DEPARTMENT OF TRANSPORTATION **[4910-EX-P]**

Federal Motor Carrier Safety Administration

49 CFR Parts 385 and 395

[Docket No. FMCSA-2004-19608]

RIN-2126-AB14

Hours of Service of Drivers

Agency: Federal Motor Carrier Safety Administration (FMCSA), DOT.

Action: Final rule.

SUMMARY: FMCSA adopts as final the provisions of the Agency's December 17, 2007, interim final rule concerning hours of service (HOS) for commercial motor vehicle (CMV) drivers. This final rule allows CMV drivers to continue to drive up to 11 hours within a 14-hour, non-extendable window from the start of the workday, following at least 10 consecutive hours off duty (11-hour rule). The rule also allows motor carriers and drivers to continue to restart calculations of the weekly on-duty limits after the driver has at least 34 consecutive hours off duty (34-hour restart).

EFFECTIVE DATE: This rule is effective January 19, 2009.

Docket: For access to the docket to read background documents or comments received, go to www.regulations.gov at any time or to the ground floor, room W12-140, U.S. Department of Transportation (DOT) Building, 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m. e.t., Monday through Friday, except Federal holidays.

Privacy Act: Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment

(or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19476) or you may visit http://docketsinfo.dot.gov.

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SUPPLEMENTARY INFORMATION:

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A. Legal Basis for the Rulemaking

This rule is based on the authority of the Motor Carrier Act of 1935 and the Motor Carrier Safety Act of 1984. 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 adopted in this final rule 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 Motor Carrier Safety Act of 1984 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 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 is also based on the authority of the 1984 Act and meets the specific mandates of 49 U.S.C. 31136(a)(2), (3), and (4). Section 31136(a)(1) primarily governs

the mechanical condition of CMVs, a subject not included in this rulemaking. To the extent 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 final rule.

B. Background

For background information on this rulemaking, please see the account published in the interim final rule (IFR) of December 17, 2007 [72 FR 71247, 71250-71251].

C. Discussion of Rule

FMCSA is promulgating as a final rule the provisions of the IFR it adopted on December 17, 2007. Because the United States Court of Appeals for the District of Columbia Circuit (the Court or D.C. Circuit) held in 2007 that the Agency had failed to provide an opportunity for public comment on certain aspects of the 2005 Regulatory Impact Analysis (RIA) [Owner-Operator Independent Drivers Association, Inc. v. Federal Motor Carrier Safety Administration, 494 F.3d 188 (D.C. Cir. 2007)], the IFR provided a 60-day period for the public to comment on the RIA. In response to the Court's finding that FMCSA did not provide an adequate explanation for certain critical elements in one of its analytical models used in the RIA, the preamble to the IFR also included a detailed explanation of the Agency's time-on-task (TOT) methodology [72 FR 71252 et seq.], thus satisfactorily addressing the second flaw identified by the D.C. Circuit.

Most of the comments to the IFR docket reiterated arguments and conclusions set forth during the 2003 and 2005 HOS rulemakings; the more significant comments are discussed below.

Before addressing those comments, it is useful to summarize the reasoning that led the Agency to adopt the 2005 HOS rule, which was restored by the IFR and is finalized by today's action. Research on the causes and effects of fatigue is sometimes inconsistent, frequently based on work environments other than truck driving, and usually conducted on a small scale. It is not unusual for an assertion or conclusion related to fatigue to be questioned in some published study. Researchers have also examined environmental factors related to many potential driver health issues, but these studies are not sufficiently precise to allow reasonable estimates of the benefits of remedial measures.[1]

Due to the lack of clear and consistent scientific evidence in this area, the Agency went to great lengths to review the research literature, utilizing resources of the Transportation Research Board of the National Academies, and the National Institute for Occupational Safety and Health (NIOSH), as well as experts from other DOT organizations. FMCSA's own expertise and judgment were particularly significant in reviewing, evaluating, and properly weighting research findings. FMCSA's unique knowledge of the motor carrier industry and its patterns of operation provide the Agency with a sound basis for assessing the safety impact of this rulemaking action. In fact, FMCSA's own field surveys, conducted in 2005 and 2007 in the course of HOS rulemakings, constitute some of the most comprehensive sources of data on driving

[1] See the extended discussion in the preamble of the 2005 final rule, 70 FR 49982-49992.

hours, off-duty time, and utilization of the restart provision. The scientific, operational, and economic analyses underlying this rule have been meticulous and extensive. The provisions made final today reflect both the paramount importance we attach to safety and the critical role of the motor carrier industry in the U.S. and world economy.

FMCSA's principal goal in the 2005 rule was to ensure truck drivers had more opportunity for sleep than under the pre-2003 rule, and that the typical work schedule would more nearly approximate the 24-hour circadian ideal.[2] Before 2003, drivers were required to take only 8 hours off duty before driving again. After leaving the terminal, returning home, and taking care of personal or family matters, a driver meeting the minimum requirements simply did not have enough time to get the 7-8 hours of sleep needed to maintain alertness.[3] By extending the minimum off-duty period from 8 to 10 hours, as the 2003 and 2005 rules did, FMCSA ensured most drivers, even those operating on compressed schedules, would be able to go home and deal with private matters and still have sufficient time for a full sleep cycle. That objective was preserved in the 2007 IFR and today's final rule.

The 2005 rule also required drivers who use sleeper berths to take 8 consecutive hours in the berth and another 2 hours off duty or in the berth, as the driver chose. The previous regulations allowed drivers to split their sleeper-berth time into two periods, neither shorter than two hours. The result was that sleeper-berth drivers often failed to take a single, uninterrupted sleep period long enough to avert fatigue. The higher crash rates reported for sleeper-berth drivers by the National Transportation Safety Board

[2] See section F.2. Circadian Influences, in the 2005 rule, 70 FR 49992.
[3] See section E.1. Sleep Loss/Restriction, 70 FR 49982-49983.

reflected that fact.[4] The 8-hour sleeper-berth period adopted in 2005 meant that these drivers would be subject for the first time to the same kind of rest requirements as all other drivers. The D.C. Circuit upheld that portion of the 2005 rule in its 2007 decision and it is accordingly unchanged by this final rule.

To enhance the effect of increased off-duty time, the Agency also reduced the driving window. Before 2003, the misnamed "15-hour rule" allowed driving within a 15-hour window after coming on duty – but off-duty time taken during that work shift was not included in the 15 hours. The result was drivers possibly being at the wheel 18 or 20 hours after coming on duty, without having had any significant rest.[5] The 2003 rule therefore allowed driving only within a fixed 14-hour window after coming on duty; off-duty time no longer stopped the clock. The combination of 10 hours off duty and a 14-hour driving window greatly increased the number of drivers who would maintain something close to a 24-hour schedule. Circadian regularity contributes to fatigue-avoidance[6]; the longer off-duty requirement and the shorter driving window combined to improve significantly the likelihood that truck drivers would be adequately rested before taking to the highway. Sleeper-berth drivers, of course, are less likely to be on a 24-hour cycle than other drivers, but the 2005 rule also improved their ability to obtain adequate rest before driving.

Although the 10-hour off-duty requirement and the 14-hour, non-extendable driving window reduced the risk of fatigue, these provisions simultaneously also imposed new constraints on motor carriers. To offset these constraints while ensuring the fatigue

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[4] See section F.4. Split Sleep, 70 FR 49994.

[5] "A 1999 study of dry freight truckload carriers by the Truckload Carriers Association (TCA) revealed that drivers spent nearly seven hours waiting for each freight shipment that they picked up and delivered" [70 FR 49986]. Those hours were typically excluded from the 15-hour "limit."

[6] See discussion and sources cited in the 2005 rule, 70 FR 49992.

benefits are realized, the Agency determined it could allow additional operational flexibility by permitting increased driving hours without diminishing the safety benefits of the new provisions. The 2003 rule therefore allowed driving no more than 11 hours following a period of at least 10 consecutive hours off duty, compared to the 10 hours of driving permitted under the former regulations. This balance reflects the integrated nature of the Agency's approach to improving the HOS rules. The drivers who operated instrumented vehicles in the large on-road study conducted by Hanowski and his colleagues at the Virginia Tech Transportation Institute[7] showed no statistically significant difference in "critical incidents" between the 10th and 11th hour of driving. "Critical incidents" were defined as crashes, near crashes (where a rapid evasive maneuver was needed to avoid a crash) and crash-relevant conflicts (which required a crash-avoidance maneuver less severe than a near crash, but more severe than normal driving). This result strongly supports the Agency's conclusion that an 11-hour driving limit adopted in this final rule, when combined with the 14-hour driving window and 10 hours of off-duty time, does not pose an increased risk to safety.

Although the Agency did not expect a large percentage of drivers to drive for 11 full hours, any more than they had previously driven for a full 10 hours, the 11th driving hour would give drivers and carriers affected by the new 14-hour window additional time to complete runs that might once have been stretched out over 15 or more hours. Subsequent comparison and analysis of field survey data collected by FMCSA during compliance reviews in 2005 and 2007 has borne out these expectations (see below). Although drivers and carriers are using the 11th driving hour more often than they did in

[7] See Hanowski et al., 2005, 2007a, and 2007b in the List of References in section F.

2005, a significant majority of drivers represented in FMCSA's 2007 field survey (69 percent) still drove less than 10 hours during a typical daily shift. In comments to the docket for the 2005 rule and the 2007 IFR, the great majority of drivers and carriers who addressed this issue supported the 11-hour driving limit.

The most controversial element in the 2003 rule was the so-called 34-hour restart. The 2003 rule did not amend the long-standing 60- and 70-hour regulations, which provide that a driver may not drive after being on duty more than 60 hours in 7 consecutive days, or in certain cases, 70 hours in 8 consecutive days. However, it did allow drivers a new method of complying with those limits. Under the 34-hour restart provision, drivers can restart their calculations of the cumulative on-duty time at any time after the driver has 34 consecutive hours off-duty. However, because the restart provision was accompanied by an increase from 8 to 10 consecutive hours of off-duty time, and a 14-hour, non-extendable window within which drivers must complete all driving during the work shift, the Agency concluded that the restart would not decrease safety. Safety data published since 2003 has given the Agency no cause to reconsider this conclusion.

Under the pre-2003 rule, drivers could operate under an 18-hour "day" by driving 10 hours, taking 8 hours off duty, and then repeating that cycle. This schedule shifted the driver's sleep period backward by 6 hours each day, disrupting the circadian rhythm and interfering with the body's ability to sleep, even if adequate rest hours were available. This compressed schedule also meant that drivers would exhaust their 60 hours of on-duty time early on the fifth day and have to wait almost 3 days until the sliding 7-day measuring period again allowed driving. In fact, this extended rest period provided an

economic incentive for drivers to falsify their records of duty status and begin driving again in defiance of the 60-hour rule.

The 2003 rule eliminated the 18-hour "day." The most compressed schedule allowed by the 2003 and 2005 rules is a 21-hour "day," i.e., 10 hours off duty followed by 11 hours of driving. This is substantially more consistent with the normal circadian rhythm. A 21-hour "day" also means that drivers cannot reach the 60- or 70-hour limit as quickly as they could before 2003 and would not have to wait as long at the end of the week before regaining compliance with the 60- or 70-hour rule.

FMCSA examined the available research on the time needed to recover from fatigue.[8] As the Agency noted in the preamble to the 2005 rule, the Transportation Research Board team, performing a literature search, "found five studies that provided information regarding the recovery time needed for CMV drivers after working a long week. Four of these studies provide support for recovery periods of 34 hours or less, while only one of these studies supports a recovery period longer than 34 hours. Two studies suggest that a single 24-hour period is sufficient time for a driver to recover from any cumulative fatigue" [70 FR 49994]. The length of a recovery period is not the only factor to consider in assessing the adequacy of weekly work-rest schedules, however. In preparing the 2005 rule, "[t]he Agency attempted to determine whether the added hours of recovery through the use of a 44-hour recovery period, created a net benefit in reducing fatigue compared to the potential negative impact on circadian rhythm of establishing a rotating cycle. The Agency has determined that there is no conclusive scientific data to guide it in determining which factor (recovery time vs. circadian

[8] See the discussion and sources cited in the 2005 final rule, 70 FR 49994-49995, 50023-50026.

disruption) is more effective in alleviating fatigue. In sum, in deciding to adopt a 34-hour recovery period, the Agency considered that compliance with a 34-hour recovery period results in a CMV driver restarting work at approximately the same time of day as his or her prior shift. The 34-hour recovery period also avoids the shifting of daytime to nighttime schedules, which research indicates can disturb the circadian rhythm and decrease alertness" [70 FR 50024-50025, August 25, 2005]. A 34-hour period gives a driver an opportunity for two consecutive 8-hour sleep periods separated by a 16-hour period of wakefulness, plus an additional two hours at some point in the 34-hour period. It allows circadian regularity to be maintained and brings the driver back to work on approximately the same schedule as before the restart. While there is valid evidence that drivers who get 8 consecutive hours of sleep every day should not develop cumulative fatigue at all[9], those who fail to follow a regular sleep schedule will be able to "zero out" their fatigue by taking 34 consecutive hours off duty.[10]

Opponents of the 34-hour restart argue that, if used to the maximum over an extended period, it allows more driving and on-duty time on a weekly basis than the pre-2003 rule. In theory this is true, but FMCSA at that time concluded that the restart provision, like the 11th hour of driving time, would not be utilized to the theoretical maximum calculated by some commenters. Commenters have not provided nor has the Agency seen any contrary evidence. As the Agency pointed out in the preamble to the

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[9] "For most healthy adults an average of 7 to 8 hours of sleep per 24-hour period has been shown to be sufficient to avoid detrimental effects on performance." 70 FR 50016.

