loss of vigilance, one of the first indications is the driver's inability to keep the vehicle within a particular lane. Lane tracking is the first and one of the best indicators for loss of vigilance or driver fatigue.

Blanco and her colleagues conducted numerous statistical tests on their data. The NYDOT commented that the study:

Contains some data manipulations that may be questionable. Table 11, which summarize the raw data, shows 11th hour as having the highest SCE rate per hour. To accommodate certain statistical analysis methods the SCE data was collapsed to be binary variable which resulted over 42 percent of the over-all SCE data, and over 59 percent of the SCE data for the 11th hour of

driving to be discarded. Through a series of further data manipulations the researchers arrive at Table 22 (the data used to calculate the odds ratios in comparing driving hours), which shows 11th hour to be the safest hour in terms of SCE rate per shift. Some justifications for these data manipulations were presented, but they are not very compelling.

The Agency agrees with NYDOT's characterization of some of the analytical techniques used in the study. The Blanco study took continuous data and converted them to a binary function. While this may be necessary for calculating odds ratios, it can also conceal useful information. For example, a driver who becomes fatigued and has difficulty maintaining vigilance is more likely to have multiple SCEs. Given the analytical approach used by Blanco, a driver's lane incursions in a given hour would be coded as "yes" (meaning there was an SCE in that hour), irrespective of the actual number of incursions. Increasingly frequent SCEs are probably indicative of increasing fatigue, but converting them to a binary function eliminates that information. This analytical technique makes it much more difficult to show statistically significant differences.

OOIDA also commented and reiterated that the Blanco study did not find statistically significant differences between the 10th and the 11th hour of driving. This is true, but again given the data procedure discussed above and the fact, as OOIDA pointed out, that many of the drivers in this study did not drive into the 11th hour, the sample size was substantially reduced. These factors have a great effect on statistical significance.

Comments from NY DOT and Advocates. The NYDOT stated that the Blanco and Jovanis (2011) findings supported reducing driving time to 10 hours and requiring breaks. It stated that Jovanis (2011) and Sando (2010a and b) supported the changes to the restart provision. Advocates stated that the studies supported the 10-hour driving limit, the mandatory break, and a 13-hour driving window. It concluded that the studies contradicted the proposal to allow drivers to extend the driving window to a 16-hour day twice a week.

FMCSA Response. FMCSA agrees that the studies show a general increase in crash risk with longer work hours. However, confronted with strong evidence that an 11-hour limit could provide higher net benefits, the Agency has concluded not enough data exists for adopting a new regulation on this issue and that the current driving limit should therefore be allowed to stand for now. As discussed elsewhere in this

preamble, however, based on the cost, an 11-hour driving limit is the most reasonable regulatory choice.

Comments on Sando Studies. ATA and Knipling criticized the applicability to the trucking industry of the transit bus studies by Sando (2010a and 2010b). The main criticisms were that transit bus drivers work in a different operating environment than over-the-road truck drivers and under different HOS rules. Other commenters on these studies made these same two arguments. In addition, Knipling criticized some aspects of the methodology used and suggested refinements that might have improved the study. He argued that the study failed to distinguish between multi-vehicle and single-vehicle crashes, and that the study omitted preventable crashes that were perceived as having been caused by factors other than fatigue.

FMCSA Response. The Agency agrees that transit bus operators generally drive in a different environment from over-the-road truck drivers. The former generally operate in an urban environment on city streets, while the latter operate on highways and rural roads and spend limited time driving in urban areas. In addition, transit bus operators drive during peak commuting periods, when traffic volumes are heavy, while truck drivers often adjust their schedules to avoid large urban areas during rush hour if possible. Finally, transit buses are not equipped with sleeper berths, and there are not always good places for transit bus operators to take breaks and rest during shifts. While these are legitimate reasons to use caution in applying the results of these studies to truck drivers, their findings cannot be totally ignored. Despite the differences in operating environments, both transit bus and over-the-road truck drivers spend the majority of their work time driving large motor vehicles. Furthermore, there is no reason to believe that truck and bus driver populations respond differently to long work hours.

Florida transit bus operators are governed by different rules than interstate truck drivers. They are allowed a maximum duty window of 16 hours, are required to take only an 8-hour break between shifts, and can drive 12 hours per day. Their maximum work hours are capped at 72 hours in 7 days. Knipling and others argue that these different rules make the application of the transit bus study findings to the trucking industry questionable. However, a look at the transit bus operator schedule data in Sando 2010b shows the average weekly hours worked by the operators included in the study.

Drivers generally averaged between 50 and 55 hours of work per week, and the maximum weekly hours for any one driver was 85.67, which is barely over the maximum number of hours a truck driver can work under the current HOS rules. In essence, the vast majority of drivers included in the study were complying with the weekly on duty hour limits that apply to truck drivers. Although governed by different hours of service rules, the fact that almost all of the drivers in the study were working schedules that would comply with the current HOS rule for truck drivers makes the findings of the study somewhat applicable.

The other criticisms of these studies involved minor methodological issues. The authors excluded crashes that were deemed to have a cause that was not fatigue-related. While this filtering of the data may have affected certain findings, especially those related to crashes during windows of circadian low, when fatigue would be a larger problem, it is unclear how this filter could invalidate the findings related to cumulative fatigue and long daily average working hours. Presumably drivers working long hours would be involved in non-fatigue-related crashes at rates similar to other drivers. If one accepts this reasonable assumption, finding that their risk of fatigue-involved crashes increases would logically mean that their overall crash risk is also higher. While it would have been helpful for the authors to look at all preventable crashes, the fact that they excluded some preventable crashes from the analysis does not invalidate the findings that long average daily work and excessive hours of weekly work increase the risk of a crash.

Knipling also claims that the authors should have looked at multi-vehicle and single-vehicle crashes separately. We see no reason why a study cannot look at crashes as a whole rather than segmenting them by the number of vehicles involved. True, multi-vehicle crashes have a different crash factor profile than single-vehicle crashes, but the same factor can increase the risk of either type of crash. In short, while the suggestions for methodological improvements are helpful, the authors' failure to conduct these extra analyses does not appear to invalidate or seriously compromise the findings of the studies.

ATA and others have argued that the Agency "has no basis" for claiming safety benefits associated with changes to the HOS rules. One of the primary safety impacts claimed by the NPRM was that long weekly work hours are associated with an increase in the risk

of a crash—i.e., that long hours over successive days result in cumulative fatigue, and cumulative fatigue results in increased crash risk. The transit bus operator studies analyzed the association between weekly working hours and preventable crash involvement and found a cumulative fatigue impairment effect that is stronger than that used by the Agency in evaluating the rule adopted today. While the Agency does not believe it would be valid to apply the cumulative fatigue impact of these transit bus operator studies to a rule governing over-the-road truck drivers, the studies do confirm that long hours of working per week are associated with decrements in driving performance and pose a safety hazard. The studies therefore provide further evidence that it may be wise to limit the amount of weekly work allowed to truck drivers.

In addition, the transit bus studies corroborate another effect used by the Agency in analyzing the impacts of the HOS rules: Long working hours are associated with fewer average hours of sleep per night. FMCSA used the relationship between work and sleep to estimate the health benefits associated with reductions in allowable daily and weekly work. The transit bus studies provide further evidence that long daily and weekly work hours are associated with sleep deficits. Chronic sleep deficits are associated with fatigue-impairment and long term adverse health consequences. Insufficient sleep therefore affects both public health and safety. Corroboration of the Agency's position that increases in work result in decreases in nightly sleep lends support to FMCSA decision to reduce the hours drivers can work.

E. Driving Time Limits

Beyond the arguments on the economic impact of the 11th hour, industry commenters generally stated that FMCSA had no data that demonstrate that the 11th hour is riskier than the 10th. NTSB, NIOSH, and the safety groups supported reducing driving time to 10 hours.

Comments on the Safety of the 11th Driving Hour. Less than 10 percent of the commenters on this issue supported reducing the permissible driving time from 11 to 10 hours. Most of these commenters asserted that the reduction to a 10-hour driving time limit would improve safety. NTSB and NIOSH stated that the reduction to 10 hours would promote adequate sleep periods. NTSB stated that reducing driving time to 10 hours would also reduce time on task. Six commenters argued that the scientific evidence supports a 10-hour

driving time limit. The joint comments filed by Advocates *et al.* cited numerous studies to support their contention that the 10-hour driving time limit is supported both by “data on driver sleep patterns under the current, 11-hour limit and by the reduction in added driving exposure at the highest level of crash risk that would be eliminated.” Three commenters, including Advocates *et al.*, cited research that they asserted shows that crash risk increases well before the 11th hour of driving. NTSB and Advocates *et al.* cited studies that they stated show that extended periods of time awake and time on task have been associated with fatigue-related performance decrements and increased crash risk. NTSB argued that because at least some statistics indicate that the 11th hour of driving is more dangerous than any of the first 10, in the absence of completely relevant scientific data, FMCSA should err on the side of caution and reduce the driving time limit to 10 hours.

Advocates *et al.* stated that in the 2003 HOS final rule, FMCSA acknowledged that performance begins to degrade after the 8th hour on duty, but justified increasing the driving time limit to 11 hours by stating that other changes in the rule would make up for the added consecutive driving time at the highest rate of crash risk. They stated that “no evidence supports the supposition that increases in other aspects of the off-duty time provided under the current rule reduce the crash risk or driver fatigue experienced in the 11th consecutive hour of driving.” They noted that the appellate court that rejected the 2003 HOS rule cited this lack of support for the trade-off. Advocates *et al.* asserted that maintaining the 11-hour limit would constitute arbitrary and capricious agency action since FMCSA still lacks evidence that driving during the 11th consecutive hour is safer than, or at least as safe as, the truck crash risk experienced during driving hours prior to the 8th consecutive hour of operation.

Finally, Advocates *et al.* presented arguments to counter assertions that there is no new research data to support an FMCSA decision to adopt a 10-hour limit. They argued that the 11th hour limit was always unsupported by research, so no new evidence is necessary to rescind it. Further, they stated that there actually are data showing that, as of 2006, drivers are not getting any more rest than they were before the rule took effect in 2004. They argued that since scientific evidence indicates that the amount of sleep drivers are currently getting is less than the amount necessary to restore driver

performance levels, revising the HOS rule is both necessary and appropriate.

ATA and most industry commenters argued that data and fatigue research do not show that a quantifiable safety benefit would result from reducing daily driving time from 11 to 10 hours, or that there is an increase in crash risk between the 10th and 11th hour of driving. Several commenters cited research studies that they asserted show that hours of driving is not a strong or consistent predictor of observed fatigue. These studies include the 2007 VTTI naturalistic driving study discussed in the NPRM (Hanowski (2007)), which ATA and others cited as showing no increase in crash risk between the 10th and 11th hours of driving. ATA asserted that although FMCSA expressed concerns about the VTTI study in the NPRM, the Agency has used that study in other rulemakings and has used other studies in the HOS rulemaking that had more severe sample size and composition flaws. Commenters, including ATA, also cited data that they asserted show that more crashes occur during the first few hours of driving, which they argued supports retaining the 11-hour daily driving limit.

FMCSA Response. A new study conducted by the same VTTI researchers whose work was cited in the NPRM, and using the same approach praised by ATA and other commenters, has found that the risk of SCEs rises with the hours since coming on duty (Blanco).

Although Blanco found some increase in risk in the 11th hour, the effect is not significant. A stronger effect is related to hours worked each day and week. Given the high cost of eliminating the 11th hour and the ambiguous data, FMCSA has decided that it does not have an adequate basis to change the driving limit. The rule also substantially reduces the maximum weekly work time and ensures that drivers cannot work the maximum number of hours every week while giving the flexibility to do so occasionally. Some of the safety benefits and most of the health benefits derive from limiting long work hours.

Comments on the Use of the 11th Hour. About 35 commenters submitted some information on the use of the 11th hour. Although one small carrier and a shipper association stated that most drivers maximize hours, many commenters, including ATA and other trucking associations, indicated that the 11th hour is used primarily for flexibility to account for unforeseen events. Some LTL carriers stated that some routes (often called “lanes”) have been rearranged to take advantage of the longer distances possible with 11 hours of driving time. Several large carriers

submitted information on the frequency with which their drivers use the 11th hour—the percentages reported were 6 percent, 7 percent, 9 percent, 9.5 percent, 11 percent, and 15.26 percent.

A private carrier stated that one division uses the 11th hour 85 percent of the time, while the rest use it 10 percent of the time. Another private carrier stated that its drivers rarely reach the 11th hour. OOIDA reported that two thirds of the respondents to its on-line survey said they use it 1 to 4 times a week. Individual drivers and smaller carriers reported higher use of the 11th hour, although again it was not always possible to determine whether they were reporting the percentage of daily periods with a full 11 hours of driving or the percentage of drivers who used the 11th hour at some point over the period examined.

FMCSA Response. None of the commenters provided data that could be used to estimate the actual level of use of the 11th hour, but in any case, FMCSA has not adopted a 10-hour limit.

Other Comments on Driving Limits. Finally, a few commenters suggested alternative driving rules. OOIDA suggested that the 10-hour limit apply only to new drivers; another commenter suggested that drivers using paper logs be limited to 10 hours. Two commenters said that as the first hour is the most dangerous, FMCSA should require drivers to be on duty for one hour before driving to be sure they are awake.

FMCSA Response. It is difficult to see how limiting a 10-hour rule to new drivers could be enforced. It is also not clear that new drivers are more prone to fatigue-related crashes than experienced drivers. The suggestion that drivers be on duty for an hour before driving is based on the assumption that the factors that lead to a high number of crashes in the first hour (which some studies do not show) are related to fatigue and sleep inertia. Fatigue may play a part in some of these crashes, but driving on secondary roads and the simple fact that all drivers drive the first hour are likely to be larger factors in first-hour crashes than fatigue. It is not clear why using paper logs would make longer driving times more fatiguing.

F. 30-Minute Break Provision

Comments. A few commenters supported mandated breaks. NIOSH and NTSB supported a required break to reduce continuous time on task. Advocates *et al.* thought breaks were temporarily helpful, but not adequate to reduce fatigue.

Commercial Vehicle Safety Alliance (CVSA) and a few other commenters stated that required breaks would

complicate enforcement. A trucking association and others warned that the proposed requirement could cause conflicts for drivers transporting Department of Defense (DOD) shipments of security-sensitive materials that require continuous attendance. ATA, OOIDA, and others expressed similar concerns about conflicts with hazardous materials transportation requirements. The Truckload Carriers Association (TCA) and OOIDA added that the provision would undermine the ability of team operations to keep the freight moving with minimal stops and to have someone in charge of the shipment for the duration of the trip.

A few commenters suggested longer or shorter breaks. Many drivers misunderstood the rule and assumed that it required a break at 7 hours. Some argued that drivers would wait until 6.5 or 7 hours to take the break so they would not have to take another break. Two commenters supported a break from driving, but not from being on duty.

FMCSA Response. FMCSA has revised the break provision in response to comments. If a driver wants to continue driving after 8 rather than 7 hours on duty as proposed, driving is not permitted if more than 8 hours have passed since the end of the driver's last off-duty or sleeper-berth period of at least 30 minutes. In other words, driving is prohibited if more than 8 consecutive hours have passed since a driver's last off-duty or sleeper-berth break of at least 30 minutes; after taking such a break (or a longer one), the driver may resume driving, provided he or she does not exceed the 11-hour driving limit. This change will make the break provision consistent with the sleeper-berth rule and address the concerns of team drivers that a break at the 7th hour will be disruptive. It will also mean that a driver working a full 14-hour day will be able to continue driving after the 8th hour on duty if he/she takes a single break between the 6th and 8th hour.

For a driver who is on a long-haul run that involves nothing but driving for the duty period, any break of at least 30 minutes taken between 3 and 8 hours on duty will meet the requirement. If a driver spends 2 hours loading at the beginning of the day, then has a 10-hour drive ahead of him, he can take a half-hour or more break at some point between the 4th and 8th hours after coming on duty, and then complete the rest of his 10 hours of driving without another break. If, as ATA and others argued, drivers are already taking breaks, the final rule should allow most of those breaks to be used to meet the requirement.

The Blanco and Jovanis (2011) studies demonstrate that breaks reduce the risk of crashes after the break, findings that are consistent with research on the impact of breaks on accident risks in other industrial sectors. Blanco analyzed SCEs in the hour preceding and after a break. This research found that any break from driving reduces risk in the hour following the break, but off-duty breaks produced the largest reduction. This study also showed that when non-driving activities (both work- and rest-related) were introduced during the driver's shift—creating a break from the driving task—these breaks significantly reduced the risk of being involved in an SCE during the 1-hour window after the break. The benefits of breaks from driving ranged from a 30- to 50-percent reduction in risk of SCEs (depending on the type of break from driving), with the greatest benefit occurring for off-duty (non-working) breaks.

Jovanis (2011) studied the effect of breaks from driving on crash risk. That analysis was unable to distinguish between on-duty breaks from driving and off-duty breaks. The analysis looked at the effects of one, two, or three breaks from driving in a day on the likelihood of crash involvement. The inclusion of any break was found to reduce the risk of a crash, and the effect of two breaks was found to be statistically significant.

In addition, O'Neill (1999) found that breaks improve performance on driving simulators. The study examined driver simulation performance following active breaks in which loading and unloading of a vehicle was simulated, and rest breaks. The study found that loading and unloading had mixed effects on driving performance, but that off-duty breaks improved performance. The driving simulations showed a decrease in simulator performance from the start of a driving period to the point at which a break was taken. After a break from driving, performance was restored temporarily, and then began to decline as the length of time since the last break increased.

To address the concerns raised about carriers of hazardous materials, FMCSA has added a new paragraph § 395.1(q) to allow drivers who are attending a motor vehicle transporting Division 1.1–1.3 explosives, but performing no other work, to log at least a half hour of the time spent attending the CMV toward the break. This time continues to be on-duty, so the driver will have to annotate his log to indicate when the break was taken. This exception will allow the driver to meet the requirements of 49 CFR 397.5 "Attendance and surveillance of motor vehicles" in the

driving and parking rules for the transportation of hazardous materials to attend the vehicle at all times without violating the break requirement. FMCSA notes that Blanco found that such on-duty breaks provide some risk reduction in the hour following the break.

On the issue of enforcement, any new requirement makes enforcement more complex, but breaks are an easy concept to comprehend.

G. Restart

General Comments on the Restart. NIOSH, Advocates *et al.*, and one carrier supported the changes to the restart provisions because they would help address fatigue issues for drivers operating at, near, or beyond the maximum permissible hours of service and would not affect compliance, given that many drivers already take weekends off. OOIDA, FedEx, TCA, and two carriers added that the current rule provided sufficient rest and sleep for drivers, regardless of whether the driver engaged in daytime, nighttime, or both types of operations. ATA referenced earlier published statements from the Agency in asserting that the 34-hour period was adequate. ATA argued that FMCSA should require long periods of "idle time" only if there is evidence that the current restart provisions may exacerbate problems with fatigue. Referring to fatigue associated with long driving hours, OOIDA said that the current rule allows drivers to return to their homes sooner than was possible under the old rule. OOIDA said that the proposed restart changes, based on FMCSA concerns of long duty hours resulting in fatigue, were unnecessary in light of anecdotal evidence regarding the actual use of the 34-hour restart. ATA stated that drivers do not use the restart to maximize hours, but for ease of recordkeeping and scheduling flexibility. OOIDA, citing the FMCSA Field Study data reported in the interim final rule published on December 17, 2007, stated that 67 percent of drivers take restarts of 44 hours or more. Schneider said that only 1.73 percent of its drivers had restarts between 34–40 hours; the average restart was 62 hours. A private carrier reported that 95 percent of its drivers' restarts exceeded 34 hours and 50 percent exceeded 58 hours.

FMCSA Response. Most industry commenters argue that changes to the restart are not necessary because drivers are not using it to maximize hours. FMCSA agrees with ATA that some drivers do not use the restart to maximize hours, but for ease of recordkeeping and scheduling flexibility. If that is the case, then the

changes will have little impact. Only drivers who work more than 60 hours in 7 days or 70 hours in 8 days need the restart to obtain extra hours. Drivers who do not need the restart but who only use it to simplify bookkeeping will not lose work hours as a result of the changes because they can already work as many hours as they prefer without using the restart provision. Any driver who is taking two consecutive days off a week will not be affected. If drivers, in fact, average 44 to 52 hours on duty a week as ATA's data showed, these drivers will not be affected. A driver who only occasionally works maximum hours will not be affected because the rule will allow that driver to use the 34-hour restart once, with a longer break at the end of the subsequent week. Repeating what we said earlier on this subject, unless a driver knows that he is working less than 60 hours a week (e.g., a regular 10-hour day, 5 days a week), he must keep a running 7- or 8-day total of on-duty hours to be sure he is within the limits regardless of the restart provision or the changes this rule makes to it. If a driver takes 34 hours or more off, he simply has a new point from which to keep the total, but he still needs to keep track of his total hours if he could be pressing the limits. Many drivers do these calculations in their heads without needing to write them down. This calculation, at any rate, is both simple (subtracting one day's hours from the running total, then adding another day's hours to the result) and can be conducted during waiting or refueling time, and so would result in de minimus effort and cost to the driver. Furthermore, any driver who only takes a restart once a week would not have to keep a tally of hours back beyond the previous restart, because that restart would reset the driver's cumulative available hours under the new rule, as it does under the current rule. Any driver who works relatively moderate hours would be unlikely to take multiple restarts in a week, or have to worry about violating the cumulative weekly hour limit.

When used to maximize hours, the 34-hour restart adopted in 2003 allows a driver to work as many as 84 hours in 7 days. Over time, drivers could average 82 hours a week. It is important to note that for a driver to work these long hours he/she must be working close to 14 hours a day 6 days out of 7. The final rule reduces the maximum weekly hours by only 3 hours for 1 week, but over time the average maximum hours per week will be about 70 hours in 7 days. Despite the reduction in the weekly work hours, drivers will retain

significant operational flexibility because they will still be able to work long hours in 1 week, while balancing those periods with shorter subsequent work weeks to obtain more rest.

Comments on the 2-Night Requirement. NTSB, Advocates, a safety official for a carrier, and about 80 other commenters supported the proposal that each restart include two nighttime periods.

The majority of commenters on this issue opposed the requirement. CVSA's comments were a summary of points raised by other opposition comments. CVSA said the proposal would reduce driver flexibility, unduly burden carrier operations that included driving time from midnight to 6 a.m., and add more CMVs to an already overburdened highway system at peak hours. Further, CVSA said it was difficult to determine whether driver health benefits would result from the change. CVSA claimed the 2-night requirement would disrupt regular weekly rest cycles for some drivers, leading to more driver performance issues and falsification of driver records of duty status (RODS). CVSA proposed a consecutive 48-hour restart period (a position not shared by other opponents of the proposal).

Some commenters stated that the two-night requirement could extend the restart up to 52 to 63 hours (commenters offered differing estimates of the shortest period necessary to comply with the proposal). One association stated that the 2003 rule allows team drivers to be idle for only 24 hours, but the 2-night requirement would extend that time period to 41 hours.

Commenters also stated that the provision would unfairly affect nighttime drivers. The California Highway Patrol (CHP) stated that the actual requirement would vary for drivers on cross-country trips because their time is determined based on their home terminal, so that the 12 a.m. to 6 a.m. period might be either 9 p.m. to 3 a.m. if a driver from an east-coast terminal took a restart in the Pacific time zone or 3 a.m. to 9 a.m. if a west-coast driver needed a restart in the Eastern time zone.

FMCSA Response. As discussed above, FMCSA has shortened the 2 nighttime periods the driver must be off duty to 1 a.m. to 5 a.m. The impact of the 2-night requirement on the restart length will vary with the time a driver goes off duty and the time he resumes work. For drivers who work a regular schedule that starts at night, the 2-night provision will generally require the driver to take 2 plus days off to maintain the regular work schedule. For example, a long-haul driver who normally drives

at night may start at 11 p.m. and work until 10 a.m. 6 days a week; the driver will need to take 2 days plus 13 hours off to obtain the 2 night periods and be able to return to work for an 11 p.m. start. For drivers who work at night irregularly, the restart length may be considerably shorter because the driver may be able to stop in time to get 2 nights into a shorter time frame; a driver who can stop between 7 p.m. and 1 a.m. can take the minimum 34 hours off while obtaining 2 periods that include 1 a.m. to 5 a.m.

