American Bakers Association
Serving the Baking Industry Since 1897

March 3, 2011

Docket Management Facility (M–30)
U.S. Department of Transportation
West Building Ground Floor
Room W12–140
1200 New Jersey Avenue, SE.
Washington, DC 20590–0001

Re: Docket No. FMCSA–2004–19608; Notice of Proposed Rulemaking
Hours-of-Service Regulations
75 Fed. Reg. 82170 (December 29, 2010)

Dear Sir or Madam:

These comments are submitted on behalf of the members of the American Bakers Association (ABA). ABA is the Washington D.C.-based voice of the wholesale baking industry. Since 1897, ABA has represented the interests of bakers before the U.S. Congress, federal agencies, and international regulatory authorities. ABA advocates on behalf of more than 700 baking facilities and baking company suppliers. ABA members produce bread, rolls, crackers, bagels, sweet goods, tortillas and many other wholesome, nutritious, baked products for America's families. The baking industry generates more than $70 billion in economic activity annually and employs close to half a million highly-skilled people. ABA appreciates this opportunity to submit these comments on the notice of proposed rulemaking (NPRM) to the Hours of Service (HOS) regulations.

The wholesale baking industry currently operates the fourth largest fleet of vehicles behind the United States Postal Service, Federal Express and United Parcel Service to deliver the freshest possible products to our customers. A single bread line can manufacture up to 10,000 loaves an hour. Our bakers are producing 1.2 million loaves per week per line and the vast majority of ABA member companies are running at least two lines. For example, bakers typically deliver five days a week. Bakers typically deliver product every day except Wednesdays and Sundays. However, our member companies are increasingly being requested to provide more deliveries to meet both consumer and store demands for fresh baked goods. Our members are committed to timely delivery of a wide variety of fresh, wholesome products that play a vital role in a healthy, balanced daily diet as recommended in the USDA/HHS Dietary Guidelines for Americans. Changes to the HOS regulations could hinder the availability of these healthy, nutritious products to consumers.

ABA and its member companies are committed to both the safety of the driving public, as well as, the health and safety of our industry's drivers. As a result, ABA and its member companies have been closely following the HOS regulations over the years. In fact, we note that this is the

fourth major re-write of this regulation in 15 years coupled with multiple lawsuits. Most recently, ABA has been in communication with the Department of Transportation (DOT), Federal Motor Carrier Safety Administration (FMCSA) and Congress to articulate our concerns regarding the proposed HOS rules. In October 2010, ABA and other concerned partners held a meeting with the Office of Information and Regulatory Affairs in the United States Office of Management and Budget to reiterate our concerns about the proposed changes to the HOS regulations. In an effort to keep lines of communication open, on January 25, 2010, ABA's Distribution Task Force, comprised of senior level baking industry distribution, logistics and transportation executives, met with FMCSA's Associate Administrator William Quade to discuss the Association's perspective on upcoming safety initiatives from the Agency. ABA is committed to staying abreast of, and complying with, all safety initiatives while continuing to voice concerns when such rules would not improve safety and in fact could inadvertently harm our business model.

Specifically, ABA has the following concerns with the proposed HOS rules:

1. The midnight to 6:00 am time-frame limitations would be ruinous for the industry
2. The rules, as proposed, are confusing;
3. The rules do not allow for flexibility;
4. The exemption rule is not sufficient for our industry;
5. The rules place an undue burden on short haul (less than 150 miles) drivers; and
6. The 34 hour restart provision would be devastating to the baking industry.

Midnight to 6:00 am Time-Frame Limitations.

A major issue for the baking industry is the midnight to 6 a.m. time-frame limit. It would make it significantly more difficult, if not impossible, for the baking industry to adequately service customers in a timely manner. Major retailers, convenience stores, restaurants and institutions all require their bakery products be delivered prior to the daily opening of their businesses. Our industry bases its business on daily deliveries of fresh perishables. Common industry practice has companies beginning their delivery routes prior to 6:00 am and making warehouse deliveries overnight to meet market needs.

In addition, many localities have ordinances that determine when deliveries may be made and were designed to reduce traffic congestion and environmental emissions. This proposal would be in direct violation of these ordinances.

The proposed rules are confusing for both industry and law enforcement, with too many interrelated variables.

The 14 hour "driving window" is actually 13 hours of on-duty time. It includes a mandatory minimum 30 minute break each seven hours. ABA believes this will incentivize drivers to work harder to finish more quickly. This could lead to increased injuries while unloading due to rushing. More injuries typically mean higher workers compensation costs for employers.

For example, a co-driver who used to be able to work beyond the 14th hour, and who wasn't going to drive again that day, will be restricted and WILL try to squeeze all the work into the 13 hours. This will also increase risk-taking which again, could result in increased injuries.

ABA anticipates the proposed rules will increase the need for additional equipment and drivers. At a time when American industry, businesses both large and small, are striving to be more efficient and when consumers are already stretching their budgets as far as possible, increasing the cost of doing business will have a negative impact on the baking industry. Consumers could possibly be affected as well through higher prices at the grocery store, further harming the fragile US economy.

The proposed rules could result in a significant and unnecessary redesign of the industry's distribution system. This would be very disruptive to our businesses. Our current processes have worked efficiently and safely for many years.

The proposed rules do not allow the flexibility needed for product delivery or team driver operations.

Many ABA member companies' employees work a split day. They work in the morning servicing stores, take a mid-day break of up to 4 hours, and then service stores again in the evening. Without the ability to split the off-duty time in a logical manner, overhead costs are likely to increase, which could eventually lead to higher product costs in the marketplace.

Another concern for the baking industry involves flexibility for team driving. Team driving is a process in which two drivers share the responsibility of driving freight across long distances. While one person drives, the other typically rests or sleeps in the truck's sleeper berth. A study carried out by the FMCSA in 2002 showed that team drivers tended "to drive much less aggressively, make fewer errors, and rely effectively on their relief drivers to avoid instances of extreme drowsiness while driving" (Publication No. FMCSA-MCRT-02-070). The same study states that, "Unlike extremely tired single drivers who may have felt compelled to continue to drive even when it was dangerous to do so, the individual drivers in a team operation generally had no similar compulsion to operate the vehicle when they were extremely tired." These findings recognize that team-driver operations create safer trucking operations. Unfortunately, this area of the regulations was not addressed in previous rule changes and should be given serious consideration at this time. Under the proposed rules, there will be more single driver activities for team drivers (unloading product, rollers, fueling, etc.) due to being relieved of duty after the 14th hour.

Requiring drivers to go "off duty" for a team operation that could keep working with more flexible rules will cause inefficiencies in scheduling, prevent drivers from being able to spend sufficient time servicing customer needs, and lengthen trip times. This issue has been thoroughly debated and resolved over the past 15 years.

Applying for exemptions is not as an answer to our members' problems.

Many of ABA's member companies employ third-party transporters for goods, ingredients and packaging. Some have suggested these companies might be able to qualify for an exemption from the proposed rules. However, since an exemption issued to the member companies would not exempt our strategic partners, this is not a viable solution for our industry. Frankly, if FMCSA conducts the rule making process properly, exemptions should not be necessary.

These rules are extremely cumbersome for "short-haul" drivers.

The proposed change in the 34 hour restart provision requiring drivers to rest a minimum of two consecutive complete nights may do very little to promote driver safety in the short haul industry. We are unaware of driver safety issues among short haul operators resulting from driver fatigue. Short haul operators frequently drive through urban areas that include stop lights and traffic signals and perform other functions, such as restocking store shelves, while on duty. The nature of this type of work helps to greatly reduce driver fatigue that may be a factor in the long haul industry.

ABA believes the 34 hour restart provision will impose a large cost and burden to the industry. This provision will seriously undermine business practices designed to mitigate urban congestion, promote safety and reduce emissions. Today, many short haul functions occur at night when trucks do not compete with commuters on urban roadways. Separating this traffic eases congestion, reduces idle emissions and increases safety while also providing the many business that rely on short haul services more predictable delivery schedules. The change to the 34 hour restart provision outlined in the proposed rules could require short haul operators to deploy more equipment and resources during peak commuter driving hours that may have an adverse impact on safety and emissions while also negatively impacting productivity for truckers and their customers. This may result in lost sales both in the U.S. and in foreign markets, as well as cause production delays for manufacturers receiving inputs.

For instance, many ABA member companies have route sales personnel and independent distributors who do little actual driving. Much of their time is spent servicing stores through stocking shelves, interacting with store management, and seeking potential sales opportunities. This would mean having to curtail business operations to ensure that they do not run out of hours of service which could mean stores will be without product for consumers.

The 34 hour restart proposal would also negatively impact fresh bakery operations.

The proposed 34 hour restart rule would also significantly impact fresh bakery operations and require a substantial, and potentially devastating, change to existing business models. It would result in companies having to add additional drivers to ensure each one had at least two consecutive days off while still being able to provide customers fresh deliveries.

Conclusion

In conclusion, the current hours of service regulations, properly enforced, have been effective in improving safety as demonstrated by current crash data trends. For example, the trucking industry's safety performance has improved at an unprecedented rate while operating under the current HOS regulations. The number of fatal accidents and injuries involving large trucks have declined more than one-third, and are now at their lowest levels in history. Therefore, there is no safety benefit or documented rationale to change the existing rules. The proposal, as written, would require significant changes to current business models that would affect employee work hours and increase the cost of transporting and delivering fresh bakery products.

ABA believes that providing single drivers an opportunity to take a rest break that does not count against on duty time would provide an additional incentive for drivers to take needed rest breaks without mandating a required minimum amount of time as part of the regulation.

Additionally, ABA believes more flexibility should also be granted to team drivers in the use of the sleeper berth. ABA recommends that the FMCSA maintain the current requirement for total sleeper berth of 10 hours while allowing team drivers to break their sleeper berth into periods of not less than five hours.

FMCSA has made a number of substantial changes to its approach since the previous regulatory impact analysis (RIA) issued in 2007. ABA finds that, in every instance, FMCSA's new methodologies and assumptions increase the apparent net benefits of the proposed rule. However, many of FMCSA's new approaches rely on misapplication of available data, use of outdated information, or lack empirical support entirely. FMCSA also makes a number of errors in its calculations which serve to further overstate its findings. These substantial findings and concerns are clearly outlined in the Edgeworth Economics analysis report commissioned by the American Trucking Association. This report is attached as an appendix to our comments.