[10] For example, a 1972 study "involved subjects who worked 8 hours a day for 3 days, followed by a 4 hours on/4 hours off schedule (similar to driving with a sleeper berth) over a 2-day period. [The researcher] found that the average performance of drivers dropped to 67 percent of baseline toward the end of this period. A 24-hour rest period was sufficient to permit recovery back to baseline. A simulator study examined daytime driving of 14 hours on/10 hours off over a 15-day period . . . These authors found that 24 hours was an adequate amount of time for recovery. A third study . . . found a dramatic recovery with respect to fatigue in team drivers who stopped overnight in the middle of a 4 to 5 day trip. Thus, with less than 24 hours off, a single night of sleep was very helpful for recovery." 70 FR 49994.

2005 rule, use of the 34-hour restart to generate routinely the very long driving and on-duty times critics fear – up to 84 hours on duty in 7 days or 98 hours in 8 days – requires an imaginary world with "nearly perfect logistics for picking up and delivering a load ... in other words, total elimination of waiting time to load, mechanical and equipment problems, and traffic- and weather-related delays." [70 FR 50022]. The Agency's more realistic scenarios have been borne out by all recent evidence. As reported in the 2007 IFR [72 FR 71264-71265], data collected during FMCSA's 2007 field survey show that use of the 11th driving hour by long-haul drivers increased only slightly since the Agency's similar 2005 survey. In 2005, 23 percent of the driving periods examined reached into the 11th hour, while 27 percent involved the 11th hour in 2007. Utilization of the restart provision has also increased somewhat; 84 percent of the drivers in the 2007 sample[11] took at least one restart period of 34 or more hours during the typical work week, compared to 73 percent of drivers in the comparable 2005 survey. Eight percent of the restart periods were exactly 34 hours long in 2007, compared to 5 percent in 2005; 22 percent of the restart periods were between 36 and 44 hours long in 2007, exactly the same as in 2005; and 65 percent of the periods exceeded 44 hours in 2007, compared to 68 percent in 2005. The Agency concluded in its 2007 IFR that, "while the restart provision is being used by drivers, the average restart period is far longer than 34 hours" [72 FR 71265].

The American Trucking Associations (ATA) surveyed its members in August, 2007, on their use of the 11th hour of driving time and the 34-hour restart. The 69 carriers

[11] A note printed below the table showing "Restart Off-Duty Hours" on page 4 of the 2007 field survey incorrectly states that "[t]his analysis excluded any restart period in excess of 72-hours." In fact, the table shows that 22 percent of restart periods were longer than 72 hours. That error does not affect comparisons with restart periods from the 2005 field survey.

that responded represent 234,000 drivers; 46 percent of these drivers reported using the 11th driving hour (meaning 54 percent did not), and driving into the 11th hour on 13 percent of their daily trips (meaning that 87 percent of the trips did not reach the 11th hour). Because of the way ATA's restart data were collected, they are difficult to compare to FMCSA data. Still, the Agency concluded both in its 2007 IFR and in today's final rule that the motor carrier industry is using both the 11th hour and the 34-hour restart provision, not to maximize driving and on-duty time, but for "operational flexibility," which is precisely its intended purpose [Id.]. This conclusion is supported by data and comments submitted to the docket, as well as data and analysis in the 2008 RIA accompanying today's final rule. No commenters provided data or analysis indicating any driver's actual use of the restart period over an extended period.

Operational data therefore provide no affirmation of concerns of vastly increased on-duty and driving time as a consequence of the 11th driving hour and the restart provision. The great majority of drivers who addressed this issue in comments to the docket praised the 34-hour restart provision and explained that it has enabled them to schedule their work more flexibly than ever before and thus to spend more time with their families, instead of waiting out the 60- or 70-hour clock at some truck stop far from home. The 2007 FMCSA Field Survey continues to support this conclusion. While miscellaneous off-duty periods taken by drivers when confronting certain logistical realities cannot be used to extend the 14-hour window within which up to 11 hours of driving time may take place, these off-duty periods are not counted as driving time or on-duty time and thus would reduce the likelihood of accumulating 84 hours on duty in 7 days, or 98 hours on-duty in 8 days. For example, if a driver is delayed for a few hours

while waiting to unload a shipment and goes of duty, that off-duty time does not extend the 14-hour window within which up to 11 hours of driving time may take place; however it is not counted in the maximum 60 or 70 hours of on-duty time allowed within a 7- or 8-day consecutive period, or following a minimum 34-hour restart period. In other words, it reduces the likelihood that a driver would accumulate the maximum 84 hours on duty in 7 days, or 98 hours on-duty in 8 days, as noted by commenters.

The preamble to the 2005 rule discussed in detail the various effects that driving a CMV might have on the health of drivers (70 FR 49982-49992). There is some evidence of adverse effects; long-term exposure to diesel exhaust seems to entail an increased risk of cancer[12], and a recent study found an even higher incidence of ischemic heart disease among unionized truck drivers.[13] With the exception of noise exposure, all of the studies related to driver health and exposure lack a dose-response curve for the factor in question that would allow FMCSA to estimate reliably the effect of longer or shorter driving and on-duty time on driver health. As for noise exposure, FMCSA concluded that drivers should not have "significant hearing loss over a lifetime of on-the-job exposure, even if drivers drove the maximum hours allowed by this final rule."[14]

The Agency is required by statute to balance the benefits likely to be achieved by its regulations against the costs likely to be imposed.[15] Because the likely benefits to driver health cannot be estimated in the absence of a dose-response curve, the 2005 rule declined to impose HOS limits designed to address health issues. Although new health studies continue to be published, some directly focused on truck drivers, the fundamental

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[12] Measured by standardized mortality ratios (SMRs) at a 95% confidence interval. See next note.

[13] Laden, et al., "Cause-Specific Mortality in the Unionized U.S. Trucking Industry," Environmental Health Perspectives, Vol. 115, No. 8, August 2007, pp. 1192-1196.

[14] See section E.3., Exposure to Noise, in the 2005 final rule, 70 FR 49987.

[15] 49 U.S.C. 31136(c)(2), 31502(d).

problem remains: the health effects of any particular change in the HOS regulations are unknown.

As explained in the Regulatory Impact Analysis (RIA) prepared for the 2005 rule (and subsequent RIAs), the Agency examined several policy scenarios (each of which included variations on the daily driving and on-duty limits, minimum restart periods, and other options) and developed elaborate simulation models of trucking operations, costs, and fatigue-performance relationships [see 70 FR 50044 et seq.]. FMCSA also undertook extensive analyses of the effect of various policy scenarios on societal costs and benefits. This final rule, like the 2005 rule, adopts by far the most cost-beneficial of the policy scenarios examined, as it is the only option that yielded net benefits. For instance, the selected policy option yielded $270 million in estimated net annual benefits versus net annual societal costs of between $1 billion and $1.7 billion annually for the other options considered[16]. Analysis carried out while preparing today's final rule estimated that eliminating the 11th driving hour and 34-hour restart provisions would result in net annual costs of $2.2 billion[17]. The Agency also conducted sensitivity analyses involving elimination of the 11th daily driving hour, both in the 2005 and the 2008 final rules. In these analyses, the Agency essentially doubled the likely percentage of fatigue-related large truck crashes, tripled the value of a statistical life, and increased by 40 percent the risk of a fatigue-related large truck crash in the 11th hour of driving; in all cases, however, the societal costs of eliminating the 11th driving hour exceeded the benefits.[18]

[16] See Section 6.7, exhibit 6-7, p. 71 of the 2005 HOS RIA.
[17] See Executive Summary Exhibit ES-4, p. ES-6 of the 2008 HOS RIA.
[18] See Section 6.8, pp. 72-75 of the 2005 HOS RIA, and Section 6.7, pp. 67-71 of the 2008 HOS RIA.

This rulemaking rests on a wide-ranging body of data and comprehensive analyses, and complies with all Congressional mandates. By adopting HOS regulations that include increased daily off-duty time, a shorter driving window, a longer period of uninterrupted rest for sleeper-berth drivers, and sufficient time for two full sleep periods before restarting the 60- or 70-hour clock, the rule ensures CMVs are "operated safely" and drivers' responsibilities "do not impair their ability to operate the vehicles safely," as required by 49 U.S.C. 31136(a)(1)-(2), respectively. FMCSA discussed in the preamble to the 2005 rule the possible "deleterious effect [of driving] on the physical condition of the operators" (49 U.S.C. 31136(a)(4)), concluding that any incremental health effects associated with the additional driving and on-duty time theoretically available under the rule cannot be calculated. This conclusion remains accurate today. The RIA for this final rule fully complies with the statutory requirement to consider benefits and costs of regulatory activities. Furthermore, data on fatigue-related highway fatalities published since 2003 show nominal annual fluctuations, but nothing of the rising trend implied by some criticism of the IFR and related earlier rules. In fact, the overall large truck fatality rate is at its lowest level ever.

D. Discussion of Comments

FMCSA received 913 comments to the docket; 26 submissions were duplicates or non-germane letters. The majority of the commenters were individuals, some of whom identified themselves as CMV drivers. In addition, 122 motor carriers, 8 trucking associations, 17 other industry trade associations, one State agency, and 6 safety advocacy groups responded to the public docket. Over 300 comments expressed general support for the IFR. Commenters who specifically addressed the 11-hour driving limit

were divided, with 67 supporting it and 53 stating that 11 hours is too long. A number of commenters favored the 34-hour restart provision, with 164 indicating their support and 30 stating that it should be changed. As one carrier noted, “The 34-hour restart had an immediate impact on our drivers, not only did it allow more flexibility, it improved their quality of life by providing them a way to spend more time with their family, not only did it refresh their available hours for working, but it refreshed them mentally and physically which helps them be more alert and safer on the highways” (FMCSA-2004-19608-3006). The American Moving and Storage Association (AMSA) believed, “The pro-safety aspects of the 34-hour recovery and restart provision are undeniable.” The ATA pointed out, “Often a restart is taken before weekly hours have expired in order to better fit driving schedules to available work and driver preferences. This element of the new rules is plainly doing more for stress reduction and driver satisfaction than any other change.”

J.B. Hunt emphasized that the rule permits, but does not require, drivers whose accumulated fatigue has been reduced or eliminated by the 34-hour restart to return to working, and it is a much safer system than the previous rule. Also, if the driver has obtained restorative rest eliminating accumulative fatigue, then it should not matter how much more work the driver is able to do. J.B. Hunt noted that “safety reports tend to indicate that drivers are as safe or safer now than they were before the current rules were put in place.” The National Industrial Transportation League (NITL) agreed, stating that, “Many shippers using private fleets have effectively built the 34-hour restart into their operations, which has improved driver satisfaction and quality of life.” Two commenters argued that shorter (24-hour) restart periods for oilfield and construction industry trucks under 49 CFR 395.1 have worked safely.

Two commenters, the National Private Truck Council (NPTC) and ATA, stated that Federal data and anecdotal information showed that motor carrier safety had improved since the 2003 rule was implemented. NPTC stated that the Agency's interpretation of fatal accident data was consistent with self-reported data it had submitted from 63 private carriers. These companies had reported that their safety performance improved in the first year of the rule. NPTC reported that the safety records of these companies have remained steady in the subsequent years. ATA cited safety improvements shown in national crash data and mentioned that data from the Bureau of Labor Statistics (BLS) on truck driver non-fatal occupational injuries show a large decline in truck driver injuries from 2002 to 2006.

Over 90 carriers and carrier associations indicated that they had seen no adverse safety impacts from the HOS regulations; in fact most of them reported reductions in crashes and in injuries. After reviewing its own safety statistics, Schneider National found "significant improvements in safety under the current HOS regulations. Safety is a multi-variant challenge, and while we cannot attribute all of the improvement to the HOS rules, it is reasonable to conclude that the current HOS regulations have not had a negative impact on safety (as some have suggested)." The Canadian Trucking Alliance stated that since the Canadian and U.S. restart provisions have been in place, they have been widely used by Canadian drivers operating on both sides of the border, and the carriers' safety experience has been positive. A few carriers also noted that they have experienced no increase in crashes during the 11th hour of driving. The Missouri DOT agreed that the rules have not detrimentally impacted safety and that the 11-hour limit and the 34-hour restart provisions should remain intact. One driver believed that his

company has had an increase in the number of accidents because of the 11-hour driving limit, but provided no data to support his assertion (FMCSA-2004-19608-3187).

ATA discussed truckload and less than truckload (LTL) carriers, and noted that for truckload operations the 11th hour of driving provides flexibility to dispatchers who work with customers and drivers to schedule freight pickup and delivery times. More drivers are able to take off-duty rest periods at home. The extra hour also provides a cushion for irregular route drivers who deal with highway congestion, weather, construction, and other unexpected delays. Some carrier operations can provide dedicated service with fewer trucks and fewer drivers than in the past. ATA pointed out that some LTL operations have found opportunities to move freight more efficiently with a planned use of the 11th hour. Over 60 carriers and carrier associations echoed these points. One carrier also noted that the rule allows more effective management of equipment maintenance (FMCSA-2004-19608-2878). The National Solid Waste Management Association supported the rule provisions because its members must deal with irregular collection schedules that include Federal holidays. The Specialized Carriers and Rigging Association asserted that its members must deal with coordinating various service provider and customer requirements, and comply with government permit restrictions on routes and operating times. Schneider National's simulation modeling indicated that productivity would suffer if the 11-hour limit and 34-hour restart were eliminated.