Some teams do currently manipulate the restart to shorten it to 24 hours; the non-driving team member counts his 10-hour off-duty time while the other driver is driving toward the 34-hour restart, both drivers are then off duty for 24 hours, and the driver with 34 hours off duty starts driving while the second driver obtains another 10 hours off. Exactly how much longer the 2-night requirement will make the restart will depend on stopping time and whether teams overlap restarts. At a minimum, stopping a truck driven by a team for the 28 hours between 1 a.m. one morning and 5 a.m. the next morning would provide two consecutive nighttime rest periods for both drivers. Both drivers could meet the 34-hour off-duty requirement for a restart if one of them was off-duty (while the other drove) for at least 6 hours before the truck stopped, and if the other stayed off-duty for at least another 6 hours after the truck started again. As a specific example, suppose the first team member drives from 5 p.m. until 1 a.m. Saturday, during which time the second team member is off-duty in the sleeper berth, and then both drivers go off-duty for 28 hours until 5 a.m. Sunday. Because this time off includes both Saturday from 1 a.m. to 5 a.m. and Sunday from 1 a.m. to 5 a.m., both drivers comply with the 2-night rule. By 5 a.m. on Sunday, the second team member will have been off-duty for a total of 36 hours (8 hours in the sleeper berth plus 28 hours while the truck is stopped), more than meeting the minimum 34-hour off-duty requirement for a restart. Thus, the second team member will be eligible to start driving. The first team member will, by that point, have had only 28 hours off-duty, but will meet the 34-hour requirement so long as he or she remains off-duty for at least the first 6 hours after the truck starts moving.

The time that the truck would have to remain stopped for both drivers to meet the restart requirements would depend on the time that the truck stopped. If it stopped at midnight instead of 1 a.m., for example, the team would have to be off-duty for 29 hours instead of 28 for

both drivers to be off-duty for two consecutive periods between 1 a.m. and 5 a.m.; similarly, if the truck stopped at 10 p.m., it would have to remain at rest for 31 hours to reach 5 a.m. a second time, and so forth. The earlier the truck stopped, the longer it would have to remain stopped; but the time could be minimized by planning on the part of the team.

It should be noted that teams can do two cross-country runs before needing a restart. If they average 50 mph, they can drive cross country in 50 hours; at the end of the trip, one driver will have used 20 hours of driving time and the other 30. Even allowing for loading and unloading, both drivers will have enough hours to make a return trip before approaching the point when a restart is needed. Many teams might not have multi-week schedules that rely on short restarts.

As for the possibility that night drivers will “flip” their sleep schedule during a restart (*i.e.*, change from daytime to nighttime sleep), it is likely that they do so regardless of the restart length, particularly when taking a restart at home; otherwise they would have minimal time to spend with their (day-oriented) families. Because daytime sleep is shorter and of lower quality, switching to a night sleep helps to at least attenuate the sleep debt a driver working maximum hours builds up (Åkerstedt 2003), (Hossain). Research consistently indicates that it is difficult to get more than 4 to 6 hours of sleep during the day; sleeping during the day on days off, therefore, simply increases the driver’s sleep debt. With respect to CVSA’s question about whether there was a health impact of the 2-night provision, these health effects are in part related to the increase in weekly sleep; the main health impact of the restart provision, however, is the result of the reduced maximum hours a driver can work over time.

The Agency knows of no reason why drivers would stop driving at night, putting more trucks on the road during rush hours, to avoid the extra hours that may be needed to meet the 2-night requirement. As discussed previously, most drivers who regularly drive overnight do not work enough hours to need a restart and, therefore are not subject to the 2-night requirement. Pick-up and delivery times are, in any case, set by shippers and receivers, not by the drivers. Drivers and carriers will have to adjust the hours worked for those working the longest hours, rather than change driving patterns.

CVSA’s concern about concealment of HOS violations is reasonable, but mandatory use of EOBRs, if adopted by

the Agency as proposed in a separate rulemaking proceeding on February 1, 2011, would make cheating more difficult because the driver would not be able to mislabel driving time.

On the issue raised by CHP about the basis for determining the 1 a.m. to 5 a.m. period, drivers’ logs are based on the time zone of their home terminal. The 2-night periods are, therefore, set by the time at the home terminal. This approach will make it easier for drivers and schedulers and not introduce new complexity to the rule. Based on comments, it appears that many and perhaps most drivers prefer to use their restart periods at home. To the extent that drivers are in other time zones during their restart, basing the time on their terminal time zone will also ease the concern expressed by commenters that all drivers would be returning to duty at the same time (*i.e.*, 5 a.m.).

Comments on the Washington State University (WSU) Study. Commenters criticized studies on which the Agency relied in formulating its 2-night requirement. ATA referenced studies indicating that the proposal likely would result in drivers transitioning to nighttime rest during the restart period, although that transition was ineffective at mitigating sleep loss and might contribute to driver impairment during the post-restart period. Several commenters also argued that the WSU study (Van Dongen (2010a and 2010b)) on which FMCSA based the changes to the restart was flawed. OOIDA criticized the WSU study as a laboratory exercise that had only 27 subjects in phase I and 12 in phase II, had no truck driver participants, and involved a 58-hour restart. J.B. Hunt offered a survey of 249 nighttime drivers (who operated between midnight and 6 a.m.); 79 percent of the survey participants who had scheduled night shifts reported that they do not change their sleep schedules *when at home* for time off. Hunt stated that this finding was contrary to the WSU study presumptions. The carrier added that drivers who get 10 hours of rest when off duty should not accumulate sleep debt.

FMCSA Response. To study the effectiveness of the 2-night restart provision, FMCSA has employed a process of testing in a controlled sleep lab environment. This is done under the premise that if a provision is not effective in the lab, it certainly will not be effective in a field-related environment. That is, if people cannot obtain adequate sleep in the best-case environment (a dark, quiet room, with no possibility of interruption), they will not be able to obtain adequate sleep in a normal environment, let alone in a

sleeper berth at a truck stop or beside a road. The first phase of the WSU study found that the 34-hour restart was effective at mitigating sleep loss and consequent performance impairment for daytime drivers, but not effective for nighttime drivers (Van Dongen (2010a)). The second phase tested a 2-night recovery period for nighttime drivers (Van Dongen (2010b)). The study found that the 2-night provision works better than 1-night to mitigate driver fatigue in nighttime drivers. The findings of the WSU study could be conservative and could be likely to understate the effect of night work on performance. In the WSU study, the subjects did not work more than half of the full 14-hour work period and had 58 hours off between weeks. The impact on drivers who are working twice as much and attempting to start work again in a shorter period is likely to be more severe than the study indicated. The subjects in the WSU study were young healthy adults with no apparent sleep disorders. If the study had been conducted in an uncontrolled field environment with actual truck drivers who sleep in a sleeper berth, the findings of performance degradation could be even more pronounced than were found in the WSU study.

As noted in previous responses, if the carrier’s survey respondents sleep during the day on their days off, they are adding to their sleep debt rather than reducing it. Monk (2000) found that married night workers with family commitments typically do not retain a day sleeping regimen during their off-duty (weekend type) break, as they want to interact with their day-oriented family rather than be awake when everyone else is asleep. In staying awake during the day, they experience powerful zeitgebers (*i.e.*, an environmental cue, such as daylight, given to a person’s biological clock to reset the sleep-wake cycle), pulling them away from a nocturnal circadian orientation. Even permanent night workers typically show a day-oriented circadian rhythm (as indicated, for example, by the body temperature rhythm) on their return to duty after a “weekend-type” break. Thus, to a certain extent, even permanent night workers are often actually rotating between nighttime and daytime circadian orientations.

With regard to the issue of sample size used in the WSU study, FMCSA completed the power analysis to determine the minimum sample size needed to be able to determine whether there is statistically significant difference between two conditions—in this case taking 1 night versus 2 nights

off. The power calculation for the WSU study determined that the minimum sample size is 12. WSU did find a significant effect in the Phase II study—that is, the 2-night restart was a significant improvement over the 1-night restart in terms of the primary outcome variable. That makes the issue of statistical power and sample size (*i.e.*, the chance of not finding an effect that is actually there) a moot point.

The Agency also notes that a small sample size of only 12 is not unusual for sleep studies. Two of the most cited studies in the sleep literature are the “Impact of Sleep Debt on Metabolic and Endocrine Function” by R. Spiegel (1999), and “The Cumulative Cost of Additional Wakefulness: Dose-Response Effects on Neurobehavioral Functions and Sleep Physiology from Chronic Sleep Restriction and Total Sleep Deprivation” by H. Van Dongen, (2003). Both of these studies were based on a sample size of 12 or fewer participants per treatment and each of these studies has been cited more than 50 times per year since date of publication (more than 700 and 400 times total respectively), so they are taken seriously by the sleep research community. Also with respect to ATA’s concern about the small sample size, the Agency notes that the original and only study used to justify the 34-hour restart provision had a sample size of 10 and was a laboratory-based study conducted by O’Neil (1999) for the American Trucking Research Institute.

Comments on the 168-Hour Limitation for Drivers Working 70 Hours in 8 Days. NTSB said that, with the other changes to the restart provisions, limiting how often drivers may use the restart should have the effect of increasing the amount of sleep drivers receive during the period and may encourage drivers to adopt more daytime oriented schedules. Although Advocates *et al.* endorsed the restart changes as an improvement, they argued that the limitations affected only those drivers operating 60 hours in 7 days. They said the Agency should apply similar restrictions to drivers who operate 70 hours in 8 days; that is, these drivers should be able to use the restart only once in 8 days. However, they considered the 168-hour limit to be a “positive step for safety” that would have a substantial impact on the portion of the driving population most at risk of driving while fatigued—drivers with very high-intensity work schedules.

FMCSA Response. FMCSA acknowledges that the 168-hour limitation has different effects on the two groups: The 60-in-7-day drivers are held to an average of 60 on-duty hours

per week, while the 70-in-8-day drivers are held to 70 hours in 7 days. The goal of this limitation, however, is to rein in the dramatic increases in weekly hours that were allowed by the institution of the restart in 2004, and it will accomplish that goal as intended. Drivers working under the 70-in-8-day provisions before 2004 could work no more than 70 hours in any 8 days, which is an average of $70/8 \times 7$ or 61.25 hours per week. Under the 2003 HOS rules, a driver working 14 hours per day Monday through Friday could build up 70 on-duty hours before midnight on Friday. If that driver then took 34 hours off, the restart would allow for a new week of work starting Sunday morning—only 6 days after the start of the previous week. Continuing this pattern would mean 70 hours on-duty per 6 days, for an average of $70/6 \times 7$ or 81.67 hours per week. Thus, the restart allows these drivers to cut up to 2 full days off the 8-day period originally intended for their 70 on-duty hours. Put another way, prior to the current rule, a driver working 14-hour days could work 5 days out of 8; under the current rule, he could work 7 days out of 8. Taking into consideration the effects of cumulative fatigue¹⁰ and impacts on driver health, FMCSA considers 81.67 hours per week to be excessive and has, therefore, instituted a limitation to keep these drivers from continuously working 70 hours every 6 days. The 168-hour limitation ensures that they can put in no more than an average of 70 hours per week—an increase over the average of 61.25 hours allowed under the pre-2003 rules, allowing for some improvements in productivity and a chance to spend more time at home, but a dramatic drop from the nearly 82 hours per week allowed now.

The situation is quite different for the 60-in-7-day drivers. To use the 60/7 provision, a carrier must operate only 6 days a week. These drivers, therefore, must always have at least one full day off every week (*i.e.*, the days when the motor carrier is not operating). Thus, the equivalent pattern to the one that allows the 70-in-8-day drivers to fit their work in a period 2 days shorter than before (namely a 60/7 driver working 56 hours in 4 days, taking 34-hours off, and beginning the next “work week” after only 5 days instead of 7) is not possible because their carrier’s 6-work-day week would interfere. Because a driver using

the 60-in-7-day provision cannot accumulate the long hours currently allowed for the 70-in-8 day drivers, the original restart provision did not allow nearly as great an increase in on-duty time for them as for the 70-in-8 day drivers. That is, for the 60-in-7 day drivers, the 2003 rule allowed an increase in average on-duty time per 7 days from 60 hours to 70 hours, which is a much smaller increase than the jump from 61 hours to 82 hours for the 70-in-8 day drivers.

From that perspective, though, the 168-hour limitation has roughly the same impact on both groups of drivers: The maximum of nearly 82 hours per week that could be accumulated by a 70-in-8-day driver is cut down to 70, a reduction of 14 percent and the maximum of 70 hours per week that could be accumulated by the 60-in-7-day driver is cut by 10 down to 60, which is also a reduction of 14 percent. But FMCSA expects that the drivers working under the 60-in-7-day provision are unlikely to be pressing the HOS limits hard enough for this limitation to be an issue: Because they are working for carriers that take a full day off every week, they are unlikely to be trying to get the absolute maximum of physical output from their resources. Many who felt too constrained by the 168-hour limit would have the option of switching to a 70-in-8-day pattern in any case.

Comment on the Impact of the 168-Hour Limit on Driving Time. A shipper association, a carrier, and an individual endorsed the 168-hour limit, provided the Agency eliminated the provision for two periods between midnight and 6 a.m. during the restart window. Advocates also claimed that the proposed changes to the restart provision will have almost no effect on the intensity of work for drivers who do nothing but drive. Advocates presented a numerical example in which a driver takes a 34-hour restart break, and then commences a period of alternating maximum driving and minimum resting until the 70-hour maximum cumulative on-duty limit is reached. If 11 hours of driving (broken up by a $\frac{1}{2}$ hour break) is followed by a 10-hour off-duty break, then 70 hours of driving is reached prior to the end of 7 of these driving shifts, interspersed with 7 half-hour rest breaks and 6 rest periods of 10 hours each. Thus, a total of $[34 + 70 + (\frac{1}{2} \times 7) + (6 \times 10)]$, or 167 hours will have elapsed since the beginning of the restart break. With a limit of one restart break every 168 hours, Advocates pointed out that the 168-hour provision would obligate the driver to wait only another hour longer before starting a restart break

¹⁰ “Analyses of Fatigue-Related Large Truck Crashes, The Assignment of Critical Reason, and Other Variables Using the Large Truck Crash Causation Study,” FMCSA, 2008, FMCSA–2004–19608–3481; and Sando 2010a and b.

than would have been necessary without that provision. (A very similar example was provided for cases allowing 10-hour driving shifts.) Thus, they claimed, the 168-hour limit does almost nothing to prevent drivers who only drive from using the restart to accumulate driving hours at a high rate.

FMCSA Response. Advocates' claim that the 168-hour limitation does almost nothing to reduce weekly driving time is both incorrect and beside the point. It is incorrect because by FMCSA's calculations the maximum driving hours per 7 days has been reduced from 73.9 hours down to 70 hours, a small but not a trivial reduction. It is beside the point because the 168-hour limitation was not aimed at cutting maximum weekly driving hours but at cutting maximum weekly on-duty hours, which had been increased dramatically by the 2003 rule, from about 61 to an average of almost 82.

FMCSA also believes that the maximum-driving-hour examples used by Advocates are not realistic. Even drivers who have no tasks other than driving will need to inspect their trucks, fuel, do paperwork, and contact their carriers. If even a half hour of non-driving work is added to each 11-hour shift, the highest practical average number of hours of driving per week drops to about 66, which is 6 hours less than what would be possible for a driver under the existing rules who took 6 11.5-hour shifts (including 0.5 hours of non-driving work) between restarts. Thus, under any plausible scenario, the proposed rule provides a significant reduction in allowable hours of driving per week. While it is true that the drivers who work the longest hours are in the truckload sector, even those on cross-country trips—less than one percent of shipments are cross country—will have some hours of loading and unloading time every week in addition to their daily driving work.

Other Comments on the 168-Hour Limitation. Most industry commenters on the restart issue opposed the 168-hour requirement. ATA and others stated that 34 hours was enough time to recover. OOIDA said the requirement was an attempt to prevent drivers from working more than 70 hours a week. A number of commenters asked why taking two 34-hour restarts in one week was objectionable. Various industries said it would be burdensome. One carrier said it would be particularly detrimental for carriers operating only 6 days a week. CHP asked how it would know if it had been 168 hours since the last restart when it conducted a roadside inspection.

FMCSA Response. OOIDA's comment is correct: The purpose of the once-a-week restriction is to limit the ability of drivers to work the longest hours week after week. Multiple restarts in each week would not generally be a problem because frequent 34-hour-long off-duty periods would leave little time in a given week to build up excessive duty hours. If, however, restarts are taken every 6 days, a problem does arise: Under existing rules, alternating 14 hours on-duty and 10 hours off, a driver would reach 70 hours in less than 5 full days. After a 34-hour break, the driver could then begin this same cycle again, totaling 70 hours on-duty every 6 calendar days, for an average of almost 82 hours per calendar week. Limiting restarts to one every 168 hours prevents this excessive buildup of on-duty hours, while still allowing drivers to use the restart provision to their advantage and avoiding the complexity of special provisions for more frequent restarts.

On the issue of how an enforcement officer will know whether 168 hours have passed since the last restart, § 395.8(k)(2) requires drivers to have 8 days of logs available on the truck (logs for the current day and the previous 7 days). If, however, a driver has taken a restart in the middle of the 8 days covered by the required logs, a roadside inspector may not be able to tell whether 168 hours have elapsed since the last restart. FMCSA recognizes that this provision will not always be enforceable during roadside inspections. FMCSA and our State partners will be able to verify compliance with this provision during compliance reviews or other interventions.

Other Comments on the Restart. Advocates *et al.* also expressed concern about the use of the restart by teams, where one 10-hour off duty period could be added to 24 hours off duty to achieve a 34-hour restart, which means that the team need only stop for 24 hours. Other commenters suggested various periods for the restart, from 24 hours to 48 hours.

FMCSA Response. The 2-night provision ensures that a driver would have to remain at rest for a minimum of 28 hours to allow drivers operating in the night to accumulate 2 consecutive periods from 1 a.m. to 5 a.m. For a team member operating solely during the day, it is true that the truck would not have to stop for as long a period (e.g., a day driver could enter the sleeper berth at 7 p.m. on a Friday, resting while the other team member drove for the next 10 hours until 5 a.m.). Then, if the truck remained at rest for another 24 hours, the first driver would have been off-duty for 34 hours, including two nighttime

periods. This much time off was found by the WSU study to have been enough time for a driver on a daytime schedule to recover.

Comments on the Impact of the Restart on Specific Sectors. Various industry groups and carriers expressed concerns about the impact of the restart changes on their sectors. Commenters supported continued exemption of oil field operations and construction from the restart requirement. One shipper association stated that fatigue was not a problem in short-haul operations and, therefore, that the restart need not be limited for these carriers.

FMCSA Response. As noted above, the applicability of the restart to construction and oilfield operations is unchanged. The concerns about the general economic impact of the restart are discussed in detail in Section IV. "Discussion of All Comments" B. "Economic Impacts." As for short-haul operations, the commenter offered no basis for its claim that fatigue is not a concern for drivers in these operations if they are working maximum hours. Local drivers may be less likely to be fatigued because they do not work the longest hours, but those drivers do not need to use the restart to obtain extra hours.

H. Duty Period/Driving Window

Comments on 13 versus 14 hours on duty. NTSB supported limiting drivers to 13 hours on duty in a 14-hour consecutive period. Most commenters on this issue opposed the change to 13 hours because they claimed it could prevent drivers from completing their work, reduce drivers' flexibility and potential earnings, require carriers to change routes, require additional drivers and equipment, increase parking problems, increase stress, cause confusion for enforcement personnel, and limit the ability of carriers to serve their customers. Con-way stated that 50 percent of its drivers work 12 to 14 hours a day, 30 percent work 10 to 12 hours. CVSA stated that there appears to be a lack of scientific studies, or collected data, to indicate that the movement from a 14-hour workday rule to a 14-hour driving window, with a 13-hour on-duty limit, will improve the overall performance of a driver of a CMV. OOIDA and others urged FMCSA to focus on driving time, and not on regulating the overall "bottom line" time spent working.

FMCSA Response. FMCSA agrees that the limited benefits of the 13-hour provision do not compensate for the increased complexity of the requirement, both for drivers and

enforcement personnel. The Agency has, therefore, eliminated this provision.

Comments on Breaks within the Duty Period. The largest number of comments on duty time asked FMCSA to allow drivers to take breaks that do not count against the 14-hour limit, so that off-duty time would extend the 14-hour period. A few commenters argued for shorter or longer duty periods (from 12 to 16 or unlimited hours).

FMCSA Response. As FMCSA discussed at length in the 2003, 2005, 2007, and 2008 rulemakings, allowing off-duty time to extend the work day results in drivers being allowed to drive long past the time when fatigue becomes extreme. The 14-consecutive-hour rule was adopted to prevent that and to help drivers maintain a schedule that is consistent with circadian rhythms. Breaks will count against the 14-hour period.

Comments on Night Drivers. FMCSA requested comments on whether drivers who drive at least three hours between midnight and 6 a.m. should have an hour less duty time available (to provide a longer period to obtain sleep). Fewer than 50 people commented on the issue, but most opposed the suggested provision because of the adverse impact it would have on them, including changes in scheduling deliveries, increased costs, reduced productivity, and problems in meeting customers' needs. One commenter asserted that such a provision could lead to lower pay, driving on congested roads, greater turnover of drivers, and less experienced drivers on the road. J.B. Hunt found that its drivers who drive occasionally or regularly in the midnight to 6 a.m. window have a 2010 reportable crash rate per million miles that is more than 30 percent lower than the 51 percent of the driving force who do not drive at night. Schneider National's examination of crash data suggested that more analysis is required to definitively conclude that reducing work hours would reduce crash rates for night drivers. ATA opposed the restriction and noted that it would create a forward rotation in scheduling that could disrupt drivers' natural circadian rhythms. FedEx Corporation criticized FMCSA's data supporting this provision.

FMCSA Response. After considering the comments on whether nighttime drivers should have one less hour of duty time, FMCSA concluded that it does not have sufficient basis to move forward with this provision. As a result, FMCSA has not adopted the shorter schedule for night drivers.

Comments on Extending the Driving Window. FMCSA proposed allowing the

extension of the driving window to 16 hours twice a week, without a change in allowed duty time. Relatively few commenters addressed this issue and those that did were about evenly divided pro and con. Some commenters specifically expressed their support for keeping the 14-hour window. One commenter opposed any change in the 14- and 10-hour format, as that would appear to defeat the science-based logic for the current rules. The commenter stated that the rules were enacted to prevent the alteration of circadian cycles, and the safety performance of the motor carrier industry in the period following their adoption speaks to the correctness of that underlying science.

ATA and several other commenters supported two 16-hour periods because that approach could provide drivers with additional flexibility to drive when conditions are optimal. OOIDA and an individual driver believed that the extension to 16 hours was a good start, but did not go far enough. Advocates *et al.* and other commenters opposed the 16-hour window for various reasons, including the view that the provision could be confusing, lead to logbook violations, require breaks away from home, cause a forward schedule rotation, and allow driving late in the duty period; they also stated that a 16-hour window lacked supporting data. A carrier pointed out that the proposal also mandates that any work, however brief, that occurs past the end of the 14th hour constitutes use of one of the 16-hour days. The commenter stated that the effect of changing the nature of the 14-hour rule to restrict work that occurs past the end of the 14th hour (rather than to restrict only driving after the end of the 14th hour) would be to eviscerate the new 16-hour provisions. Other commenters argued that the increase in the driving window would be meaningless because of the reduction in maximum on-duty time and the need to anticipate when an unexpected event will occur. Schneider National stated that it would be extremely difficult to manage particularly with electronic logging; to be practical, the carrier would have to pre-approve the use of the longer period, but that would defeat the purpose of using it for unexpected delays.

CVSA noted that anytime there are exceptions outlined in a regulation the difficulty of uniform enforcement practices is greatly multiplied, and the falsification of records of duty status could occur as drivers try to create more on-duty hours within the 14- and 16-consecutive hour driving window. Drivers could claim inspection, servicing (fuel, *etc.*), and many other

forms of on-duty time as off-duty, to create a larger window for driving time. With no supporting document requirements for drivers, it would be difficult, at best, to determine actual regulatory compliance or non-compliance during roadside enforcement.