ABA appreciates this opportunity to provide comments on the proposed changes to the Hours of Service regulations, which are of substantial importance to the baking industry. ABA is confident that the concerns outlines above will be useful as the Agency finalizes its HOS regulation. Should FMCSA have questions or need additional information, please contact me.

Respectfully submitted,

Lee Sanders
Senior Vice President
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Attachment

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REVIEW OF FMCSA'S REGULATORY IMPACT ANALYSIS FOR THE 2010-2011 HOURS OF SERVICE RULE

Prepared for the American Trucking Associations

By Edgeworth Economics

February 15, 2011

REVIEW OF FMCSA'S REGULATORY IMPACT ANALYSIS FOR THE 2010-2011 HOURS OF SERVICE RULE

I. Introduction and Summary of Findings

The American Trucking Associations (ATA) asked Edgeworth Economics to review the Regulatory Impact Analysis ("RIA") for the 2010-2011 Hours of Service Rule issued by the Federal Motor Carrier Safety Administration (FMCSA) on December 29, 2010. FMCSA's preferred proposal (designated "Option 2" in the RIA) includes several significant changes to current hours-of-service ("HOS") regulations, including: a restriction of daily on-duty time to a maximum of 13 hours; a reduction of daily driving time to a maximum of 10 hours; and a requirement that the "restart" period include two consecutive off-duty periods from 12 a.m. to 6 a.m.[1] FMCSA also considers an option which retains the 11th driving hour ("Option 3") and one which restricts driving time to 9 hours ("Option 4").

FMCSA estimates the impact of the proposed options on industry productivity, the frequency of fatigue-related crashes, and driver health. FMCSA concludes that Option 2 would generate net benefits of $380 million annually under the agency's central assumptions, with a range based on other assumptions from $1.45 billion to -$750 million per year.[2] FMCSA calculates net benefits of Option 3 in the range of $1.26 billion to -$190 million ($560 million central case) per year and net benefits of Option 4 in the range of $1.37 billion to -$2.32 billion (-$420 million central case) per year. FMCSA concludes that the net benefits of the proposed rule "are likely to be positive" for Options 2 and 3, but not for Option 4.[3]

Our analysis of the proposed rule focuses on the following questions:

- Can FMCSA's analyses be replicated and its conclusions verified using information provided in the RIA or elsewhere in the public record?
- Are the assumptions and methodologies used by FMCSA to calculate the costs and benefits associated with the proposed rule internally consistent within the RIA and consistent with available data and with the precepts of economics and statistics?
- Are the assumptions and methodologies in this RIA consistent with previous FMCSA analyses—in particular, the RIAs issued by FMCSA in 2007 and 2002 for previous versions of HOS rules?
- Do any errors, inconsistencies, or unreasonable assumptions in the RIA affect FMCSA's conclusions regarding the costs and benefits of the proposed rule?

Our analysis is based on the previously issued RIAs and Federal Register notices regarding the various versions of the hours-of-service ("HOS") interim and final rules. We also reviewed source documents cited by FMCSA, when publicly available, as well as other materials available in the public domain related to large-truck crashes, the relationship between work and sleep time, the relationship between sleep and mortality, and other relevant issues.

FMCSA has made a number of substantial changes to its approach since the previous RIA issued in 2007. We find that, in every instance, FMCSA's new methodologies and assumptions increase the apparent net benefits of the

[1] RIA, pp. 1-5 and 1-6.

[2] RIA, p. ES-4. Dollar amounts in the RIA are generally reported in 2008$.

[3] RIA, pp. ES-3 and ES-4.

proposed rule. However, many of FMCSA's new approaches rely on misapplication of available data, use of outdated information, or lack empirical support entirely. FMCSA also makes a number of errors in its calculations which serve to further overstate its findings. We document these issues in this report. Our main conclusions include the following:

- FMCSA overestimates the total number of hours at issue by misusing the data from the 2005 and 2007 Field Surveys. In particular, the agency fails to consider that carriers sampled in those surveys, particularly those chosen because of poor safety performance, may use drivers more intensely than other carriers. FMCSA also overestimates the extent to which drivers sampled in the surveys actually exceeded 9 hours of driving or 13 hours of work and assumes, inappropriately, that drivers who were measured by the surveys to be out of compliance with current HOS rules would nonetheless comply with the new, more restrictive rules. These factors result in an overstatement of both the costs and benefits of the proposed rule.

- FMCSA has abandoned its model of carrier logistics, which the agency previously had used to calculate the impact of HOS rule changes on industry productivity in the 2007 RIA. Instead, FMCSA estimates costs using a series of assumptions based only on the agency's "judgment and knowledge of the industry." Under these unsupported assumptions, FMCSA estimates that the proposed rule (Option 2) would reduce productivity by 2.8 percent, compared to the agency's previous finding of a 7.1-percent impact for similar changes in HOS policies. This change in approach increases the net benefits of the proposed rule by more than $1.5 billion annually.

- FMCSA overstates the risk of driver fatigue and the extent to which a reduction in driving or work time would reduce such risk. For its estimate of the rate of fatigue risk, FMCSA relies on the finding from the Large Truck Crash Causation Study that 13 percent of crashes had driver fatigue as an "associated factor." This figure is almost double the 7-percent estimate of average fatigue risk used in the 2007 RIA. The LTCCS, however, was based on crash data collected prior to the implementation of current HOS rules, which were designed specifically to reduce fatigue risk. FMCSA fails to adjust the findings of the LTCCS to reflect the impact of current HOS rules. Additionally, FMCSA treats the LTCCS's coding of fatigue as an "associated factor" in a crash as an indication that fatigue was the "cause" of that crash, despite the fact that many crashes have multiple associated factors. FMCSA's approach contradicts the agency's previous analysis of LTCCS data. FMCSA also fails to adjust for oversampling of single-vehicle crashes in the LTCCS, which further inflates the agency's measure of fatigue risk for the industry as a whole. Applying the 7-percent figure rather than FMCSA's new assumption of 13 percent reduces the apparent benefit of the proposed rule by $330 million annually.

- In previous RIAs and in public comments related to those analyses, FMCSA repeatedly asserted that current rules provide sufficient flexibility for drivers to eliminate any concern about fatigue caused by accumulation of on-duty time (as opposed to "acute" fatigue caused by a long tour on a particular day). FMCSA now has reversed its position and estimates substantial crash-reduction benefits associated with reducing weekly work time. The agency, however, again relies inappropriately on an analysis of pre-2004 crash data from the LTCCS for its calculations. FMCSA further errs by assuming that the risk of a crash is the same during a non-driving work hour as it is during a driving hour, which is clearly false, and by rounding up any reductions in work time to a whole hour, even if the calculated effect is only a small fraction of an hour. These two errors alone serve to inflate the apparent benefits of the proposed rule by almost $200 million per year.

- FMCSA calculates the cost of crashes by long-haul drivers using an assumption of 434,000 crashes per year—approximately the level of crashes during the 2000-2003 period. Since that time, however, the frequency of crashes by long-haul drivers has fallen substantially—to 286,000 in 2009. FMCSA's use of outdated crash numbers results in an overstatement of benefits by about 34 percent.

- In previous statements, FMCSA had taken the position that current HOS rules allow drivers to obtain sleep levels "within normal ranges consistent with a healthy lifestyle." In contrast, FMCSA now assumes that the small reductions in work time under the proposed rule will translate into even smaller increases in average sleep levels for long-haul truck drivers, and that this will result in improved driver health. FMCSA bases its calculations on two fundamentally flawed analyses. First, FMCSA assumes that an observed correlation between work time and sleep time for truck drivers can be used as a basis to assume that small reductions in work will result in proportional increases in sleep for drivers. In the Notice of Proposed Rulemaking, FMCSA states that "the Agency has no basis for estimating the extent to which drivers who have an extra hour a day or hours per week off duty will use that time to exercise and sleep"; yet the agency's analysis in the RIA relies on precisely such an assumption. FMCSA fails to consider that the observed correlation may be due, in whole or in part, to differences between drivers rather than responses to changing work patterns. Second, FMCSA attributes reductions in mortality to very small changes in sleep levels for drivers who already obtain a "normal" amount of sleep, despite a lack of adequate support from sleep research and previous acknowledgement by the agency that such benefits were not measurable. FMCSA ignores the conclusions of sleep researchers that the agency itself cites in the RIA, who state that "there is no evidence that sleeping habitually between 6 and 8 [hours] per day in an adult is associated with harm and long term health consequences."

- Where adequate data is available, we correct the errors and unreasonable assumptions in FMCSA's analysis described above. We estimate that FMCSA's Option 2 would result in a net *cost* of $320 million per year. That is, we find that FMCSA has overstated the net benefits of the proposed rule by about $700 million annually and that the proposed rule would impose a net cost on society, rather than a net benefit as claimed by FMCSA. This estimate excludes any health-related benefits associated with increased sleep levels. If health-related benefits are included in the model as calculated by FMCSA, while making the other corrections, we calculate the proposed rule would still result in a net cost to society of $20 million annually—i.e., FMCSA has overstated the net benefits of the proposed rule by $400 million per year. Due to a lack of adequate documentation in the RIA, we were unable to replicate FMCSA's calculations for Options 3 and 4; however, based on our calculations for Option 2, we expect that both policies would result in substantial net costs.

This report was prepared by Jesse David with assistance from Chuck Fields at Edgeworth Economics. Edgeworth is a consulting firm that provides analysis and advice on economic and regulatory issues for companies, individuals, industry groups, and government agencies. Dr. David holds a Ph.D. in Economics from Stanford University and has 14 years of experience as a professional economist. Dr. David specializes in the evaluation of regulatory policies, economic impact analysis, and the valuation of assets and businesses in complex commercial transactions and disputes. He has testified before regulatory agencies, such as the Federal Energy Regulatory Commission and the National Energy Board of Canada, as well as in Federal and State courts on a variety of economic issues. Dr. David also has served as a peer reviewer for the Environmental Protection Agency's STAR grant program. Dr. David has prepared studies for entities such as the National Football League Players Association, the San Diego County Water Authority, the New York Power Authority, and the Ocean Conservancy. Dr. David analyzed previous RIAs issued by FMCSA for HOS rules in public comments sponsored by the ATA.[4]

II. Summary of FMCSA's Methodologies and Assumptions

In this section, we summarize FMCSA's assumptions, methodologies, and results regarding the projected costs and benefits of the proposed rule.

[4] See Mark Berkman and Jesse David, "A Review of the Federal Motor Carrier Safety Administration's Economic Analysis for Its Proposed Hours of Service Standard," August 3, 2000; and NERA Economic Consulting, "A Review of FMCSA's Regulatory Impact Analysis for Hours of Service Options," February 4, 2008.