Many commenters raised issues not addressed in the IFR, which focused only on the 11-hour driving limit and the 34-hour restart provisions vacated by the Court. In particular, 212 commenters objected to the non-extendable 14 hour duty period; and 259 expressed opposition to the sleeper-berth provisions. Because FMCSA responded to these

concerns at length in the 2005 rule, and because the D.C. Circuit upheld the Agency's sleeper-berth and "14 hour rule" provisions, the Agency will not discuss them further in this document. See 70 FR 50012-50014, 50026-50031, August 25, 2005. Commenters also continued to express concerns about shipper practices, parking, driver pay structure, and other issues that are beyond the scope of the IFR and outside of FMCSA's statutory authority. These comments are not addressed in this final rule.

The following sections summarize the comments submitted in response to the specific topics covered by the IFR. In particular, the discussion addresses the comments of the Insurance Institute for Highway Safety (IIHS), Public Citizen, and, in a joint filing, Advocates for Highway and Auto Safety, Public Citizen, the International Brotherhood of Teamsters, and the Truck Safety Coalition (Advocates et al.).

1. Statutory Duty. Advocates et al. asserted that FMCSA has failed to make safety its highest priority. They argued that "The Agency has relegated its safety mission to simply a balancing of economic costs to industry without regard for its basic mission – to prevent deaths, injuries, and adverse health impacts of much longer driving and working hours."

FMCSA Response

This rule is an excellent example of the paramount value FMCSA places on safety. It significantly reduces the daily driving window and lengthens the off-duty period drivers must take, greatly reducing the risk of short- and long-term fatigue while providing operational flexibility. However, as noted in the Legal Basis section, the Agency must consider multiple factors in issuing any motor carrier regulation, including their costs and benefits (49 U.S.C. 31136(c)(2)(A) and 31502(d)).

In its 2004 decision, the D.C. Circuit stated: "…neither petitioners nor the court suggests that the statute requires the agency to protect driver health to the exclusion of [cost/benefit] factors, only that the agency must consider it" (374 F.3d at 1217). The Court thus acknowledges that the Agency must consider costs, benefits, and health factors in developing regulations, though it provided no further guidance on the weight to assign each factor. There is no case law on point, and the legislative history is silent. The FMCSA has therefore used its analytical capacity, expertise, knowledge of the industry, and best judgment to create a rule that enhances motor carrier safety while minimizing costs, consistent with its primary safety mission.

2. Comments on Safety. Advocates et al., and to an extent some private citizens and drivers, disputed the Agency's assertion that motor carrier safety has improved since the 2003 rule went into effect, and argued that national crash data contradict this claim. Specifically, they stated that Fatality Analysis Reporting System (FARS) data are not consistent and, at best, show insignificant decreases in the fraction of fatigue-related crashes. In any case, they noted that the preamble to the 2005 rule itself described recent crash data as unreliable and inconclusive. They also pointed out that total large truck crash fatalities only began to decline in 2006, and that large truck fatal crashes per million vehicle miles traveled actually increased immediately after the 2003 rule went into effect. Regardless of national crash data, commenters stated that the Agency has not and cannot establish any causal link between improved safety and the 34-hour restart or the 11th hour of allowable driving time. Commenters also criticized the Agency for not carefully studying the actual near-term safety impact of the 2003 rule.

FMCSA Response

FMCSA has consistently been cautious about inferring causal relationships between the HOS requirements and trends in overall motor carrier safety. The Agency believes that the data show no decline in highway safety since the implementation of the 2003 rule and its re-adoption in the 2005 rule and the 2007 IFR.

The Agency also examined crashes per million vehicle miles traveled. The fact that the fatal crash rate continues to follow a downward trend suggests the HOS regulations have not had an adverse impact on safety. The number of fatigue-related crashes is small and has remained relatively stable from year to year, without any clear trend since the 2003 rule was adopted.

Advocates et al. are inconsistent in arguing that national crash data show a definite degradation in safety since the 2003 rule was implemented, while simultaneously claiming that the data FMCSA has cited are too preliminary and have not been studied in enough detail to allow final conclusions. The Agency acknowledges that all data contain "noise" and that three or even four years' worth of annual crash data may not provide definitive evidence of the effect of the current HOS rule. Nonetheless, actual operations have thus far validated the Agency's analysis of the benefits and costs of this rule.

FMCSA appreciates the self-reports of positive safety experiences from carriers, discussed previously in this document and in the preamble to the 2005 rule. While not definitive, these data are consistent with the Agency's conclusion that safety has been maintained under this rule. Moreover, the BLS data on occupational injuries submitted by ATA seem to provide evidence of the overall improvement in motor carrier safety.

However, because these data are not linked in any discernable manner to drivers' work-rest schedules, they do not provide immediate justification for this rule.

3. Comments on Driver Health. Advocates et al. argued that FMCSA has failed to protect driver health and consider the impact and costs of long hours on driver health. They also stated that FMCSA's position on driver health conflicted with the reports of the National Research Council's Transportation Research Board (TRB) Panels of Experts. They cited a newly published NIOSH Conference Report and Selective Literature Review [Saltzman, G.M., and Belzer, M.H., (2007)]. Advocates et al. also stated that there are decades of research on the impact of long work hours or shift work which FMCSA failed to consider in its HOS rule.

FMCSA Response

The Agency has considered driver health at length. FMCSA carefully evaluated health impacts in the 2005 rule using three steps. First, the Agency reviewed numerous studies, including those previously cited in a May 20, 2000, notice of proposed rulemaking (NPRM) (65 FR 25540) and in the 2003 rule. Second, FMCSA contracted with the TRB, which selected nationally known health and fatigue experts to conduct a thorough literature review of studies relevant to this rulemaking. The research reports TRB discovered clustered around a few issues: driver exposure to diesel exhaust, noise, and vibration; prevalence of cardiovascular disease; and the effect of sleep loss or deprivation, shift work, and long work hours generally. As discussed at length in the preamble to the 2005 rule (Section E, 70 FR 49982 et seq.), many of the studies involved self-evaluations, which cannot be independently verified. Other studies are based on objective data, but their results are not "fine-grained," i.e., they do not allow the Agency

to calculate the health effects of a few more hours of driving or on-duty time, or a few less. FMCSA reaffirms today the conclusion it reached in 2005 – this rule neither causes nor exacerbates the risks associated with driving a CMV. Third, when commenters cited over 200 additional studies they deemed relevant, TRB reviewed them to inform our health and safety evaluation. In addition, the Agency conducted a literature review in December of 2007 to review studies of driver fatigue and health that were completed after the TRB review in 2005 [Belenky, G. and Wu, L.J., (2008)]. The Agency is not aware of, nor did any commenters provide, any studies published since the 2005 rule that would change these conclusions.

Advocates et al. appear to have misunderstood FMCSA's response to the TRB panel. FMCSA did not dispute that there are some links between driving and various health conditions. The TRB literature review on driver health concluded that "Lung cancer is likely caused by exposure to diesel exhaust and the longer that exposure lasts the more likely it is that a cancer will develop" [Orris, P., et al. (2005), p.8]. It went on to state that while "the evidence linking this exposure to bladder cancer is less robust than that to lung cancer, it remains likely that there is such a relationship and that it is governed by a positive dose response curve" (Id., p.8). FMCSA has not disagreed with this finding as explained fully in Section E2, Exposure to Diesel Exhaust, of the 2005 HOS rule. However, the Agency found: (1) that no credible research exists which established a positive dose-response curve between diesel exhaust and lung or bladder cancers; (2) that the U.S. Environmental Protection Agency (EPA) has undertaken significant steps to reduce the amount of diesel particulate matter to which commercial drivers are exposed; and, (3) that no evidence of significant increases in drivers' working

hours has appeared, and therefore, that drivers have experienced no increased exposure to diesel exhaust as a result of the 2003 HOS rule compared to the prior HOS rule. FMCSA concluded that, while exposure to diesel exhaust probably entails some risk to drivers, neither the 2005 rule, the 2007 IFR, or this 2008 final rule causes or exacerbates that risk when compared to prior HOS rules.

The TRB medical panel also concluded that there is some evidence that cardiovascular disease (CVD) is caused in part by truck driving, and its risk increases with the duration of this activity and the disruption of the sleep cycle (Id., p. 8). In 2005, a NIOSH representative to FMCSA's health group reviewed the literature regarding CMV driving and the risk of developing CVD. The NIOSH representative concluded, and FMCSA concurred, that current research suggests the presence of only a weak association between CVD and truck driving. Additionally, CVD is associated with many other occupational types. No research studies were found that permitted an examination of whether additional hours of driving a CMV impact driver health as measured by increased CVD or acute myocardial infarction (AMI). FMCSA therefore concluded that nothing in the available research implicates today's HOS rule in a heightened risk of CVD or AMI.

The TRB medical panel concluded that based on exposure assessments, noise-induced hearing loss could be a result of a working lifetime as a driver (Id., p. 8). The Agency has previously funded research to test the noise levels in large trucks and reviewed the documented research; the tests and the research have not shown that truck noise exceeds OSHA or FMCSA standards. The Agency is not aware of any data or

epidemiological evidence that the noise levels in CMVs may lead to significant hearing loss.

Both the TRB medical panels and the Agency concluded that the research on whole body vibration (WBV) and its potential health effects, such as low back syndrome, is inconclusive because the studies rely primarily on self-reporting and application of risks derived from other environments (Id., p. 8). The literature related to commercial driving and other musculoskeletal disorders suffers from the same limitations (Id., p. 8). The studies that tested vibration in CMVs found that vibration was close to the International Organization for Standardization (ISO) health risk threshold, but it did not consistently exceed that threshold. When comparing the 2003 HOS rule to today's rule, it is the Agency's best judgment that, based on the studies reviewed and comments received, WBV does not pose a significant health risk to CMV drivers.

FMCSA also reviewed the NIOSH report entitled Overtime and Extended Work Shifts: Recent Findings on Illnesses, Injuries, and Health Behaviors [Caruso, C.C., et al. (2004)] and all studies in the report regarding commercial drivers. For a complete description of the Agency's review and analysis of the NIOSH report, see section E.6., Long Work Hours, in the preamble to the 2005 HOS rule (70 FR 49989 et seq.). In short, the NIOSH review found that "extended work shifts and overtime lengthen exposure times and shorten recovery times, and the health consequences are uncertain" (Id., p. 29). The NIOSH review went on to conclude that "Despite the increased current interest in long working hours, research questions remain about the ways overtime and extended work shifts influence health and safety. Few studies have examined how the number of hours worked per week, shift work, shift length, the degree of control over one's work

schedule, compensation for overtime, and other characteristics of work schedules interact and relate to health and safety" (Id., p. 30). As a result of NIOSH's own comments regarding the state of research, FMCSA concluded in 2005 and again today that, based on current knowledge and the limited research specific to CMV driver health and work hours, in the Agency's best judgment there is not enough sufficient, credible evidence that the number of work hours allowed by the HOS regulation will have an negative impact on driver health.

Advocates et al. cited proceedings from a 2003 NIOSH conference that were published in 2007 [Saltzman, G.M., and Belzer, M.H., (2007)]. FMCSA is well aware of the conference since FMCSA representatives attended and presented papers at the meeting. The purpose of the conference was to present research on driver health and to start a dialogue on a National agenda for future research in the area of driver health. Both anecdotal accounts and published research were included the NIOSH proceedings. The TRB literature review of driver health included research published by January 2005. Therefore, there is nothing new in these conference proceedings that the Agency has not already considered.

In summary, as discussed at length in the 2005 rule, the Agency undertook a comprehensive examination of issues related to driver health. The Agency is aware of no new studies, nor have commenters provided any, published since the 2005 rule was promulgated that have changed these underlying conclusions and the regulatory provisions adopted. Driver health research simply is not mature enough to allow the conclusion that a number of extra hours of work would result in increased driver health problems. Also, there are many confounding factors that affect driver health, such as diet,

smoking, and exercise. It remains very difficult to isolate the impact of exposure and longer working hours. The research to date has not provided a basis for analyzing the health impact of the 2003 and 2005 final rules and the 2007 IFR, all of which allowed more driving time per day but fewer hours of daily work and longer required off-duty periods. Without a dose-response curve, which would indicate the incremental effect of each hour of exposure to diesel exhaust, vibration or long working hours, FMCSA has no basis for estimating health impacts and costs. FMCSA, along with many other Federal and private entities, is funding driver health research; however, it will be years before researchers are able to separate the impacts of daily work exposure versus driver lifestyle. The Agency concluded in 2005 that it was unable to quantify or monetize the impacts of that rule on driver health; the same conclusion applies to today's rule.