A few commenters supported a twice-weekly extension of the driving window. Other commenters argued that drivers should be able to use the extension even more frequently. One carrier disagreed with FMCSA's proposal that the use of the 34-hour clock would not "reset" the use of the 16-hour provision. A trucking association indicated that although carriers cannot always schedule each trip accurately due to unforeseen circumstances, such as adverse weather or traffic conditions, drivers and dispatchers plan for particular schedules. Because it would only be available twice per week, this extension would likely be used infrequently by most carriers who require as much certainty as possible in any scheduled trip. Drivers warned that shippers and receivers may abuse the 16-hour period to extend waiting time. Some carriers were skeptical about the value of the provision, and drivers were sharply split, some favoring it, but others arguing that carriers and shippers would force them to use every bit of the 16 hours, rather than reserving the extra time for special needs.

FMCSA Response. FMCSA has decided not to adopt the proposed two 16-hour driving windows. The Blanco study showed increasing risk as the duty period increases. The study is consistent with a large body of other research pointing to the same conclusion (*e.g.*, Jovanis, TIFA, studies of accident rates in other sectors discussed above). Under the proposed provision, long-haul drivers could have been driving more than 16 hours after waking, when fatigue becomes acute. That is a risk that can neither be ignored nor accepted.

Comments on Requiring Drivers to Go Off Duty at the End of the Driving Window. Of the fewer than 200 commenters on this issue, some supported the proposal to end work at the end of the duty period. Most, however, objected to the provision. Reasons for opposition included a reduction in driver pay, the need for carriers to incur added costs and revise scheduling, the adverse effect on providing customer service, the lack of scientific support for the revision, and questioning FMCSA's authority to determine the number of non-driving work hours. AMSA stated that the

current rule allows a driver to complete inventorying, packing, loading, or unloading at the end of the day without needing to deploy another crew or come back the next day to finish the job. McLane stated that the current rule benefits team drivers because both team members can help unload even if one has used his full 14 hours. It stated that restricting additional time does not contribute to public safety because the first driver cannot drive again until he has taken his 10 hours off. The provision would force more drivers and trucks on the road to make the same number of deliveries.

FMCSA Response. On the question of FMCSA's authority to regulate work hours beyond driving hours, the Agency's statutory authority derives from 49 U.S.C. 31502(b), which authorizes the FMCSA to regulate hours of service and more broadly from 49 U.S.C. 31136(a), which mandates the Agency to ensure that the vehicle be operated safely and that the responsibilities imposed on a driver do not impair his ability to operate the vehicle safely. Long work hours can impair a driver's ability to operate safely. Moreover, none of the statutes authorizing FMCSA to regulate hours-of-service limit the meaning of the term "hours-of-service" to driving hours, and it is entirely reasonable for FMCSA to construe the term to include time spent by drivers engaged in activities associated with their operation of CMVs. In fact, that construction was first adopted by the Interstate Commerce Commission (ICC) in the 1930s [see 3 M.C.C. 665, 690 decided December 29, 1937] and has been the position of all Federal agencies charged with enforcement of the HOS regulations for 70 years. However, the Agency is not using this authority to require drivers to go off duty at the end of the driving window.

There are too many uncertainties associated with such a requirement to warrant adoption at this time. The Agency has little direct data on the frequency of work beyond the 14th hour, the average number of drivers involved, or the average amount of time spent on duty after the 14th hour. Efforts to derive this information from available sources were unsuccessful. FMCSA was therefore unable to calculate the cost to the motor carrier industry of requiring drivers to go off duty at the end of the 14th hour. The benefits of such a requirement are also unknown. Bureau of Labor Statistics (BLS) data indicate that truck drivers have a substantially higher rate of occupational injuries than most American workers, including the kinds

of injuries related to non-driving work (back pain, sprains and strains, overexertion in lifting). Research on occupational injuries and accidents submitted with the comments of NIOSH and Advocates *et al.* clearly links long work hours to an increased risk of such injuries; the studies indicate that the risk of injuries rises sharply after 14 hours (*Dembe*). This research, however, is not specific to the motor carrier industry, which further compounds the uncertainty created by the lack of data on drivers working beyond the 14th hour. The Agency remains concerned with long work hours and will seek additional research on the risk of working past the 14th hour, but given the absence or uncertainty of relevant data at this time, FMCSA cannot justify promulgation of this proposed rule provision.

I. Paragraphs 395.1(e)(2) and (o)

Comments. FMCSA proposed eliminating § 395.1(o), which allows some regional drivers to extend their driving window to 16 hours once a week, because it would conflict with the proposed two 16-hour driving windows. The Agency also sought comments on whether § 395.1(e)(2) should be eliminated for the same reason; this paragraph allows certain local drivers to extend their driving window to 16 hours twice a week. About 20 commenters responded. Some of the commenters sought other changes to the provisions, while others stated that the provisions were needed.

FMCSA Response. FMCSA has decided not to rescind either of these paragraphs. The NPRM discussed that option to avoid the excessive complexity that would result from adding two 16-hour driving windows per week to the existing 16-hour provisions. Because the Agency is not extending the driving window from 14 to 16 hours twice a week, as proposed in § 395.3(a)(2)(ii), there is no need to remove § 395.1(e)(2) or § 395.1(o). FMCSA continues to believe, as explained in the 2005 final rule, that the risk of fatigue and fatigue-related crashes for the local short-haul drivers who can utilize the existing 16-hour provisions is less than for regional or long-haul drivers subject to the 14-hour driving window (70 FR 49978, at 49980, 49995–49996, August 25, 2005). Local short-haul drivers typically drive regular schedules of limited mileage during daylight hours, with frequent non-driving breaks, and return to their home terminal in time to sleep in their own bed virtually every night. A study cited in the 2005 final rule (Balkin) showed that short-haul drivers often

take naps of 1–2 hours within their work shift to reduce any fatigue accrued during the work day. The authors of a 1997 study of driver fatigue in short-haul operations, which was also cited in the 2005 rule (70 FR 49996), concluded that, despite the limitations in the available data, "the numbers seem to indicate that class 7–8 tractors in over-the-road service have higher fatigue related fatal involvement rates, per truck or per mile, than the other categories of trucks that were considered" (Massie). The minimization of fatigue associated with short-haul operational patterns may account for the results noted by Massie, *et al.* In addition, the requirement for 10 hours off duty between shifts makes the use of consecutive 16-hour days under § 395.1(e)(2) unlikely because the driver would have to start his second day 2 hours later than normal and his third day 4 hours later, significantly disrupting his normal schedule. On the other hand, while the Blanco study on work hours was limited to line and long-haul drivers, it does raise concern regarding driving and working long daily hours. The Agency will therefore continue to study the risks posed by allowing the 16-hour exception for local short-haul drivers.

J. On-Duty Definition

Comments Supporting the Changes to the On-duty Definition. FMCSA proposed to exclude from the definition of on-duty time any time resting in a parked CMV or up to 2 hours in the passenger seat of a moving CMV, immediately before or after 8 consecutive hours in the sleeper berth. Fewer than 200 commenters addressed the proposed changes to the definition of on-duty time. ATA, OOIDA, and many others supported the proposed change. ATA stated that the vast majority of team drivers are not able to rest or sleep in a sleeper berth for a full 10 hours, and they would prefer spending two of those hours in the passenger seat. Three carriers supported the proposed changes, but they did not think the rest periods should be deducted from the permissible 14-hour on-duty time. One commenter asked why a driver who can only sleep six or seven hours in the sleeper berth should not be allowed to sit in the passenger seat for the remaining time.

A rail delivery company noted that exclusion of time resting in a parked vehicle from the definition of on-duty would be very beneficial for local short-haul drivers who have a rest period between busy periods or those who must park awaiting loading and unloading. TCA suggested that allowing

drivers to clock time spent resting in a parked CMV would be helpful for the industry provided that the definition of "resting" includes reading, checking emails, talking to friends or family, or other similar activities. If so, TCA commented, the ability to count hours wasted at shipping facilities as off-duty will benefit the truckload industry tremendously. It further stated that, although the adjusted definition would not reduce detention times, it could help prevent them from being such a detriment to carriers. The Petroleum Marketers Association of America supported allowing time spent by a driver in a parked CMV to count as off-duty time, and thought that up to three hours would be appropriate. Another commenter favored a three-hour allowance for drivers parked in line waiting to load product.

FMCSA Response. FMCSA is adopting the changes as proposed. FMCSA emphasizes that the changes to the definition do not alter the existing parts of the definition that define, as on duty, "(5) All time loading or unloading a commercial motor vehicle, supervising, or assisting in the loading or unloading, attending a commercial motor vehicle being loaded or unloaded, remaining in readiness to operate the commercial motor vehicle, or in giving or receiving receipts for shipments loaded or unloaded." Unless a driver is released from all responsibility for the vehicle while waiting to be loaded or unloaded, time spent waiting is still considered on duty time.

Comments Opposing the Changes to the On-duty Definition. Advocates *et al.*, CVSA, and some other commenters opposed the proposed change, primarily because the rule did not specify a limit (such as two or three hours) for the amount of time a driver could rest in a parked CMV. Commenters expressed concern that drivers could "rest" in the passenger seat for 10 hours to re-qualify without the benefits of truly restorative rest. In addition, they stated that the rule change is complicated, would make enforcement more difficult, and could lead to logbook falsification. One commenter warned that the exclusion from on-duty time might be used by some drivers for time spent waiting for loading or unloading, which may not provide a real opportunity for rest. CVSA added that the provision cannot be justified without further studies and data collection. A carrier claimed that the change in the definition would expand FMCSA's authority beyond professional drivers and include driver-qualified dock laborers as well, which would encroach upon Department of Labor authority and result in confusion

over compliance. Advocates *et al.* suggested the need for a clarification that drivers cannot use vehicles other than the CMV they are operating for these purposes.

FMCSA Response. FMCSA disagrees that the rule should include a time limit in a parked CMV. Under the previous definition, a driver could be forced to spend time up to the 10-hour break out of the cab even if there were no safe place to do so or no shelter or facilities. It is surely better that the driver can rest in the cab in these circumstances. With the 14-hour limit, it is unlikely that either the carrier or driver will want the driver to spend extended periods off duty in a parked truck during the duty day because all of the time counts against the 14-hour period. Drivers are unlikely to tolerate 10 hours at a stretch off-duty without a sleeper berth or provision of a place to sleep; any carrier compelling drivers to sleep in the cab for 10 hours may have trouble retaining its drivers.

The rule change is not complicated; it simply defines when a driver may log certain time as off duty rather than on duty, not driving. The change seems unlikely to lead to any more logbook falsification than already exists. The change in the definition does not alter FMCSA's authority. If a dock worker also drives a CMV in interstate commerce, he is subject to FMCSA rules when driving the vehicle and his other work is included in his on-duty not driving time and counted against his weekly limits.

Other Comments on the On-Duty Definition. Two carriers asked why the two hours in the passenger seat must be immediately before or after the eight-hour period. One commenter suggested that the provision could increase CMV idling time if drivers who formerly rested outside their vehicles will now take "off-duty" time in a parked, but idling, CMV. Another carrier pointed out that redefining an activity as off-duty should not change the rule's health benefits.

Although CVSA did not support the change in the definition of on-duty time, it believed EOBRs will help compliance and enforcement efforts if this provision were to be adopted as proposed. In addition, it urged FMCSA to require specified supporting documents to be maintained on a CMV, with access available to roadside enforcement personnel, which would provide a means whereby duty status entries could be verified or refuted.

FMCSA Response. ATA requested the proposed re-definition of on-duty time in September 2005 to allow a team driver to log off duty up to 2 hours

riding in the passenger seat immediately before or after the 8-hour sleeper berth period. Many drivers told ATA and repeated in the listening sessions and in docket comments that they take 10 consecutive hours off duty in the sleeper berth to simplify their recordkeeping. This rule allows drivers to take 8 consecutive hours in the sleeper berth as required by the current rule, and to take an additional 2 hours in the passenger seat when the vehicle is moving, without artificially confining them to the sleeper berth for the entire 10-hour period.

FMCSA also proposed excluding from the definition of "on duty," time spent resting in or on a parked CMV. Drivers in the past have noted that the current definition makes it difficult for drivers of CMVs without sleeper berths (known as day cabs) to rest because they were considered to be on duty if they were in a parked truck. In many cases, the safest, most comfortable, and often the only place for such a driver to rest during a duty tour will be in the parked truck. This change to the on-duty definition to allow drivers resting in or on a parked vehicle may lead to more idling, but if the alternative is that a driver has to stand outside, without shelter, in bad weather or in an unsafe location, more idling is the lesser of the two evils. In any case, the proliferation of State and local anti-idling laws makes it questionable whether this amendment will increase idling time. The changes to the definition were not considered in evaluating the health benefits of the rule; at this time, there is no obvious way to evaluate the health effects of such a small change. The issue of supporting documents is beyond the scope of this rulemaking.

K. Penalties

Comments on the Penalty Provision. Fewer than 100 commenters discussed the proposal to consider driving (or allowing a driver to drive) 3 or more hours beyond the driving-time limit to be an egregious violation and subject to the maximum civil penalties. Advocates *et al.* argued that the maximum penalties should be triggered by violations that exceed 2, rather than 3, hours over the daily and weekly driving limits. Another advocacy group argued that because the Agency devoted little attention to the issue in both the NPRM and the RIA, it is unclear why FMCSA considers a violation of 3 or more hours to be egregious whereas a violation for anything less is not. This commenter asserted that without more explanation, the selection of a 3-hour "trigger" for maximum penalty eligibility appears entirely arbitrary.

Carriers and drivers did not generally oppose the imposition of maximum penalties for egregious violations, but commented on the scope and applicability of such a provision. One carrier commented that the fact that the imposition of penalties would not be automatic is critically important for the fair administration of this provision. A driver similarly commented that there are situations caused by crashes, traffic congestion, or weather where additional driving time would minimize the possibility of an unsafe condition.

Regarding applicability, one carrier argued that penalties should not apply to carriers unless there is proof that the carrier is complicit in the violation. A driver argued that the provision making both driver and companies responsible for violations is good because too often the carrier causes the driver to push his limits past good safety practices. Another carrier argued that shippers and receivers should be accountable for their actions in instances where shippers or consignees force carriers/drivers to leave shipper premises, even though the driver is over his/her hours. The carrier argued that because the unpredictable load and/or unload times are difficult to plan, such a situation is often out of its control. For similar reasons, a driver argued that duty time violations that occur while getting to a safe place to park (if the driver still has driving time) should not be considered violations. One carrier argued that it does not believe that an egregious violation concept similar to that proposed should apply to other provisions (e.g., duty time, driving window, weekly limits, and restart).

FMCSA Response. The selection of 3 hours as the threshold for an egregious violation was intended to acknowledge the rapid increase in the risk of fatigue-related crashes as work and driving hours increase, and the consequent seriousness of the violation. While opinions may differ about the point at which a violation should be treated as egregious, the Agency made a reasonable policy choice that reserves the maximum penalties for violations that are unequivocally serious.

FMCSA agrees that it is important not to impose the maximum penalty automatically, and to take into account special circumstances. It disagrees, however, that carriers should not be subject to such penalties unless there is proof of their complicity. Under 49 CFR 390.11, motor carriers have long been required to ensure that their drivers comply with the FMCSRs. Carriers are responsible for scheduling and for oversight of drivers' HOS compliance. That includes scheduling runs that will

not result in egregious driving-time violations and penalizing drivers who commit such violations despite company policy.

FMCSA does not have the authority to act against shippers and receivers, although it recognizes that the practices of and pressures upon shippers and receivers often contribute to driver violations of the HOS limits. Regardless, it is still the responsibility of the driver and the carrier to stay within the limits. It is difficult to see how a driver who has reached his driving limit when he arrives at a receiver's or shipper's facility would, if forced to leave after loading or unloading, need to drive three hours more before stopping, which could trigger the maximum potential penalty. FMCSA did not propose to apply the provision to any requirement other than driving time.

Other Comments on Penalties.

Another commenter asserted that FMCSA's operating statute does not authorize it to regulate the hours of service of self-employed truckers or instructors who are not employees of a motor carrier.

FMCSA Response. Contrary to this assertion, the Motor Carrier Safety Act of 1984 gives FMCSA broad authority over both an "employee"—defined as "an operator of a commercial motor vehicle (including an independent contractor when operating a commercial motor vehicle)"—and an "employer"—defined as "a person engaged in a business affecting interstate commerce that owns or leases a commercial motor vehicle in connection with that business, or assigns an employee to operate it" (49 U.S.C. 31132(2) and (3), respectively). An owner-operator could be either an "employee" or an "employer" and in both cases would be subject to FMCSA's jurisdiction.

L. Compliance Dates

Comments. Commenters suggested compliance dates of 6 to 18 months from the date of publication. The Ohio Public Utilities Commission supported 6 months and stated that inspectors would require substantial retraining and that software modifications would be necessary. It also suggested that FMCSA should provide States with the training and software updates at least 3 months prior to the rule's effective date to allow sufficient time to test the software and complete training.

Three carriers and a shippers' association argued that a compliance date should be no sooner than 1 year after publication because that much time would be necessary to train drivers and reprogram electronic log software. One carrier commented that, given the

timing of the implementation of the EOBR regulations, it appears likely that programming changes necessary for HOS compliance will overlap and be significantly impacted by the necessary programming and installation of new EOBR-compliant hardware. A shippers' association commented that companies would need a year to transition to a 10-hour driving limit because they would be required to make extensive operational changes and acquire additional drivers and equipment, to adjust to the more restrictive requirements. Schneider National, which suggested a lead time of at least 18 months, stated that time would also be needed to test updated systems. It commented that training curriculum would need to be developed, contracts would have to be re-negotiated, and lanes would need to be re-engineered to ensure compliance. XATA Corporation, an EOBR developer, argued that FMCSA would need to allow between 4 and 6 months for software/hardware development time, between 4 and 6 months testing, and between 4 and 6 months certifying and validating for deployment.

FMCSA Response. The compliance date, July 1, 2013, is the date on which motor carriers of property and drivers must begin to comply with specified provisions of this rule. Because this final rule is more stringent than the previous rule, drivers and motor carriers of property may comply with its provisions immediately if they wish, but they are not required to do so until the compliance date.

Generally, when implementing safety rules, the Agency prefers to set shorter compliance dates. However, in this case, the Agency recognizes, as many commenters pointed out, that industry and law enforcement may need extra time to train personnel and to adjust schedules and automated systems. With the extended compliance date provided for relevant provisions of this rule, affected entities will have nearly 18 months in which to prepare for these changes. The motor carrier and associated industries and the law enforcement community are dynamic sectors; they have been able to adjust successfully to previous regulatory changes within shorter implementation periods. Based on the comments received to this rule and its experience with the industry and the law enforcement community, FMCSA is confident that an implementation date of July 1, 2013, is sufficient for affected entities to be able to adjust to this rule's requirements.

M. Other Comments

Comments on Complexity.

Commenters said that the proposed rule was too complicated for the average truck driver and would make compliance and enforcement by carriers and law enforcement much more difficult. The Pennsylvania Motor Truck Association said the complexity of the NPRM would discourage enforcement personnel from fully enforcing it. OOIDA said that the proposed rule would lead to inadvertent logging errors by drivers and enforcement errors by enforcement personnel.

Advocates *et al.* said that claims that the proposed rule would make the HOS rule more complex to operate under or enforce were misguided. They said that the proposed rule contains “simple, reasonable, common sense ideas” that are not too complicated to understand. They also suggested that if the complexity of the HOS rules is a concern, then the 34-hour restart provision should be eliminated altogether. They added that FMCSA’s companion proposal to require EOBRs would help simplify record-keeping and enforcement of the HOS rules.

FMCSA Response. FMCSA has simplified the final rule (e.g., by eliminating the 13-hour provision and the two 16-hour periods). It should be noted, however, that before the NPRM was issued the Agency had, in fact, tested the proposed rule with a panel of its own inspectors, some of whom are former drivers or carrier employees responsible for safety. These inspectors were able to grasp the rule very quickly, and most thought the industry would adapt equally rapidly.

Comments on Flexibility. A substantial number of commenters complained that the proposed rule (like the 2003 rule) did not provide drivers with the ability to rest when they need to. Commenters made this point particularly in the context of the duty period, but also raised it in relation to breaks, the restart, and sleeper berth periods. Many of the commenters stated that when they asked FMCSA for flexibility at the public listening sessions in 2010, what they meant was the flexibility provided by the pre-2003 rule, where off-duty time stopped the clock and did not count against daily limits.

FMCSA Response. FMCSA has provided some flexibility in the final rule, but has no intention of returning to the pre-2003 standard. Under the rules the drivers are seeking, they could be on duty and drive well past 14 hours after they came on duty, when studies show that fatigue can become extreme.

Drivers under the pre-2003 rule could change their sleeping time by several hours from day to day, disrupting their circadian clocks and further adding to their fatigue.

Comments on the Oilfield Exemption. FMCSA proposed to revise the oilfield operations exception (§ 395.1(d)(2)) to clarify the language on waiting time and to state that waiting time would not be included in the calculation of the driving window. Some commenters supported the proposed revision. CVSA added that the change would allow enforcement personnel to properly identify when actual waiting time is being used at a natural gas or oil well site. However, it said that enforcement would still be difficult because of the lack of a definition for “commercial motor vehicles which are specially constructed to service oil wells.” CVSA asked FMCSA to clarify which specific types of equipment qualify for this exception by adding a definition to § 395.1(d)(2). A transportation consultant said that the oilfield exemption would be helpful in some instances, but it would not help drivers on “non-commercial driving days.” She said that limiting the number of hours that a driver can work on such days “just doesn’t seem fair and would severely cripple the oilfield industry.”

A carrier opposed the proposed language that would prohibit specially trained drivers of CMVs that are specially constructed to service oil wells from using the exemption for 100 air-mile radius drivers (§ 395.1(e)(1)). The carrier said that its past use of this exemption has not been a safety hazard, and that the proposed prohibition would be an unnecessary burden on the oil and gas industry. This carrier also requested that FMCSA modify the proposed language that specifies how drivers using this exemption should record their duty status. The carrier asked that FMCSA allow the separate “waiting time” line to be considered as an “off duty” entry without the driver having to make two entries.

Other commenters argued that if drivers in oilfield operations are allowed to turn off the 14-hour clock, all other commercial drivers should also be allowed to do so. Three commenters, including NTSB, opposed the oilfield exemption itself. They argued that drivers in oilfield operations need rest and breaks from work as much as other drivers. NTSB said that such exemptions “are likely to lead to increased risk for the exempted population and the driving public.” A driver said that FMCSA should rewrite this provision so that it is clear that a driver cannot extend the 14-hour clock

unless he or she has access to a sleeper berth or other sleeping quarters.

FMCSA Response. The Agency did not propose substantial revisions to, or elimination of, the § 395.1(d) oilfield exception. The revisions clarify existing regulatory language regarding the permissible methods of recording “waiting time.” They also affirm that “waiting time” does extend the 14-hour driving window, as FMCSA has stated in its Web site’s Frequently Asked Questions and other public documents since the 14-hour rule was established in 2003 (effective in January 2004).

FMCSA did not propose any revisions to definitions of terms used in the § 395.1(d) exception and cannot go beyond its proposals when publishing this final rule. The terms, such as “specially constructed to service oil wells,” have been in place for nearly 50 years and have been clarified in many documents and interpretations during that time.

The Agency believes that the operational flexibility allowed by the § 395.1(d) exception necessitates accurate recordkeeping for enforcement purposes. This is best accomplished through the use of RODS (“logs”) in accordance with § 395.8, or electronic devices compliant with § 395.15. Many drivers would not be eligible to use the 100 air-mile radius exception in § 395.1(e) because their schedules would not meet the conditions of the exception (e.g., returning to the normal work reporting location within 12 hours); therefore, the Agency does not believe that the improved recordkeeping requirement will impose an unnecessary burden.

Comments on State Issues. CVSA, California Trucking Association (CTA), and the Public Utilities Commission of Ohio (PUCO) commented on the impact of the NPRM on Federal and State law enforcement agencies. They expressed concerns about the costs that States would incur to implement the rule. PUCO and NPTC suggested that FMCSA work with State regulators to implement a pilot program to gather information on the proposed rule’s effect on safety and feedback on State enforcement and industry compliance challenges. CTA said that the proposed rule would cause enforcement to suffer during the transition period, because enforcement officers would be taken away from their duties for training on the new rules. CVSA said that the proposed rule was confusing and would be more difficult to enforce at the roadside than the current rules, generating a lack of uniformity that would have a negative impact on FMCSA’s CSA initiative.

FMCSA Response. As noted above, FMCSA tested the proposed rule on its own inspectors and found that they had no trouble learning the changes quickly. Most thought the industry would adapt equally rapidly. The final rule is less complex, which should further reduce training time. The retention of the previous 11-hour driving-time limit also ensures that drivers will not need to revise their recordkeeping practices on this point. Any rule change requires some re-education, but that is not a reason to forgo needed changes.