A. Drivers Affected by the Proposed Rule

FMCSA assumes that only drivers of large trucks who engage in "long-haul" operations—defined by the agency as drivers who travel beyond 100 miles from their base—will be affected by the proposed rule.[5] FMCSA estimates that there are 1.6 million drivers in this category, based on an estimate of total long-haul trucking revenue from the Economic Census and an assumption of $175,000 of revenue per long-haul vehicle.[6] For the purposes of its calculations, FMCSA assumes that the industry will be in complete compliance with the proposed rule.[7]

B. Long-Haul Driver Operating Patterns

FMCSA allocates long-haul drivers to four categories defined by average weekly work time: Moderate (average of 45 hours); High (60 hours); Very High (70 hours); and Extreme (80 hours).[8] Based on the 2005 and 2007 Field Surveys, FMCSA estimates the share of the workforce in each category and makes a series of assumptions to characterize the "typical" work day and work week for drivers in each category.[9] FMCSA then uses findings from the field surveys to estimate the proportion of tours of duty that currently utilize the 10th or 11th driving hour or the 14th work hour—i.e., the share of tours that would be affected by the proposed rule. FMCSA's key assumptions are summarized in Table 1.

Table 1
FMCSA Assumptions Regarding the Operating Patterns of Long-Haul Truck Drivers

Driver Group	*Avg. Weekly Work Time*	*% of Workforce*	*Typical Weekly Work Days*	*Typical Daily Driving Hours*	*Use of 14th Work Hour[1]*	*Use of 11th Driving Hour[1]*	*Use of 10th or 11th Driving Hour[1,2]*
Moderate	45	66%	5	7	2%	10%	25%
High	60	19%	6	8	7%	25%	50%
Very High	70	10%	6	9	25%	50%	75%
Extreme	80	5%	6	10	60%	70%	90%
Weighted Avg.					8.9%	21.1%	39.6%

Source: RIA, pp. 2-5 – 2-8.

Notes: [1] FMCSA estimates the figures for each driver category so that the weighted averages across all drivers match the industry-wide figures from the 2005 Field Survey.

[2] FMCSA's description of these figures as representing use of the 10th *and* 11th driving hours appears to be incorrect. FMCSA's figures correspond to data from the 2005 Field Survey for drivers who use the 11th *or* the 10th/11th driving hours—i.e., driving in excess of 9.0 hours per day. [2005 Field Survey, p. 7]

C. Impact of the Proposed Rule on Drivers

FMCSA then makes a series of assumptions based on the agency's "judgment and knowledge of the industry" about how each category of driver would respond to the restrictions imposed by the proposed rule. We summarize these assumptions in Table 2.

[5] RIA, p. 2-1.

[6] RIA, p. 2-3.

[7] RIA, p. 1-6.

[8] RIA, pp. 2-5 – 2-8.

[9] "FMCSA Field HOS Survey: Motor Carrier Industry Implementation & Use of the April 2003 Hours of Service Regulations," June 2005 ("2005 Field Survey"); and FMCSA, "2007 Hours of Service Study" ("2007 Field Survey").

Table 2
FMCSA Assumptions Regarding Changing Work Patterns in Response to New HOS Restrictions

Driver Group	*Current Use of 14th Work Hour as a Break*[1]	*Ability to Shift 14th Work Hour to Another Day*	*Portion of 11th-Hour Driving Time Lost Due to 10-Hour Restriction*	*Portion of 10th/11th-Hour Driving Time Lost Due to 9-Hour Restriction*	*Additional Weekly Work Hours Lost Due to Restart Provision*		
					Option 2	*Option 3*	*Option 4*
Moderate	n/a	1	55%	65%	0	0	0
High	0.5 hr	0.5	65%	75%	0	0	0
Very High	0.75 hr	0.33	75%	85%	0.7	0.7	0.7
Extreme	1 hr	0	85%	95%	4.9	7.1	3.0

Source: RIA, pp. 3-4 – 3-10 and D-1.

Note: [1] FMCSA assumes that some fraction of current use of the 14th hour is non-productive break time, which could not be shifted to another day. Drivers in the Moderate category are assumed to be able to fully shift any use of the 14th hour without productivity loss. See RIA, pp. D-1 and D-2 for FMCSA's explanation of these assumptions.

In addition, FMCSA assumes that Option 2 would shift a full hour of driving time for drivers who would have used any part of the 11th hour in the absence of the new rule. FMCSA assumes that Option 4 would shift 1.5 hours of driving time for any driver who would have used any part of the 10th or 11th hours in the absence of the new rule. Finally, FMCSA assumes that under Option 2 one half of the impact of the work-time restriction would be felt through a reduction in driving time. Thus, the additional drive-time restriction would have less of an impact than it would if it was the only change in the rules. FMCSA does not appear to make such an assumption for Option 4.

FMCSA uses these assumptions to estimate an overall reduction in industry productivity of 2.8 percent under Option 2.[10] The figures for Options 3 and 4 are 1.3 percent and 6.4 percent, respectively.

FMCSA monetizes these figures using an estimate of $356 million per 1-percent productivity loss, based on calculations performed in previous RIAs regarding additional driver wages and benefits, capital expenditures, and overhead associated with replacing the work time lost due to the proposed rule.[11] FMCSA calculates an annual cost to the industry of $990 million for Option 2, $480 million for Option 3, and $2.27 billion for Option 4.[12] FMCSA adds $40 million per year for training and reprogramming costs.[13]

D. Safety Benefits from Reduced Daily Driving Time

FMCSA calculates safety-related benefits associated with reduced daily driving time by estimating the share of all large-truck crashes due to fatigue at each hour of driving and then assuming that the proposed rule will shift the relatively high-risk driving at the 10th or 11th hours to relatively lower-risk driving at lower hours.

The first step is estimating the fatigue-risk curve. FMCSA uses 1991-2007 data from the Trucks Involved in Fatal Accidents (TIFA) study to generate a fatigue-risk/driving-hours relationship. FMCSA fits a "logistic" curve to the raw data in order to generate a smooth, upward-sloping relationship between hours of driving and fatigue risk, which reaches approximately 5 percent at 11 hours (i.e., 5 percent of crashes in the 11th hour are caused by fatigue).[14]

[10] Edgeworth calculations based on descriptions of FMCSA's approach in the RIA.

[11] RIA, p. 3-9; and FMCSA and ICF International, Inc., "Regulatory Impact Analysis for Hours of Service Options," December 7, 2007 ("2007 RIA").

[12] RIA, pp. 6-2 – 6-3.

[13] RIA, pp. 6-3 – 6-4.

[14] RIA, p. 4-21.

Based on work patterns from the 2005 Field Survey, FMCSA calculates an average fatigue-risk of 1.8 percent across all driving hours.[15]

The agency, however, does not believe that the TIFA data provide an accurate overall measure of fatigue-risk. Instead, FMCSA uses a figure of 13 percent taken from 2001-2003 data in the Large Truck Crash Causation Study (LTCCS).[16] This figure represents the share of large-truck crashes in the LTCCS sample where fatigue was determined to be an "associated factor"—i.e., "any of approximately 1,000 conditions or circumstances present at the time of the crash is coded."[17] FMCSA then scales up the risk curve from the TIFA data so that it indicates an average risk of 13 percent. As recognized by FMCSA, the coding of fatigue in the LTCCS could suffer from upward bias due to the tendency of inspectors to record fatigue as a factor if they learn that the driver was on the road for extended hours, without any independent evidence of fatigue, as well as the possibility that the observed increase in fatigue risk at high driving hours may reflect only an increase in the share of crashes associated with fatigue rather than an increase in the frequency of such crashes (which is the relevant factor for analyzing the proposed rule).[18] Despite these issues, FMCSA nonetheless asserts that the 13-percent figure is "conservative" because the LTCCS does not count any crashes as fatigue-related if the associated factors were coded as "unknown."[19] FMCSA also provides additional calculations using an average fatigue risk of 7 percent (the rate used by FMCSA in its previous RIA) and 18 percent (described by FMCSA as "roughly as far above the LTCCS value of 13 percent as the 8.15 percent pre-2003 estimate is below 13 percent").[20]

FMCSA then calculates the reduction in risk from shifting the affected hours to either the same driver on a different day (shifted to hours 6-10 in Option 2 or hours 6-9 for Option 4) or to a different driver who is assumed to have an average level of fatigue-related risk.

Finally, to monetize this reduction in risk, FMCSA calculates an average cost of large-truck crashes equal to $10.33 per hour driven.[21] This figure is based on the following assumptions: 1) an average cost per crash of $148,000; 2) 434,000 large-truck crashes per year; 3) 58 percent of large-truck crashes associated with long-haul routes; and 4) 2,257 hours driven per year per long-haul driver. FMCSA multiplies the risk reductions by the per-hour crash cost to calculate an annual value of the shift in driving time of $180 million for Option 2 and $490 million for Option 4.[22] FMCSA also reports a figure of $20 million for Option 3; however, the agency did not provide enough details to verify this calculation.

E. Safety Benefits from Reduced Cumulative Weekly Work Time

In addition to the benefits from reducing maximum daily driving time, FMCSA estimates a separate component of benefits related to reduction in cumulative weekly work time. FMCSA bases its calculations on a fatigue function developed from the LTCCS data, indicating an upward-sloping relationship between hours worked in the previous week and the likelihood of the presence of fatigue as an associated factor in a crash.[23] FMCSA adjusts the curve slightly so that it is consistent with an average fatigue rate of 13 percent at 52 hours of work per week (the average

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[15] RIA, p. 4-22.

[16] RIA, p. 4-20.

[17] FMCSA, "Report to Congress on the Large Truck Crash Causation Study," March 2006 ("LTCCS Report to Congress"), p. 9.

[18] "Hours of Service of Drivers: Notice of Proposed Rulemaking," Federal Register, v. 75, n. 249, December 29, 2010, ("2010 NPRM") p. 82175.

[19] RIA, p. 4-20.

[20] *Ibid*.

[21] RIA, p. 4-23.

[22] RIA, p. 6-5.

[23] RIA, p. 4-25.

weekly work time across all drivers, based on FMCSA's assumptions described above). As in FMCSA's analysis of daily driving time, here the agency again assumes that the presence of fatigue as an associated factor in crashes implies that fatigue *caused* those crashes.