FMCSA also notes that several major carriers and associations, including ATA, NPTC, and the National Industrial Transportation League (NITL) stated that the rule had benefited drivers' health and quality of life. These parties also noted that Advocates et al. focused exclusively on two provisions of the rule, but ignored the changes which provide drivers more time for sleep such as the 14-hour driving window, the sleeper-berth rule, and especially the 10-hour off-duty period. The 14-hour window limited the period of time available for driving and, in combination with the 10-hour off-duty period, moved drivers toward a 24-hour circadian period. Research at Virginia Tech Transportation Institute (VTTI) has shown that as a result of the 2003 rule, CMV drivers are getting more sleep (1 hour) on a daily basis [Hanowski, R.J., et al. (2005), p. 1]. Additionally, because the sleeper-berth provision requires a consecutive 8-hour sleeper-berth period and a second 2-hour off-duty or sleeper-berth period to be used at the driver's discretion

for breaks, naps, meals, and other personal matters, drivers have a much greater opportunity to obtain additional rest when needed. Consistent with the issues of exposure discussed above, the Agency also was unable to quantify the positive impacts on driver health from obtaining more sleep as a result of this rule. Nonetheless, drivers are sleeping more overall with more circadian regularity; and are now sleeping within normal ranges that are consistent with a healthy lifestyle.

In an OOIDA survey, drivers reported an improved quality of life based on the combined effects of the 2005 rule (70 FR 50025). A tally of comments from the 2005 rule (Id. at 50037) leads to the same conclusion. FMCSA agrees with comments emphasizing the need to treat the rule as a single interactive whole, instead of analyzing its provisions separately (70 FR 50041, 72 FR 71252). Moreover, numerous drivers reported that the 2003 rule's off-duty time provided the opportunity not only for sleep, but also for relaxation and personal tasks that improved their quality of life (Id. at 50040). The preamble to the 2005 rule also noted that certain lifestyle choices, over which the Agency has no control, including eating, smoking, and exercise, may "by themselves be predictive" of cancer and cardiovascular disease. (Id. at 50007). In addition, stress is a risk factor for cardiovascular disease (Id. at 49988). To the extent today's rule can reduce stress, it may be directly beneficial to driver health. The operational flexibility allowed by the rule, which (to judge from their comments to the docket) allows more drivers to spend weekends at home, may have just such an effect.

4. Approach to Research. Advocates et al. stated that FMCSA provided no evidence that it reviewed scientific research that did not support its conclusions, and that the Agency disregarded almost all studies not directly linked to truck driving or ignored

studies on the basis of flaws that were also evident in the few studies selected to support the new HOS regulation.

FMCSA Response

FMCSA conducted extensive literature reviews in the course of formulating its HOS regulations. In 1996, the then Office of Motor Carriers (OMC) of the Federal Highway Administration (FHWA) collected, reviewed, and docketed all relevant research on driver fatigue and performance. As part of that effort, a detailed literature review on driver fatigue was published (Freund, entry 956 in Docket 2350, Nov. 1999). In 1998, OMC commissioned an expert panel to deliberate on changes to HOS regulations for commercial drivers. As discussed previously, in 2005 FMCSA systematically and extensively researched both U.S. and international health and fatigue studies and consulted with other Federal safety and health experts. A detailed description of the qualifications of the TRB team and the methodology used can be found in the preamble to the 2005 rule (70 FR 49981). In addition, the Agency conducted a literature review in December of 2007 of studies of driver fatigue and health that were completed after the TRB review in 2005 [Belenky, G. and Wu, L.J., (2008)]. FMCSA has used the best available research in its HOS rulemaking.

Comment. Advocates et al. stated that the FHWA Expert Panel did not guide FMCSA decision-making on HOS. The Expert Panel was convened and their report was published, but according to the commenters, the Panel's findings were mostly disregarded or discarded, especially when the findings contradicted the Agency's regulatory decisions.

FMCSA Response

The commenters are mistaken. The Expert Panel's role is to provide guidance; it is exclusively the Agency's responsibility to make decisions with regard to rulemaking. The Expert Panel is not constrained by statutory requirements in undertaking its work, unlike the Agency. Alternatively, the Agency must take into account various statutory requirements in considering the guidance provided to it by the Expert Panel, and make decisions based on this consideration. To merely adopt recommendations by the Panel, without due consideration, would be abdicating the Agency's statutory rulemaking responsibility. Nonetheless, FMCSA did extensively use the Expert Panel's results to guide its decision making.

The Expert Panel urged that a final rule rely on a 24-hour work/rest cycle [Belenky, G., et al. (1998), p. 7]. This final rule is based in part on that concept. A 14-hour driving window and a 10-hour off-duty period, which are likely to be the standard for many drivers, ensures 24-hour circadian regularity. The Expert Panel indicated that "Off-duty hours must include enough continuous time off duty so that drivers are able to meet the demands of life beyond their jobs and are also able to obtain sufficient uninterrupted rest … The time allotted for sleep must be a minimum of 9 hours" (Id., p. 7). Today's final rule exceeds the Expert Panel's recommendation.

The Expert Panel noted that "rest or sleep acquired in a sleeper berth is not equivalent to rest or sleep in a bed" (Id., p. 9). It therefore urged that the Agency's regulations require an uninterrupted sleeper-berth period of at least 7 hours to allow for 6 hours of continuous sleep, with another period of at least 2 hours for a nap. This was one of the many factors that went into the decision to change the sleeper-berth provision in the 2005 rule. The 2005 rule required a consecutive 8-hour sleeper-berth period to allow

drivers to obtain one primary period of sleep, and a second 2-hour off-duty or sleeper-berth period to be used at the driver's discretion for breaks, naps, meals, and other personal matters. This provision of the rule was upheld by the D.C. Circuit and is therefore being adopted without change in today's final rule.

The Expert Panel noted that "recovery time periods must take into consideration the necessity for overcoming cumulative fatigue resulting from such schedules and must include sufficient sleep… Recovery time should include at least two uninterrupted time periods…and such recovery time must be made available at least once in every 7 days" (Id., p. 12). The 2003 rule created a minimum 34-hour recovery period that provides sufficient time for two 8-hour sleep periods and one 16-hour period of intervening wakefulness, allowing the opportunity for recovery from any potential cumulative fatigue that might occur. Although the effect of the 34-hour restart cannot be isolated from all the other factors that affect highway safety, it should be noted that FMCSA's Field Surveys show increased use of the restart provision between 2005 and 2007, at a time when the rate of fatigue-related fatal truck crashes remained essentially unchanged and the overall large-truck fatal crash rate dropped to the lowest level ever recorded. This final rule therefore readopts the IFR's 34-hour restart provision without change.

On one issue, the Expert Panel made a recommendation not fully adopted by FMCSA; for example, the Panel stated that "no distinction should be made between on-duty time and driving time." The Panel noted that "for a variety of tasks (driving a bus, driving a truck, operating a train), an early rise in accident risk . . . peaks between 2 and 4 hours after onset of duty, then falls and does not reach the level of the early peak until after 12 to 14 hours, when it continues to rise at an accelerating rate" (Id., p. 8). This final

rule, like previous HOS rules, does distinguish between driving and on-duty time, but today's 11-hour limit on driving time within a 14-hour on-duty window is otherwise fully consistent with the Panel's conclusions.

The Agency did not reject the Expert Panel's recommendations; FMCSA embraced the Expert Panel's report and developed a rule that is supported by its recommendations

.Comment. Advocates et al. also argued that FMCSA selectively quoted from the studies it relied on to justify the HOS rule. Furthermore, they stated that FMCSA has capriciously selected research studies, relying on inadequate research and data to justify the IFR, while rejecting conflicting studies.

FMCSA Response

On the contrary, FMCSA has worked on its current HOS rule for more than a decade, and has funded considerable research to expand the knowledge of sleep and fatigue science. This HOS rule has been developed by FMCSA experts who have carefully reviewed and weighed the findings from previous research efforts. Over the years the research has improved as more sophisticated technology for data collection became available. The Agency has relied and will continue to rely upon improved research studies to produce the best possible regulations.

The first principle that the Agency uses in evaluating research is that studies based on quantifiable, objective data that can be independently verified and tested are preferable to those based on subjective data such as individuals' opinions or perceptions. Where no objective data that was collected through strictly controlled, unbiased scientific experimentation exist, the Agency will use the best alternatives available; that could, in

some instances, be subjective data. FMCSA prefers to use well-designed objective studies like the Virginia Tech Transportation Institute (VTTI) naturalistic driving research, rather than surveys of drivers.

The second principle is to rely primarily on independent studies that are sufficient in scope, are peer reviewed, and use an application of statistics (power analysis) to determine appropriate sample sizes. The term "sufficient in scope" refers to the degree to which a study is designed to answer the research questions posed, and the conclusions can be reliably verified. Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. The proper use of statistics ensures that results of a sample can be generalized to a wider population.

The third principle used in evaluating research is to place greater value on studies with repeatable findings or outcomes. Researchers test theories, and the more these theories are validated, the more they are generally accepted as principles. For example, the Driver Fatigue and Alertness Study (DFAS) (Wylie et al., 1996) was the first to identify the impact of circadian rhythm on CMV driver alertness, and almost every fatigue study after the DFAS has used those results or found similar results, to the point that the impact of circadian rhythm on driver performance is now a generally accepted principle. This is another reason that FMCSA relies on the findings by VTTI regarding TOT versus hours of driving. Increasingly, naturalistic driving data and studies are coming to the same conclusion -- that time of day plays a greater role in driver alertness than the number of hours driven. To answer the concern of Advocates et al., FMCSA reviewed the research literature on driver health and driver fatigue. The Agency used its

best judgment to weigh the adequacy of the research in developing the 2005 final rule. Because subsequent safety data have borne out that judgment, today's rule adopts as final the provisions of the IFR.

Comment. Advocates et al. questioned the value of some of the research that FMCSA used to justify its positions in the HOS rule. Specifically, Advocates et al. stated that FMCSA relied on DFAS despite critical comments from the Agency's peer review panel.

FMCSA Response

The commenter's argument that DFAS was deemed to have "no scientific credibility" is belied by the fact that it formed the basis for a paper published in the New England Journal of Medicine (Mitler, et al., 1997).

DFAS was a landmark study of driver fatigue. Until recently, DFAS was the largest on-road naturalistic driving study, with over 250,000 miles of driving data and over 80 CMV drivers operating in the United States and Canada. It also was the first study that used sophisticated technology to instrument trucks to measure driver performance and fatigue. DFAS was particularly important in changing the methodology by which commercial driver research would be conducted in the future, introducing the use of instrumented vehicles and technology for collecting data in a field setting. The DFAS findings also changed commercial driver fatigue research by identifying the important role of time of day, rather than TOT, with regard to commercial driver fatigue.

In February 1995, a peer review of FHWA fatigue research was performed by eleven specialists from the fields of human factors, sleep research, behavioral psychology, and transportation safety. The peer review actively examined several FHWA

fatigue-related research projects including DFAS. The peer review panel offered a number of comments on how the study was conducted, and some of these could be construed as criticisms. FHWA accepted some of these comments, but believed that others reflected the individual research perspectives of the reviewers. Many of the reviewers, particularly those whose primary experience was in clinical or laboratory settings, were uncomfortable with the operational aspects of the study. However, three other reviews of DFAS by (primarily) applied researchers did not yield these kinds of comments. As with all peer reviews, the DFAS authors and FHWA reviewed, accepted, and made appropriate changes to the final report to reflect constructive comments. Additionally, many of the reviewers commented positively on the strength of the instrumentation package, the extensive database obtained, and the ability of the team to obtain the cooperation of the trucking industry. FHWA believed that the early and intense scrutiny of DFAS findings by the peer review panel significantly enhanced the long-term technical value of this project as well as the planning of future fatigue research.

Comment. Advocates et al. stated that FMCSA also relied on the findings of instrumented driving studies by Hanowski et al. at VTTI (2005, 2007a, 2007b) to support the claim of no difference in risk between the 11th and 10th hours of driving. Advocates were highly critical of the study, stating that the drivers were using experimental warning systems intended to alert them to signs of drowsiness, making it impossible to isolate the effects of an additional hour of driving or to generalize to the population of large truck drivers.

FMCSA Response

FMCSA referred in the IFR to a VTTI study (Hanowski et al., 2007b) that was awaiting publication at the time. That study has now been peer reviewed; the review is posted in the docket for this rule. The peer review panel found that "this study is a valuable contribution to the science underpinning HOS regulations for truck drivers and has potential application to other modes of transportation and operation as well" (Belenky et al., 2008). The peer review panel went on to say that "this is an excellent study and an excellent contribution to the HOS debate" (Id., p. 4). The statement from commenters that "…drivers were using experimental systems…" is correct, but the statement that "[t]his makes it impossible to isolate the effects…" is not. Multiple analyses were conducted that did not include trips where the experimental warning systems were used, thus enabling the effects to be isolated for the additional hours of driving.

In the VTTI study, the number of trips or opportunities decreased as the number of driving-hours increased. Drivers often concluded their trips short of the 11th hour. However, there were 1,535 trips that did include the 11th hour. All driving hours were treated the same. Drivers who stopped a few minutes into the fourth, fifth, or eleventh hour were classified as having driven in the fourth, fifth, or eleventh hour, respectively. In other words, there was no "systematic underestimation" of critical incident risk in the 11th hour of driving; the same procedure was applied to all hours.

It is true that VTTI did not focus on drowsiness-related critical incidents. By not excluding critical incidents based on their underlying cause (for example, distraction or drowsiness), this study directly addressed the driving-hour, or TOT, issue and allowed the Agency to answer the question whether there is an increase in risk associated with

driving into the 11th hour. The multiple analyses that parsed the data in many different ways consistently came to the same conclusion: there is no measurable increased risk for drivers driving in the 11th hour as compared to the 10th hour or any other driving-hour. The finding that TOT is a poor predictor of crashes is consistent with other well-conducted research in this domain (for example, Wylie et al., 1996). FMCSA emphasizes that it relies on research like this study to inform policy so that regulations are based on rigorous, broadly-accepted, and repeatable protocols.