Comments on Fatigue Risk-Management Programs. ATA said that rather than implement the proposed rule, FMCSA should focus its expertise and resources on sleep-disorder issues, including training and screening, and promote (but not mandate) the use of fatigue risk-management programs as are promoted in other modes. CVSA also agreed that FMCSA should facilitate the implementation of fatigue management programs and driver health and wellness programs in the industry. Dart Transit Company said that FMCSA has failed to reasonably recognize legitimate fatigue management proposals, as demonstrated by its denial of the company's proposal in early 2010.

FMCSA Response. The Agency continues to consider the role of sleep disorders among CMV drivers, but the issue is beyond the scope of this rulemaking. FMCSA understands that fatigue management programs may be helpful, but given the large number of active carriers, it is hard to imagine how such programs could be monitored by the Agency or enforced at roadside. Inspectors would have no way of determining whether the carrier had a plan or, if so, was operating in compliance with it. Other modes may promote their use, but only the Federal Aviation Administration (FAA) has proposed allowing these programs to substitute for some or all of the flight and duty time limits and then only with FAA approval and oversight of the specific plan. With the very limited number of air carriers and their highly computerized scheduling systems, FAA inspectors would be able to monitor compliance in a way that is simply not feasible in trucking.

Comments on Consistency with Executive Order 13563. The U.S. Chamber of Commerce cited Executive Order 13563, "Improving Regulation and Regulatory Review," which President Obama issued in January 2011. The Chamber said that the proposed rule is in "direct contradiction" to the Executive Order and that the rule would be a model of the type of regulation that "actually

produces lower safety standards while simultaneously hurting business productivity in the domestic and global supply chain." The National Turkey Federation requested that FMCSA carefully review the proposed rule in accordance with this Executive Order.

FMCSA Response. The final rule is consistent with Executive Order 13563. The rule will reduce fatigue and improve driver health, while having relatively small impacts on business productivity. As discussed at the beginning of this section, the claims of severe impacts made by some commenters were not supported by facts. ATA's own economic consultant stated that the Agency had overstated the use of certain rule provisions, which led to an overstatement of the costs. (See Section IV."Discussion of All Comments" B. "Economic Impacts" and Section VI. "Required Analyses" A. "Executive Order 12866 and Executive Order 13563" for discussions of Edgeworth.) In fact, Executive Order 12866, with its directive to use "the least burdensome tools for achieving regulatory ends," thus reinforcing the statutory mandate to consider the "cost and benefits" of proposed rules [49 U.S.C. 31136(c)(2)(A) and 31502(d)], was a major factor in FMCSA's decision not to adopt the 10-hour driving limit identified in the NPRM as the Agency's preferred option.

Comments on Motor Carrier Safety Advisory Committee (MCSAC). ATA said that MCSAC has recommended that FMCSA conduct effectiveness reviews of a number of regulations, including Part 395: Hours of Service of Drivers. ATA called it "regrettable" that FMCSA did not conduct an effectiveness review before issuing a proposed rule. According to ATA, the review could have revealed whether changes are necessary and—if so—to which provisions of the rule. Further, it would have helped to provide meaningful justification of the changes that could be used in the Agency's regulatory impact analysis.

FMCSA Response. As ATA is aware, the schedule for this rulemaking is constrained by legal agreements. The rulemaking could not be delayed for yet another review that would simply repeat the same research that the Agency had conducted and continues to conduct on issues related to HOS.

Comments on the Baseline for the Rulemaking. ATA and many industry commenters argued, either explicitly or implicitly, that FMCSA had to prove that the 2003 rule was increasing the risk of crashes before a change would be justified. Advocates *et al.*, in contrast, stated that the 11th hour of driving and

the 34-hour restart had never been adequately supported by evidence. They stated that unless the Agency can demonstrate that 2003 changes would improve safety and not adversely affect driver health, the 2003 provisions cannot stand. The baseline for the rulemaking, in their argument, should be the pre-2003 10-hour driving limit and no restart.

FMCSA Response. Arguments about what the Agency should have done in 2003 have been overtaken by time and events. The 2003 rule was replaced by notice and comment rulemaking in 2005. In 2007, the DC Circuit vacated two requirements of that rule because of the Agency's failure, first, to provide an opportunity for comment on one part of the methodology of its driver fatigue model and, second, to explain another part of that methodology. *OOIDA v. FMCSA*, 494 F.3d 188 (DC Cir. 2007). FMCSA addressed both of those deficiencies in its 2007 interim final rule (IFR) (72 FR 71247, December 17, 2007) and adopted the IFR as final in 2008 (73 FR 69567, November 19, 2008). In 2009, Advocates, Public Citizen, and others petitioned the DC Circuit for review of that final rule, but the parties have agreed to hold the litigation in abeyance while FMCSA completes this rulemaking. The opposing views of the motor carrier industry and various safety groups, repeatedly expressed during this litigation, are opinions; no court has ruled on the merits of an 11-hour driving limit or a 34-hour restart. Both of those provisions, however, have governed motor carrier operations since the start of 2004. The proper baseline against which to evaluate this final rule is therefore the rule currently in effect. The Agency's obligation under the Administrative Procedure Act is to explain reasonably and persuasively why it has changed the rules in effect for the last 7 years. FMCSA believes that this rule does precisely that.

Comments on One Size Fits All. Many commenters criticized the proposed rule for using a "one-size-fits-all" approach to regulating driver hours of service. In general, they said that the proposed rule is more appropriate for over-the-road trucking than for other types of operations. Commenters supported exemptions or separate rules for the following types of drivers or carriers. In some cases, such exemptions are already in place; others would be new:

- Construction companies.
- Transportation construction industry.
- Short-haul operations.
- Solid waste and recycling collection trucks.

- Equipment dealers providing parts, repairs, and service of planting and harvesting equipment.

- Propane deliveries within a 100-air-mile radius.

- Carriers hauling Department of Defense shipments of arms, ammunition, explosives, and other sensitive or classified cargo.

- Experienced drivers with few or no HOS violations.

- Drivers of support vehicles for firefighting helicopters.

- LTL drivers.

- Tow truck drivers responding to police-generated calls.

- “On-call” individuals responding to no-heat, crashes, and other situations that could potentially cause harm to person or property.

- Railroad employees for whom driving a CMV is incidental to their main responsibilities.

The Association of General Contractors (AGC) of America and a carrier wrote in support of the existing provision that allows construction drivers to reset their on-duty clocks after an off-duty period of at least 24 consecutive hours. However, AGC recommended that the air-mile radius coverage be expanded from 50 to 100 miles and that the time drivers are in line waiting to load materials or to dispense materials not be included in the calculation of the driving window. Agricultural Education Group defended the exemption for operators of vehicles transporting agricultural commodities and farm supplies.

One carrier opposed all HOS exemptions or special provisions, claiming that they are politically motivated and do not promote highway safety. Another carrier objected to HOS rules being different for property carriers and for passenger carriers. In addition, the carrier argued in favor of having the same HOS rules for all drivers of commercial vehicles, not just holders of CDLs.

FMCSA Response. As FMCSA stated in the NPRM, the HOS rules are not one-size-fits-all. There are multiple exemptions and exceptions, some statutory, some regulatory (many cited by the commenters themselves). This final rule does not change existing regulatory exemptions or exceptions, and it cannot change statutory exemptions. On the other hand, the Agency’s unfavorable experience with segment-specific HOS proposals does not encourage further action along those lines. In the 2000 NPRM, the Agency proposed different rules for different operational segments. That proposal was almost universally criticized. It was considered too complicated and too

difficult given the number of carriers whose operations covered multiple segments and whose drivers may shift from one segment to another from day-to-day.

N. Beyond the Scope

A number of commenters raised issues that were not addressed in the NPRM. Commenters noted the lack of parking areas for trucks. They complained about the practices of shippers and receivers that require the drivers to wait for long hours to load or unload. They stated that shippers press them to violate the rules to meet schedules that the shippers impose. Commenters objected to EOBRs and anti-idling laws. They also stated that other drivers cause most crashes, that traffic laws discriminate against trucks, and that enforcement, not more regulation, is the solution. Several commenters, including ATA, stated that FMCSA should act on recommendations of the Medical Review Board rather than revise the HOS rules. The Expedite Alliance of North America, the National Association of Small Trucking Companies, and Air & Expedited Motor Carrier Association jointly said that both the current and proposed HOS rules lack any real effort to address and monitor fatigue rather than to monitor and restrict hours of service based upon on-duty and driving time. They stated that modern science has developed a variety of cost-effective measures for measuring driver alertness, biorhythms, and fatigue. They urged FMCSA to commit to a “third millennium” method for measuring actual fatigue.

FMCSA Response. These issues are beyond the scope of this rulemaking and, in many cases, are beyond FMCSA’s statutory authority.

V. Section-by-Section Analysis

In part 385, Appendix B (explanation of safety rating process) is revised to update references to part 395. Revised references are added for paragraphs in § 395.3. References to § 395.3(c)(1) and (2) are deleted because a violation of the minimum restart period will constitute, and be cited as, a violation of the 60- or 70-hour rule. Providing separate violations for elements of the rule will allow FMCSA to determine what parts of the rule have been violated. Under the current method of citing violations, a driver who drives for 17 hours straight cannot be distinguished from the driver who drives 11 hours, takes a 9.5 hour break, then drives another 6 hours. Both are cited for violating the 11-hour driving rule.

In part 386, Appendix B, (penalty schedule; violations and maximum civil

penalties) paragraph (a) is revised to add a new paragraph (6) to state that any violation of the driving-time limit that is 3 or more hours above the driving limit could be considered an egregious violation that could trigger imposition of the maximum penalty.

Section 390.23(c) (relief from regulations) is revised to reference § 395.3 on the restart rather than to repeat the language on the restart.

In § 395.1, paragraph (b) (adverse driving conditions) is revised to remove paragraphs (1)(i)–(iv) and to clarify that drivers are allowed to drive no more than 2 hours above the driving limits set in §§ 395.3 and 395.5. In § 395.1, paragraph (d)(2) (oilfield operations) is revised to clarify the language on waiting time and to state that waiting time is not included in the calculation of the 14 consecutive-hour period.

In § 395.1, paragraph (e) (short-haul operations), paragraph (e)(1)(iv)(A) is revised to reference § 395.3. Paragraph (e)(2) is revised to clarify that it exempts drivers from § 395.3(a)(2) (duty time). This approach allows paragraph (e)(2) to focus on only those rules that are different for drivers using the exemption rather than repeating all of the provisions of § 395.3.

Section 395.1(g) (sleeper berths) is revised to change the driving time to a reference to § 395.3 in § 395.1(g)(1)(i)(B). It is also revised to add the provision (to paragraph (g)(1)(ii)(C)) that a team driver may log as off duty up to 2 hours in the passenger seat of a moving vehicle immediately before or after an 8-hour period in the sleeper berth.

The previous language of § 395.1(q) is removed and new text is added as paragraph (q). Paragraph (q), a statutory exemption for certain transporters of grapes, expired on September 30, 2009. See Sec. 4146 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, Pub. L. 109–59, 119 Stat. 1144, 1749, August 10, 2005. New paragraph (q) sets forth rules specifically applicable to drivers of CMVs transporting Division 1.1, 1.2 or 1.3 explosives. These drivers will be exempt from the requirement that the half-hour break must be off duty. They will be allowed to log a half hour or more of time spent attending the CMV, but performing no other work, as their break. They will have to annotate their record of duty status to indicate when the break was taken.

In § 395.2, the definition of “on-duty time” is revised to allow a team driver to log as off duty up to 2 hours spent in the passenger seat either immediately before or after the 8-hour period in the sleeper berth. In addition, FMCSA is

excluding from the definition of “on duty,” time spent resting in or on a parked CMV except as provided in § 397.5 “attendance and surveillance of motor vehicles” by CMV drivers transporting Division 1.1, 1.2, and 1.3 explosives.

Section 395.3 is revised to place the individual requirements in separate paragraphs so that FMCSA will be able to cite drivers for violations of specific elements. Under the current rule, drivers are cited only for violations of driving time, on-duty time, and the weekly limits. The rule will make it possible to cite drivers for violations of the daily off-duty break, the restart, the 2-night provision, and the 168-hour provision as well as driving time, weekly hours, and on-duty time. This approach will provide useful information about the types of violations being committed. The revised section includes the provisions that apply through June 30, 2013, and the provisions adopted today, which will apply after that date.

It should be noted that, although § 395.3 is being restructured in the form proposed in the NPRM, the 11-hour driving limit in § 395.3(a)(3) is not a newly adopted provision, but simply a ministerial rearrangement of the 11-hour limit in the previous § 395.3(a)(1).

VI. Required Analyses

A. Executive Order 12866 and Executive Order 13563

Under Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993) as supplemented by E.O. 13563 (76 FR 3821, January 18, 2011), FMCSA must determine whether a regulatory action is “significant” and, therefore, subject to Office of Management and Budget (OMB) review and the requirements of the E.O. The E.O. defines “significant regulatory action” as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities.

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency.

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.

(4) Raise novel legal or policy issues arising out of legal mandates, the President’s priorities, or the principles set forth in the E.O.

Under the E.O., agencies must estimate the costs and benefits of potential rules; for rules that may be considered economically significant (\$100 million or more in costs and benefits), agencies must also evaluate options.

FMCSA developed a Regulatory Impact Analysis (RIA) for the proposed rule (available in the docket) and accepted comments on it. This section first summarizes the comments and responds to them, then presents the revised results of the RIA for the final rule.

Edgeworth Analysis

Comments and Responses to the Edgeworth Analysis. Most commenters on the RIA were trade associations and large carriers. Nineteen commenters cited or submitted the study conducted for ATA by Edgeworth Economics. Besides that critique, the major issues raised were the following:

- A perceived failure to analyze supply chain impacts.
- A failure to account for impacts on LTL networks.
- The estimates of training costs for drivers and inspectors.

The Edgeworth study made the following points, cited by commenters:

- FMCSA’s field study data overstate the use of long hours. Industry data from large carriers put the use of the 11th hour at 10.7 to 10.8 percent, not 21 percent.

- The RIA assumes that drivers in the field study who were out of compliance would comply with the new rule.

- The RIA overstates the number of drivers who maximize hours. The RIA assumes that a driver who uses part of the 11th or 14th hour uses all it. This overstates costs and benefits.

- The change in methodology (no longer using the logistics model) reduced the estimate of productivity losses.

- The RIA assumes that each hour of driving lost can be seamlessly shifted to another day or driver, rather than modeling the impact of shifting hours as in previous RIAs.

- The RIA assumes that drivers in the moderate and high categories of work intensity never use the restart. The field study indicated that 84 percent of drivers used the restart, 85 percent when they had worked less than 65 hours in the previous week. The RIA understates the impact of the restart change.

- The RIA overstates fatigue by using data from FMCSA’s 2006 Large Truck Crash Causation Study (LTCCS), which were collected prior to the 2003 rule; the data should have been adjusted for

fatigue-reduction produced by the 2003 rule. The 13 percent fatigue figure was for “associated factor” not for the critical event. FMCSA also did not adjust for over-sampling of single-vehicle crashes. The RIA should have used 7 percent as the central estimate of crashes associated with fatigue.

- The RIA assumes that the risk of a crash is the same during a non-driving hour as during a driving hour and rounds up any reductions in work time to the whole hour. These two errors inflate benefits by \$200 million.

- The RIA uses old crash data, rather than new data, showing 34 percent fewer crashes. Using the older data thus overstates the number of crashes, and therefore overstates benefits.

- The RIA overstates net benefits by \$700 million; the rule would have a net cost of \$320 million, excluding health benefits. If the health benefits are included, the rule would still have a net cost of \$20 million.

FMCSA Response. Edgeworth, in criticizing FMCSA’s use of the Field Survey data, stated that “It is reasonable to consider that carriers targeted for review may use their drivers more intensely and may be more frequently up against current driving limits, if not over those limits.”

If a broad source of data that included information on weekly work, daily work, and daily driving for the same carriers and drivers was available, the Agency would have used it. The allegedly superior sources pointed out by Edgeworth, however, are fragmentary and partial. The field study, while not without its problems, covered a substantial number of carriers of different sizes and types. It could be that this analysis has overstated the frequency of the use of the 11th hour; if so, that overstatement would affect both costs and benefits in roughly equal measure, and should not change their relative relationship. Hence, it would only mean that FMCSA is being conservative, *i.e.*, that the Agency is less likely to have understated the impacts on the industry of the options that would have limited driving time.

Edgeworth also stated that FMCSA includes “4.0 percent of tours that exceeded the current legal limit of 11 hours. FMCSA assumes that all of these trips would become compliant under the 10-hour restriction in Option 2. FMCSA offers no explanation for its assumption that drivers currently out of compliance with HOS rules would become compliant under the new rule.”

As a preliminary matter, OMB requires that agencies estimate costs and benefits at full compliance. FMCSA did, in fact, explicitly discuss (in Section 1.3

of the RIA) why we assumed that the rule's limits would be observed by drivers who might currently be out of compliance: again, to avoid the appearance of understating the impacts of its rule by assuming that drivers would not comply with it. Certainly, drivers who currently exceed 11 hours would be unlikely to choose to drive less than 10 hours under a rule that limited driving to 10 hours, so their existence suggests a preference for long driving days; it would be unreasonable to assume they did not exist. Even if they are not complying with the existing driving limit, they could be influenced by it. A lower limit might cause them to reduce their driving hours to an extent so as not to be too far from the legal limit. To the extent that FMCSA overstated the effects of some options by treating current violators of the 11-hour limit as though they will comply with a tighter limit, the Agency is overstating both costs and benefits of its options.

Edgeworth also asserted that FMCSA has overstated the impacts of its options through its use of the Field Survey data, stating "In its calculations of both costs and benefits, FMCSA assumes that one full hour of driving time would be affected under Option 2 for the share of drivers who are recorded as having used the 11th hour in the field survey. Similarly, FMCSA assumes that one full hour of work time would be affected for the share of drivers that are recorded as having used the 14th hour. Thus, FMCSA has overstated the number of affected hours and, as a result, overstated both the costs and benefits of the proposed rule."

First, FMCSA explicitly does not assume that one full hour of work time would always be affected for the share of drivers who are recorded as having used the 14th hour. In the RIA for the NPRM, FMCSA stated that only part of the 14th hour is affected by a 13-hour limit on on-duty time: none of that hour for the moderate drivers, half of it for the high intensity drivers, three quarters of it for the very high intensity drivers, and all of it only for the extreme drivers. The analysis then assumes that most of these drivers will be able to shift some of the lost work time to another day, leading to an even lower impact.

Second, though not exactly the same procedure is followed for the 11th hour (because breaks will not necessarily affect the maximum possible hours of driving in a day), industry comments make clear that for many drivers the reason that they have stopped short of the 11th hour is that they do not schedule a trip for more than 10 hours and use the 11th hour to deal with unplanned events (crashes, weather

delays, unexpected congestion). Thus, drivers have chosen to leave a cushion between their driving and the limit (stopping at a convenient point to avoid exceeding the limit). To the extent that this takes place, and the drivers chose to use the same cushion under Option 2 (10 hours), dropping the driving limit by 1 hour would affect driving on that day by the full 1 hour. For example, drivers who would stop at 10.5 or 10.75 hours under an 11-hour limit could be expected to stop at 9.5 or 9.75 hours under a 10-hour limit to maintain the same cushion. Finally, to the extent that FMCSA has overstated the effects of the options, the effects would apply to both costs and benefits, that is, both would be lower. The result would be that the actual impacts would be less costly than estimated and that much easier for the industry and the economy to absorb and adjust to, while not changing the relationship of benefits to costs.

Comments and Responses on Impacts of the Proposed Rule on Carrier Operations

Edgeworth asserted that FMCSA's cost analysis is highly inconsistent with its previous RIAs: "In the 2007 RIA * * * FMCSA tested the current rules against an option which reduced the maximum consecutive driving time to 10 hours and eliminated the restart provision—i.e., a policy similar to FMCSA's Option 2 in the proposed rule. FMCSA estimated that the restrictions would reduce industry productivity by 7.1 percent."

Edgeworth's assertion that reducing driving time to 10 hours and eliminating the restart position is a policy similar to FMCSA's Option 2 in the proposed rule is incorrect. The option it refers to in the 2007 analysis eliminated the restart, reverting to the old limits of 60/7 or 70/8. Option 2 in the proposed rule allowed a 34-hour restart every single week for the vast majority of drivers and every second week for those driving maximum hours. Comparing the 2007 option with the 2010 option is invalid because the options produce very different effects on productivity. A better comparison is between the option that did nothing but limit driving to 10 hours in the 2007 analysis and FMCSA's current estimate of the impact of a 10-hour driving limit taken by itself. The 2007 analysis estimated the incremental cost of limiting driving hours to 10 at \$686 million, or an increase of slightly over 2 percent.

Elimination of the 11th Hour of Driving in Option 2

In addition to Options 1 and 2, we also examined a more restrictive variant of Option 1. That option limited driving to 10 hours in

a tour of duty. This more restrictive option was found to provide more benefits than Option 1, but at substantially higher cost. Crash risks were originally found to be reduced by about 0.3 percent relative to Option 1. As discussed in Sections 5.4.3, 5.4.4, 6.4 and Appendix (V), this variant is now estimated to reduce LH [long-haul] crashes by 0.43 percent. This reduction is estimated, using the recent updates to the number of crashes, the damages caused by each crash, and the VSL described above, to be worth \$146 million per year.

The projected costs, however, are much higher. They were originally estimated to be \$586 million more per year than under Option 1, which has been updated for inflation, industry growth, and industry coverage to \$686 million. This estimate was made by finding the average reduction in driver productivity in shifting between a case that assumed the characteristics of Option 1 and a variant that capped driving hours at 10. The average change in productivity, weighting by the fraction of all driving estimated to fall into each operational case, was just over 2.0 percent. (See 2007 Interim Final Rule RIA, pages 69–70, FMCSA–2004–19608–2529.)

The 2010 NPRM analysis presents, in Exhibit C–7, an estimated cost of \$680 million, which translates to an increase of slightly less than 2 percent. These values, while not precisely the same, are entirely compatible and do not indicate any material inconsistencies between the complex and detailed approach used in 2007 and the approach FMCSA is currently using (which, as mentioned in Section 3.1 of the RIA, was designed to be simpler and more transparent than the previous analysis, and better able to focus on the particular changes made in this rulemaking). And again, to the extent that there are any differences in estimates of the magnitude of the effects on hours of driving and working, they would affect both costs and benefits in largely equal measure.

Edgeworth also claimed that FMCSA's current approach could understate productivity impacts because it assumes that driving could be seamlessly reassigned to other drivers, and that "In the previous RIA, FMCSA's carrier logistics model may have accounted for such issues (we are unable to confirm this without access to the detailed workings of the model). However, FMCSA's current methodology clearly does not. For this reason, FMCSA's assumptions may underestimate the productivity impacts of the proposed rule."

This concern is unwarranted, as demonstrated by the fact that the results generated by the current methodology closely track the results obtained from the 2007 model for the economically significant provision (i.e., the impacts of elimination of the 11th driving hour)

where a direct comparison of the analyses is possible.

Edgeworth then claimed that FMCSA's approach understates the impact of the restart provisions because it assumes they will have no effect on drivers averaging 60 hours per week or fewer. Edgeworth argued that these drivers might occasionally exceed 70 hours and will be affected at those times. Because the restart provisions actually allow a restart every week, though, a driver who occasionally needed to work even as much as 81 hours in a single 7-day period would be able to comply with the rules (working 13.5 hours per day for 5 days, then taking a restart, and working another 13.5 hour day, for a total of 81 hours over that 7 day period). Only drivers who work intensely for 2 or more weeks in a row will be affected. Thus, occasional intense but brief periods of work would still not be affected by the rule. Furthermore, some drivers who occasionally work intensely will have the capacity to redistribute work from more intense weeks to weeks that do not come close to the weekly limits. Edgeworth also pointed to data from the 2007 Field Survey showing that drivers frequently use the restart after weeks in which they work only 65 hours, asserting that these drivers (who fall into the less intense categories) would be affected by the restart provisions. This assertion confused the use of the restart as a bookkeeping convenience with the use of the restart for increasing productivity. Drivers who do not reach their weekly limit do not need the restart to maintain their productivity and will not lose productivity if they cannot use the restart.