FMCSA then calculates a reduction in fatigue risk from reducing work time for drivers with an average of 60 or more hours of work time per week by shifting work time to other drivers. FMCSA assumes no reduction in fatigue risk due to reduced weekly work time for drivers in the Moderate category. FMCSA adjusts the lost-time figures downward to account for the impact of the driving-time restriction on work hours.[24]

FMCSA monetizes the reduction in fatigue risk due to reduced work time using the same $10.33 per hour figure described above, which represents the average cost of large-truck crashes per hour of driving. FMCSA calculates a value of these risk reductions of $540 million annually for Option 2, $410 million for Option 3, and $740 million for Option 4.[25]

F. Health Benefits from Reduced Cumulative Weekly Work Time

Finally, FMCSA estimates health benefits associated with increased average sleep time for drivers. FMCSA starts with an estimate of the baseline level of sleep for each type of driver. The agency uses "low" estimates based on a study by Hanowski, *et al*. [2009], "high" estimates based on a study by Balkin, *et al*. [2000], and "medium" estimates which are the average of the other two.[26] FMCSA's medium estimates of baseline sleep range from 6.23 hours per day for drivers in the Extreme category to 7.02 hours per day for drivers in the Moderate category.[27]

FMCSA then uses the results of an internal analysis correlating work hours and sleep hours for long-haul drivers to translate the change in work hours for each driver type and HOS option into a change in sleep level. FMCSA calculates that Option 2 would result in increases in sleep ranging from 0.2 minutes per day for drivers in the Moderate category up to 22.7 minutes per day for drivers in the Extreme category.[28] FMCSA finds that Option 3 would result in slightly smaller sleep increases for drivers in the Moderate to Very High categories and that Option 4 would result in slightly greater sleep increases. FMCSA finds that drivers in the Extreme category would be affected equally under all options.[29]

FMCSA then applies research by Ferrie, *et al*. [2007], which shows a "u-shaped" relationship between average sleep and mortality, to calculate changes in mortality based on the increased amounts of sleep under each option.[30] According to FMCSA's interpretation of Ferrie, mortality rates are lowest for people who average about 6.9 hours of sleep per day, with higher mortality rates associated with either more or less sleep. FMCSA then uses actuarial data to calculate a change in drivers' expected lifespan from the percent change in mortality rates due to increased sleep.

Finally, FMCSA monetizes the change in expected lifespan using a value of $6 million per statistical life, an assumed career length of 35 years, and an assumption that each year of increased sleep over a driver's entire career has an incremental effect equal to 1/35 of the total effect.[31] That is, FMCSA assumes that a change in sleep each year of a

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[24] RIA, p. D-10.

[25] RIA, p. 6-5.

[26] RIA, p. 5-4.

[27] RIA, p. 5-5.

[28] *Ibid*.

[29] *Ibid*.

[30] RIA, pp. 5-6 – 5-8.

[31] RIA, p. 5-9.

driver's career has an incremental effect that, over the driver's entire career, sums to the effect that would pertain if the driver's average sleep level was changed over his entire lifetime.

Based on these assumptions and calculations, FMCSA estimates that Option 2 will generate health-related benefits of $690 million annually under the agency's medium baseline sleep assumption.[32] FMCSA finds greater benefits when it assumes a lower level of baseline sleep and a loss of health-related value under the high baseline sleep scenario. The reduction occurs because, under this scenario, drivers are already obtaining at least optimum sleep levels and the proposed rule would increase sleep further past the optimum. Option 3 shows net benefits under all three baseline sleep assumptions ($100 million to $1.2 billion). Option 4 shows net benefits under the low and medium baseline sleep assumptions and net costs under the high baseline sleep assumption. FMCSA states that "although our analysis shows a negative health benefit for drivers with a high baseline level of sleep, we do not believe that these negative benefits would be realized because drivers are likely to choose other activities rather than sleeping if they are getting enough sleep already."[33]

G. Total Costs and Benefits

Combining the results from FMCSA's central-case cost and benefit calculations results in annual net benefits of $380 million for Option 2, $560 million for Option 3, and -$420 million for Option 4.[34] Table 3 summarizes FMCSA's results.[35] FMCSA concludes that the net benefits of the proposed rule "are likely to be positive" for Options 2 and 3, but not for Option 4.[36]

Table 3
Annualized Costs and Benefits for HOS Options, as Calculated by FMCSA: Central-Case Assumptions (million 2008$)

	Costs		*Benefits*			*Net Benefits*
HOS Option	*Lost Productivity*	*Compliance*	*Safety - Reduced Driving Time*	*Safety - Reduced Work Time*	*Improved Driver Health*	
Option 2 – max. 10 hrs. driving	$990	$40	$180	$540	$690	**$380**
Option 3 – max. 11 hrs. driving[1]	$480	$40	$20	$410	$650	**$560**
Option 4 – max. 9 hrs. driving[1]	$2,270	$40	$490	$740	$660	**-$420**

Source: RIA, pp. 6-4 – 6-8.

Note: [1] Due to a lack of adequate documentation in the RIA regarding its calculations of the benefits associated with Options 3 and 4, we were unable to confirm all the components of FMCSA's analysis.

[32] RIA, p. 5-10.

[33] *Ibid*.

[34] RIA, p. 6-8.

[35] Note, FMCSA also presents results for each combination of its sensitivity analyses, including the high and low baseline sleep assumptions and the high and low fatigue risk assumptions.

[36] RIA, pp. ES-3 and ES-4.

III. Problems with FMCSA's Assumptions and Methods and Differences from Previous RIAs

A. Current Industry Operating Patterns

As described above, FMCSA bases its cost and benefit calculations on several important assumptions about drivers' current driving and work patterns, including: the share of the workforce in each driver category, hours worked and driven per day, days worked per week, use of the 14th hour of work, and use of the 10th and 11th hours of driving. FMCSA states that these assumptions are derived from the 2005 and 2007 Field Surveys. However, without access to the raw data from the surveys, we cannot verify FMCSA's assumptions.

Notwithstanding this issue, we have several concerns about FMCSA's use of the field surveys to estimate industry-wide driving intensity. First, the field surveys primarily report data obtained in the course of compliance reviews (81 percent of the observations in the 2005 survey and 70 percent of the observations in the 2007 survey).[37] FMCSA describes the selection criteria for compliance reviews as "poor safety performance or receipt of a non-frivolous complaint, or in follow-up to previous compliance/enforcement actions."[38] It is reasonable to consider that carriers targeted for review may use their drivers more intensely and may be more frequently up against current driving limits, if not over those limits. The remaining data in the field surveys come from safety audits, which are performed on new carriers during their first 18 months of operation. Neither category of carriers covered by the field surveys—i.e., the targets of compliance reviews or new carriers—are likely to exhibit characteristics that reflect those of the industry as a whole.

FMCSA uses the figure of 21 percent from the 2005 Field Survey as its estimate of the frequency of use of the 11th driving hour.[39] However, in its 2007 Interim Final Rule, FMCSA cited a number of data sources which indicate that the field survey results may not be representative, including:

- an August 2007 survey by ATA of its members, which shows that the 11th driving hour is used in 18 percent of daily trips;
- data from carrier Schneider National, Inc. showing use of the 11th hour in 10.7 percent of daily on-duty periods;
- an affidavit filed by carrier J.B. Hunt, stating that its drivers use the 11th hour or some portion of it about 10.8 percent of their daily driving days; and
- an affidavit from carrier Interstate Distributor Company stating that its drivers use the 11th hour on approximately 10 to 12 percent of days.[40]

FMCSA performs no analysis to determine whether the field surveys are representative of the industry overall, but nonetheless applies the results from the surveys in the RIA without explanation or adjustment.

A second problem with FMCSA's use of the field survey data relates to the agency's assumption that drivers who reported non-compliant work hours in the surveys would nonetheless fully comply with the proposed rule. For example, the 2005 Field Survey reported that 20.7 percent of tours exceeded 10.0 hours of driving per day, including

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[37] 2005 Field Survey, p. 2; and 2007 Field Survey, p. 2.

[38] "Hours of Service of Drivers: Interim Final Rule," Federal Register, v. 72, n. 241, December 17, 2007 ("2007 Interim Final Rule"), p. 71264.

[39] 2005 Field Survey, p. 2.

[40] 2007 Interim Final Rule, pp. 71265-71266.

4.0 percent that exceeded the current legal limit of 11 hours.[41] FMCSA assumes that all of these tours would become compliant under the 10-hour restriction in Option 2. FMCSA offers no explanation for its assumption that drivers currently out of compliance with HOS rules would become compliant under the new rule. Rather, it is possible that compliance rates would actually decline under a more restrictive rule. FMCSA's assumption about work time suffers from the same problem. In its estimate of use of the 14th on-duty hour (i.e., more than 13.0 hours), FMCSA includes the 4.3 percent of tours in the 2005 Field Survey which exceeded 14.0 hours of total work time.[42]

A third issue with FMCSA's use of the field survey data relates to the amount of driving/work time that would be shifted to lower hours under the proposed rule. As described above, FMCSA extracts figures for "use of the 11th (and 10th) driving hour" and "use of the 14th work hour" from the field surveys. The field surveys appear to be recording "use of the 11th hour" in any case where the driver was on the road between 10.0 and 11.0 hours, including, for example, a tour of 10.5 hours. Similarly, the field surveys appear to be recording "use of the 14th hour" in any case where the driver worked between 13.0 and 14.0 hours. However, in its calculations of both costs and benefits, FMCSA assumes that one full hour of driving time would be affected under Option 2 for the share of drivers that are recorded as having used the 11th hour in the field survey.[43] Similarly, FMCSA assumes that one full hour of work time would be affected for the share of drivers that are recorded as having used the 14th hour. Thus, FMCSA has overstated the number of affected hours and, as a result, overstated both the costs and benefits of the proposed rule.

Below, we calculate cost and benefit figures using FMCSA's model after adjusting FMCSA's assumptions to account for partial use of the 11th driving hour and the 14th work hour under current rules as well as to reflect impacts only on drivers who are in compliance with current rules.