Comment. Advocates et al. stated that FMCSA contradicted itself by rejecting the Paul Jovanis Final Report [Jovanis, P.P., et al**.** (2005)] based on small sample size.

FMCSA Response

FMCSA contracted for and supported the Jovanis study. The Agency did not use the Jovanis study in the 2005 HOS rulemaking because of concerns with the models it used for crash risk in the later hours of driving. For instance, there were 693 trips that involved the first hour of driving and 28 crashes that occurred in the first hour of driving (Id.,p. 5). However, only 30 trips reached the 11th hour, with four crashes occurring in the 11th hour of driving. Conversely, in the VTTI study, there were 1,535 trips in the 11th hour of driving [Hanowski. R.J., et al. (2007), p. 6]. As the result of this small sample size in the 11th hour of driving, FMCSA believes that the models produced in the Jovanis study lack predictive power about the crash risk in the later hours of driving. In evaluating predictive power, one need only inspect the standard error around the crash risk point-estimate. The standard error increases with driving time, particularly during hours 10 and 11. A model's standard error is the difference between the actual values of the dependent variables (results) and the predicted values. The range of the standard error

suggests that the confidence intervals around the model's point estimate could be similar to the first hour of driving or as much as 11 times higher. The confidence interval is used to indicate the reliability of the model's point estimate. How likely the interval is to contain the parameter is determined by the confidence level or confidence coefficient. This model's very wide confidence interval in the 11th hour suggests that it is not reliable for predicting driving risk in the 11th hour of driving. Typically, logistical regression models with increasing standard error or the funneling of confidence intervals around a point estimate are indicative of sample size problems. The increasing standard error demonstrates that this model has no real predictive power in the later hours of driving. Therefore, FMCSA did not reject the Jovanis study because it failed to support FMCSA's conclusions, but rather because of technical problems with its underlying models.

Comment. Advocates et al. stated that Effects of Operating Practices on Commercial Driver Alertness (O'Neil et al., 1999) suffers from severe limitations and cannot be relied on by the Agency.

FMCSA Response

The O'Neil et al. study had appropriate and objective performance metrics, and was tightly monitored and managed by the study agent. The study consisted of laboratory research that assessed the effects of the physical activity of loading and unloading on subsequent driver alertness. This experiment also measured and documented drivers' performance on a daily schedule involving 14 hours on duty. The study concluded that "drivers recovered to baseline performance within 24 hours of the end of a driving week, and should be fit to resume duty after 36 hours… [A] work schedule of 14 hours on-duty/10 hours off-duty for a 5-day week did not appear to produce cumulative fatigue.

Subjective sleepiness, psychomotor vigilance response, and some other measures showed a slight but statistically significant deterioration over the 5-day driving week, but performance on planned and unplanned driver challenge probes did not show cumulative deterioration." [emphasis added]

Laboratory studies, like that of O'Neil and his colleagues, lack the intense realism of naturalistic studies, but they compensate by controlling variables more rigorously than is possible in over-the-road operational studies. Both research strategies are valuable, and both have limitations. FMCSA reviewed and took into account both types of studies evaluated in this rulemaking and used its expert judgment in deciding what weight to give any particular study.

Comment. Advocates et al. claimed that a 2006 study by the American Transportation Research Institute (ATRI) has no credibility for HOS regulatory decisions.

FMCSA Response

ATRI's "Safety and Health Impacts of the New Hours-of-Service Rules" (Dick, V., et al., 2006) reviews how the 2005 HOS rule is functioning within the trucking industry. The study examined aggregated collision and driver injury data from motor carriers before and after implementation of the 2003 HOS rule. The study was significant because it involved 23 medium-to-large trucking fleets, roughly 100,000 commercial drivers and more than 10 billion vehicle miles of travel each year. This study involves the largest number of drivers and vehicle miles traveled that FMCSA is aware of. It found statistically significant reductions in the overall collision rate per million vehicle miles traveled (-3.7 percent), as well as reductions in the preventable collision rate (-4.8

percent), the driver injury rate (-12.6 percent), and the collision-related injury rate (-7.6 percent). These results are consistent with the trends in the FARS data and further support the conclusion that overall safety of the motor carrier industry has been maintained since the 2003 and 2005 HOS rules became effective.

Comment. Advocates et al. offered a 2007 study by Friswell and Williamson that purported to show the dimensions of the fatigued truck driver problem. The commenters asserted that this study contradicts FMCSA's claim that fatigue contributes only to 7 percent of fatal large truck crashes.

FMCSA Response

Friswell and Williamson (2007) found that 38 percent of CMV drivers reported experiencing fatigue at least once a week. The authors surveyed drivers who offered their opinions as to whether they had experienced any fatigue during the prior week. The authors, however, defined fatigue broadly "as feeling drowsy, sleepy, tired, lethargic, bored, unable to concentrate, unable to sustain attention, and mental slowness." With this broad and subjective definition, it is impossible to draw any reasonable scientific comparison with statistically-based studies of fatigue relied upon by FMCSA, or to draw conclusions about whether these drivers were so fatigued they could not safely drive a CMV. Additionally, this study was of Australian drivers who operate under very different operational and regulatory environments than in the United States. Because of the vague definitions, subjective data, and different operating and regulatory environments, the Agency did not rely on the study for this rulemaking.

5. Use of Data, Analysis, and Modeling

a. Crash Data Used in the Regulatory Impact Analysis (RIA)

Advocates et al. criticized the Agency's use of Trucks Involved in Fatal Accidents (TIFA) data in the 2007 IFR RIA. They argued that these data have been used despite the Agency's acknowledgement of their inherent limitations, because they show minimal increases in relative risk between the 10th and 11th hours of driving. They also stated that TIFA is primarily a survey, and depends critically on the ability of the interviewers to retrieve police accident reports or to contact someone directly connected with the fatal crash. Consequently, the TIFA file does not parallel FARS in robustness.

Advocates et al. submitted a research paper by Gander et al. (2006) on under-reporting of fatigue. This study, conducted from 2001 to 2002 in New Zealand, found that police correctly identified fatigue in only 41 to 71 percent of truck driver fatigue-related crashes. The Gander study also emphasized that its findings of police report-based underreporting of fatigue related truck crashes is generally accepted throughout the research community across several countries.

FMCSA Response

FMCSA disagrees with the interpretation provided by Advocates et al. of how the Agency has used data for its analyses. The purpose of the RIA was to evaluate as comprehensively as possible the existing data, models, and research findings to develop estimates of the costs and benefits of implementing different policy options. The ultimate goal was to inform Agency decision-making via the net benefits associated with each option. Consequently, the Agency chose to use the data it believed were best suited for this analysis. The TIFA data are the most comprehensive source of data on fatal large truck crashes. TIFA starts with FARS data and adds further information on those fatal crashes. As FARS represents a census of all large truck fatal crashes, TIFA also

represents a census. As such, TIFA cannot reasonably be characterized as less robust than FARS. It should also be noted that the Agency did not restrict itself to FARS and TIFA data. As discussed in Section F ("Evaluation of Recent Safety and Operational Data Under 11-Hour and 34-Hour Rules") of the 2007 IFR and Sections H (Crash Data) and I (Operational Data) of the 2005 Final Rule, FMCSA considered a multitude of data sources in its deliberations.

FMCSA recognized in the RIA that accompanied the 2005 rule (pp. 44-47) that TIFA and FARS data have inherent limitations. No dataset is perfect, but at least FARS data, upon which TIFA is built, are comprehensive. The datasets can be used to estimate costs and benefits in a robust manner and, therefore, allowed the Agency to make informed decisions about tradeoffs from different policy options. Non-linearity of the crash risk over drive time is commonly found in all data of this nature, and the Agency has never denied that the risk curve becomes steeper at higher drive times in the analysis based on FARS and TIFA data, even though the VTTI study showed no TOT effects. In fact, the Agency developed two separate TOT models, the first for the 2005 rule, and the second for the 2007 IFR, that are specifically designed to track this feature in the data. Notwithstanding the dramatic effects commenters infer from graphs of the data, empirically-based estimates of the increase in crash risk in the 11th hour of drive time fail to demonstrate that the safety benefits of eliminating that hour of drive time exceed the costs.

The TIFA data are the only source of information on large truck crashes by hour of driving that also include coding of fatigue by an unbiased source (the officer at the scene) or alternatively, data gathering and validation by an independent researcher at the

University of Michigan Transportation Research Institute (UMTRI). FMCSA uses the national level FARS/TIFA data precisely to minimize the potential impact of State-by-State differences in the coding of fatigue by each State's officers. There is no reason to believe that the coding of fatigue in large truck crashes would change across all States simultaneously, such that the national level estimates would vary significantly from one year to the next. To ignore the FARS/TIFA data in the Agency's policy making would be to omit from consideration the most reliable dataset available on large truck fatal crashes.

Comment. Advocates et al. argued that the Agency mishandled FARS and TIFA data and that the Agency did not explain its procedures and rationale for dropping a large number of observations from the TIFA dataset. They submitted a report by Quality Control Systems (QCS), which criticized the Agency for excluding TIFA data with missing fatigue information and suggested how to integrate records with partial or missing information into the analysis.

FMCSA Response

The Agency does not agree with the suggestions in the QCS report submitted by the commenters. First, the calculations performed on FMCSA's dataset for the 2005, 2007, and 2008 RIAs, which use only records with full HOS data, are not significantly different, statistically speaking, from those that use the dataset that includes records with partial HOS data, which QCS suggests to use. Second, the standard errors from imputing missing information, whatever the approach, must be integrated into the model. Given that the difference between the partial and full data is not statistically significant, the net result would be to degrade the performance of the model, not enhance its precision.

b. Analysis and Modeling Used in the RIA

This section of the preamble outlines and responds to comments and questions submitted to the docket regarding particular data, models, and/or analysis used in the RIA.

i. Use of Default "% Fatigue Crash" Estimate. Advocates et al. contended that the 1.6 percent of crashes attributed to fatigue that is reported in the FARS data is unrealistic, and submitted numerous criticisms and studies attempting to show that fatigue is systematically underreported in police accident reports. They also asserted that the Agency itself has acknowledged that the effect of fatigue on crash risk is probably underestimated because it may often play a less direct role in triggering a crash; fatigued individuals are prone to a variety of mental and physical errors. These commenters noted a systematic underreporting of fatigue that was even more evident from the State-by-State FARS data, which showed that some States were reporting relatively large numbers of crashes, but no fatigue.

Advocates et al. questioned the Agency's estimated baseline for fatigue-related crashes (7 percent of all large truck crashes), asserting that the choice was arbitrary.

FMCSA Response

FMCSA has already acknowledged that FARS tends to underreport fatigue at a national level and that the coding of fatigue is a complex determination based on a number of factors. Consequently, the current RIA adjusts its estimate of the fatigue-related crash rate upward based on Agency analysis of the available data.

As explained in the RIAs that accompanied the 2005 rule and the 2007 IFR, the Agency's 7 percent figure for fatigue-related truck crashes within the long-haul sector was based on a series of calculations using nationally representative data; the original

calculations were discussed in the RIA that accompanied the 2003 rule. Specifically, the 7 percent baseline used in the 2005 and 2007 HOS RIAs was calculated based on extensive analysis of FARS, General Estimates System (GES), and other data to remove cases that would erroneously bias the estimate downwards (for example, States that never coded fatigue), and an increase to allow for inattention crashes likely to be caused by fatigue. These calculations, assumptions, and analyses associated with defining the baseline for fatigue-related large crashes were explained in detail in Chapter 8 of the RIA that accompanied the 2003 rule, which is available in the docket. Overviews of these calculations, with explanations of adjustments, were outlined in Chapter 5 of both the 2005 and 2007 RIAs, and were also included in the RIA accompanying today's final rule.

At a broader level, FMCSA is not aware of any studies that unambiguously show what percentage of crashes are caused by fatigue. Studies showing high levels of fatigue, such as the 40 percent figure in a docketed National Transportation Safety Board (NTSB) study ("Factors That Affect Fatigue in Heavy Truck Accidents: Volume 1 Analysis," January 18, 1995), were not derived from representative samples of large truck crashes, but from highly atypical data sets. For example, some of these studies are based primarily on fatal crashes in which the truck driver was killed, which are more likely to involve single-vehicle crashes, thereby increasing the percent of total crashes likely to be fatigue-related. As such, these crashes are far from a representative sample of all large truck crashes involving fatigue.

To address the uncertainty surrounding the baseline estimate, FMCSA conducted sensitivity analyses in all of its RIAs in which it nearly doubled the baseline estimate for

fatigue-related crashes. However, even these adjustments do not alter the conclusions of the RIA.

Additionally, while FMCSA had used an estimate of 7 percent as the percentage of all large truck crashes across all hours of driving that would be fatigue-related under the latest HOS rules, recent empirical data actually indicate that this percentage may be relatively accurate. Specifically, as is discussed in more depth later in this preamble, recent TIFA data (i.e., calendar years 2004 through 2006, or after the latest HOS rules became effective) reveal that the percentage of large trucks involved in fatal crashes where the large truck driver was coded as fatigued was only 2.2 percent (or one of 45 large trucks involved in fatal crashes in the 11th driving hour between calendar years 2004 and 2006). Given the relative-risk curves estimated and used in the present RIA analysis, one would naturally expect the percent of fatigue-related involvements in the 11th hour of driving to be higher than 7 percent, since the average across all driving hours was estimated at 7 percent. However, since the percent derived from recent empirical data indicates a much lower percent (2.2%), FMCSA analysts believe the original analysis regarding the 7 percent figure is accurate, even when recognizing that the coding of fatigue-related crashes may be underestimated.

ii. Calculation of Relative Risk Ratios Used in RIA. Advocates et al. expressed confusion over the use of TIFA data in deriving ratios to estimate the relative risk of a fatigue-related truck crash by hour of driving. In particular, they noted that the bar charts shown in Exhibit 5-1 of both the 2005 and 2007 RIAs were not consistent with the data appearing above the bar charts in Exhibit 5-1, or with the text that followed the Exhibit describing the calculation of relative risk ratios used in the RIA.