Comments and Responses on the Analysis of Fatigue-Reduction Benefits

Turning to the analysis of fatigue-reduction benefits, Edgeworth asserted that FMCSA's use of the estimated percentage of crashes related to fatigue overstates the potential to reduce crashes by reducing fatigue. Edgeworth pointed out that fatigue is, in many cases, only one of a number of associated crash factors, not the single cause of a given crash, and that therefore eliminating fatigue in a crash that had other risk-increasing factors would not be enough to prevent the crash. FMCSA believes, however, that in the absence of truck driver fatigue, the chances of avoiding any given crash (even crashes in which the critical responsibility lies with the driver of the other vehicle) would be much greater. Furthermore, given the difficulty of detecting driver fatigue in the aftermath of a crash, even the careful estimates

from the Large Truck Crash Causation Study (LTCCS) could be substantially understated. For these reasons, FMCSA chose to stay with the general approach it used in previous rulemakings, changing only its baseline estimate of the prevalence of fatigue on the basis of LTCCS data.

Edgeworth offered no evidence for its assertion that an accurate estimate of the incremental effects of fatigue could be derived by dividing the number of fatigue-associated crashes by the total number of associated factors.

The moderate benefits that were attributed in two of the options to tightening the daily driving limit, using FMCSA's Trucks Involved in Fatal Accidents (TIFA) analysis, accord well with, or are actually more modest than, the benefits implied by the two most recent studies of the decline of performance over long work days. Blanco and Jovanis (2011) were both conducted under the current HOS rules. The results do not support Edgeworth's contention that fatigue has fallen to the point where it is greatly overstated by FMCSA's use of the TIFA data, nor that reductions in fatigue effects need to be discounted before they are applied to reductions in crashes.

Blanco's study provides clear evidence that there is a statistically significant rise in the risks related to crashes as driving hours increase. A strong trend is seen across all shifts. A somewhat weaker trend, but one that is similar and still significant using a one-tail test (which is the correct statistical approach to use if there are very strong reasons to believe that long hours of driving would not improve performance), is seen even for the smaller set of data that go into the 11th hour.¹¹ That latter trend shows that risk in the 11th hour is about 36 percent higher than the risk in the first hour (*i.e.*, $(0.1379 + 11 \cdot 0.0052) / 0.1379 + 1 \cdot 0.0052 = 1.36$). That is actually a stronger effect than would be seen based on the baseline time-on-task function used in the RIA, scaling the fatigue crashes to 13 percent (which is $[(1 +$

$36.1 \text{ percent}) / (1 + 7.4 \text{ percent}) = 1.27$). Given that both of these functions are uncertain because they are based on statistical estimation, however, these values are entirely consistent. The results are not, however conclusive on whether the 11th hour is significantly different from the 10th, or on whether increases in risk over the day are more attributable to long hours of driving or long hours in the work shift. The Jovanis (2011) study shows risk increases (not fatigue increases) for the 11th hour of driving in both the TL and LTL segments that are clearly more substantial than the increases estimated and used by FMCSA for the RIA, though it does contain some results that are difficult to interpret.

Edgeworth claimed that the LTCCS overstates the prevalence of fatigue-related crashes because it contains too many single-vehicle crashes. In making this assertion they cite a previous submission to the docket by Knippling. Knippling's submission contended that LTCCS has an overrepresentation of single-vehicle crashes when compared to the proportion of single-vehicle crashes estimated by the National Highway Traffic Safety Administration's (NHTSA) General Estimates System (GES). These comments err in one basic fact, according to Agency analysis of the GES data. The Agency estimates that an average of roughly 20 percent of serious injury and fatal crashes are single-vehicle crashes in the GES for the years in which LTCCS data were collected, not the 15 percent cited in the Knippling submission to the docket. The estimate of the proportion of single-vehicle crashes in GES rises to 26–31 percent, depending on the year chosen, if all crashes—including those that are less severe—are included in the analysis. As Table 1 of the LTCCS Summary tables posted on the Agency's web site shows, single-vehicle crashes were 25 percent of all truck crashes sampled in LTCCS in the raw data. Using the weighted data the percentage increases to 31 percent. Thus the LTCCS data are less biased with regard to sampling single-vehicle truck crashes than the comments claim.

It is not clear whether GES or the LTCCS would have the more accurate estimate of the true single-vehicle crash representation. GES sampling methods were set up to get an accurate assessment of passenger vehicle crashes, not large truck crashes. It could be that the LTCCS, because it was focused exclusively on crashes involving large trucks, derived a more representative distribution of large-truck-involved crashes than that generated by the GES. In addition, LTCCS crash investigators were fairly conservative in coding crash

¹¹ Tests of statistical significance are used to determine whether a parameter estimate could have taken a value at least as high as it appears to be, simply due to random variability in the data. A standard "two tail" test is used if the parameter could be either positive or negative, and takes account of both "tails" or extremes of the distribution of a random variable. A "one-tail" test is appropriate if there are strong reasons to think that the true value of the parameter cannot have one particular sign—*e.g.*, if the true value cannot be negative. In this case, because there are good reasons to believe that, if time on task has any effect on driving performance that effect is deleterious, a one-tail test is appropriate for assessing whether the time-on-task effect found in the Blanco study is significant.

factors—roughly 12 percent of the crashes in the data were coded with unknown causes. It is reasonable to assume that some of these crashes were fatigue-involved, especially since evidence of fatigue is often difficult to find in the aftermath of a crash.

Finally, the Knipling submission went to great lengths to show the effects that the overrepresentation of single-vehicle crashes would have on the portion of crashes where asleep-at-the-wheel was coded as a factor or critical reason. The Agency, however, did not use asleep-at-the-wheel crashes in its analysis, but instead analyzed crashes where the truck driver was coded as fatigued. This is an important distinction because asleep-at-the-wheel overrepresentation in single-vehicle crashes is significantly higher than fatigue overrepresentation. As a result, overrepresentation of single-vehicle crashes is a less significant problem when looking at fatigue involvement than when one is looking at crashes where the driver actually fell asleep. It is true that asleep-at-the-wheel crashes would be a subset of fatigue-involved crashes, but many fatigue-involved crashes are the result of impairments that fall short of actually falling asleep. If one carries out Knipling's calculations showing the effect of single-vehicle crash overrepresentation on asleep-at-the-wheel representation for fatigue-involved crashes instead, the differences are far smaller. Looking at the single-vehicle involvement rate and multi-vehicle fatigue involvement rate for fatigue, and correcting for the weighting issue using 20 percent single-vehicle involvement from GES compared to 31 percent from LTCCS, a much smaller overestimation is derived. At worst, the LTCCS overweighting of single-vehicle crashes would result in an overestimate of fatigue involvement in the neighborhood of 10–13 percent—*i.e.*, at the worst, the Agency's baseline estimate of 13 percent would be reduced to somewhere between 11 and 12 percent. However, given the variability inherent in any statistical sample or estimate and the fact that LTCCS crash investigators were conservative in coding crash factors, we feel that the estimate from LTCCS is as accurate as any other estimate available, and continue to use it as our baseline.

Edgeworth also claimed that the baseline estimate of 13 percent for fatigue-related crashes is “substantially higher than any measure previously used by the agency in its analysis of HOS rules or any other publicly-available measure.” This claim is not correct. For example, the RIA for the 2000 NPRM used a 15 percent estimate

and the RIAs for the 2003 and 2007 rules used 15 percent in the sensitivity analyses. In fact, estimates of fatigue-associated crashes run as high as NTSB's 31 percent (though that figure is for truck crashes fatal to the driver) and their observation that “truck driver fatigue may be a contributing factor in as many as 30 to 40 percent of all heavy truck accidents.” FMCSA continues to use a range of baseline fatigue estimates, similar to that used in the past, giving a higher weight to the 13 percent estimate because of the care with which the LTCCS analysis was conducted.

On the subject of cumulative fatigue, Edgeworth brought up FMCSA's previous statements that the current rules provide enough time for sleep to allow recovery from cumulative fatigue, and claims that the introduction of a cumulative fatigue function represents a reversal. However, the DC Circuit explicitly faulted FMCSA's previous analyses for excluding the cumulative fatiguing effects of excessive work (as opposed to insufficient time to sleep). FMCSA has since developed and now applies a function relating work hours in the previous week to fatigue levels in the current week, using the LTCCS. This function shows that, for drivers pushing the outer limits of the on-duty hours allowed under current rules, fatigue could still be a serious problem. This problem might not show up in the nationwide data because of other factors (such as the increased rest period between daily shifts) and because maximum weekly hours are not the norm, but that does not mean that safety could not be improved for those drivers who are truly pushing the limits.

Edgeworth pointed out that, in applying the cumulative fatigue function to the regulatory options, FMCSA used a step function that, essentially, rounded reductions in weekly hours up to the nearest hour. This is a fact that FMCSA itself noticed during the comment period and pointed out to ATA/Edgeworth.¹² That approach did overstate estimated benefits somewhat, but this overstatement applied roughly equally to all options. We corrected for this in the regulatory analysis of the final rule, by using a much finer-grained analysis. The corrected analysis shows estimated benefits that are lower by a few

percentage points, but does not significantly change the net benefits of Options 2, 3, and 4 relative to each other.

Edgeworth also asserted that FMCSA has ignored the likely interaction between different sources of fatigue (daily driving and weekly work hours), and that reductions in one will be likely to decrease the effectiveness of reductions in the other. This potential issue, however, cuts both ways: for options aimed at cutting work hours and driving hours for the hardest-working drivers, its total effects could well be even greater than its effects on each factor. For example, the limits on the use of the restart will have a disproportionate impact on the 11th hour of driving (because the hardest working drivers can be expected to drive the most hours), and these drivers will often be pushing into the 11th hour in a state of cumulative fatigue.

Edgeworth noted that, in calculating the impact of changes in working hours, the benefits of redistributing hours to other drivers should be based on the value of crash damages per hour on duty, not per hour driving. We acknowledge that there is an inconsistency in this calculation and have corrected it for the final rule. The change is considerably smaller than estimated by Edgeworth. In the existing analysis, the single crash reduction value used to calculate the benefits of redistributing both driving and working hours was part-way between the correct value for driving hours and the correct value for working hours. Changing to a more specific value for each slightly raises the value of reducing the daily driving hours per day while slightly lowering the value of reducing weekly working hours.

Edgeworth then claimed that the reduction in crashes since the crash cost analysis was conducted means that the benefits of reducing crash rates by a given percent has declined. We used the most up-to-date comprehensive assessment of crash costs available. The substantial declines seen in recent years coincided with a sharp drop in the economy, which had a substantial effect on the number of trucks on the road at any time, the miles driven, and the loads moved; the Economic Census Service Sector Survey indicates that there were about 100,000 fewer for-hire trucks on the road in 2009 than in 2007, an 8 percent decline.¹³ ATA's complete truckload-sector mileage index indicates that mileage fell roughly 19 percent from 2007 to 2009, using annualized

¹² FMCSA sent this information to ATA in an email titled, “Supplemental Information on HOS NPRM.” FMCSA docketed the contents of the attachments with the title “Response to ATA Request for Further Information on the Cumulative Fatigue Function Used in the Regulatory Evaluation for the 2010 NPRM Proposing Revisions to the Hours of Service Rules,” January 28, 2011. It is in the docket at FMCSA–2004–19608–6147.

¹³ http://www2.census.gov/services/sas/data/48/2009_NAICS48.pdf.

numbers. Reduced trucking activity implies reduced costs for any rule that imposes a limit on productivity; it would be invalid to take account of only one side of the equation. Furthermore, the recent recession affected not only truck traffic but also the volume of other vehicles on the road—and with fewer vehicles with which to collide, the crash rate per 100 million miles traveled fell as well. Compounding these effects, if the economic recession caused drivers to work fewer hours, the lower levels of effort by truck drivers could be expected to cut their levels of fatigue at the same time they cut the economic cost of any restrictions. While it would be possible to attempt to estimate the extent to which all of these transient conditions reduced both the benefits and the costs of a given rule, the conclusions would apply only to recessionary periods, which (fortunately) are relatively rare.

Comments and Responses on the Impact of the Proposed Rule on Driver Health

On the subject of the estimated benefits of the proposed rule for driver health, Edgeworth noted that previous RIAs concluded that insufficient evidence existed to support a connection between reduction of maximum work or driving time and health of drivers. While that remains true of many of the health factors discussed in the 2005 rule (exposure to diesel exhaust, noise, and vibration), in recent years the evidence has grown that excessive work and insufficient sleep (which tends to accompany excessive work) are damaging to health. These points are detailed in Chapter 5 and in Appendix B to the RIA. More recent data on driver sleep, collected since the 2003 rules have been in effect, prompted Agency concerns about the baseline average sleep levels experienced by drivers.

Edgeworth then questioned whether increased work is likely to lead to reduced sleep, pointing to the fact that the drivers whose work and sleep patterns were used as the basis for the estimates of the changes in sleep per change in work hours were operating under somewhat different rules. The relationship between additional time working and the way that time cuts into the hours of sleep, though, is a general relationship, and would not be expected to appear only under a particular regulatory regime (especially if many of the drivers were not even pressing hard against the limits in effect at the time). Naturally, there will be some uncertainty in estimating exactly how much average sleep will decline when average work increases, but the risk of overstating the relationship is no greater

than the risk of understating it; we believe the Agency's estimate is reasonable.

Edgeworth also pointed to FMCSA's prior statement that "[t]he Agency has no basis for estimating the extent to which drivers who have an extra hour a day or extra hours per week off duty will use that time to exercise and sleep." That statement, however, is strictly true only insofar as both exercise and sleep are considered together, because FMCSA did not search for a relationship between work hours and exercise hours.

The idea put forth by Edgeworth that changes in work hours do not necessarily affect average sleep time is inconsistent with the commonplace observation that workers sleep more on weekends than on week nights as documented in the American Time Use Survey, National Sleep Foundation surveys, and other research.

Finally, Edgeworth also stated that FMCSA should have included the negative effects of excess sleep, but failed to recognize that these negative effects were included as an offset to the benefits of the rule. In both cases, FMCSA is commenting on the difficulty of predicting changes in sleep exactly, but nonetheless uses a consistent methodology in applying the changes in work hours to its health benefits method.

Edgeworth also disputed FMCSA's use of Ferrie's findings of a U-shaped relationship between sleep and mortality, offering several arguments: that the study populations were different, that FMCSA imputed too great a level of precision to the study, and that the very small extra hours of sleep for some driver categories are too small to make any real difference. Though one can raise questions about any particular study population, Ferrie's study is only one of many that find a U-shaped relationship—some stronger, some weaker—between sleep above and below an ideal point (e.g., Grandner & Patel (2009), Cappuccio (2010)). It is true that for some of the driver categories the changes in average sleep are very small—but those are also the categories for which FMCSA finds, and includes, a small negative benefit of restricting hours; leaving them out of the analysis would change the results very little. For the drivers in the more extreme categories, the changes in average sleep are considerably larger. In the real world not every driver will be exactly at the baseline sleep level and will not have exactly the average change in sleep. Given the wide variability in sleep across individuals, many drivers in a category that has (for example) 6.2

hours of sleep on average will actually be sleeping well below 6 hours, and for them the effects of the rule may well be substantial. Although Cappuccio (one of the authors of the study used by FMCSA for its quantitative analysis) raised questions about the way FMCSA applied the Ferrie study (of which he is a co-author) for its quantitative analysis, the lead author of the study, Jane Ferrie, is on record as approving of FMCSA's use, and even considered the Agency's approach conservative in terms of the benefits that could be derived from improved sleep. (See the detailed discussion of Cappuccio's criticism and Ferrie's response below under Comments on Health Benefits.)

Other Comments on the Cost/Benefit Analysis

Comments on Impacts to Shippers, Brokers, or Consumers. Commenters, including ATA, National Association of Manufacturers, the Chamber of Commerce, shipper and trucking associations, and major carriers stated that FMCSA had not addressed the costs of the rule to shippers, brokers, or consumers. They stated that the supply chain would have to be re-engineered. A distributor association estimated costs for changing routes of one carrier at \$20 million and cited Kraft Foods as saying that the number of routes that could be covered in one day would drop from 75 percent to 60 percent.

FMCSA Response. The costs of the rule are measured by the cost to the carriers (which, in the case of private carriers, includes shippers because they are the same in that case). We assume that these costs are then shifted, largely, to the direct and indirect users of shipping services: shippers, receivers, and ultimately consumers. We have included costs for reprogramming routes, based on the clearest quantitative estimates provided in past comments in listening sessions; to the extent that the shippers do the work of altering the routes in light of the rule changes, that should reduce the costs to carriers. We have addressed costs to consumers in the RIA. Our cost estimates are for carriers providing the same, or essentially the same, service using more drivers and trucks each with slightly lower average productivity. The costs of changing routes will be mitigated by the time allowed for compliance. In a dynamic economy frequent changes in shipping and routing are necessary; any changes necessitated by the new rules can be phased in whenever they are most convenient. FMCSA believes that the cost factors provided by the commenters are not adequately justified, and they

are exaggerated compared to the averages.

Comments on Impacts on LTL Carriers. ATA stated that the analysis did not account for impacts on LTL carriers; it estimated the productivity losses at 5 to 9 percent. Con-way said the rule would require network changes.

FMCSA Response. The analysis of the impact of the different options did consider impacts on LTL carriers, as they were included in both the population of drivers and power units, and in a survey that was the basis for the estimates of the distribution of work effort. Though there might be some LTL routes that could lose this much productivity if driving were restricted to 10 hours per day, it is highly unlikely that the industry-wide average impact would be that high. Only a driver who drove 11 hours every day, and who was required to cut back to 10 hours, would lose as much as 9 percent of baseline productivity, and ATA is on record stating that even FMCSA's estimate that the 11th hour is used on only about a fifth of trips is substantially overstated. Any segment that currently requires 10 hours or less, or more than 11 hours, would be unaffected by a change in the daily driving limit, and any driver currently taking a full weekend off would be unaffected by the changes in the restart provisions. It is true, as Con-way stated, that some changes in networks might be necessary, and a cost has been assigned to those changes. It should be noted, however, that Con-way stated that its drivers averaged less than 8 hours of driving a day. In any case, the final rule leaves daily driving hours unchanged.

Comments on Reduction in Productivity. Schneider stated that the rule would reduce its productivity by 4.72 percent. Drivers would get home 25 percent less; the average run would drop from 501.7 miles to 478 miles, which would translate to \$3,000 a year decrease in driver pay to offset the loss in productivity. Other carriers stated that those carriers that maximize hours would have an 8 to 10 percent reduction in productivity.

FMCSA Response. FMCSA's estimate of the nationwide productivity impacts is close to an average of 1.2 percent; the Agency assumes there is substantial variability across operations and firms. The estimated reduction in productivity for the carriers allowing or requiring drivers to work the longest hours is quite consistent with our estimates—those working about 80 hours must cut back to something below 70, which is a reduction of more than 12 percent.

Comments on Costs to Short Haul. Three shipper associations stated that

FMCSA had ignored the costs to short-haul operations and that its statement that they would not be affected was without foundation, particularly as the provisions limited work time other than driving time.

FMCSA Response. The RIA for the 2003 HOS rules did calculate costs and benefits for short-haul and local drivers, and the analysis for the 2005 HOS rules also looked at how longer driving windows could reduce impacts on that segment. For the final rule, however, FMCSA considers any potential impacts to be small. This conclusion is based largely on the nature of the HOS rule changes considered in this rulemaking, compared to the work patterns identified in previous rulemakings. The 2003 rules increased the daily driving hours from 10 to 11, increased the required off-duty period from 8 to 10 hours, allowed restarting the multi-day count of on-duty hours after a 34-hour period off-duty, and limited driving to a 14-hour window after coming on duty. FMCSA's review of work by short-haul and local drivers, which included quantitative assessments of two driver surveys and discussions with industry sources, concluded that most of the changes in the rules would have essentially no effect on short-haul and local drivers. The ability to work the maximum numbers of hours per week (through the restart) was also considered unlikely to provide benefits to the short-haul and local drivers, because they were judged to work much more moderate and regular hours than longer-haul drivers, often with full weekends off.

The only provision of the 2003 rule found to be likely to impose a significant cost on short-haul and local drivers was the fixed 14-hour limit on the driving window. FMCSA's data on the variability of daily work by short-haul and local drivers, however, found that work in excess of 14 hours was quite rare, even when drivers were permitted to work beyond a 14-hour window. Furthermore, the provisions that allow short-haul and local drivers to exceed the 14-hour driving window once or twice a week should provide enough flexibility to prevent any significant impact on the vast majority of these drivers. Finally, the final rule has dropped the 13-hour limit on daily on-duty hours, further reducing the chances that a short-haul or local driver's operations will be constrained.

Comments on Costs of Training Enforcement Personnel. CVSA and the Oregon Department of Transportation stated that the RIA failed to take into account the cost of training 14,000 enforcement personnel, which they

estimated to be between \$2,682,680 (8-hour course) and \$4,924,020 (12-hour course), not including travel and per diem. According to the commenters, these costs will be an additional burden on State resources. Carriers, ATA, and other trucking associations also stated that the 2-hour estimate for training was too low.

FMCSA Response. The proposed rule has been simplified, and the 11-hour driving limit from the previous rule retained, which should mitigate the length of the training needed to familiarize inspectors and drivers with the new requirements. The Agency considered including these costs, but found that they did not change the total cost of the rule, which is rounded to the nearest \$10 million. FMCSA also notes that the lead time provided before the rule takes effect will allow training to be incorporated into other on-going activities. For industry costs, we used the clearest quantitative estimate available from comments at listening sessions.

Comments on Costs and Driver Additions. Advocates *et al.* stated that fatigue-related truck crashes cost between \$5.5 and \$13 billion annually. They also posited that the current HOS rule eliminated the need to hire 60,000 drivers; the proposed rule would add 44,000 driver jobs to the economy.

FMCSA Response. This estimate is broadly consistent with FMCSA's estimates for fatigue-related crashes, though higher than its estimates for long-haul crashes alone. FMCSA's estimate of the number of new drivers is lower, because it anticipates a small shift from truck to rail, and leaves the daily driving limit at 11 hours.

Comments on Cost Disaggregation. Another advocacy group stated that FMCSA should have disaggregated the costs for each key provision, not just driving time. The group also commented that FMCSA should estimate the effects of changes in congestion.

FMCSA Response. FMCSA analyzed the costs and benefits of the provisions individually, as shown in RIA Appendix C, and summarized in Table 3 of this preamble. FMCSA does not expect any significant net effects on congestion. The requirement for two consecutive nighttime periods off to qualify for a restart, which might be anticipated to shift traffic into more crowded times of day, will affect only one day per week for the fraction of drivers who routinely work all night and routinely work very long hours per week. Any effect on congestion due to these small shifts will be counterbalanced by the small

anticipated shift from truck to rail due to the rule's effect on productivity.

Comments on Safety Benefits. Two trade associations and the Missouri Department of Transportation stated that the Agency has no basis for projecting safety benefits. ATA stated that there were no safety benefits. OOIDA stated that the analysis was flawed because it is based on data collected under the pre-2003 rule.

FMCSA Response. FMCSA has shown that reducing working, and building in breaks in long days, will provide more time to rest and reduce the buildup of fatigue. Because fatigue is known to be an important cause of heavy-vehicle crashes, a regulation that reduces fatigue can be expected to reduce crash risks. Some of the analysis did use data from before 2003 along with more recent data, because the most recent data are not yet extensive enough to form the basis of an entirely new set of analyses. FMCSA has no reason to believe that basic relationships between work and sleep, and between excessive work and fatigue, have changed enough since 2003 to invalidate its analysis using data prior to the current rule change. There is no reason why the use of pre-2003 data to examine time-on-task effects would produce spurious results. Furthermore, the time-on-task function used in the current RIA was incorporated into the RIAs accompanying the 2005 and 2008 rules and was used in those rulemaking actions to evaluate the differences in safety impacts between the various options considered. The use of that function in previous rulemakings was tacitly accepted by all commenters.

On March 17, 2008, ATA submitted comments on FMCSA's December 7, 2007, Interim Final Rule's RIA.¹⁴ ATA commented "that FMCSA had taken diligent and extraordinary steps to assure the comprehensiveness of the analysis and its parts. This included adequately explaining two critical elements of the model in the RIA accompanying the 2005 rule—the analysis of time-on-task and the analysis of whether the 34-hour restart affects cumulative fatigue." FMCSA's 2007 RIA used the same TIFA function to estimate benefits as the RIA for this final rule.