B. Impact of the Proposed Rule on Carrier Operations

In the 2007 RIA, FMCSA used a simulation model to estimate the impact of HOS provisions on carrier operations. FMCSA's approach allowed for explicit measurement of the impact of the rules on carriers with a range of characteristics, based on actual data related to origins and destinations of truck hauls, driving speed, loading time, minimum and maximum HOS requirements, and other factors. FMCSA tested the current rules against an option which reduced the maximum consecutive driving time to 10 hours and eliminated the restart provision—i.e., a policy similar to FMCSA's Option 2 in the proposed rule. FMCSA estimated that the restrictions would reduce industry productivity by 7.1 percent.[44]

FMCSA now bases its estimates of the impact on carrier operations on a series of assumptions, which are unsupported by any model or other reference. FMCSA states only that:

> *Data on industry-wide characteristics, combined with data from a limited number of consistent sources on overall intensity, and judgment on how the use of individual rule elements would impact driver schedules gave us a simplified picture of the work and driving characteristics of drivers with varying levels of intensity of work.*[45]

Based on these undocumented assumptions, FMCSA now estimates that Option 2 will cause only a 2.8-percent loss of productivity—less than half the loss calculated in the 2007 RIA for a similar policy change. FMCSA provides no explanation for why it has abandoned its model of carrier logistics nor why its new cost estimates are so much lower than the estimates created by the agency three years ago.

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[41] 2005 Field Survey, p. 7.

[42] *Ibid*.

[43] FMCSA assumes that drivers recorded as using the 10th or 11th hour would lose 1.5 hours of driving time under Option 4.

[44] 2007 RIA, p. ES-4.

[45] RIA, p. 3-2.

Since FMCSA does not base its assumptions regarding the response of drivers to the proposed rule on any data, model, or other replicable analysis, we cannot verify the agency's calculations. However, several of FMCSA's assumptions are clearly unreasonable. As we describe above, FMCSA's assumption that drivers currently in non-compliance with HOS rules would become compliant under the new rules is unfounded. Furthermore, FMCSA's assumption that every driver currently using the 11th driving hour would lose a full hour under Option 2 (with a similar assumption about the 14th work hour) is not reasonable.

A further problem with FMCSA's assumptions is that the agency assumes that every lost hour of driving caused by the proposed rule could be replaced seamlessly by shifting the time to another work day or to another driver. Presumably, drivers' current schedules reflect an optimization of assignments, given circumstances such as origin/destination pairs, delivery time requirements, driver availability, and other factors. If the proposed HOS constraints are imposed, carriers may experience additional productivity losses due to an inability to perfectly substitute alternate drivers for every lost hour. For example, it may be difficult to replace an hour of driving time lost for a driver in the middle of a cross-country route with an hour from another driver. In the previous RIA, FMCSA's carrier logistics model may have accounted for such issues (we are unable to confirm this without access to the detailed workings of the model). However, FMCSA's current methodology clearly does not. For this reason, FMCSA's assumptions may underestimate the productivity impacts of the proposed rule.

An additional problem with FMCSA's calculations of productivity impacts is that the agency assumes that the restart restriction would have no impact on drivers in the Moderate or High categories. Although these drivers may not *typically* use the restart option in the HOS rules, there is no basis to assume that they *never* use it. To the contrary, the 2007 Field Survey reported that 84 percent of drivers used at least one restart period during the reviewed tours.[46] The survey also reported that in 85 percent of the instances in which the restart was used, the driver worked less than 65 hours in the week prior to the restart. Since the Very High and Extreme driver categories comprise only 15 percent of the workforce, there appears to be substantial use of the restart by drivers in the other categories. Thus, FMCSA has underestimated the impact of the proposed restart provision. We do not have sufficient information to calculate impacts due to the restart provision for these other groups of drivers, but the difference could be substantial due to the large number of drivers in these categories. For example, if the restart provision causes drivers in the Moderate and High categories to experience a loss of only 0.175 work hours per week—one quarter of the loss assumed by the FMCSA for drivers in the Very High category—that would increase the productivity impact of Option 2 by more than $100 million annually.[47]

Although we do not apply specific alternate assumptions about lost productivity in our calculations here, it is instructive to consider how FMCSA's new assumptions affect the agency's ultimate findings regarding the net benefits of the proposed rule. In the current RIA, FMCSA calculates a productivity loss of $990 million annually under Option 2—equivalent to a 2.8-percent reduction from current levels. If FMCSA had applied an impact of 7.1 percent, as the agency previously calculated using the carrier logistics model described in the 2007 RIA, the total loss would be $2.52 billion annually. In this scenario, Option 2 would result in a net loss to society of $1.15 billion annually, rather than a gain of $380 million as calculated by FMCSA. In other words, FMCSA's finding that the net benefits of Option 2 are "likely to be positive" is heavily dependent on its new assumptions regarding productivity impacts.

[46] 2007 Field Survey, pp. 3-4.

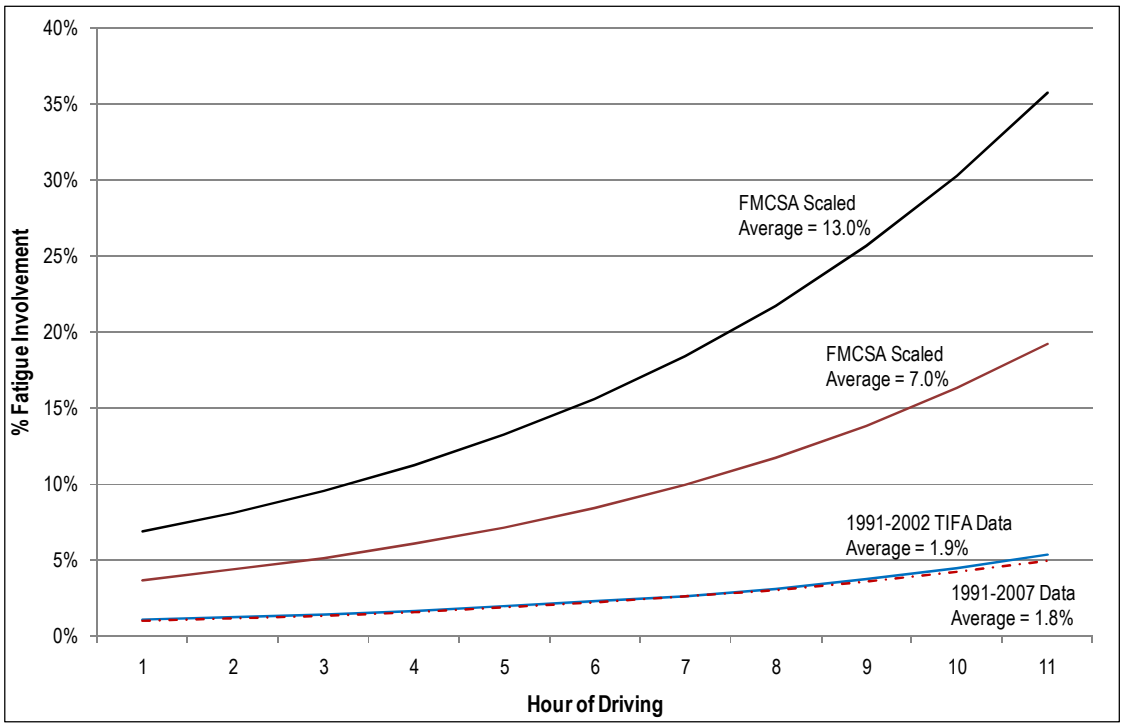
[47] Edgeworth calculations, based on FMCSA's methodology and other assumptions as described in the RIA.

C. Impact of the Proposed Rule on Large-Truck Crashes

1. Relationship between Driving Hours and Fatigue Risk

A key component in FMCSA's analysis of crash-related benefits is the relationship between driving hours and fatigue risk (the "fatigue curve"). As described above, FMCSA uses the TIFA data to determine the shape of the fatigue curve, but believes that the average level of risk demonstrated by that data—1.8 percent—is too low. Instead, FMCSA scales the fatigue curve derived from the TIFA data upward to reflect an average fatigue risk of 13 percent, based on the finding from the LTCCS that 13 percent of large-truck crashes showed fatigue as an "associated factor." Figure 1 shows the fatigue curves for: 1) the 1991-2002 TIFA data used in FMCSA's previous RIA; 2) the updated (1991-2007) TIFA data; 3) FMCSA's current model, which adjusts the updated TIFA model to an average of 13 percent; and 4) the TIFA data scaled to an average of 7 percent, which is the risk level estimated by FMCSA in the previous RIA. Note that FMCSA's method of scaling the TIFA findings not only raises the fatigue curve, but also substantially increases the slope of the curve. This inflates the apparent benefit of shifting drive time from the 11th hour to an earlier hour.

Figure 1
Fatigue Curves from FMCSA Analyses



Source: RIA, pp. 4-15 – 4-22.

This approach by FMCSA is problematic for several reasons. First, by treating the coding of fatigue as an associated factor in the LTCCS as identifying the "cause" of a crash, FMCSA implicitly assumes that a policy which reduces the frequency of fatigue as an associated factor in crashes would necessarily eliminate those crashes in direct proportion. This assumption contradicts previous research by FMCSA, which makes clear that an associated factor is not equivalent to the "cause" of the crash. FMCSA's Report to Congress on the LTCCS describes associated factors as "any of approximately 1,000 conditions or circumstances present at the time of the crash is coded."[48] FMCSA further states that when coding the LTCCS data, "[n]o judgment is made as to whether any [associated]

[48] LTCCS Report to Congress, p. 9.

factor is related to the particular crash, just whether it was present."[49] Another FMCSA study specifically differentiates between two definitions of "cause": 1) as a "necessary factor" (had the factor not been present in the crash sequence, the crash would not have occurred); or 2) as a "risk-increasing factor" (the factor increases the risk, or probability, of a crash).[50] FMCSA's prior analyses using the LTCCS data used the latter definition; however, in the RIA the agency now assumes the former.

The fallacy of FMCSA's assumption becomes evident when reviewing the full set of associated factors reported in the LTCCS. The study estimated a total of approximately 430,000 associated factors for 141,000 large-truck crashes—or about three factors per crash. Fatigue was coded as an associated factor in 13 percent of crashes, but those factors represented only 4.2 percent of the total number of associated factors recorded in the study. Thus, FMCSA's treatment of associated factors in the RIA implies that fatigue was the necessary cause of every crash in which it was present, even though there were, on average, approximately two other factors present in that same crash. Furthermore, FMCSA's approach even includes crashes in which the "critical reason"—i.e., the "failure leading to the critical event [crash]"—was not assigned to the truck, but rather to another vehicle.[51] Clearly, eliminating fatigue on the part of the truck driver would not necessarily eliminate such crashes. If one assumes that each associated factor recorded for a particular crash had an equal likelihood of being the "cause" of that crash (defining "cause" in the manner implied by FMCSA's analysis in the RIA), then 4.2 percent, rather than 13 percent, represents a better indicator of average fatigue risk.