Advocates et al. believed that the relative risk ratios calculated by hour of driving identified along the X-axis of Exhibit 5-1 should have been calculated by dividing by the relative risk associated with the first hour of driving.

FMCSA Response

The bar charts in Exhibit 5-1 represent the relative risk ratios by hour of driving, but the data appearing above those bar charts simply represent the raw TIFA data which were used to calculate those ratios. The text under the Exhibit describes the bar charts (representing the relative risk ratios by driving hour) and not the raw data appearing above the charts. This is explained via a step-by-step process discussed on pp. 41-42 of the RIA for the 2007 IFR, which culminated in the following statements on page 42:

> Finally, to estimate the relative risk ratios that appear in Exhibit 5-1, the percent of all trucks where fatigue was present at the crash within each driving hour (i.e., 9.6 percent in the 11th driving hour) was divided by 1.9 percent, or the percent of all trucks involved in fatal crashes across all driving hours where it was determined that the truck driver was fatigued at the crash. The result is a relative risk estimate per involvement in a fatigue-related crash for each driving hour. In the case of the 11th driving hour, this estimate is equal to about five (or 9.6% divided by 1.9%), which is represented by the height of the bar chart in Exhibit 5-1 for the 11th driving hour.

As explained in the preamble of the 2007 IFR and in the RIA accompanying today's final rule, the appropriate baseline for calculating the relative risk ratios for driving hours (most importantly, the 11th driving hour) is not the first hour of driving, but a combined weighted average of driving hours 1 through 10. If the daily driving limit was restricted to 10 hours, thereby eliminating the possibility of the 11th hour of daily driving, then that foregone 11th hour would be redistributed to other drivers and/or other driving shifts represented by the spectrum of allowable driving hours 1 through 10.

iii. Questions on the Use of the TOT Curve in 2005 Rule. Advocates et al. expressed concern about the use of the TIFA data in calculating the TOT curve for the purposes of estimating the safety benefits from eliminating the 11th hour of daily driving. According to the commenters, use of TIFA data underestimates the role of fatigue in large truck crashes because TIFA is an extension of FARS data (that is, it simply appends to FARS data additional information on the driver and the large truck involved in the crash) and there have been numerous concerns expressed about under-reporting of fatigue in FARs via use of police accident reports. According to Advocates et al., this subsequently led to very little difference in relative fatigue crash risks between the 10th and 11th driving hours, while ignoring other studies showing very high incidence of fatigue in crashes.

FMCSA Response

In previous HOS documents (the 2003 and 2005 RIAs, and the preamble to the 2005 rule), and as discussed earlier in this document ('Use of "% Fatigue Crash" Estimates'), FMCSA acknowledged the potential under-reporting of fatigue-related crashes in datasets such as FARS and TIFA. Despite these limitations, FMCSA, as well as commenters to this docket, have recognized the unique value of FARS and TIFA to motor carrier policy makers. TIFA is the only dataset that the Agency is aware of that represents a census of nationwide large truck fatal crashes where fatigue is coded by hour of driving, a critical factor for this rulemaking, which must consider differences in relative risk of fatigue in large truck crashes between the 10th and 11th hour. No other database available today provides such comprehensive information. Additionally, an important element of the analysis was the relative difference by hour of driving in the

percent of large truck fatal crashes where fatigue was present versus those where it was not, aside from the baseline level of fatigue crashes. It is this relative difference that forms the basis for calculating relative risk ratios, calculating a TOT multiplier, and subsequently comparing marginal differences in benefits and costs associated with setting a daily driving limit at, for example 10 versus 11 hours. It is true that there are relatively few data points in TIFA involving high-duration TOT such that one could reliably estimate relative risks of fatigue-related crashes. But there are enough total data points at both low and high levels to find a reliable statistical relationship that FMCSA can use to derive a curve for interpolating a relative risk value for the 11th hour and then develop an associated TOT multiplier. This is precisely what the Agency did in its 2005 and 2007 RIAs, as discussed extensively in Section E ("Evaluation of Issues Concerning the Regulatory Impact Analysis") of its 2007 HOS IFR. Dr. M. Laurentius Marais, Ph.D., an independent statistician asked by ATA to review the entire issue, concluded that FMCSA's approach "has a reasonable basis, in contrast with [Public Citizen's] illustrative example, which is virtually guaranteed to produce a biased result." Dr. Marais found that "FMCSA's cubic regression curve matches the curves produced by more sophisticated methods quite closely over the relevant range of driving hours, in contrast to [Public Citizen's] illustrative alternative curve, which departs substantially from the curves produced by more sophisticated methods" [72 FR 71254, fn. 2].

With regard to using other studies, such as Jovanis' work, to develop relative risk ratios by hour of driving, it should be noted that they have their own limitations, and reveal results that vary widely. Jovanis (2005) presents an analysis of data from earlier years that shows that all TOT levels beyond 4 hours are essentially the same, and, if

extrapolated, would give risks at the 11th hour of driving that differed very little from those at 10 hours. In particular, this is the case with the recent study by R.W. Hall and A. Mukherjee (Transportation Research Part E44 (2008)) submitted to the docket by commenters. The commenters stated that:

> Driving-hour data from Lin et al. (1993; 1994), Park et al. (2005), and Jovanis et al. (2005) are more likely to be accurate than TIFA data because they were supplied by unionized carriers with fixed routes and schedules who are less likely to have hours-of-service violations. FMCSA's statistical models should have used these and other strong studies of crash risk (e.g., Jones and Stein, 1987). One of these studies is by Hall and Mukherjee (2008, attached), who conclude that the benefit of changing the driving hour limit from 11 to 10 would be a 2 percent reduction in crashes.

A careful review of the paper by Hall and Mukherjee (who also happened to be a co-author, along with Park, of the Jovanis Final Report) reveals that the commenters appear to have misinterpreted the paper's result. Their estimate of a 2-percent crash reduction from reducing the daily driving limit to 10 hours was erroneously based on a numerical example, not Hall and Mukherjee's actual estimate. For instance:

> We will use the normal distribution <u>as an example</u>, with coefficient of variation values of 0.15 and 0.3, mean trip lengths ranging from 2 to 8 h, and upper bounds ranging from 6 to 12 h. But first, we use a mean driving time of 8 h and a standard deviation of 2.4 h (CV = 0.3) for <u>illustration</u>. [emphasis added] (Hall and Muhkerjee 2008, p. 305)

Using these parameters for their numerical example, Hall and Mukherjee find, in Table 2b of the paper, that the change from 11 hours down to 10 reduces crashes not by 1.99% (which is the reduction from 12 hours) but by (1.99%-1.08%) or only 0.91%. Furthermore, Hall and Mukherjee's quantitative estimate of the value of reducing daily driving limits from 11 hours to 10 hours was, as shown in Table 7 of the paper,

$274 million minus $174 million, or $100 million per year, which is entirely consistent with FMCSA's estimates. Hall and Mukherjee also stated that:

> from an economic perspective, very stringent HOS rules, limiting drivers to perhaps six hours per day, would reduce the cost of crashes by no more than about $1.2 billion per year. This number is consistent with prior FMCSA analyses, which estimated the annual cost of fatigue-related crashes to be $2.3 billion per year. (p. 312)

One reason Hall and Mukherjee find relatively moderate benefits from limiting daily driving hours is that they base their TOT function on the study by Park et al. (Park, 2005) of less-than-truckload drivers. That study did indeed find that crash risks in the 10th hour were twice as high as in the first – but largely because the first hour was so far below the average.

As seen in Table 3 of Jovanis (2005), beyond the first 4 hours, the crash risks relative to the first hour are 1.865, 1.825, 1.837, 1.969, 1.741, and 2.108 – all of these are significantly above the first hour, but show no strong trend. The Jovanis Final Report states:

> Importantly, the risk trend with driving time differs in comparison to earlier findings (e.g. Lin, et al., 1993): the risk increase after hour 4 . . . is not nearly as steep, particularly in the last hour of driving. While unable to statistically differentiate the crash risk, the trend in risk is a general increase from hours 5 through 10. (Jovanis Final Report, p. 15)

Hall and Mukherjee extrapolate the trend from these data to the 11th hour and beyond using the function $y = 0.374 \ln(x) + 1.149$ (from Hall and Mukherjee, Figure 1); substituting 10.5 for x in this expression to estimate risks during the 11th hour relative to the first hour yields 2.03.

The RIA's estimate of the value of crash reductions showed that each one percent of long-haul sector crashes is worth $340 million. Shifting 2 percent (or 0.02) of long-

haul driving from the 11th hour of driving of a trip to new trips lasting an average of 7 hours, would reduce risks by about 0.35[19] times 0.02 which is 0.007, or 0.7 percent. In other words, the reduction in crash risk calculated using this method would be only one-third as large as commenters claim – 0.7 percent rather than 2 percent. If reducing long-haul sector crashes by 1 percent is worth $340 million, then reducing them by 0.7 percent would be worth about $237 million (or $340 million times [0.7 percent divided by 1 percent]). This is quite comparable to the value calculated using FMCSA's method as discussed in the 2005 and 2007 RIAs. This estimate relies on an extrapolation of Park's results, which extended only through the 10th hour, as only the most recent Jovanis study included the 11th hour explicitly. In that more recent study, the uncertainty surrounding the 11th hour estimate was so great that it is not distinguishable from the results based on the earlier study. However one evaluates the Hall and Mukherjee paper, its conclusions remain inconsistent with the results of the Virginia Tech Transportation Institute[20] studies which showed no difference in crash precursors or critical incidents between the 10th and 11th hours of driving.

iv. Balkin Study. Advocates et al. also questioned FMCSA's reliance on the Balkin study (Balkin, T., et al. (2000)) to estimate the relationship between fatigue and performance, contending that the study's "primary finding was that there was no compensatory or adaptive response by the subjects to even mild sleep loss, including the 7-hour cohort." They also asserted that there were many limitations to this study, including the way it was designed, so that they could not calculate TOT effects for each sleep-restricted subject hour-by-hour during the awake daytime period. Also, it was noted

[19] This figure is derived by dividing 2.03 (Hall and Mukherjee's relative risk in the 11th hour compared to the first hour) by 1.505 (their average risk of the first seven hours).
[20] See Hanowski et al., 2007a and 2007b in the List of References in section F.

that the sample size was small, the study failed to address circadian rhythm, and finally that the sleep-restricted 7-hour cohort that achieved an average of 6.28 hours of sleep did not regain baseline performance even after three nights of sleep in a row.

FMCSA Response

The assertion that "there was no compensatory or adaptive response . . . to even mild sleep loss" was not the primary finding of the Balkin study. Rather than being "centered on demonstrating recovery related to the amount of sleep taken for each day," the Balkin report states that "the focus was on quantification of the relationship between nighttime sleep duration and subsequent performance across 7 consecutive days," which was precisely the purpose for which FMCSA used the results of this study – to develop a quantitative relationship between sleep histories and alertness, for the purposes of predicting changes in crash risks in a complex environment.

The Agency acknowledges that the Balkin study did not address TOT issues. That is why FMCSA altered the basic approach of the Walter Reed Sleep Performance Model (WRSPM), which was based on the Balkin study, to use a separate TOT function/multiplier. The fact that the Balkin study did not address TOT does not show that its approach to other fatigue issues is incorrect and cannot be used in combination with a TOT function.

Furthermore, contrary to commenters' assertion that the Balkin study did not consider circadian rhythm, the study did indeed consider circadian effects; data from the study (performance scores by time of day) were used in calibrating the WRSPM, which uses circadian factors as one component of predicted performance.

The Balkin study does state in its Executive Summary that "following more severe sleep restriction (e.g., the 3-hour group) recovery of performance was not complete after 3 consecutive nights of recovery sleep (with 8 hours spent in bed on each night). This suggests that full recovery from substantial sleep debt requires recovery sleep of extended duration." [emphasis added.] The Balkin study clearly indicates, however, that the 7-hour group is an example of a " . . . mild degree of sleep loss." The report's conclusions about recovery from mild sleep loss are more equivocal than the observations about severe or substantial sleep loss shown in the Executive Summary (see p. 2-85 – "The effects of recovery sleep were variable . . . when performance did recover, it was generally not complete after the first 8-hour recovery sleep period. . . . [I]n the 3-hour group, three 8-hour recovery sleep periods were sometimes insufficient to restore performance to baseline levels . . .")

v. Appropriateness of the Sleep, Activity, Fatigue and Task Effectiveness Model and the Fatigue Avoidance Scheduling Tool (SAFTE/FAST Model). Advocates et al. questioned whether the SAFTE/FAST Model used by FMCSA to estimate the impact of work schedules on fatigue and subsequent performance levels under the latest HOS regulations was appropriate for this analysis, given that it was originally designed as a model used by the military. As such, there were questions as to whether it met FMCSA's criteria that truck driving-related studies should be used for this work. The commenters also pointed out that the data integrated into the model represented a small sample size, which FMCSA had considered disqualifying in other contexts. It was noted that the SAFTE/FAST Model measures subject recovery from sleep restriction in relation to a "sleep reservoir" on which the subject draws to perform. Advocates et al. stated that the

average amount of sleep that hard-working drivers were asserted to get per day, 6.57 hours, is inadequate, given FMCSA's repeated documented belief that a minimum of 7 to 8 hours daily sleep is needed by most individuals. It was also asserted that FMCSA ignored the caveat of the Hursh et al. (Hursh 2004) article, which said of the SAFTE/FAST Model that "great care must be taken when applying a model to a performance metric distinct from the one used to design the model."