ATA noted in its 2008 comments that "The regression analysis (model) used by FMCSA to measure and project the effect on the risk of crashes associated with driver fatigue of driver's time on task (TOT) is reasonable and

appropriate." In addition, a statistician hired by ATA as a consultant to examine the Agency's TIFA-based time on task function submitted the following comment: "Based on my review of the 2007 RIA and related docket materials as well as the considerations set forth in my September 2007 Declaration, it is my opinion that the form and implementation of FMCSA's revised logistic regression model are reasonable in the circumstances for the purpose for which FMCSA used this calculation in the 2007 RIA" (Marais). In light of the fact that the function has been used twice in the past, and that even ATA and its consultants have stated that use of this function is appropriate, it seems reasonable for the Agency to have used it again for the December 2010 NPRM and this final rule to estimate safety benefits associated with reducing allowed daily driving.

More recent research has corroborated time-on-task and cumulative fatigue effects for driving occupations. Two new studies sponsored by the Agency and conducted with post-2003 data have found evidence of increasing crash risk or SCEs as driving time increases through the day (Blanco and Jovanis (2011)). In addition, other studies involving transit bus operators have shown evidence that longer weekly work hours are associated with an increase in crash risk for drivers working 45 hours per week or more (Sando (2010a and 2010b)). While these drivers operate in a different setting than over-the-road truck drivers, the fact remains that the increase in risk begins appearing at weekly work-effort levels well within the current and previous HOS rules. Taken together, these studies bolster the Agency's claim that limiting work would reduce crashes related to time on task and cumulative fatigue.

Comments on Health Benefits

Although drivers who work fewer hours than the maximum allowed by the rule will experience only limited health benefits, those who currently work the longest schedules must curtail their weekly work hours—in some cases significantly—and will, therefore have additional time off duty to sleep or exercise, both of which are associated with improved health, lower medical costs and, ultimately, with longer life expectancy.

Comments on the Use of the Ferrie Study. ATA submitted an opinion from Francesco Cappuccio that disputed the use of studies cited by FMCSA in the 2010 NPRM to estimate changes in mortality based on sleep. His points were the following:

- The studies used are based on epidemiological data, which do not imply a causal relationship.
 - Sleep duration is self-reported and does not differentiate between naps and longer daily sleep. The studies also do not exclude people with sleep disorders.
 - The description of a so-called U-shaped relationship between duration of sleep and risk of death is currently insufficient to justify an interpretation of a 'graded and continuous' relationship between exposure (sleep duration) and outcome (death). There could be threshold effects.
 - The mapping of sleep time is not supported by data.
 - The RIA did not consider the impact of more than 8 hours of sleep.
 - Sleep time between 6 and 8 hours is not associated with harm. Most drivers appear to fall into this range.
 - There is no evidence that increasing sleep by 5.5 minutes per day would produce health benefits.
 - FMCSA assumes that, if given extra time off, drivers would use it to sleep. This is not supported by data.
- Cappuccio concluded:

In these studies reduced weekly work hours led to an increase in sleep time because other approaches were taken at the same time as the reduction in work hours to encourage and facilitate the workers to sleep longer and to recover better from previous shifts. These measures include important components based on well-established principles of sleep medicine and circadian biology: Limit consecutive night shifts to reduce the build-up of chronic partial sleep deprivation due to the limited sleep between night shifts; limit shift duration to minimize acute sleep deprivation; design the sequence of shifts to abolish 'slam shifts'; instruct workers and facilitate naps; and also reduce the proportion of long work weeks. These approaches are effective on performance and reduce errors. No evidence of efficacy on health outcomes is yet available.

Jane Ferrie, the lead author of the study in question on which Cappuccio collaborated, submitted a comment to the docket. She noted that the RIA acknowledged that epidemiological data do not prove causation. She cited a number of studies on self-reported sleep indicating that such reports overstate sleep. Ferrie cited other studies showing that self-reported sleep is strongly associated with health outcomes. The projections in the RIA were very close to the results derived from the data analysis of the Whitehall study. She described the mortality ratios used in Exhibit 3 as robust and added that the quadratic regression analysis used in the RIA is a relatively good approximation within the range of 5–9 hours sleep duration. Mortality rates in Exhibit 5–3 outside these ranges would be less

¹⁴ See document item FMCSA–2004–19608–3437 for ATA's comment on pages 13–14, and document item FMCSA–2004–19608–2924 for NERA's paragraph on page 2.

stable, but she noted that the Agency did not appear to have used them in the cost-benefit analyses. She stated that the problem of covariates appears to be quite minor. She also stated that the inferences in the RIA on increased mortality seem to be in rough agreement with estimates from her study. She noted that the RIA acknowledged that small changes in the amount of sleep make little difference for individuals, but “small changes at the population level, particularly in large populations, can have significant effects.”

On the unquantified health benefits, Ferrie cited an increasing body of research documenting the effects of working more than 55 hours a week on heart disease, cognitive function, depression, and sleep disturbances. She stated that repeated exposure to long working hours has been shown to be associated with a 3-fold increased likelihood of shortened sleep, a nearly 7-fold increased likelihood of difficulty falling asleep, and a 2-fold increased likelihood of early morning waking. She noted that these effects are not related to shift work. Ferrie concluded that the methods of analysis FMCSA used appear to be robust and that the RIA takes a cautious approach to interpreting the health benefits.

FMCSA Response. In every instance, Cappuccio appears to have drawn the narrowest possible conclusion from the available data, both in the study that he co-authored and in the RIA, with the result that he finds the connection between mortality and sleep duration tenuous or contingent on further research and better data. According to Cappuccio, some sleep scientists suggest that there may be an alternative “threshold” hypothesis for the relationship between sleep and mortality. According to this hypothesis, individuals getting at least as much sleep at some threshold level (e.g., 5 hours a night) would gain nothing from small changes in sleep. Cappuccio, however, is on record as stating that research shows that sleeping less than 7 hours a night is likely to lead to greater mortality. In his comments (FMCSA–2004–21675), Cappuccio mentioned his study Cappuccio (2010), which is docket item FMCSA–2004–19608–4041. That report includes the sentences, “Our study shows an unambiguous and consistent pattern of increased risk of dying on either end of the distribution of sleep duration. Pooled analyses indicate that short sleepers (commonly <7 h per night, often <5 h per night) have a 12% greater risk.”) Thus, granting for the sake of argument that there may be a threshold, even Cappuccio likely would place it above

the levels at which we are estimating benefits. Ferrie, on the other hand, was more willing to trust the available research, and to draw real-world conclusions from it. She found FMCSA’s use of her own research to be cautious and had no objection to the use of those results as a partial rationale for HOS policy. On the issue of fitting a continuous curve through data collected on an ordinal scale, her comments supported the Agency. As shown above, Ferrie thinks: “Both the estimated increases in sleep duration and decreases in mortality that result from the RIA are very small, a point acknowledged by the FMCSA authors; the curvature of the relationship ‘means that changing average sleep makes very little difference for individuals.’ However, small changes at the population level, particularly in large populations, can have significant effects.” These comments show that the Agency’s inferences regarding increases in sleep and mortality reductions were reasonable. In addition, both Ferrie and Cappuccio, along with other researchers on this topic, have referred to a U-shaped curve rather than a step function when discussing the relationship between sleep and mortality. A curve generally connotes a continuous function in the scientific literature, therefore references to a curve in the literature imply a continuous relationship rather than a threshold or step function. While FMCSA recognizes the need for improved data and is sponsoring a wide range of research projects on sleep and fatigue, we are not prepared to repudiate reasonable inferences from work already available because more perfect work might someday be completed. We agree with Ferrie’s comments.

FMCSA is, in fact, implementing three of Cappuccio’s suggestions in this final rule. This final rule is: (1) Regulating time to abolish “slam shifts,” which are shift schedules that cause sudden changes in the sleep/wake cycles; (2) Facilitating naps by providing a 30-minute break; and (3) Reducing the proportion of long work weeks.

Other Comments on Health Benefits. An advocacy group noted that there are underlying medical conditions that lead to lower sleep, such as sleep apnea. A shipper association and a company stated that health benefits are inflated by the change in the on-duty definition.

FMCSA Response. FMCSA recognizes that sleep conditions can reduce sleep, but many of these conditions are associated with obesity, which is linked to long work hours and a sedentary lifestyle. The direction of causality can

be difficult to determine, but one likely sequence is that long work hours reduce sleep, which causes biochemical changes that facilitate obesity, which is associated with high blood pressure and diabetes, all of which are associated with an increased incidence of sleep apnea.

The economic analysis did not look at the changes in the on-duty definition or use it to change estimates of sleep time; the revised definition is not expected to alter sleep time. The revision allowing 2 hours in the passenger seat to be logged as off-duty time mainly affects team drivers, whose sleep is poor in any case according to those drivers. Local drivers may “rest” in the truck if they are off duty, but that rest will not necessarily include sleep, particularly as local drivers usually work during daylight hours when sleep is difficult even when someone is tired.

Other Comments on Benefits. A trucking association stated that FMCSA should demonstrate that the safety benefit of the 2-night requirement for the restart provision outweighs the cost of increased congestion. An advocacy group stated that the RIA should analyze the costs and benefits of the 16-hour provision and the 30-minute break. It stated that FMCSA should monetize the health impacts beyond mortality. It noted that besides leading to premature death, the chronic diseases associated with lack of sleep impair both quality of life and productivity for a long period. The direct and indirect costs associated with these conditions are high.

FMCSA Response. As discussed earlier in this preamble, it is not clear why commenters believed that the two-night requirement will lead to increased congestion. They seem to assume that nighttime deliveries will end, but they will in fact continue 5 nights a week for the hardest working drivers and 6 or 7 nights a week for drivers who do not need the restart. The final RIA does monetize the costs and benefits of the break; the 16-hour provision has been dropped.

As explained in the RIA, it is difficult to monetize the costs of the chronic health impacts because to do so, FMCSA would need data that linked these conditions to specific amounts of sleep. There are, for example, data that indicate the increase in mortality associated with increases in body mass index (BMI), but these vary considerably by sex and race. To begin to monetize those costs we would need data that link specific levels of sleep to BMI and then data that linked the BMI to incidence of diseases.

Comments on Fatigue Research. Thirteen commenters responded to the

WSU study on night drivers. ATA, OOIDA, CVSA, CHP, a State trucking association, and several carriers stated that the number of subjects was too small and the lab setting too artificial. Two drivers objected to using young healthy subjects instead of trained drivers. Another driver stated that the study did not consider drivers whose natural rhythms are suited for working at night. Advocates stated that previous research supported the findings of the WSU study. JB Hunt stated that it surveyed 249 drivers, 82 percent of whom regularly drove at night; 79 percent of these drivers said they did not change their sleep schedules when at home, which is contrary to the WSU assumption. JB Hunt also stated that anyone who gets 10 hours of rest a day should not develop a sleep debt.

FMCSA Response. FMCSA addressed most of these comments above, in Section IV. "Discussion of All Comments" G. "Restart," under the 2-night requirement heading. As for the assertion that 10 hours of rest a day is sufficient to eliminate sleep debt, the commenter is assuming that a driver with 10 hours off will use 7 to 8 hours of that time to sleep. Research has shown that night drivers who are trying to sleep during the day generally get less than 6 hours of poor quality sleep even when they have more than 10 hours off.

Comments on the Impact of Long Hours. On the issue of long hours, Ferrie noted that a recent review concluded that work in excess of 8 hours carries an increasing risk of crashes, with the risk in the 12th hour double that of the 8th. Sando reported that his study showed an increased risk of collisions as hours worked increased.

NIOSH cited a number of studies that indicate that sleep deprivation produces performance deficits, including an inability to assess risk and an increase in risk taking. It also cited studies on fatigue and CMV crashes and sleep apnea. Advocates *et al.* stated that research indicates that performance degrades when drivers have less than 7 to 8 hours of sleep and that most drivers get less than 6 hours of sleep on work days. They also cited a number of studies that indicate people need 7 to 9 hours of sleep. They countered industry arguments that the rule was based on pre-2003 data by noting that the NIOSH study of drivers covered 2004–2006. They stated that the findings of the 2005 Fatigue Management Survey on sleepy drivers indicate that this problem is more common for CMV drivers than for other drivers.

An association stated that fatigue literature does not address the relative risk of the 11th hour. The Missouri

Department of Transportation cited the LTCCS as indicating that fatigue was the 10th highest associated factor.

FMCSA Response. FMCSA agrees with the commenters that the great majority of research associates long hours of work with fatigue and increased crash risk. FMCSA also agrees that fatigue literature does not directly address the relative risk of the 11th hour of driving. The new VTTI study indicates that it is difficult to isolate the relative risk of any particular hour of driving because driving hours can occur at differing times during the work day. For example, the 11th hour cannot occur sooner than 11 hours into the work day, but it can occur anytime from 11 to 14 hours into the work day. The fifth hour of driving can occur anytime from 5 to 14 hours into the workday. This affects the relative risk of any particular hour of driving. As for the LTCCS, it may have found that fatigue was the 10th highest factor, but it still was associated with 13 percent of crashes.

Comments on Health Research. Relatively few commenters discussed the health research reported in the NPRM and RIA. ATA and the Retail Industry Leaders Association (RILA) stated that FMCSA has argued in past HOS rulemakings that long hours do not affect health. RILA further stated that the 2000 Balkin study on the relation of work time to sleep time was not valid because the data were collected under the previous HOS rule. It also questioned the assumption that a reduction in driving time would lead to more sleep and exercise. Another State trucking association and a carrier argued that FMCSA had not proven that changes to the rule would have measurable positive impact on driver health. The Minnesota Trucking Association stated that the studies did not answer the question of whether long hours, shift work, or short sleep lead to obesity and diabetes.

NIOSH submitted a number of studies that address health issues. NIOSH cited studies linking shift work to smoking and obesity, noting that research has found that short and poor quality sleep periods alter hormone levels and metabolic function and lead to insulin resistance. NIOSH cited research linking shift work to a higher risk of cardiovascular diseases, including studies of drivers. It noted that a study of unionized U.S. drivers found an elevated rate of mortality from ischemic heart disease. NIOSH stated that the International Agency for Research on Cancer has designated shift work with circadian disruption as a probable carcinogen. It also reported on studies

linking long hours to depression and finding that working less than 12 hours a day and 58 hours a week reduced depression and fatigue. It cited a 2010 study of truck drivers associating disrupted sleep patterns with increased obesity and several chronic diseases. Studies of verifiable sleep of truck drivers found daily averages well below 7 to 8 hours (3.8 to 5.2 hours).

Finally, Schneider National stated that FMCSA should address sleep apnea among drivers, which it said is a more important cause of fatigue than HOS. It also questioned the current rule allowing chiropractors to serve as medical examiners. A safety group stated that FMCSA should analyze the impact of diesel fumes.

FMCSA Response. As FMCSA explained in the NPRM, the body of research that finds a connection between long hours of work and worker health has grown substantially in the past 6 years. Most of the health issues that FMCSA reviewed for the 2005 rule—exposure to diesel fumes, noise, and vibration—were not and still are not scientifically associated with long hours. The findings on noise and vibration indicated that the levels to which drivers are exposed were not great enough to cause health effects. With diesel exposure, drivers who are parked with trucks idling may be exposed to higher levels than when they are driving. Altering work hours would not necessarily reduce exposures.

These issues are not the basis of the health impacts discussed in the 2010 NPRM. As the studies submitted by NIOSH and others cited in the NPRM and RIA have reported, long hours of work, particularly work that is primarily sedentary, are associated with low sleep, obesity, and cardiovascular disease. With many factors linked, it is not possible to define a simple pathway for effects. There is, however, a substantial body of research that has identified the chemical changes caused by lack of sleep that can increase the likelihood of obesity and diabetes and increase blood pressure. CMV drivers have a markedly higher rate of obesity than adult male workers as a whole and have been shown to have an elevated risk of dying of some cardiovascular diseases. Interestingly, the commenters did not attempt to deny that drivers have a higher incidence of chronic health conditions, each of which is linked to higher mortality rates and higher on-going medical costs. As mentioned above, this rule is unlikely to improve the health of drivers who work moderate schedules. On the other hand, those currently working the longest schedules will be required to reduce

their work hours, which is likely to increase their opportunity for sleep and/or exercise, both of which are conducive to better health and lower medical costs.

Final Rule Regulatory Impact Analysis

For the analysis of the final rule, FMCSA considered and assessed the consequences of four regulatory options. (A copy of the complete RIA is available in the docket.) Option 1 is the no-action alternative, which would retain the provisions of the current HOS rule. All costs are relative to Option 1. Options 2 through 4 require at least one break during the duty day (none is currently required), and limit the use of the 34-hour restart provision to once every 168 hours with at least 2 nights off duty. Options 2 through 4 differ only in driving time allowed between 10-hour breaks. Option 2 limits allowable daily driving to 10 hours, the driving limit that existed prior to the 2003 rule. Option 3 retains the 11 hours of driving allowed under the current rule. Option 4 allows only 9 hours of driving, or 1 hour less than Option 2. This RIA compares the costs and benefits (in 2008 dollars) of Options 2 through 4 relative to the current rule (*i.e.*, Option 1) and assumes that there is full compliance with each of the options.

Compliance with HOS rules was assumed to be 100 percent for both the baseline and options; no attempt was made to estimate real-world compliance rates or to adjust costs and benefits for non-compliance. This assumption was made to avoid understating the true costs of the rule. To the extent that compliance rates fall short of 100 percent, both costs and benefits would be lower. This approach allows for

analyses of supplementary rules aimed at improving compliance, which would presumably move both costs and benefits closer to the levels estimated in this analysis. These incremental changes in costs and benefits would not duplicate the costs and benefits estimated for this rule; rather they would indicate the extent to which the supplementary rules ensured that the rule's costs and benefits were realized.

To calculate the impact of the changes to the HOS rule, it is necessary to develop a profile of the motor carrier industry and estimate the degree to which drivers in various segments work up to or close to the limits of the current rule. Drivers whose preferences or work demands lead them to schedules well within the current limits for reasons unrelated to those limits will not be affected by the rule changes.

The analysis concentrated on inter-city long-haul or regional, as opposed to local, trucking operations. In general, short-haul trucking work has far more in common with other occupations than it does with regional or long-haul trucking. These local, short-haul trucking operations are generally 5-day-a-week jobs, and much of the time on duty is given to tasks other than driving. Typical work days are 8 to 10 hours or so and typical weeks are 40 to 55 hours. Many of these drivers receive overtime pay past 8 hours in a day. Most of the work is regular in character; drivers go to basically the same places and do the same things every day. The rule is expected to have little effect on such operations.

Both for simplicity of presentation and because of the nature of the available data, the analysis used 100

miles as the point of demarcation between local and over-the-road (OTR) service. Much of the information on working and driving hours is drawn from FMCSA's 2007 Field Survey.¹⁵ Companies and drivers were identified as operating within or beyond a 100-mile radius. The Economic Census, which provided data on revenue, defines a long-distance firm as one carrying goods between metropolitan areas; this is roughly compatible with a 100-mile radius for the distinction between local and OTR service. One hundred miles is also compatible with the length-of-haul classes in the Commodity Flow Survey.

To evaluate the impact of the rule changes, the analysis needed to define the prevailing operating patterns in the industry. Of particular interest is the extent to which drivers work close to the limits set by the current rule. To analyze current patterns in work intensity, drivers were assigned to four intensity groups, based on their average weekly hours of work. For this purpose, the analysis used data on weekly work hours from FMCSA's 2007 Field Survey to define intensity groups as shown in Table 6.

Moderate-intensity drivers are on duty an average of 45 hours per week. High-intensity drivers are on duty an average of 60 hours per week. The third group, very-high-intensity drivers, works an average of 70 hours per week. The fourth group, extreme-intensity drivers, is on duty an average of 80 hours per week. The 2007 Field Survey indicated a distribution of the driver population across these groups as shown below.

TABLE 6—DRIVER GROUPS BY INTENSITY OF SCHEDULE

Work intensity group	Average weekly work time	Percent of workforce	Weighted average hours per week
Moderate	45	66	29.70
High	60	19	11.40
Very High	70	10	7.00
Extreme	80	5	4.00
Total			52.10

The weighted average is obtained by multiplying the average work time in each class by the fraction of the workforce in that class. The sum, just over 52 hours, is the average hours of work per week based on each group's

share of the total population. The analysis made similar calculations using the Field Survey data to determine the weighted averages for use of the 10th and 11th hour of drive time and the 14th hour of daily on-duty time. These

figures can be found in the accompanying RIA.

To estimate the costs of operational changes, the basic approach is to follow the chain of consequences from changes in HOS provisions to the way they

¹⁵ The "2007 Field Survey" is an alternate title for the FMCSA, "2007 Hours of Service Study," 2007. FMCSA-2004-19608-2538.

would impinge on existing work patterns in terms of work and (where relevant) driving hours per week, taking overlapping impacts of the rule provisions into account. Estimated changes in productivity are translated into changes in dollar costs using functions developed for the regulatory analyses of previous HOS rules. Summing the different cost components resulted in a total annualized cost of \$1.00 billion for Option 2, \$470 million for Option 3, and \$2.29 billion for Option 4. Though these costs are estimated using impacts on industry productivity, they would most likely be passed along as increases in freight transportation rates, and then ultimately to consumers in increased prices for the goods that are transported by truck.

Rule Benefits

The primary goal of the final rule is to improve highway safety in the most cost-effective way by reducing driver fatigue and the associated increase in the probability that fatigued drivers will be involved in crashes. A second benefit expected from this rule is a decrease in driver mortality due to health problems caused by long working hours and the association of long working hours with inadequate sleep.

To analyze the safety impacts of the 2010 NPRM and 2011 final rule, the Agency developed a series of functions that incorporate fatigue-coded crashes to hours of daily driving and hours of weekly work. In the pre-2010 HOS regulatory analyses, the effects on fatigue and fatigue-related crashes of changing the HOS rules were calculated using fatigue models. These models (the Walter Reed Sleep Performance Model for the 2003 rules, and the closely related SAFTE/FAST Model for 2005, 2007, and 2008 analyses) took into account the drivers' recent sleeping and waking histories, and calculated fatigue

based on circadian effects as well as acute and cumulative sleep deprivation. These models did not incorporate functions that independently accounted for hours of driving after an extended rest (*i.e.*, acute time-on-task) or cumulative hours of work (as opposed to off-duty time) over recent days. These effects were assumed, instead, to be accounted for in the effects of long daily and weekly work hours on the drivers' ability to sleep. For the 2005 and later analyses, a separate time-on-task function based on statistical analysis of TIFA data was added to ensure that available evidence for time-on-task effects was not ignored; those analyses were still criticized as deficient for excluding consideration of cumulative time-on-task effects.

For the 2010 NPRM and the 2011 final rule analyses, FMCSA replaced the use of the sleep-related fatigue models with a simpler approach that explicitly relates the risk of a fatigue-coded crash to hours of daily driving and hours of weekly work. The function used to model the effects of daily driving hours is the same as the TIFA-based logistic function used since 2005, while the function for modeling weekly work hours is taken from FMCSA's analysis of the LTCCS. Other fatigue effects, including the effects of insufficient sleep and circadian effects of working and sleeping at sub-optimal times, are implicitly assumed to be incorporated in the daily driving and weekly work-hour functions because those effects were at work on the drivers involved in the crashes recorded in TIFA and LTCCS. To add fatigue effects calculated by a sleep/performance model on top of the empirically based functions would, therefore, run the risk of double counting the benefits of restrictions on work and driving. These functions, and the uncertainty surrounding them, are described in detail in the RIA.

The basic approach for using the empirically based fatigue risk functions was to count the changes in hours worked and driven as a result of the regulatory options. Each hour of driving that is avoided results in a reduction in expected fatigue-related crashes. These reductions were calculated using the predicted levels of fatigue-related crashes indicated by the fatigue functions. The hours of driving and working that are prevented by the options, though, were assumed to be shifted to other drivers or to other work days rather than being eliminated altogether. The fatigue crash risks for those other drivers and other days were also calculated. Taking account of these partially offsetting risks means that the predicted crash reductions attributable to the options were really the net effect of reducing risks at the extremes of driving and working while increasing risks for other drivers and on other days.