A second problem with FMCSA's use of the LTCCS data is that the study oversampled single-vehicle crashes. Single-vehicle crashes make up 27 percent of the observations in the LTCCS sample, yet they comprise only 17.5 percent of the observations in the much more comprehensive Fatality Analysis Reporting System (FARS) database.[52] This sampling issue skews the results related to fatigue, since fatigue is more likely to be an associated factor in single-vehicle crashes than in multiple-vehicle crashes. For example, data from the LTCCS indicates that fatigue was an associated factor in 7.5 percent of two-vehicle crashes, compared to 13 percent in all crashes.[53] Consequently, the LTCCS analysis overestimates the frequency of fatigue as an associated factor relative to the true frequency across all crashes. Knipling [2008] found that the sampling pattern in the LTCCS results in an overstatement of the share of total crashes in which the driver was coded as "asleep at the wheel" by 80 percent.[54]

For these reasons, 13 percent is clearly an overestimate of the ratio of large-truck crashes caused by fatigue. Moreover, this figure is substantially higher than any measure previously used by the agency in its analyses of HOS rules or any other publicly-available measure. For example, in the 2007 RIA, FMCSA stated that FARS provided "consistent data on the causes of crashes." FMCSA performed an "extensive analysis" of FARS and other data and concluded that driver fatigue was a "factor" in 7.25 percent of large-truck crashes. FMCSA added 0.9 percent to account for crashes in which driver "inattention" was coded as a factor to reach a final estimate of 8.15 percent. FMCSA then estimated that the fatigue rate would fall to 7 percent under the current HOS rules. In a response to public comments, FMCSA confirmed its judgment that "the 7 percent figure is accurate, even when recognizing that

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[49] *Ibid*.

[50] James Hedlund and Daniel Blower, "Large Truck Crash Causation Study (LTCCS) Analysis Series: Using LTCCS Data for Statistical Analyses of Crash Risk," FMCSA publication, January 2008.

[51] 45 percent of crashes in the LTCCS had critical reasons assigned to other vehicles. [LTCCS, p. 11]

[52] In the RIA, FMCSA states that single-vehicle crashes make up 21 percent of all LTCCS crashes. [RIA, p. 4-19] FMCSA claims that figure is "within the margin of error" of the 17.5-percent figure from FARS. FMCSA provides no basis for this assertion. In any case, the 21-percent figure appears to be an error, as the LTCCS study clearly states that single-vehicle crashes make up 26.9 percent of the sample. [LTCCS, p. 11]

[53] LTCCS Report to Congress, pp. 15 and 18.

[54] Ronald R. Knipling, "Critique of Large Truck Crash Causation Study (LTCCS) Driver Fatigue Statistics and Analysis," March 17, 2008, p. 3.

the coding of fatigue-related crashes may be underestimated."[55] Other estimates of the share of large-truck crashes in which fatigue played a role tend to be even lower than 7 percent, including:

- 2.2 percent from FMCSA's analysis of 2004-2006 TIFA data in the 2008 Final Rule;[56]
- 2.1 percent from data collected by DriveCam in 2009 using in-cab video recorders;[57]
- 2.6 percent from a study of 1996-2001 fatal commercial vehicle crashes conducted by the Michigan State Police Carrier Enforcement Division;[58] and
- 2.5 percent, calculated by Knipling [2008], based on findings of "asleep at the wheel" in the LTCCS, with an adjustment to correct for oversampling of single-vehicle crashes.[59]

A further problem with FMCSA's approach is that the crashes in the LTCCS sample used to determine the fatigue curve occurred under previous HOS rules (i.e., before 2004). As FMCSA has recognized, under those rules the risk associated with driving extended daily hours may have been higher than under current rules, due to the less restrictive requirements for off-duty time.[60] Furthermore, recent data shows that the overall level of fatigue risk has fallen, from an average of 1.9 percent in the 1991-2002 TIFA data to an average of 1.8 percent when data from 2003-2007 is added. FMCSA does not provide sufficient information about the more recent TIFA data to identify fatigue risk for the 2003-2007 period precisely, but we estimate a decline of approximately 15 percent relative to the 1991-2002 period.[61] FMCSA recognizes that its reliance on data from prior regulatory regimes is problematic, but fails to account for any bias that this method might introduce into its results.[62]

FMCSA's overstatement of the rate of fatigue-related risk has a substantial impact on its results. We calculate that using a rate of 7 percent, rather than 13 percent, would reduce the benefits associated with the proposed rule by $330 million per year, using FMCSA's other central-case assumptions for Option 2.[63]

2. FMCSA's Analysis of Benefits from Reduced Cumulative Work Time

FMCSA's calculation of a separate component of benefits for reduced cumulative work time is an analysis that the agency had not conducted in previous RIAs. To the contrary, FMCSA asserted repeatedly in responses to public comments to the 2007 RIA that the 2003 rule provided sufficient flexibility to eliminate any concerns about cumulative work time. For example, FMCSA stated:

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[55] "Hours of Service of Drivers: Final Rule," Federal Register, v. 73, n. 224, November 19, 2008 ("2008 Final Rule"), p. 69578.

[56] *Ibid*.

[57] DriveCam report for the ATA, dated March 15, 2010, attached to June 3, 2010 letter from Bill Graves to the Honorable Anne Ferro.

[58] James Hedlund and Daniel Blower, "Large Truck Crash Causation Study (LTCCS) Analysis Series: Using LTCCS Data for Statistical Analyses of Crash Risk," FMCSA publication, January 2008.

[59] Knipling (2008), p. 3.

[60] "Hours of Service of Drivers: Final Rule," Federal Register, v. 70, n. 164, August 25, 2005 ("2005 Final Rule"), p. 49981.

[61] Based on an assumption that the annual number of fatal crashes has been (approximately) constant over the entire time period, consistent with current data. [FMCSA, "Large Truck and Bus Crash Facts 2009: Early Release," October 2010 ("Crash Facts 2009"), Tables 4, 7, and 8]

[62] 2010 NPRM, pp. 82179-82180.

[63] Note, as we describe below, FMCSA's assumption regarding average fatigue risk affects the agency's calculation of benefits related to both reducing daily driving time and reducing weekly work time. Our calculation here includes the impacts of both components.

> *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." 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.*[64]

FMCSA has now reversed its position on this issue, claiming that "the increase in total maximum allowable work per week allowed by the rule, and the short restart, may result in adverse impacts on driver health and safety."[65] However, FMCSA cites no new research or evidence from recent data to support its concerns. Instead, the agency relies on an analysis of the LTCCS data collected *before* implementation of the current rule. Since FMCSA calculates that the benefits associated with reducing fatigue from cumulative work time are approximately three times as great as those associated with reducing daily driving time (under Option 2), the importance of confirming the existence of cumulative fatigue and of any relationship between work time and such fatigue using current data is clear. FMCSA's failure to use data collected under current HOS rules to test for this effect sheds substantial doubt on the agency's findings.

Notwithstanding this general concern about FMCSA's approach, we found additional problems with the agency's calculations of benefits associated with reducing cumulative weekly work time which serve to inflate the net benefits of the proposed rule as calculated by FMCSA. First, when FMCSA calculates the reduction in crash risk associated with reducing weekly work hours, the agency treats any partial hour of reduced time as a full hour.[66] This inflates the apparent benefits of the risk reduction. For example, FMCSA calculates that drivers in the High category will lose 1.04 hours of work time under Option 2, shifting from 60 hours per week to 58.96 hours per week.[67] However, when FMCSA calculates the reduced crash risk associated with that loss of work time, the agency assumes that the new level of work time will be 58.0 hours—a full 2-hour reduction.[68] In supplementary documentation placed in the docket, FMCSA concedes that "[t]he use of this methodology may result in slightly higher estimated benefits for each option, compared to using exact values."[69] We calculate that this method overstates the benefits of Option 2 by about $70 million per year.

An additional problem with FMCSA's new analysis of crash risk associated with cumulative work time is that the agency applies fatigue curves for daily driving time and for weekly work time separately, without recognizing that a reduction in daily driving time could reduce the risk of high weekly work hours and vice versa. In other words, the slopes of FMCSA's fatigue curves are likely to be sensitive to changes in HOS rules. In previous RIAs, FMCSA recognized the interaction between daily work restrictions and cumulative fatigue, for example stating in 2005:

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[64] 2008 Final Rule, p. 69575, citation omitted.

[65] RIA, p. 1-5.

[66] FMCSA does not describe this assumption in the RIA. We obtained supplementary information from FMCSA, now in the public docket, in which the agency explained its methods and assumptions in more detail. [FMCSA memo, "Response to ATA request for Further Information on the Cumulative Fatigue Function used in the Regulatory Evaluation for the 2010 NPRM Proposing Revisions to the Hours of Service Rules," plus accompanying spreadsheets, January 28, 2011 ("FMCSA Cumulative Fatigue Memo")]

[67] RIA, p. D-5.

[68] FMCSA Cumulative Fatigue Memo.

[69] *Ibid*.

> *Under today's rule, most drivers have an adequate opportunity to limit the accumulation of fatigue. Ten hours off duty gives drivers enough time for 7–8 hours of sleep. In addition, adopting a non-extendable 14-hour duty tour (reduced by one or more hours from the pre-2003 rule) will also limit the accumulation of fatigue.*[70]

FMCSA's present analysis, however, is based on the implicit assumption that a reduction in weekly work time would have no impact on the relationship between daily driving hours and fatigue risk, and similarly that a reduction in daily driving hours would have no impact on the relationship between weekly work time and fatigue risk. This assumption is unreasonable. Consider two drivers each averaging 8 hours of driving per day: Driver A, who averages 50 hours of total work per week, and Driver B, who averages 45 hours. It is logical to expect that the increment of fatigue risk between the 10th and 11th driving hours on any particular day will be higher for Driver A than for Driver B. The information provided in the RIA is not sufficient to permit us to estimate the magnitude of these effects, but they could be significant. By omitting such considerations, FMCSA has overstated the benefits of the proposed rule.