FMCSA Response

The SAFTE/FAST Model was based closely on the Balkin study, which explicitly used truck drivers as subjects and assessed their performance using truck driving simulators, not battle simulators. Additionally, FMCSA worked directly with Dr. Steven Hursh, the developer of the SAFTE/FAST Model, when it leased the model for use in preparing its RIA. At that time, Dr. Hursh voiced no objections to the use of SAFTE/FAST in the context of this work.

Dr. Greg Belenky, one of the authors of the Balkin study, stated in a peer review of the 2007 HOS RIA (contained in the docket) that "[i]t makes excellent sense to embed the SAFTE/FAST model in a broader system of fatigue risk assessment as is done here.... Conceptually using the SAFTE/FAST model to evaluate schedules is a sound approach to fatigue and crash risk assessment." Dr. Belenky obviously believed that the SAFTE/FAST Model was an appropriate choice for modeling truck drivers' responses to various schedules.

It is also important to clarify here that FMCSA did not claim to use the SAFTE/FAST Model directly for TOT – rather, the results from that model were augmented to increase the fatigue levels it predicted by a factor derived from a separate

data set (TIFA), via the TOT multiplier exercise, in direct response to concerns raised by the D.C. Circuit in 2004. The comment that the SAFTE/FAST Model was inappropriate has no bearing on whether the TOT modeling was reasonable. As with the Balkin study, SAFTE/FAST cannot account for the effects of TOT. Again, that is why a separate TOT function was developed and overlaid on the SAFTE/FAST results. The FMCSA is not aware of any models that can simultaneously take into account all the effects of sleep and schedule patterns, and the Agency therefore used its expertise and best judgment to construct a method that would come as close as possible to this ideal.

The SAFTE/FAST Model was used not to "produce a new more palatable crash risk analysis," but to incorporate the mechanism of the WRSPM using a commercially available package that could reduce the chances of error in application and also take into account shifts in the circadian rhythms. The predicted sleep obtained during a series of 14-hour days would not prevent a decline in performance from an ideal level; the decline is small enough, however (given the chance to obtain recovery sleep during a weekly break), to minimize the decrease in performance. Lastly, the performance metric used was performance vigilant test (PVT) scores, which the WRSPM showed were closely related to simulated driving performance.

In summary, the SAFTE/FAST Model was based closely on a carefully controlled laboratory study of the effects of important fatigue-related factors on the performance and alertness of dozens of truck drivers. It performed, overall, better than any other model tested against real-world data. To this model, FMCSA added a TOT multiplier to further improve its ability to assess the distinction between 10- and 11-hour rule variants. Though Advocates et al. suggested other studies that might be used to replace the

particular TOT model that was used to augment the SAFTE/FAST model results, they provided no indication as to how the use of a different TOT function would solve the problem they identify – that no TOT function has been integrated into a model that can simultaneously account for all important schedule-related factors. Asserting that FMCSA can estimate the effects of its policies only with a model that has been developed to include all important factors, and then has been empirically tested under real-world conditions (which would require extremely intrusive monitoring of actual sleep and performance, with a population large enough to produce a large sample of serious crashes under enough combinations of schedules to demonstrate that the model is accurate under all conditions) is to set the bar unreasonably high.

vi. Applicability of the Cost/Benefit Analysis. Advocates et al. stated that FMCSA had not assessed the costs and benefits for a comprehensive set of commercial truck driver schedules under the new HOS regulations, or more precisely, "of truck drivers working all duty hours both in a shift and over several consecutive days of driving and other work." Conversely, ATA, in its filing to the docket, commented that "FMCSA has taken diligent and extraordinary steps to assure the comprehensiveness of the [cost-benefit] analysis and its parts." NERA Economic Consulting, as a result of its technical review of the 2007 IFR RIA, remarked in its docket comments that "FMCSA has performed a thorough, well-documented analysis of the costs and benefits of the 11th-hour and restart provisions. In fact, we have rarely seen such an exhaustive and technically advanced analysis of a proposed rule from any government agency."

FMCSA Response

Contrary to the assertions of Advocates et al., FMCSA actually evaluated the driving and working schedules of 12 distinct commercial driver types representing all major industry operating segments (for example, for-hire random trip drivers, private regular route drivers, and team drivers) using a simulation model that maximized driver productivity given certain pre-defined constraints (for example, driving hour limits). The driver schedules were estimated over the course of an entire year, so the model examined truck driver driving and working hours over many days and many weeks and measured average daily driving hours, average weekly working hours, and average restart periods. Results from the simulation modeling were described in the RIAs that accompanied the 2003 and 2005 rules and the 2007 IFR, and the technical spreadsheet model and outputs were placed in the docket and made available to the public by FMCSA. For additional details on these models, see "Section D. Regulatory Analysis and Notices" later in this notice and the stand-alone RIA for this final rule found in the docket.

vii. Use of Outdated Crash Cost Estimates. Advocates et al. criticized the Agency for use of crash cost estimates in the 2007 IFR RIA that it claimed were not current.

FMCSA Response

In response to this comment, FMCSA incorporated several updates into its 2008 HOS RIA to reflect more recent information that is publicly available about crash costs and industry size. These updates did not represent significant changes to the RIA and its findings, but were made to reflect more recent information available on crash costs, the value of a statistical life, and the size of the industry. Specifically, these included the following:

- Updating the estimates of the number of commercial drivers engaged in long-haul operations;
- Increasing the value of a statistical life, based on updated values announced by the U.S. Department of Transportation in February 2008; and
- Updating the costs and benefit estimates of the RIA to reflect 2005 dollars (from 2004 dollars) and incorporating new data on crash damages.

More details on these and other nominal changes to the RIA are fully explained in the RIA itself. None of these changes affected the cost/benefit conclusions of the 2007 RIA.

c. Large Truck Crash Causation Study (LTCCS) Data and Analysis

In the 2007 IFR RIA, the Agency used data from the LTCCS. The Agency received several comments about the data, many of them highly technical. The Missouri Department of Transportation stated that the LTCCS showed fatigue at the bottom of the top 10 causes of crashes. Dr. Ronald R. Knipling stated in comments to the docket that the LTCCS provided new, valid information on truck driver fatigue. Nevertheless, he stated that single-vehicle crashes were over-sampled (or over-weighted), which may have led to an exaggeration of truck driver fatigue as a crash factor. According to the commenter, the data could not be used to calculate true relative risk statistics because they lacked exposure data. He also reiterated a critique (referred to as the "confounding factors" critique) that because driver schedule factors were used in the fatigue determination, the fatigue variable and the schedule factors were highly collinear, but the causal relationship was less certain. Safety advocacy groups submitted numerous reviews from the time of the study's inception and data gathering. These reviews included both

positive assessments and criticism, which the safety groups highlighted. Deficiencies they cited included the lack of a control group and exposure data; small sample size; missing, deficient, and uncertain data; and lack of control for confounding factors. These groups also repeated the criticisms of certain reviewers that the study lacked a focused research design.

FMCSA Response

The LTCCS was designed to study why crashes that occurred did occur. That is a characteristic of the data, not a flaw. As such, the LTCCS is well-suited to investigate the causes of crashes or the prevalence of contributory factors, both of which the Agency has analyzed. Safety advocacy groups submitted several early reviews of the LTCCS that were both favorable and unfavorable. Although some of the reviewers faulted the study for the lack of a specific line of inquiry, another reviewer correctly pointed out that there is nothing wrong with studies with broad analytic objectives; almost all major economic surveys conducted by government agencies collect broad amounts of data to support several different lines of analysis. Nevertheless, as one LTCCS reviewer points out, the study is focused insofar as it is designed to gather information on the factors affecting large truck crashes. The fact that the study was not designed to answer a specific question about crash causation does not invalidate its use, although it cannot be used to investigate every hypothesis with the same level of accuracy.

As Knipling pointed out in his comment to the docket, the LTCCS does make a meaningful contribution to research on driver fatigue, and the Agency believes it does have useful applications for specific analyses on this topic. The LTCCS sample size was not small; for a study of this kind, approximately 1,000 crashes involving over 1,200

truck drivers is a very substantial sample. Certain lines of inquiry may be limited by missing data or infrequent occurrences in the data, but in the case of driver fatigue, the dataset yields 706 observations (individual truck drivers) from 642 crashes. The safety advocacy groups misunderstood the "confounding factors" critique. The LTCCS assessed fatigue based on, among other things, drive time, not on an independent physiological determination. This, coupled with Knipling's observation that the apparent over-representation of single vehicle crashes would exaggerate the role of fatigue, suggests that the study would overstate, not understate, the importance of fatigue because an investigator might have a bias toward coding fatigue where a driver has long drive times, measures of work hours, etc., while the converse might be true for low drive times and measures of work hours.

d. Supplemental LTCCS Analysis. The Agency recently commissioned a study of the effects of fatigue in crashes included in the LTCCS. This research has been placed in the docket for this rule, and a summary of the analysis and results follows.

The LTCCS collected data on a random sample of approximately 1,000 crashes involving at least one large truck (gross vehicle weight rating of at least 10,000 pounds) during 2001-2003 where there was a fatality, an incapacitating injury, or a non-incapacitating, but evident injury. The study was a nationwide survey with 24 data collection sites in 17 states and the results were weighted to represent all nationwide crashes. For each crash, investigators collected data on all vehicles involved, including information from driver, witness, and police interviews and from driver logbooks, and determined the critical reason for the crash. Critical reason is not an assignment of fault, but an assessment of whether driver behavior fostered the occurrence of the crash. The

LTCCS also provides information on the driver's level of attention, behavior, and mental or emotional state prior to the crash, including an assessment of fatigue. Investigators determined whether each driver was fatigued based on the driver interview and other information such as logbooks. Factors such as fatigue may have been present even if the driver had not been assigned any critical reason for the crash. Even though a driver may have been found to be fatigued, he or she may not have had any responsibility for the crash.

This analysis focused on the truck drivers involved in the crashes. FMCSA used logistic regression to investigate the relationship between driver fatigue and driver-related critical reason and several explanatory variables: hours of driving, hours worked on day of crash, hours awake, hours of last sleep, hours worked last week, time of day, number of vehicles involved, day of week, and truck type. Because not all fatigued drivers were assigned the critical reason for a crash, the analysis of critical reason more directly examines how the explanatory variables cause crashes. Hours of driving and hours worked provide insight into TOT effects, while hours worked last week can determine the extent to which cumulative fatigue exists. The most important variables associated with driver fatigue were hours awake, hours of last sleep, hours worked the previous week, and the number of vehicles involved. The most important variables associated with driver critical reason were hours of last sleep, hours worked last week, number of vehicles involved, and truck type.

This analysis revealed several interesting facts. Among the more striking findings are that sleep-related variables (including time awake, length of last sleep, and average sleep over the past week) are clearly related to both the chance that a driver of a large

truck involved in a crash was fatigued and to the chance that the driver was assigned the critical reason for the crash. (See figures 3, 4, and 16 in the analysis for plots of the chance of fatigue against these three variables, respectively, and figures 9, 10, and 17 for plots of the chance that the driver was critically responsible against the same three variables.) At the same time, though driving extra long hours in a day or working overtime the previous week appeared to increase fatigue (see figures 1 and 5 for plots of the chance of fatigue against these two variables, respectively), there was no evidence that they increased the chance that a driver was assigned the critical reason for the crash (see figures 7 and 11 of the analysis for plots of the chance that the driver was critically responsible against the same two variables); that estimated probability was almost constant at the longer hours. Furthermore, the main model seemed to validate an hypothesis of the peer review panel for the RIA of this rule that time awake and total on-duty time were more critical than driving time. Long hours of driving in a day did not appear to be related even to fatigue, once hours awake and hours worked were taken into account (see figure 6).

e. New Fatal Large Truck Crash Data. Section F **(**"Evaluation of Recent Safety and Operational Data Under 11-Hour and 34-Hour Rules") of the 2007 IFR provided an extensive discussion of FARS data considered in this rulemaking. In that discussion, FMCSA included a table showing FARS fatal, and fatigue-related fatal, large truck crash data for calendar years 2000 through 2006. Additionally, FMCSA stated that, "In the 3 years since the 2003 HOS rule has been in effect, the number of fatigue-related large truck crashes as a percent of all large truck fatal crashes each year has remained relatively stable," fluctuating "from a high of 2.2 percent in 2000 to a low of 1.5 percent in 2001

and 2004." Since the issuance of the 2007 IFR, the National Highway Traffic Safety Administration has released its 2007 FARS Annual File via the FARS website (www-fars.nhtsa.dot.gov/Main/index.aspx). Those data indicate that the percent of fatal large truck crashes has continued to remain relatively stable, with 78 fatal crashes where the driver of the large truck was coded as fatigued, out of a total of 4,190 large truck fatal crashes in 2007. Thus, 1.9 percent of all fatal large truck crashes occurring in 2007 involved a fatigued truck driver, well within the longer-term high and low of 2.2 percent in calendar year 2000 and 1.5 percent in calendar year 2004.