The changes in crash risks were monetized (*i.e.*, translated into dollars) using a comprehensive and detailed measure of the average damages from large truck crashes. This measure takes into account the losses of life (based on the DOT's accepted value of a "statistical life," \$6 million when this rulemaking began); medical costs for injuries of various levels of severity, pain, and suffering; lost time due to the congestion effects of crashes; and property damage caused by the crashes themselves.¹⁶

The monetary value of each of the effects thought to affect the safety of drivers was estimated under three different assumptions of the baseline level of fatigue involvements in crashes: 7 percent, 13 percent, and 18 percent. The total benefits resulting from improvements in the safety of long-haul (LH) drivers for Options 2 through 4 are shown below in Tables 7 through 9 below.¹⁷

TABLE 7—ESTIMATED SAFETY BENEFITS BY FATIGUE CRASH RATE FOR OPTION 2 (10 HOURS DRIVING)

[Millions 2008\$]

Assumed percent of crashes due to fatigue ¹⁷	Benefits due to reduced daily time on task effect ^a	Benefits due to reduced weekly time on task effect ^b	Total benefits due to reduced crashes
7	\$110	\$210	\$320
13	210	390	600
18	290	540	830

^a Acute fatigue from long hours in a day.

¹⁶ Average large truck crash costs were obtained from the report, "Unit Costs of Medium and Heavy Truck Crashes," March 2007, by E. Zaloshnja and T. Miller. The cost of a crash was updated to 2008 dollars and to reflect a value of a statistical life of \$6 million. The report is in docket #FMCSA-2004-19608-3995.

¹⁷ Truck driver fatigue was coded as a factor in 13 percent of all crashes in the Large Truck Crash Causation Study (LTCCS). As a sensitivity analysis, FMCSA also used a lower value of 7 percent involvement in fatigue-related crashes, based on the 8.15 percent value used in the RIA for the 2003 HOS rule. A higher value of 18 percent involvement

in fatigue-related crashes also was used as a sensitivity analysis, chosen to be roughly as far above the LTCCS value of 13 percent as the 8.15 percent pre-2003 estimate is below 13 percent.

^b Cumulative fatigue from long hours over many days.

TABLE 8—ESTIMATED SAFETY BENEFITS BY FATIGUE CRASH RATE FOR OPTION 3 (10 HOURS DRIVING)
[Millions 2008\$]

Assumed percent of crashes due to fatigue	Benefits due to reduced daily time on task effect ^a	Benefits due to reduced weekly time on task effect ^b	Total benefits due to reduced crashes
7	\$10	\$150	\$150
13	10	270	280
18	10	380	390

^a Acute fatigue from long hours in a day.

^b Cumulative fatigue from long hours over many days.

Note: Totals do not add due to rounding.

TABLE 9—ESTIMATED SAFETY BENEFITS BY FATIGUE CRASH RATE FOR OPTION 4 (10 HOURS DRIVING)
[Millions 2008\$]

Assumed percent of crashes due to fatigue	Benefits due to reduced daily time on task effect ^a	Benefits due to reduced weekly time on task effect ^b	Total benefits due to reduced crashes
7	\$290	\$320	\$610
13	550	590	1,130
18	760	810	1,570

^a Acute fatigue from long hours in a day.

^b Cumulative fatigue from long hours over many days.

Note: Totals do not add due to rounding.

The analysis also calculated benefits associated with improvements in driver health. The Agency has a statutory mandate to ensure that driving conditions do not impair driver health. Research indicates that reducing total daily and weekly work for the drivers working high-intensity schedules should result in these drivers getting more sleep on a daily and weekly basis. Recent research on sleep indicates that inadequate sleep is associated with increases in mortality. This effect appears to involve several complex pathways, including an increase in the propensity for workplace (and leisure time) crashes and mortality due to decrements in several health-related measures, such as an increase in the incidence of high blood pressure, obesity, diabetes, other cardiovascular disease (CVD), and other health problems. See Appendix B of the RIA for the references for this statement. The analysis attempted to model the workplace transportation crash effect explicitly in the crash reduction benefits. However, explicit modeling of all the other various ways that insufficient sleep increases mortality becomes too complex and uncertain for this analysis. The studies the analysis relied on to model health benefits, therefore, are population-based studies that look at overall mortality,

independent of the cause of death, as a function of sleep. Because increases in hours worked are associated with decreases in hours spent sleeping and truck drivers working high-intensity schedules get significantly less than the 7 to 8 hours of sleep that studies generally show are required for optimal mortality. Cutting back somewhat on daily work hours and more significantly cutting back on weekly work hours should, to some extent, reduce mortality among these drivers.

These benefit estimates depend on how much sleep CMV drivers currently get and how much more sleep they are expected to get under the proposed rule. The analysis developed a function that relates hours worked to hours slept and used this function to predict how much more sleep drivers would get under the proposed rule than they currently obtain under the existing rule. The results of this analysis are sensitive to the amount of sleep drivers are currently getting; increases in sleep have less substantial health benefits if individuals are already getting close to the optimal 7–8 hours per night than if they average less sleep. Since there is a degree of uncertainty surrounding how much sleep drivers currently get, a sensitivity analysis varied the baseline amount of sleep drivers are currently obtaining. This analysis showed that health improvement benefits are greatest when

drivers are getting the least sleep under the current rule, because they have the most room for improvement.

The sensitivity analysis scenarios are divided into the low sleep, medium sleep, and high sleep categories. Under the low sleep scenario, the benefits are greatest because it is the most pessimistic regarding how much sleep drivers currently obtain. The high sleep scenario assumed that drivers are getting close to the optimal amount; as a result, there is little if any benefit to giving them opportunity for more sleep. Results of this analysis indicate that the measurable health benefits of reducing the maximum hours of work allowed per week could well be as great as the costs, and other possible health benefits (which have not been included in the quantitative analysis) could add even further to these benefits. The health benefits of Options 2 through 4 were estimated for three different levels of baseline sleep by drivers at 7 and 3 percent discounting of future health benefits (shown in Table 10). For the assumption of a high level of baseline sleep for Options 2 and 4, it is interesting to note that the benefits are negative (to a relatively minor extent for Option 2), indicating that it is not beneficial for individuals to get additional sleep if they are already getting adequate sleep.

TABLE 10—ESTIMATED HEALTH BENEFITS BY AMOUNT OF SLEEP FOR ALL OPTIONS

[3 and 7 Percent discount rates]

[Millions 2008\$]

Assumed baseline amount of nightly sleep	Total benefits due to increased sleep					
	7 Percent discounting			3 Percent discounting		
	Option 2	Option 3	Option 4	Option 2	Option 3	Option 4
Benefits with Low Sleep	\$810	\$630	\$1,110	\$1,090	\$850	\$1,490
Benefits with Medium Sleep	380	350	370	510	470	500
Benefits with High Sleep	– 50	70	– 370	– 70	90	– 500

In addition to the quantified and monetized benefits discussed above, there may be other health benefits that shorter work days and weeks could produce. Research indicates that the metabolic and endocrine disruptions associated with short sleep time and long work hours are significantly related to obesity (Van Cauter). Obesity is in turn associated with higher incidences of diabetes, CVDs, hypertension, and obstructive sleep apnea (Mokdad).

These medical conditions impose costs on drivers who suffer from them and affect the quality of their lives. Sedentary work alone is also associated with obesity and mortality impacts (Katzmarzyk).

Research on the health of drivers and health costs found that CMV drivers are both heavier for their height and less healthy than adult males as a whole. Drivers are far more likely than adult male workers as a whole to be obese.

Table 11 presents the distribution of drivers by weight category and the incidence of health conditions for drivers in each weight group, taken from a study that used medical examination records and health insurance claims of 2,950 LTL drivers (Martin). (The national statistics for the incidence of health conditions among adult males include men over 70, who may have higher incidences of some conditions than the younger working population.)

TABLE 11—DRIVER HEALTH CONDITIONS BY WEIGHT CATEGORY

N = 2,950	Percent drivers in weight category (percent)	Presence of at least one health risk factor	Hypertension (percent)	Diabetes (percent)	High cholesterol (percent)
Normal weight	13	26	21	5	11
Overweight	30	39	31	10	17
Obese	55	59	51	21	26
Overall		48	41	16	21
National adult male (CDC statistics)			31.80	¹ 10.9	15.60

¹ 7.4% diagnosed.

FMCSA has not attempted to quantify the benefits of improved health that may accrue to drivers who have more time off. First, the Agency does not have dose-response curves that it can use to associate sleep time with mitigation or exacerbation of the various health impacts other than sleep loss itself. Second, many of the health impacts are linked to obesity; given the difficulty most people have in losing weight, it would be unjustifiably optimistic to attempt to estimate the degree of potential weight loss.

The health consequences of long hours, inadequate sleep, and long stretches of sedentary work are, however, significant: they cause serious health conditions that may shorten a driver's life and increase healthcare costs. In addition, some studies have linked obesity to increased crash risks, including a recent analysis of the VTTI data, which found that obese CMV drivers were between 1.22 and 1.69 times as likely to drive while fatigued,

1.37 times more likely to be involved in an SCE, and at 1.99 times greater risk of being above the fatigue threshold as measured by eye closure when driving (Wiegand).

Conclusion

Net benefits (*i.e.*, benefits minus costs) are likely to be positive, but could range from a negative \$730 million per year to more than a positive \$630 million per year for Option 2 (a negative \$750 million to positive \$920 million with 3 percent discounting), from a negative \$250 million to more than a positive \$550 million for Option 3 (a negative \$220 million to a positive \$770 million with 3 percent discounting), and from a negative \$2.05 billion to more than a positive \$390 million for Option 4 (a negative \$2.18 billion to a positive \$780 million), as shown in Tables 12 through 14 below. The wide ranges in estimates of benefits and net benefits are a consequence of the difficulty of measuring fatigue and fatigue

reductions, which are complex and often subjective concepts, in an industry with diverse participants and diverse operational patterns. Still, it seems clear that the benefits could easily be substantial, and are on the same scale as the costs. The costs, for their part, are large in absolute terms but minor when compared to the size of the industry: \$1.00 billion per year (the total annualized cost for Option 2) is less than two thirds of 1 percent of revenues, \$470 million per year (the total annualized cost for Option 3) is less than one third of 1 percent of revenues, and \$2.29 billion per year (the total annualized cost for Option 4) is less than 1.5 percent of revenues in the for-hire LH segment of the industry. These total annual costs are an even smaller fraction of revenues of the LH segment as a whole. As an additional example, the costs of Option 3 are equivalent to about a \$0.03 per gallon increase in long-haul industry fuel costs, which is a minimal increase in an industry used

to wide swings in fuel costs. Between 2006 and 2010, diesel fuel prices ranged from \$2.09 a gallon to \$4.70 a gallon.¹⁸

TABLE 12—NET BENEFITS FOR OPTION 2 BY SLEEP SCENARIO, CRASH RATE, AND DISCOUNT RATE
[Millions 2008\$]

Assumed percent of crashes due to fatigue	Assumed amount of nightly sleep					
	7 Percent discounting			3 Percent discounting		
	Low sleep	Medium sleep	High sleep	Low sleep	Medium sleep	High sleep
7	\$130	–\$300	–\$730	\$410	–\$170	–\$750
13	400	–20	–450	690	110	–470
18	630	210	–220	920	340	–240

TABLE 13—NET BENEFITS FOR OPTION 3 BY SLEEP SCENARIO, CRASH RATE, AND DISCOUNT RATE
[Millions 2008\$]

Assumed percent of crashes due to fatigue	Assumed amount of nightly sleep					
	7 Percent discounting			3 Percent discounting		
	Low sleep	Medium sleep	High sleep	Low sleep	Medium sleep	High sleep
7	\$310	\$30	–\$250	\$530	\$150	–\$220
13	440	160	–120	660	280	–90
18	550	270	–10	770	390	20

TABLE 14—NET BENEFITS FOR OPTION 4 BY SLEEP SCENARIO, CRASH RATE, AND DISCOUNT RATE
[Millions 2008\$]

Assumed percent of crashes due to fatigue	Assumed amount of nightly sleep					
	7 Percent discounting			3 Percent discounting		
	Low sleep	Medium sleep	High sleep	Low sleep	Medium sleep	High sleep
7	–\$570	–\$1,310	\$2,050	–\$180	–\$1,180	–\$2,180
13	–50	–790	–1,520	340	–660	–1,650
18	390	–350	–1,090	780	–220	–1,220

Compared to the other two options that were analyzed, Option 2 would have roughly twice the costs of Option 3 (which allows 11 hours of daily driving), and less than half the cost of Option 4 (which allows 9). In keeping with their relative stringencies, Option 3 has lower, and Option 4 has higher, projected benefits than Option 2. Option 3's calculated net benefits appear likely to be somewhat higher than the net benefits of Option 2 under some assumptions about baseline conditions. Option 4's substantially larger costs, on the other hand, did not appear to be justified by its generally higher range of benefits. Based on the estimated net benefits of the options, FMCSA has selected Option 3 as the Final Rule. The Agency's goal of improving highway safety and protecting driver health, combined with the potentially significant but unquantifiable health

benefits of reductions in maximum working and driving hours, make the functional equivalent of Option 3—the final rule does not change a driving-time limit but retains the current 11-hour limit—the most reasonable choice.

Changes in the Analysis of HOS Options From the NPRM to the Final Rule

There are two distinct categories of changes that result in different estimates of the costs and benefits of the HOS options between the NPRM and the Final Rule:

- Changes to the options, some of which change the cost/benefit calculations for all of the options; and
- As recommended by commenters, refinements to the benefit analyses, which change the estimated benefits, and thus the estimated net benefits, for each of the options.

The changes that fall into these two categories are discussed below, followed by a description of how they affect the estimated costs and benefits.

After considering the comments received on the NPRM and new research, as well as the President's Executive Order 13563 on "Improving Regulation and Regulatory Review," FMCSA has made several changes to the HOS options considered in the NPRM, including the following:

- Eliminating a driving-time limit from the final rule.
- Dropping the 13-hour limit on on-duty time between breaks of at least 10 hours, but keeping the provision requiring at least a half-hour break part-way through long days.
- Shortening the 2-night restart window from two periods including midnight and 6 a.m. to two periods including 1 a.m. through 5 a.m.

¹⁸ U.S. Energy Information Administration, Gasoline and Diesel Fuel Update, <http://www.eia.gov/oog/info/gdu/gasdiesel.asp#>.

- Changing the break requirements to require a break of a half-hour (or more) within the past 8 hours of continuous work, rather than 7, to continue driving.

- Dropping the provision that would have allowed two 16-hour driving windows per week.

Only the first three of these changes affect the cost/benefit calculations. The other two do not change the cost/benefit calculations because the analyses for the NPRM were not sensitive to the particular provisions involved: the effects of breaks were considered to be subsumed within the effect of the daily limit on duty hours, and the use of a 16-hour driving window was not modeled due to uncertainty about how and how much it would be used and the small expected magnitude of its effects.

In response to comments and its own review of the analysis of safety benefits, FMCSA has made three refinements to its benefits analysis of the HOS options. First, as suggested by the Edgeworth study, the safety benefits of reductions in cumulative fatigue are being estimated using a finer-grained function. Because this change affects all of the options to about the same extent, it has no real effect on the relative rankings of the options. Similarly, in response to the Edgeworth study, FMCSA has also refined its estimate of the value of reducing crash damages per hour of effort reallocated from one driver to another. Because this refinement affects all of the options equally, it has no effect on their relative ranking. Third, the Agency has made technical adjustments in the way it calculated and discounted health benefits due to improvements in sleep duration. Careful re-examination of the Ferrie study, occasioned by disagreements in docket comments submitted by Ferrie and Cappuccio on the applicability of their work to HOS rulemaking, suggested that a more refined estimate of the health benefits was possible and should be undertaken. This new analysis ultimately had minimal impact on the cost-benefit analysis, and did not impact the Agency's decision to choose option 3 in the final rule.

Chapter 5 of the RIA presents in detail the methodology used to make these changes. These changes have the effect of moderately reducing benefits associated with improvements in driver health. The size of the reduction in benefits is affected by the discount rate, with a 3 percent discount rate having a smaller impact. Although the Agency norm is to present all impacts in the RIA—including driver health benefits—discounted at 7 percent, the Agency applies equal weight to results using the 3 percent discount rate. Using a 3

percent discount rate, the options rank the same with or without the methodological refinements—Option 3 (11 hours) would be the preferred option at medium sleep, but Option 2 (10 hours) would have higher net benefits at low sleep. Discounted at 7 percent, Option 3 would have higher net benefits at both low sleep and medium sleep than Option 2. Option 4 (9 hours) would be the least likely to have positive net benefits, and its net benefits would be lower than the other two options under any scenario.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires Federal agencies to determine whether rules subject to notice and comment could have a significant economic impact on a substantial number of small entities. FMCSA completed a Final Regulatory Flexibility Analysis (FRFA) to analyze the impact of the proposed changes to the HOS regulations on small entities.

1. A Statement of the Need for, and Objectives of, the Rule

The objectives of the today's changes to the HOS rule are to improve safety in the most cost-effective manner while ensuring that the requirements do not have an adverse impact on driver health. The impact of HOS rules on CMV safety is difficult to separate from the many other factors that affect heavy-vehicle crashes. While the Agency believes that the data show no decline in highway safety since the implementation of the 2003 HOS rule and its re-adoption in the 2005 HOS rule, the 2007 IFR, and the 2008 HOS rule (73 FR 69567, 69572, Nov. 19, 2008), the total number of crashes, though declining, is still unacceptably high. Moreover, the source of the decline in crashes is unclear. FMCSA believes that the required break during long days, and the limits on maximum weekly hours, coupled with FMCSA's many other safety initiatives and assisted by the actions of an increasingly safety-conscious motor carrier industry, will result in continued reductions in fatigue-related CMV crashes and fatalities. Furthermore, the changes in the rule are intended to protect drivers from the serious health problems associated with excessively long work hours, without significantly compromising their ability to do their jobs and earn a living.

2. A Summary of the Significant Issues Raised by the Public Comments in Response to the RFA, a Summary of the Assessment of the Agency of Such Issues, and a Statement of Any Changes Made in the Proposed Rule as a Result of Such Comments

Comments. Very few commenters directly addressed the Initial RFA analysis. Commenters generally stated that the rule would affect revenues of carriers, but these impacts were not specific to small entities. Shippers and receivers also argued that they would be affected, but these entities are not subject to FMCSA regulations and are not, therefore, considered in the RFA analysis. The Petroleum Marketers Association of America stated that the changes to the restart provision would have a serious impact on small heating oil and propane suppliers. They would need to hire extra drivers to cover emergency deliveries.

FMCSA Response. As stated in previous responses, the restart provision will affect only drivers working the longest hours. Without information on the hours being worked by drivers for fuel retailers, it is difficult to assess whether they will be affected, but most local drivers do not work 60 to 70 hours a week and, therefore, are not limited by the restart provision. In any case, drivers of CMVs used primarily in the transportation of propane for winter heating are statutorily exempt from most of the regulations in the FMCSRs if compliance with those regulations would prevent the driver from responding to an emergency condition requiring immediate response (*see* 49 CFR 390.3(f)(7)).

3. The Response of the Agency to Any Comments Filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA) in Response to the Proposed Rule, and a Detailed Statement of Any Change Made to the Proposed Rule in the Final Rule as a Result of the Comments

The Office of Advocacy at SBA filed comments that were a summary of concerns raised by industry at a roundtable that it hosted on February 9, 2011. As SBA indicated, the comments are "nearly identical to many of those expressed at FMCSA's public listening session on the proposed rule * * *." Summarized, the points are as follows:

- The proposed rule is not supported by existing safety and health data.
- The proposed rule would reduce flexibility and could actually impede safety and driver health by increasing the stress on drivers as they try to work within the limits.

- The proposed rule would be operationally disruptive and costly.
- Truck related crashes are decreasing under the current rules, even while truck miles driven have increased.

FMCSA Response. As has been stated throughout this preamble, FMCSA disagrees strongly with these industry claims. The rule is supported by research on crashes and the health effects of long hours on health. Research on the effects of long work hours on crash rates, both for drivers and for other workers clearly indicate that risk rises after 8 hours of work. The research on the health effects of sleep loss and long hours is also extensive.

On the idea that the limits put stress on drivers, the Agency notes that any limit will do this for a driver who is working to the limits. The only way to remove this stress is to allow drivers and carriers to work as many hours as they want regardless of the safety consequences. Research has shown that drivers (and everyone else) have very little ability to accurately assess their own fatigue levels, as is also evidenced by the high percentage of CMV drivers who admit to falling asleep at the wheel. Today's rule allows the hardest working drivers to average 70 hours a week, which is surely enough.

The claims of serious operational disruptions are unsupported by any data and contradicted by the industry's own statements that the provisions at issue are not used by most drivers. SBA noted that carriers are subject to factors beyond their control, such as loading dock availability. FMCSA recognizes that carriers cannot control shippers and receivers, but allowing drivers to regularly work maximum hours is not a reasonable solution to that problem. On SBA's final point, Section IV.

"Discussion of All Comments" A. "Safety" of this preamble discusses the flaws in this argument at length.

FMCSA has made changes to the final rule to reduce the complexity of the rule and provide some flexibility. The periods required under the 2-night restart provision are 2 hours shorter than proposed; this change will provide more flexibility for drivers who work at night irregularly. Most drivers who have regular nighttime schedules already take 2 nights off a week and do not need to use the restart provision. The final rule also changes the break requirement to make it easier for drivers using the sleeper berth provision. Finally, FMCSA has removed the 13-hour duty time limit to reduce the complexity of the final rule.

4. A Description and an Estimate of the Number of Small Entities to Which the Rule Will Apply or an Explanation of Why No Such Estimate Is Available

The HOS regulations apply to both large and small motor carriers. The SBA defines a small entity in the truck transportation sub-sector (North American Industry Classification System [NAICS] 484) as an entity with annual revenue of less than \$25.5 million [13 CFR 121.201]. Using data from the 2007 Economic Census, FMCSA estimated that the average carrier earns roughly \$160,000 in annual revenue per truck for firms with multiple power units,¹⁹ suggesting that a typical carrier that qualifies as a small business would have fewer than 141 (\$25.5 million/\$160,000) power units (*i.e.*, trucks or tractors) in its fleet. From the 2007 Economic Census data on non-employer firms, sole proprietorships earn approximately \$107,700 in annual revenue.

To determine the number of affected small entities, we used the analysis conducted by FMCSA for the Unified Carrier Registration (UCR) rule.²⁰ The economic analysis for the UCR rule divided carriers into brackets based on their fleet size (*i.e.*, number of power units), and estimated the number of carriers in each bracket. These brackets and their corresponding numbers of carriers are shown in Table 15.

According to these estimates and the above-mentioned characterizations of small entities in the trucking industry, all of the carriers in Brackets 1 through 4 would qualify as small entities, as would many of the carriers in Bracket 5. Therefore, this analysis estimates that between 422,196 (Brackets 1 through 4) and 425,786 (Brackets 1 through 5) small entities would be affected by the HOS rule changes. This range overstates the number of affected small entities for several reasons. First, many private carriers with small fleets may not qualify as small businesses because their primary business is not the movement of freight. These private firms have other sources of revenue and fall under different NAICS codes; for example, one of the largest pharmacy chains has fewer than 141 power units, but is not a small entity. Second, the carriers are allowed to register by location so that a single firm may have multiple DOT registrations, each of which appears to be small, but which at the firm level represents a large entity. Third, the carrier numbers include firms that are not subject to this rule, such as passenger-carrying carriers and utilities, or are subject to only part of the rule (*e.g.*, construction firms have a different restart provision).

TABLE 15—NUMBER OF CARRIERS BY FLEET SIZE
(From FMCSA's analysis of the unified carrier registration plan rule)

Bracket	Fleet size	Number of carriers
1	1	194,425
2	2–5	145,266
3	6–20	65,155
4	21–100	17,350
5	101–1,000	3,590
6	1,001+	292
Total		426,078

Table 16 below presents figures for private carriers by NAICS code for

industries with large numbers of drivers (and hence the likelihood of large

numbers of fleets). The table includes the total number of CMV drivers

¹⁹ See the RIA Appendix A for the revenue per power unit. A firm with one power unit and two drivers would have even higher revenues per truck

because the two drivers could drive more hours than a firm with a single driver.

²⁰ FMCSA, "Regulatory Evaluation of the Fees for the Unified Carrier Registration Plan," February 19, 2010. Available in the docket: FMCSA–2009–0231–0181.

working in each industry, the percentage of payroll those drivers account for, and the payroll of those industries as a percent of total industry revenue. Some of these industries have SBA size thresholds that are considerably lower than the threshold for truck transportation, strongly suggesting that many firms in these industries that would be considered small using the threshold of 141 power units are actually large. For example, a wholesaler with 141 trucks is certainly

a large firm because it will have more than 100 employees. Other industries have thresholds as high as 1,500 full-time equivalent employees (FTEs); a firm in one of these industries might rank as small with even more than 141 power units if the number of power units in its fleet were large compared to the size of its workforce (e.g., if it had 300 power units, and only three employees per power unit, it could be considered small in an industry with a threshold of 1,500 FTEs). From Table

16, however, this circumstance is not likely to be common: in firms in NAICS 21 and 31–33, which have high FTE thresholds, drivers make up only a very small percentage of the workforce. Thus, firms with a substantial numbers of power units are likely to have much larger labor forces, and are therefore likely to rank as large firms. Given these considerations, we are, if anything, over-counting the number of private carriers that qualify as small businesses.