3. Crash Cost per Hour of Driving/Work

FMCSA monetizes the change in crash risk by assuming a proportional reduction in the cost of crashes per hour of driving. FMCSA calculates the cost of large-truck crashes per hour of long-haul driving by calculating the average cost of a large-truck crash, multiplying by the total number of crashes by long-haul drivers per year, and then dividing by the annual number of long-haul driving hours per driver per year. The assumptions and calculations used here by FMCSA appear reasonable, with one important exception. FMCSA uses a figure of 434,000 large-truck crashes per year, without any citation. As shown in Figure 2, FMCSA's figure represents approximately the level of large-truck crashes during the 2000-2003 period, which the agency used to determine costs in its 2003 RIA and then adopted again in its 2007 RIA.[71] Since 2003, however, the number of large-truck crashes per year has fallen substantially. In the Notice of Proposed Rulemaking, FMCSA cites a figure of 365,000 crashes in 2008.[72] The most recent figure, from 2009, is 286,000 crashes—34 percent lower than the figure used in the RIA. Preliminary data for 2010 indicates that crash rates are continuing to fall.[73] Clearly, FMCSA's assumption of 434,000 large-truck crashes per year is no longer appropriate. Applying the most recent (2009) data to FMCSA's calculations reduces the crash cost per hour of driving to $6.81. We calculate that making this change alone to FMCSA's calculations would reduce the benefits of the proposed rule by about $250 million per year, using FMCSA's other central-case assumptions for Option 2.

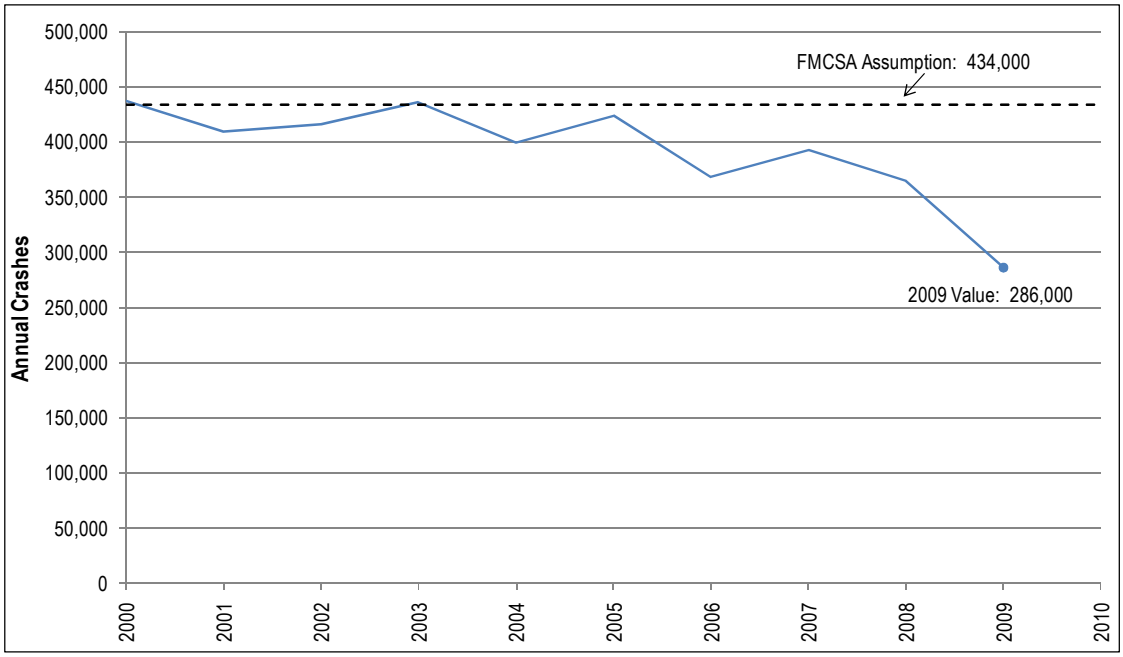
[70] 2005 Final Rule, p. 50023.

[71] ICF Consulting, Inc. and Jack Faucett Associates, "Regulatory Impact Analysis and Small Business Analysis for Hours of Service Options," prepared for the FMCSA, December 2002 ("2002 RIA"), p. 8-37; and 2007 RIA, p. 68.

[72] 2010 NPRM, p. 82176.

[73] See, for example, National Highway Transportation Safety Administration, "Early Estimate of Motor Vehicle Traffic Fatalities for The First Three Quarters (January-September) of 2010," December 2010.

Figure 2
Large Truck Crashes, 2000-2010



Sources: RIA, p. 4-23; and Crash Facts 2009, Tables 4, 7, and 8.

A further problem with FMCSA's use of the per-hour crash cost is the agency's application of the figure to its calculations of reduced crashes associated with cumulative weekly work time. As described above, FMCSA assesses benefits associated with reduced cumulative work in addition to the benefits from reduced daily driving time. However, FMCSA uses the same "crash cost per hour of driving" figure to monetize the reduced risk from shifting weekly work time to drivers with less intensive work schedules. FMCSA has erred in its approach here. Reducing work time must have a smaller per-hour benefit than reducing driving time, since crashes do not occur in non-driving work hours. FMCSA should have calculated a "crash cost per hour of work," which is necessarily less than the "crash cost per hour of driving." Based on FMCSA's assumptions, we calculate that the crash cost per hour of work time is 22 percent lower than FMCSA's figure.[74] We calculate that FMCSA has overstated the benefits of reducing cumulative weekly work time by approximately $120 million per year for Option 2, based on this issue alone.

D. Impact of the Proposed Rule on Driver Health

1. Comparison to Previous RIAs

In previous RIAs, FMCSA concluded that insufficient evidence existed to support a connection between reduction of maximum work or driving time and the health of drivers. In 2005, FMCSA stated:

> *The driver health team found very little research to evaluate specifically the association between long work hours and CMV driver health. No research studies were found that permitted an examination of whether additional hours of driving or nondriving time would impact driver health.*[75]

[74] Based on 40.6 average weekly driving hours and 52.1 average weekly work hours, from FMCSA's assumptions described in Table 1, above.

[75] 2005 Final Rule, p. 49990.

> *[I]n the Agency's best judgment, the difference between a driving limit of 10 and 11 hours is inconsequential from the standpoint of driver health.*[76]
>
> *[I]n the Agency's best judgment there is no evidence that the number of work hours allowed by the HOS regulation adopted today will have any negative impact on driver health.*[77]

Similarly, in 2008 FMCSA concluded:

> *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. … 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.*[78]

In the new RIA, however, FMCSA calculates substantial health-related benefits associated with reducing daily work time. Without such benefits, all of the proposed options would result in net costs to society, according to FMCSA's calculations. For example, excluding health-related benefits leads to a calculation of a net loss to society of $310 million per year, using FMCSA's other central-case assumptions for Option 2.

In order to reach a conclusion that reduced work time would improve driver health, there are two chains of causation that must be demonstrated: first, that reducing work time for drivers would result in an increase in sleep; and second, that increasing sleep would improve drivers' health. FMCSA's analysis of each component is flawed.

2. Relationship between Work Time and Sleep Time

In order to show that reducing work time would result in an increase in drivers' sleep, FMCSA cites an analysis by Balkin, *et al*. [2000] correlating work hours and sleep hours for long-haul drivers.[79] We have several concerns with FMCSA's use of the Balkin results in this manner.

First, the Balkin study was published in 2000;[80] therefore the data was collected from truck drivers operating under previous HOS rules. The measured relationship between drivers' work time and sleep time may no longer pertain, due to changes in HOS restrictions following implementation of current rules in 2003.

Our second concern with FMCSA's methodology is one of *causation*. The observation of a simple correlation between work time and sleep time does not necessarily imply that a reduction in work would result in an increase in sleep in accordance with the observed correlation. In the Notice of Proposed Rulemaking issued concurrently with the RIA, FMCSA makes clear the difficulty in determining the behavioral responses of drivers to the proposed rule,

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[76] 2005 Final Rule, p. 50011.

[77] 2005 Final Rule, p. 49990.

[78] 2008 Final Rule, p. 69574.

[79] RIA, pp. 5-3 – 5-5 citing Balkin, T., Thome, D., Sing, H., Thomas, M., Redmond, D., Wesensten, N., Williams, J., Hall, S., & Belenky, G., "Effects of Sleep Schedules on Commercial Motor Vehicle Driver Performance," Walter Reed Army Institute of Research, Washington, D.C., May 2000.

[80] Note, the RIA states that Balkin was published in 2002; however, the report in the docket entry cited by FMCSA actually shows a publication date of May 2000.

stating: "the Agency has no basis for estimating the extent to which drivers who have an extra hour a day or extra hours per week off duty will use that time to exercise and sleep."[81] Yet, in the RIA, FMCSA makes precisely that determination, despite the lack of evidence demonstrating a causal link. In particular, the observed correlation between work time and sleep time could be due in part to any or all of the following circumstances:

- Drivers with non-work-related sleep disorders or a preference for lesser amounts of sleep choose to work longer hours. Similarly, drivers who prefer more sleep for reasons unrelated to work choose to work less.

- The observed pattern of work/sleep time across drivers is a function of other driver characteristics that would be unaffected by a change in work time, such as age, family status, or use of pharmaceuticals.

- Individual drivers adjust their time spent on activities other than work or sleep in response to changes in work time in a different manner than reflected in the relationship measured by FMCSA.

Although FMCSA fails to address these questions in its analysis of work/sleep correlation, elsewhere in the RIA the agency apparently recognizes the fact that the observed correlation between work time and sleep time does not necessarily imply that changes in one cause changes in the other in any sort of fixed relationship across the entire population of drivers. In particular, when discussing its findings that some of the options would result in higher driver mortality due to an increase in sleep time above the optimum level, FMCSA states:

> *Although our analysis shows a negative health benefit for drivers with a high baseline level of sleep, we do not believe that these negative benefits would be realized because drivers are likely to choose other activities rather than sleeping if they are getting enough sleep already.*[82]

FMCSA offers no evidence to support this assertion. Moreover, it would be true only if drivers were perfectly aware of their actual and optimum sleep times and chose to convert all reductions in work time to non-sleep activities. In any case, FMCSA's statement shows recognition that individual drivers do not necessarily respond to changes in work in the manner suggested by a simple work/sleep correlation measured from a cross section of the driver population. It would seem apparent that a driver currently obtaining slightly less than the optimum sleep level might maintain that level in response to a decrease in work time, just as a driver currently obtaining slightly more than the optimum level of sleep would do, as suggested by FMCSA. Even drivers with intensive work schedules may make the conscious choice to forgo additional sleep in order to pursue other non-work-related activities.

This issue represents a fundamental flaw in FMCSA's approach. FMCSA's failure to consider characteristics of drivers or their behavioral responses to changes in HOS rules sheds considerable doubt on its results. Moreover, the internal inconsistencies within the RIA and Notice of Proposed Rulemaking demonstrate the lack of sound bases for FMCSA's assumptions.