Section F of the 2007 IFR also included a discussion of Trucks Involved in Fatal Accidents (TIFA) data for the calendar years 1991 through 2005. As described in the IFR, the TIFA data file combines large truck fatal crash data obtained annually from NHTSA's FARS with other information obtained by the University of Michigan Transportation Research Institute (UMTRI). UMTRI collects the additional data items on the commercial driver and vehicle through telephone interviews with truck drivers, carriers, or investigating officers after fatal crashes. UMTRI combines vehicle, crash, and occupant records from FARS with information obtained through TIFA, such as the physical configuration of the large truck, the motor carrier's operating authority, and the hour of daily driving at the time of the crash.

TIFA and FARS variables of particular interest include whether the large truck driver was coded as fatigued at the time of the crash, the time of day, the intended trip distance, and hours driving since the last mandatory off-duty period (a legal minimum of 8 hours for data through calendar year 2003 and 10 hours for calendar year 2004 and 2005 data).

TIFA data published in the 2007 IFR covered the years 1991 through 2005 (the most recent data then available). This file represents more than 50,000 medium/heavy trucks involved in fatal crashes in the U.S.; the truck driver was fatigued in approximately 1,000 of these crashes.

The TIFA data covering calendar year 2006 have become available this year and show a continued downward trend in fatigue-related fatal crashes since the Agency published the 2003 HOS rule (see Table 1).

Table 1: Large Trucks Involved in Fatal and Fatigue-Related Fatal Crashes in the 11th Hour of Driving, by Calendar Year

Calendar Year (CY)	Fatal Crashes	Fatigue-Coded (Large Truck Driver)	Fatigue-Coded as Percent of Total
1991-2002	94	9	9.6 percent
2003	13	1	7.7 percent
2004	16	0	0.0 percent
2005	13	1	7.7 percent
2006	16	0	0.0 percent
1991-2003 Combined	107	10	9.3 percent
2004-2006 Combined	45	1	2.2 percent

Source: Trucks Involved in Fatal Accidents (TIFA), 1991-2006

In CY 2006, 16 large trucks were involved in fatal crashes where the driver was operating in the 11th hour, but in none of these cases was the truck driver coded as fatigued. Combining the 2004-2006 TIFA indicates that there were a total of 45 large trucks involved in fatal crashes during the 11th hour of driving, of which one of these (or 2.2 percent) involved a truck driver coded as fatigued. Conversely, combining data for the 1991-2003 period indicates there were a total of 107 large trucks involved in fatal crashes during the 11th hour of driving, of which 10 involved a fatigued truck driver. As such, collectively, the 2004 through 2006 TIFA data represent a significant improvement over the pre-2003 period, in terms of the percentage of large truck drivers operating in the

11th hour who were coded as fatigued at the time of the fatal crash. Although only three years of TIFA data are available since implementation of the new HOS rules at the start of 2004, the trend is encouraging.

E. Regulatory Analyses and Notices

Executive Order 12866

FMCSA has determined that this action is an economically significant regulatory action within the meaning of Executive Order 12866. As such, the Agency has prepared an RIA analyzing the costs and benefits of this final rule. A copy of the RIA is included in the docket referenced at the beginning of this final rule. However, a brief summary of the RIA results is provided in this section. The Office of Management and Budget (OMB) has reviewed this document.

Introduction to the RIA

This analysis considers and assesses the potential consequences of two potential regulatory options:

Option 1 is the current rule. It allows up to 11 hours of driving, allows a new 7- or 8-day period to begin after a 34-hour restart break, and some splitting of off-duty periods using sleeper berths. The option constrains the use of sleeper berths, however, to ensure that the main sleeper berth period is at least 8 hours long, supplemented by an additional 2-hour break that may be taken outside the sleeper berth.

Option 2 is more stringent than Option 1, limiting driving to 10 (rather than 11) hours in a tour of duty, and eliminating the 34-hour restart provision. The sleeper-berth provisions are the same as in Option 1, and both options retain the short-haul provision contained in the 2005 rule. That provision allows operators of short-haul vehicles that do

not require a commercial driver's license (CDL) – typically those of less than 26,000 lbs gross vehicle weight rating (GVWR) – and that remain within a 150 mile radius of their base, to keep timecards in lieu of logbooks and be on-duty up to 16 consecutive hours two days during a seven-day work week.

Overview of the RIA Analysis

The simulation model used to estimate the costs for implementing Options 1 and 2 was first loaded with data representative of shipping patterns and carrier cost structures, and tested to ensure that it could realistically simulate typical lengths of haul, empty mile ratios, and productivity. The model was then set up to cover the most important cases, under certain constraints (that is, daily driving hour limits, minimum restart hours) represented under each option, and used to simulate carrier operations under different conditions and HOS rule options. FMCSA then analyzed the data representing the simulated operations, using changes in miles driven as a measure of productivity impacts. Output measures from individual runs were weighted to give a realistic representation of the affected industry, including the drivers' use of the most important provisions of the options. The weighted changes in productivity from this procedure were then used to estimate the cost increases imposed on the industry by each option, using an analysis of the changes in wages and other costs likely to result from changes in productivity. These productivity-related costs were combined with transition costs associated with shifting to new regulations to produce estimates of total social costs.

Safety impacts were measured by feeding the on-duty and driving schedules from the carrier simulation model into an operator fatigue model (known as the SAFTE/FAST Model) to project driver performance levels under different schedules allowed under each

HOS option. Then, the fatigue model results were used to estimate the resulting changes in crash risks under each HOS option and for the different operations cases. Changes in fatigue-related crash risks, calibrated to match realistic levels, were then multiplied by the value of all affected crashes to yield estimates of total benefits.

The approaches used to estimate the costs and benefits of this final rule have not changed since the 2007 HOS IFR. However, several inputs to the RIA were updated between the IFR and this final rule in order to reflect the most recent data available. Specifically, these updates include the following: dollar values are now expressed in 2005 dollars rather than 2004 dollars; the industry population has been updated to account for growth in numbers of long-haul drivers over the past six years, when the data were originally collected for the 2003 rule; estimated changes in productivity and crashes have been corrected slightly to include effects on the less-than-truckload sector; and the value of crash reductions has been updated using newer crash information and a revised value of a statistical life. These updates were made either because of comments submitted to the docket regarding the outdated inputs used in the cost/benefit estimation, or, in the case of a higher value of a statistical life, due to new guidance issued by the DOT in Spring 2008.

RIA Results

The weighted productivity impacts from implementing Option 2 (that is, 10 hours driving, no restart) results in a 7.30 percent reduction in driver (labor) productivity compared to the current IFR. From research conducted for the 2003 Rule RIA (contained in the docket), FMCSA analysts showed that each one percent change in driver productivity is associated with just under $300 million in costs using a population

estimate based on the year 2000 and cost figures expressed in 2004 dollars. Updating to a more recent and larger 2005 estimate for the long-haul driver population and expressed in terms of 2005 dollars raises the cost of each one percent change in productivity to $335 million. Multiplying the weighted average productivity impacts by the costs per percent decrease in productivity yields $2,443 million in annual costs associated with implementing Option 2 (relative to Option 1, which obviously showed no change in costs relative to the current operating environment).

The reduction in crash risk from implementing Option 2 instead of Option 1 was estimated to be approximately 0.63 percent. This change in risk was valued by multiplying it by an estimate of the total annual damage associated with heavy-duty long-haul truck crashes, updated to account for a slight increase in total crashes, and re-estimated damages per crash using a higher value of a statistical life. This total was multiplied by the percentage of total damages that were caused by the long-haul segment, yielding just over $34 billion. The reduction in risk attributable to Option 2, given this total value, is about 0.63 percent x $34 billion or about $214 million per year.

In summary, the total annual costs from implementing Option 2 are roughly $2,443 million and the total annual safety benefits are roughly $214 million, resulting in a net annual cost from implementing Option 2 of approximately $2,229 million (in 2005 dollars).

The Agency conducted a series of sensitivity analyses, where it “stress tested” various assumptions related to elimination of the 11th hour of driving. Specifically, the Agency revised its assumptions with regard to several important inputs to the RIA, including the percent of all large truck crashes that are fatigue related (increasing it from

7 percent to 15 percent), the value of a statistical life (increasing it from $5.5 million to more than $10 million), and raising the relative risk of a fatigue-related crash in the 11th hour of driving (by 1.3 times the value used in the revised TOT multiplier). Each change improved the safety benefits relative to costs from eliminating the 11th hour of daily driving, but none of these changes in individual assumptions made elimination of the 11th driving hour cost beneficial. Although it is unlikely that FMCSA mis-specified these three assumptions in its initial analysis, the Agency nonetheless combined all of the new assumptions in a way that makes elimination of the 11th daily driving hour more favorable from a benefit-cost analysis perspective. This exercise still generated net annual costs of $71 million, meaning that eliminating the 11th hour is unlikely to be cost-effective under any reasonable set of circumstances. This represents a brief summary of the contents of the RIA accompanying this final rule. Readers are encouraged to review the full contents of the stand-alone 2008 HOS RIA contained in the docket to this rulemaking.

Regulatory Flexibility Act

Under the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104-121, 110 Stat. 857), FMCSA is not required to prepare a final regulatory flexibility analysis under 5 U.S.C. 604(a) for this final rule because the Agency has not issued a notice of proposed rulemaking prior to this action. However, FMCSA believes the RFA impacts of this final rule were adequately described by the 2005 rule; there are no changes here.

Unfunded Mandates Reform Act of 1995

This final rule will not impose an unfunded Federal mandate, as defined by the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1532, et seq.), that will result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $128.1 million or more in any one year.

Paperwork Reduction Act

This final rule does not alter the existing information collection requests for HOS recordkeeping.

Environmental Justice

FMCSA evaluated the environmental effects of this final rule in accordance with Executive Order 12898 and determined that there are no environmental justice issues associated with its provisions or any collective environmental impact resulting 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 environmental assessment, discussed under National Environmental Policy Act, would result in high and adverse environmental impacts.

National Environmental Policy Act

FMCSA prepared an environmental assessment (EA) of the IFR in accordance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321, et seq., as amended), the FMCSA’s NEPA Implementing Procedures and Policy for Considering

Environmental Impacts (FMCSA Order 5610.1),[21] the Council on Environmental Quality Regulations (CEQ) regulations implementing NEPA (40 CFR parts 1500–1508), the DOT Order 5610.C (September 18, 1979, as amended on July 13, 1982 and July 30, 1985), entitled ‘‘Procedures for Considering Environmental Impacts,’’ and other pertinent environmental regulations, Executive Orders, statutes, and laws for consideration of environmental impacts of FMCSA actions. The Agency relies on all of the authorities noted in this paragraph to ensure that it actively incorporates environmental considerations into informed decision-making on all of its actions, including rulemaking.

As shown in the EA that accompanied the IFR, none of the alternatives considered would have had a significant adverse impact on the human environment. Subsequently, FMCSA determined that the IFR and this final rule will not significantly affect the quality of the human environment and that a comprehensive Environmental Impact Statement is not required. The EA for the IFR, as well as the Agency’s finding of no significant impact (FONSI), are contained in the docket referenced at the beginning of this notice.

Executive Order 13132 (Federalism)

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 13132. FMCSA has determined this rule does not have a substantial direct effect on States, nor would it limit the policymaking discretion of the States. Nothing in this document preempts any State law or regulation.

[21] FMCSA’s environmental procedures were published on March 1, 2004 (69 FR 9680), FMCSA Order 5610.1, National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, and effective on March 30, 2004.

Executive Order 12372 (Intergovernmental Review)

The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities do not apply to this program.

Executive Order 12630 (Taking of Private Property)

This rule will 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.

Executive Order 12988

This regulation meets the applicable standards set forth in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform.

F. List of References

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G. Removal of Rescission Provision

In view of the events following the 2003 HOS rule – a legal challenge resulting in an adverse decision by the D.C. Circuit, which Congress temporarily suspended to allow time for further Agency action, culminating in a new rule – FMCSA thought it appropriate to highlight that the pre-2003 rule had been entirely superseded. It did so by promulgating § 395.0 in the 2005 rule, which provided that "[a]ny regulations on hours of service of drivers in effect before April 28, 2003, which were amended or replaced by the final rule adopted on April 28, 2003 [69 FR 22456] are rescinded and not in effect." As there is no longer a question that the pre-2003 rule is superseded, and further absent any amendment of specific provisions of the Code of Federal Regulations, the provision may not be consistent with the Federal Register Act. FMCSA is therefore removing § 395.0.

List of Subjects

49 CFR Part 385

Administrative practice and procedure, Highway safety, 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 adopts as final the interim final rule published at 72 FR 71247, December 17, 2007, with the following change:

PART 395 – HOURS OF SERVICE OF DRIVERS

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

Authority: 49 U.S.C. 504, 14122, 31133, 31136, 31502; Sec. 229, Pub. L. 106-159, 113 Stat. 1748; Sec. 113, Pub. L. 103-311, 108 Stat. 1673, 1676; and 49 CFR 1.73.

§ 395.0 [Removed]

2. Remove § 395.0.

Issued on: November 13, 2008

David H. Hugel
Deputy Administrator

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