TABLE 16—PRIVATE CARRIERS AND DRIVERS BY INDUSTRY

NAICS	Industry	SBA standard	Number of drivers	Drivers as percent of all employees	Payroll as percent of revenues
21	Mining, Quarrying, and Oil and Gas Extraction.	500 FTE	29,900	4.17	10
23	Construction	\$14 million to \$33.5 million	127,200	1.76	19
31–33	Manufacturing	500–1,500 FTE	238,600	1.78	11
42	Wholesale	100 FTE	509,000	8.53	5.5
44–45	Retail	\$7 million to \$29 million	307,900	2.01	10
53	Real Estate and Leasing	\$7 million to \$25 million	40,500	1.9	18
56	Administrative and Support and Waste Management and Remediation Services.	\$7 million to \$35.3 million	132,300	1.64	46
722	Food Services	\$7 million	175,400	1.82	29
81	Other Services	\$7 million	44,000	0.80	24

The analysis of the impact of the HOS rule on small entities shows that, while it is unlikely for the rule to have a significant impact on most small entities, FMCSA cannot certify that there would be no significant impacts. For a typical firm, the first-year costs of the final rule are well below 1 percent of revenues, as are the average annual costs when spread over 10 years.

However, projecting the distribution of impacts across carriers, few of which fit the definition of typical, is made more difficult by the variability in both costs and revenues. The new HOS rule is designed to rein in the most high-intensity patterns of work while leaving more moderate operations largely unchanged. As a result, we project a substantial majority of the costs of the rule to fall on the sixth of the industry currently logging the most hours per week. Thus, most carriers are likely to be almost unaffected, while a minority could experience productivity impacts—and hence costs—well above the industry average.

Average revenues presumably range widely as well, meaning that the ratio of costs to revenues is difficult to characterize. Because greater work intensities are likely to generate greater revenues, though, the impacts and revenues per power unit are likely to be positively correlated: the carriers for which productivity is curtailed the most

and which could incur the greatest costs will, therefore, be likely to have unusually large revenues per power unit as well.

5. A Description of the Projected Reporting, Recordkeeping, and Other Compliance Requirements of the Rule, Including an Estimate of the Classes of Small Entities Which Will Be Subject to the Requirement and the Type of Professional Skills Necessary for the Preparation of the Report or Record

The rule does not change recordkeeping or reporting requirements. Drivers are required by current rules to keep records of duty status that document their daily and weekly on-duty and driving time, and submit these records of duty status to their employing motor carrier on a bi-weekly basis. This rule does not change or add to this recordkeeping requirement for drivers or carriers. Drivers in all segments of the industry, including independent owner-operators, are well accustomed to complying with these recordkeeping and reporting requirements, and no professional skill over and above those skills that drivers already possess would be necessary for preparing these reports. All small entities in the industry that operate in interstate commerce are subject to these rules. The type and classes of these

small entities are described in the previous section of this analysis.

6. A Description of the Steps the Agency Has Taken To Minimize the Significant Adverse Economic Impact on Small Entities Consistent With the Stated Objectives of Applicable Statutes, Including a Statement of the Factual, Policy, and Legal Reasons for Selecting the Alternative Adopted in the Final Rule and Why Each of the Other Significant Alternatives to the Rule Considered by the Agency Was Rejected

The Agency did not identify any significant alternatives to the rule that could lessen the burden on small entities without compromising its goals. However, in response to docket comment from the motor carrier industry, in which small entities are very heavily represented, the Agency did modify the options proposed in the NPRM to reduce both the cost and complexity of the rule adopted today. These changes include retaining the 11-hour daily driving limit, and shortening the 2 nighttime periods required by the new restart provision by one-third, from 12 midnight–6 a.m. to 1 a.m.–5 a.m. This rule is targeted at preventing driver fatigue, and the Agency is unaware of any alternative to restricting driver work that the Agency has authority to implement that would address driver fatigue. This rule impacts motor carrier

productivity proportionally to the number of drivers a motor carrier employs and the intensity of the schedules that motor carrier's drivers work. It is not obvious that productivity losses would be greater for small entities than for larger firms. To the extent that drivers working for a small entity work more intense schedules, that entity may experience greater productivity losses than a carrier whose drivers work less intensely on a daily and weekly basis. However, there appears to be no alternative available to the Agency that would limit driver fatigue while allowing more work. To improve public safety, all drivers, regardless of the size of the carrier they work for, must work within reasonable limits.

The recordkeeping and reporting burdens related to this rule will also affect entities proportional to the number of drivers they employ, and therefore do not disproportionately affect small motor carriers in any way. As noted above, drivers in all segments of the industry, working for entities of all sizes, are accustomed to compiling and submitting records of duty status on a regular basis. This rule will therefore not place an undue recordkeeping or reporting burden on smaller entities.

C. Paperwork Reduction Act

This rule would call for no new collection of information under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501–3520).

D. National Environmental Policy Act

The Agency analyzed this rule for the purpose of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*) and determined under our environmental procedures Order 5610.1, published March 1, 2004 in the **Federal Register** (69 FR 9680), that this action will not have a significant impact on the environment. FMCSA has also analyzed this rule under the Clean Air Act, as amended (CAA) section 176(c), (42 U.S.C. 7401 *et seq.*) and implementing regulations promulgated by the Environmental Protection Agency. Approval of this action is exempt from the CAA's general conformity requirement since it would not result in any potential increase in emissions that are above the general conformity rule's *de minimis* emission threshold levels (40 CFR 93.153(c)(2)). The Agency received no comments on the draft Environmental Assessment, published with the NPRM. A copy of the Environment Assessment is available in the docket.

E. Executive Order 13132 (Federalism)

A rule has implications for Federalism under Executive Order 13132, Federalism, if it has a substantial direct effect on State or local governments and would either preempt State law or impose a substantial direct cost of compliance on them. This action has been analyzed in accordance with E.O. 13132. FMCSA has determined this rule would not have a substantial direct effect on States, nor would it limit the policymaking discretion of States. Nothing in this document preempts any State law or regulation.

F. Privacy Impact Assessment

FMCSA conducted a Privacy Threshold Analysis (PTA) for the rule on hours of service and determined that it is not a privacy-sensitive rulemaking because the rule will not require any collection, maintenance, or dissemination of Personally Identifiable Information (PII) from or about members of the public.

G. Executive Order 12630 (Taking of Private Property)

This rule would not effect a taking of private property or otherwise have taking implications under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights.

H. Executive Order 12988 (Civil Justice Reform)

This rule meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

I. Executive Order 13045 (Protection of Children)

FMCSA analyzed this rule under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This rule would not create an environmental risk to health or risk to safety that might disproportionately affect children.

J. Executive Order 13211 (Energy Supply, Distribution, or Use)

FMCSA analyzed this rule under Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use. FMCSA determined that it is not a "significant energy action" under that order. Though it is a "significant regulatory action" under Executive Order 12866, it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The Administrator of the Office of Information and Regulatory Affairs

has not designated it as a significant energy action. Therefore, it does not require a Statement of Energy Effects under Executive Order 13211.

K. Executive Order 12898 (Environmental Justice)

FMCSA evaluated the environmental effects of this NPRM in accordance with Executive Order 12898 and determined that there are no environmental justice issues associated with its provisions nor any collective environmental impact that could result from its promulgation. Environmental justice issues would be raised if there were "disproportionate" and "high and adverse impact" on minority or low-income populations. None of the alternatives analyzed in the Agency's EA, discussed under NEPA, would result in high and adverse environmental impacts.

L. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531–1538) requires Federal agencies to assess effects of their discretionary regulatory actions. In particular, the Act addresses actions that may result in the net expenditure by a State, local, or tribal government, in the aggregate, or by the private sector of \$143.1 million or more in any one year. Though this rule would not result in a net expenditure at this level, the economic impacts of the rule have been analyzed in the RIA.

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List of Subjects

49 CFR Part 385

Administrative practice and procedure, Highway safety, Mexico, Motor carriers, Motor vehicle safety, Reporting and recordkeeping requirements.

49 CFR Part 386

Administrative practice and procedure, Brokers, Freight forwarders,

Hazardous materials transportation, Highway safety, Motor carriers, Motor vehicle safety, Penalties.

49 CFR Part 390

Highway safety, Intermodal transportation, Motor carriers, Motor vehicle safety, Reporting and recordkeeping requirements.

49 CFR Part 395

Highway safety, Motor carriers, Reporting and recordkeeping requirements.

In consideration of the foregoing, FMCSA is amending 49 CFR chapter III, parts 385, 386, 390, and 395 as set forth below:

PART 385—SAFETY FITNESS PROCEDURE

- 1. The authority citation continues to read as follows:

Authority: 49 U.S.C. 113, 504, 521(b), 5105(e), 5109, 13901–13905, 31133, 31135, 31136, 31137(a), 31144, 31148, and 31502; Sec. 113(a), Pub. L. 103–311; Sec. 408, Pub. L. 104–88; Sec. 350, Pub. L. 107–87; and 49 CFR 1.73.

- 2. Amend Appendix B to part 385, section VII, List of Acute and Critical Regulations, as follows:

- a. Revise the entries for § 395.3(a)(1) and § 395.3(a)(2);
- b. Add entries for § 395.3(a)(3)(i) and § 395.3(a)(3)(ii), in numerical order; and
- c. Remove the entries for § 395.3(c)(1) and § 395.3(c)(2).

Appendix B to Part 385—Explanation of Safety Rating Process

* * * * *

§ 395.3(a)(1) Requiring or permitting a property-carrying commercial motor vehicle driver to drive without taking an off-duty period of at least 10 consecutive hours prior to driving (critical).

§ 395.3(a)(2) Requiring or permitting a property-carrying commercial motor vehicle driver to drive after the end of the 14th hour after coming on duty (critical).

§ 395.3(a)(3)(i) Requiring or permitting a property-carrying commercial motor vehicle driver to drive more than 11 hours (critical).

§ 395.3(a)(3)(ii) Requiring or permitting a property-carrying commercial motor vehicle driver to drive if more than 8 hours have passed since the end of the driver's last off-duty or sleeper-berth period of at least 30 minutes (critical).

* * * * *

PART 386—RULES OF PRACTICE FOR MOTOR CARRIER, INTERMODAL EQUIPMENT PROVIDER, BROKER, FREIGHT FORWARDER, AND HAZARDOUS MATERIALS PROCEEDINGS

- 3. The authority citation for part 386 continues to read as follows:

Authority: 49 U.S.C. 113, chapters 5, 51, 59, 131–141, 145–149, 311, 313, and 315; Sec. 204, Pub. L. 104–88, 109 Stat. 803, 941 (49 U.S.C. 701 note); Sec. 217, Pub. L. 105–159, 113 Stat. 1748, 1767; Sec. 206, Pub. L. 106–159, 113 Stat. 1763; subtitle B, title IV of Pub. L. 109–59; and 49 CFR 1.45 and 1.73.

- 4. Amend Appendix B to part 386 by adding paragraph (a)(6) to read as follows:

Appendix B to Part 386—Penalty Schedule; Violations and Monetary Penalties

* * * * *

(a) * * *

(6) *Egregious violations of driving-time limits in 49 CFR part 395.* A driver who exceeds, and a motor carrier that requires or permits a driver to exceed, by more than 3 hours the driving-time limit in 49 CFR 395.3(a) or 395.5(a), as applicable, shall be deemed to have committed an egregious driving-time limit violation. In instances of an egregious driving-time violation, the Agency will consider the “gravity of the violation,” for purposes of 49 U.S.C. 521(b)(2)(D), sufficient to warrant imposition of penalties up to the maximum permitted by law.

* * * * *

PART 390—FEDERAL MOTOR CARRIER SAFETY REGULATIONS; GENERAL

- 5. The authority citation for part 390 continues to read as follows:

Authority: 49 U.S.C. 504, 508, 31132, 31133, 31136, 31144, 31151, 31502; sec. 114, Pub. L. 103–311, 108 Stat. 1673, 1677–1678; sec. 212 and 217, Pub. L. 106–159 (as transferred by sec. 4115 and amended by secs. 4130–4132, Pub. L. 109–59, 119 Stat. 1144, 1726, 1743–1744); sec. 4136, Pub. L. 109–59, 119 Stat. 1144, 1745 and 49 CFR 1.73.

- 6. Amend § 390.23 by revising paragraph (c) to read as follows:

§ 390.23 Relief from regulations.

* * * * *

(c) When the driver has been relieved of all duty and responsibilities upon termination of direct assistance to a regional or local emergency relief effort, no motor carrier shall permit or require any driver used by it to drive nor shall any such driver drive in commerce until the driver has met the requirements of §§ 395.3(a) and (c) and 395.5(a) of this chapter.

PART 395—HOURS OF SERVICE OF DRIVERS

- 7. The authority citation for part 395 continues to read as follows:

Authority: 49 U.S.C. 504, 31133, 31136, 31137, and 31502; sec. 113, Pub. L. 103–311, 108 Stat. 1673, 1676; sec. 229, Pub. L. 106–159 (as transferred by sec. 4115 and amended by secs. 4130–4132, Pub. L. 109–59, 119 Stat. 1144, 1726, 1743, 1744); sec. 4133, Pub. L. 109–59, 119 Stat. 1144, 1744; sec. 108, Pub. L. 110–432, 122 Stat. 4860–4866; and 49 CFR 1.73.

- 8. Amend § 395.1 as follows:

- a. Revise the paragraph (b) heading and paragraph (b)(1) introductory text;
- b. Revise paragraph (d)(2);
- c. Revise paragraphs (e)(1)(iv) and (e)(2);
- d. Revise paragraphs (g)(1) and (g)(2)(ii); and
- e. Revise paragraph (q).

The revisions read as follows:

§ 395.1 Scope of rules in this part.

* * * * *

(b) *Driving conditions.* (1) *Adverse driving conditions.* Except as provided in paragraph (h)(2) of this section, a driver who encounters adverse driving conditions, as defined in § 395.2, and cannot, because of those conditions, safely complete the run within the maximum driving time permitted by §§ 395.3(a) or 395.5(a) may drive and be permitted or required to drive a commercial motor vehicle for not more than 2 additional hours beyond the maximum time allowed under §§ 395.3(a) or 395.5(a) to complete that run or to reach a place offering safety for the occupants of the commercial motor vehicle and security for the commercial motor vehicle and its cargo.

* * * * *

(d) * * *

(2) In the case of specially trained drivers of commercial motor vehicles that are specially constructed to service oil wells, on-duty time shall not include waiting time at a natural gas or oil well site. Such waiting time shall be recorded as “off duty” for purposes of §§ 395.8 and 395.15, with remarks or annotations to indicate the specific off-duty periods that are waiting time, or on a separate “waiting time” line on the record of duty status to show that off-duty time is also waiting time. Waiting time shall not be included in calculating the 14-hour period in § 395.3(a)(2). Specially trained drivers of such commercial motor vehicles are not eligible to use the provisions of § 395.1(e)(1).

(e) * * *

(1) * * *

(iv)(A) A property-carrying commercial motor vehicle driver does

not exceed the maximum driving time specified in § 395.3(a)(3) following 10 consecutive hours off duty; or

(B) A passenger-carrying commercial motor vehicle driver does not exceed 10 hours maximum driving time following 8 consecutive hours off duty; and

* * * * *

(2) *Operators of property-carrying commercial motor vehicles not requiring a commercial driver's license.* Except as provided in this paragraph, a driver is exempt from the requirements of § 395.3(a)(2) and § 395.8 and ineligible to use the provisions of § 395.1(e)(1), (g), and (o) if:

(i) The driver operates a property-carrying commercial motor vehicle for which a commercial driver's license is not required under part 383 of this subchapter;

(ii) The driver operates within a 150 air-mile radius of the location where the driver reports to and is released from work, *i.e.*, the normal work reporting location;

(iii) The driver returns to the normal work reporting location at the end of each duty tour;

(iv) The driver does not drive:

(A) After the 14th hour after coming on duty on 5 days of any period of 7 consecutive days; and

(B) After the 16th hour after coming on duty on 2 days of any period of 7 consecutive days;

(v) The motor carrier that employs the driver maintains and retains for a period of 6 months accurate and true time records showing:

(A) The time the driver reports for duty each day;

(B) The total number of hours the driver is on duty each day;

(C) The time the driver is released from duty each day;

(D) The total time for the preceding 7 days in accordance with § 395.8(j)(2) for drivers used for the first time or intermittently.

* * * * *

(g) * * *

(1) *Property-carrying commercial motor vehicle.* (i) *In General.* A driver who operates a property-carrying commercial motor vehicle equipped with a sleeper berth, as defined in §§ 395.2 and 393.76 of this subchapter,

(A) Must, before driving, accumulate (1) At least 10 consecutive hours off duty;

(2) At least 10 consecutive hours of sleeper-berth time;

(3) A combination of consecutive sleeper-berth and off-duty time amounting to at least 10 hours; or

(4) The equivalent of at least 10 consecutive hours off duty if the driver

does not comply with paragraph (g)(1)(i)(A)(1), (2), or (3) of this section;

(B) May not drive more than the driving limit specified in § 395.3(a)(3)(i) following one of the 10-hour off-duty periods specified in paragraph (g)(1)(i)(A)(1) through (4) of this section. After June 30, 2013, however, driving is permitted only if 8 hours or fewer have passed since the end of the driver's last off-duty break or sleeper-berth period of at least 30 minutes; and

(C) May not drive for more than the period specified in § 395.3(a)(2) after coming on duty following one of the 10-hour off-duty periods specified in paragraph (g)(1)(i)(A)(1)–(4) of this section; and

(D) Must exclude from the calculation of the 14-hour period in § 395.3(a)(2) any sleeper-berth period of at least 8 but less than 10 consecutive hours.

(ii) *Specific requirements.* The following rules apply in determining compliance with paragraph (g)(1)(i) of this section:

(A) The term “equivalent of at least 10 consecutive hours off duty” means a period of

(1) At least 8 but less than 10 consecutive hours in a sleeper berth, and

(2) A separate period of at least 2 but less than 10 consecutive hours either in the sleeper berth or off duty, or any combination thereof.

(B) Calculation of the driving limit includes all driving time; compliance must be re-calculated from the end of the first of the two periods used to comply with paragraph (g)(1)(ii)(A) of this section.

(C) Calculation of the 14-hour period in § 395.3(a)(2) includes all time except any sleeper-berth period of at least 8 but less than 10 consecutive hours and up to 2 hours riding in the passenger seat of a property-carrying vehicle moving on the highway immediately before or after a period of at least 8 but less than 10 consecutive hours in the sleeper berth; compliance must be re-calculated from the end of the first of the two periods used to comply with the requirements of paragraph (g)(1)(ii)(A) of this section.

(2) * * *

(ii) The driving time in the period immediately before and after each rest period, when added together, does not exceed the limit specified in § 395.3(a)(3);

* * * * *

(q) *Attendance on commercial motor vehicles containing Division 1.1, 1.2, or 1.3 explosives.* Operators who are required by 49 CFR 397.5 to be in attendance on commercial motor

vehicles containing Division 1.1, 1.2, or 1.3 explosives are on duty at all times while performing attendance functions or any other work for a motor carrier. Operators of commercial motor vehicles containing Division 1.1, 1.2, or 1.3 explosives subject to the requirements for a 30-minute rest break in § 395.3(a)(3)(ii) may use 30 minutes or more of attendance time to meet the requirement for a rest break, providing they perform no other work during the break. Such drivers must record the rest break as on-duty time in their record of duty status with remarks or annotations to indicate the specific on-duty periods that are used to meet the requirement for break.

* * * * *

■ 9. Amend § 395.2 by revising the definition of “on-duty time” to read as follows:

§ 395.2 Definitions.

* * * * *

On-duty time means all time from the time a driver begins to work or is required to be in readiness to work until the time the driver is relieved from work and all responsibility for performing work. *On-duty time* shall include:

(1) All time at a plant, terminal, facility, or other property of a motor carrier or shipper, or on any public property, waiting to be dispatched, unless the driver has been relieved from duty by the motor carrier;

(2) All time inspecting, servicing, or conditioning any commercial motor vehicle at any time;

(3) All driving time as defined in the term *driving time*;

(4) All time in or on a commercial motor vehicle, other than:

(i) Time spent resting in or on a parked vehicle, except as otherwise provided in § 397.5 of this subchapter;

(ii) Time spent resting in a *sleeper berth*; or

(iii) Up to 2 hours riding in the passenger seat of a property-carrying vehicle moving on the highway immediately before or after a period of at least 8 consecutive hours in the sleeper berth;

(5) All time loading or unloading a commercial motor vehicle, supervising, or assisting in the loading or unloading, attending a commercial motor vehicle being loaded or unloaded, remaining in readiness to operate the commercial motor vehicle, or in giving or receiving receipts for shipments loaded or unloaded;

(6) All time repairing, obtaining assistance, or remaining in attendance upon a disabled commercial motor vehicle;

(7) All time spent providing a breath sample or urine specimen, including travel time to and from the collection site, to comply with the random, reasonable suspicion, post-crash, or follow-up testing required by part 382 of this subchapter when directed by a motor carrier;

(8) Performing any other work in the capacity, employ, or service of, a motor carrier; and

(9) Performing any compensated work for a person who is not a motor carrier.

* * * * *

■ 10. Revise § 395.3 to read as follows:

§ 395.3 Maximum driving time for property-carrying vehicles.

(a) Except as otherwise provided in § 395.1, no motor carrier shall permit or require any driver used by it to drive a property-carrying commercial motor vehicle, nor shall any such driver drive a property-carrying commercial motor vehicle, regardless of the number of motor carriers using the driver's services, unless the driver complies with the following requirements:

(1) *Start of work shift.* A driver may not drive without first taking 10 consecutive hours off duty;

(2) *14-hour period.* A driver may drive only during a period of 14 consecutive hours after coming on duty following 10 consecutive hours off duty. The driver may not drive after the end of the 14-

consecutive-hour period without first taking 10 consecutive hours off duty.

(3) *Driving time and rest breaks.* (i) *Driving time.* A driver may drive a total of 11 hours during the 14-hour period specified in paragraph (a)(2) of this section.

(ii) *Rest breaks.* After June 30, 2013, driving is not permitted if more than 8 hours have passed since the end of the driver's last off-duty or sleeper-berth period of at least 30 minutes.

(b) No motor carrier shall permit or require a driver of a property-carrying commercial motor vehicle to drive, nor shall any driver drive a property-carrying commercial motor vehicle, regardless of the number of motor carriers using the driver's services, for any period after—

(1) Having been on duty 60 hours in any period of 7 consecutive days if the employing motor carrier does not operate commercial motor vehicles every day of the week; or

(2) Having been on duty 70 hours in any period of 8 consecutive days if the employing motor carrier operates commercial motor vehicles every day of the week.

(c)(1) *Through June 30, 2013*, any period of 7 consecutive days may end with the beginning of an off-duty period of 34 or more consecutive hours. *After June 30, 2013*, any period of 7 consecutive days may end with the

beginning of an off-duty period of 34 or more consecutive hours that includes two periods from 1 a.m. to 5 a.m.

(2) *Through June 30, 2013*, any period of 8 consecutive days may end with the beginning of an off-duty period of 34 or more consecutive hours. *After June 30, 2013*, any period of 8 consecutive days may end with the beginning of an off-duty period of 34 or more consecutive hours that includes two periods from 1 a.m. to 5 a.m.

(d) *After June 30, 2013*, a driver may not take an off-duty period allowed by paragraph (c) of this section to restart the calculation of 60 hours in 7 consecutive days or 70 hours in 8 consecutive days until 168 or more consecutive hours have passed since the beginning of the last such off-duty period. When a driver takes more than one off-duty period of 34 or more consecutive hours within a period of 168 consecutive hours, he or she must indicate in the Remarks section of the record of duty status which such off-duty period is being used to restart the calculation of 60 hours in 7 consecutive days or 70 hours in 8 consecutive days.

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Anne S. Ferro,
Administrator.

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