3. Relationship between Sleep Time and Driver Health

FMCSA's approach to estimating impact on driver health caused by changes in average sleep levels is based on an adaptation of the results from Ferrie [2007]. In that study, researchers analyzed a sample of approximately 10,000 British civil servants in the late-1980s and early-1990s and found a "u-shaped" relationship between average weeknight sleep amounts and subsequent mortality rates.[83] They concluded:

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[81] 2010 NPRM, p. 82190.

[82] RIA, p. 5-10.

[83] Ferrie, J., Shipley, M., Cappuccio, F., Brunner, E., Miller, M., Kumari, M., & Marmot, M., "A Prospective Study of Change in Sleep Duration: Associations with Mortality in the Whitehall II Cohort," *Sleep*, v. 30, n. 12, 2007, pp. 1659-1666.

> *[W]e consistently demonstrate higher rates of all-cause mortality among participants who report short sleep (≤5 hours) or long sleep (≥9 hours) at follow-up, regardless of their sleep duration 5-6 years earlier. A decrease in sleep duration among those regularly sleeping 6, 7, or 8 hours at baseline was associated with a 110% excess risk of cardiovascular mortality. However, an increase in sleep duration among those regularly sleeping 7 or 8 hours at baseline was associated with a 110% excess risk of non-cardiovascular mortality.*[84]

We have several concerns with FMCSA's use of the results from Ferrie. First, FMCSA ignores any potential differences between the population sample studied by Ferrie (British civil servants in the 1980s) and the relevant group here (long-haul truck drivers in the U.S. today). For example, FMCSA fails to consider that truck drivers are subject to HOS rules governing weekly work levels and off-duty time, which were designed specifically to allow recovery from intense work schedules so that cumulative fatigue is avoided. Presumably, British civil servants in the 1980s were not subject to comparable rules. Other important differences between the groups include: 1) the types of people who choose to work as long-haul truck drivers may have different optimal sleep levels than those who choose to be civil servants; and 2) long-haul trucks drivers may have more variable schedules than civil servants, which allows drivers to recover during non-work periods despite (potentially) lower average sleep levels during work periods.

Second, FMCSA imputes a level of precision to the Ferrie study that does not exist in the original research. Ferrie reports mortality figures based on survey responses to the question: "How many hours of sleep do you have on an average week night?" Response categories were "5 hours or less," 6, 7, 8, and "9 hours or more." While Ferrie does find higher mortality associated with the lowest and highest responses relative to the middle responses, the researchers were careful to attribute mortality effects only over ranges of sleep hours at the extremes of the survey responses—i.e., at sleep levels "less than or equal to 5 hours" or "greater than or equal to 9 hours." Ferrie found no statistically significant differences between the mortality rates of people who reported 6, 7, or 8 hours of sleep.[85]

FMCSA's attribution of mortality effects to small changes in sleep levels within the "normal range" contradicts the agency's previous conclusions as well as the broader set of findings by medical researchers. For example, in response to comments on a previous RIA, FMCSA concluded that "the finding of 6.28 hours of sleep per night [the average reported in a 2005 FMCSA study] is within normal ranges consistent with a healthy lifestyle."[86] Additional academic research has consistently supported the same findings. For example, Cappuccio, *et al*. [2010], also cited in the RIA, reported the results of a "meta-analysis" of sleep research comparing the findings of 16 different studies regarding sleep levels and mortality, including the 2007 Ferrie study.[87] The researchers concluded: "Currently, there is no evidence that sleeping habitually between 6 and 8h per day in an adult is associated with harm and long term health consequences."[88] FMCSA ignores this conclusion, citing only Cappuccio's finding of a "slightly higher relative risk for short sleep," which the researchers define as "5 hours or less."[89]

In contrast to this research, FMCSA uses the five data points from Ferrie to identify a purportedly optimum sleep level at a precise point near 6.9 hours, and then attributes mortality impacts to very small changes around that optimum. For example, FMCSA's assumes average baseline sleep levels of 6.2 to 7.0 hours (in its central case) for the four

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[84] *Ibid*, p. 1662.

[85] The differences between the average mortality hazard ratios for people reporting these three sleep levels were well within the 95-percent confidence intervals associated with the sample estimates of those ratios. [Ferrie , p. 1661]

[86] 2005 Final Rule, p. 49983.

[87] Cappuccio, F., D'Elia, L., Strazzullo, P., & Miller, M., "Sleep Duration and All-Cause Mortality: A Systematic Review and Meta-Analysis of Prospective Studies," *Sleep*, v. 33, n. 5, 2010, pp. 585-592.

[88] *Ibid*, p. 591 (italics added).

[89] Cappuccio, *et al*. state: "People reporting consistently sleeping 5 hours or less per night should be regarded as a higher risk group for all-cause mortality" (p. 591).

categories of drivers, with increases under Option 2 of as little as 13 seconds per day for drivers in the Moderate category to at most 23 minutes per day for drivers in the Extreme category. The results from Ferrie and from the broader field of research do not support the attribution of mortality impacts from such small changes in sleep levels for people who currently obtain 6 to 8 hours of sleep.

IV. Adjusted Cost-Benefit Calculations

In order to evaluate the importance of these issues in the overall assessment of the proposed rule, we recalculate the costs and benefits of Option 2 using FMCSA's general approach and central-case assumptions, but we adjust key variables to correct for some of the errors and unreasonable assumptions made by FMCSA.[90] First, we summarize the impact of each of seven adjustments in isolation. We then combine all the adjustments.

1) We assume that the average use of the 11th driving hour by drivers who exceed 10.0 hours is 0.5 hours, rather than one full hour as assumed by FMCSA. Similarly, we assume that the average use of the 14th work hour is 0.5 hours.[91]

   → Reduces the apparent net benefits of Option 2 by $80 million per year.

2) We assume that tours in which driving or work times are currently non-compliant (about 4 percent of tours according to the 2005 Field Survey) would be unaffected by the proposed rule.[92]

   → Reduces the apparent net benefits of Option 2 by $110 million per year.

3) We use a fatigue-risk rate of 7 percent. This rate was applied by FMCSA in the previous RIA and is more consistent with recent trends in fatigue-related crashes and other available data than FMCSA's figure of 13 percent, which is based on a misuse of the "associated factors" tracked by the LTCCS.

   → Reduces the apparent net benefits of Option 2 by $330 million per year.

4) We calculate benefits from reducing weekly work time using the relationship that FMCSA identified from the actual data, rather than FMCSA's approach of inflating partial lost work hours to full lost work hours.

   → Reduces the apparent net benefits of Option 2 by $70 million per year.

5) We calculate total annual crash costs using 2009 data for the number of large-truck crashes—286,000—rather than FMCSA's figure of 434,000 from early in the last decade.

   → Reduces the apparent benefits of Option 2 by $250 million per year.

6) We apply a "crash cost per hour of work" to calculate benefits associated with eliminating the 14th work hour, rather than FMCSA's "crash cost per hour of driving."

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[90] As noted above, due a lack of adequate documentation in the RIA regarding the calculations associated with Options 3 and 4, we were unable to replicate all of the components of FMCSA's analysis. We therefore analyze these issues only with respect to Option 2.

[91] In this scenario, we assume the lost hours due to the restart provision are one-half of the values chosen by FMCSA—i.e., 0.35 hours per week for drivers in the Very High category and 2.44 hours per week for drivers in the Extreme category.

[92] In this scenario, we assume the lost hours due to the restart provision are equal to the values chosen by FMCSA multiplied by the ratio of compliant tours in excess of 13 hours relative to all tours in excess of 13 hours—i.e., 0.36 hours per week for drivers in the Very High category and 2.52 hours per week for drivers in the Extreme category.

→ Reduces the apparent benefits of Option 2 by $120 million per year.

7) We exclude health-related benefits from the analysis, due to FMCSA's lack of support for its claim that small changes in sleep time within the "normal" range would have an adverse effect of drivers' health.

→ Reduces the apparent benefits of Option 2 by $690 million per year.

Note, the impacts of these individual corrections are not additive; when more than one is implemented at the same time, the effect of each correction on the net benefits of the proposed rule is reduced.

When all of these corrections are applied together, we calculate a net *cost* associated with Option 2 of $320 million per year.[93] That is, we find that FMCSA has overstated the net benefits of the proposed rule by about $700 million annually and that the proposed rule would impose a net cost on society, rather than a net benefit as claimed by FMCSA. If health-related benefits are included in the model as calculated by FMCSA, while making the first six corrections described above, we calculate that the proposed rule would still result in a net cost to society of $20 million annually—i.e., FMCSA has overstated the net benefits of the proposed rule by $400 million per year. Table 4 summarizes these results.

Table 4
Annualized Costs and Benefits for HOS Option 2
FMCSA Central-Case Assumptions vs. Edgeworth Adjustments
(million 2008$)

	Costs		*Benefits*			*Net Benefits*	*Change from RIA*
Scenario	*Lost Productivity*	*Compliance*	*Safety - Reduced Driving Time*	*Safety - Reduced Work Time*	*Improved Driver Health*		
FMCSA Assumptions	$990	$40	$180	$540	$690	**$380**	
All Edgeworth Adjustments							
Excluding Health Benefits	$360	$40	$30	$50	$0	**-$320**	***-$700***
Including Health Benefits	$360	$40	$30	$50	$300	**-$20**	***-$400***

Source: Edgeworth calculations, based on assumptions described here and information provided in the RIA.

In addition to these problems with FMCSA's assumptions and methods for which we were able to provide specific calculations of adjusted net benefits, we identified several other problems with FMCSA's approach for which adequate data were not available to calculate exact corrections. These include:

1) FMCSA's failure to consider potential differences between carriers that were sampled in the field surveys and the broader industry.

2) FMCSA's failure to consider logistical issues in its replacement of lost driving time.

3) FMCSA's unfounded assumption that drivers in the Moderate and High categories would not be affected at all by the proposed restart provision.

[93] In this scenario, we assume the lost hours due to the restart provision are equal to the values chosen by FMCSA multiplied by the ratio of compliant tours in excess of 13 hours relative to all tours in excess of 13 hours, then multiplied again by one-half—i.e., 0.18 hours per week for drivers in the Very High category and 1.26 hours per week for drivers in the Extreme category.

4) FMCSA's reliance on data collected during prior HOS regimes to determine fatigue risk.

5) FMCSA's failure to account for the fact that, when holding other factors constant, a reduction in weekly work hours would reduce the risk of fatigue from driving extended hours, and vice versa.

6) FMCSA's failure to evaluate drivers' actual change in sleep habits in response to changes in work time.

Appropriate consideration of these factors would lead to further reductions in the calculated net benefits of the proposed rule.