Critique of Volpe National Transportation Systems Center Report
Agricultural Commodity Carriers and Hours-of-Service Exemption Analysis

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This is a review and critique of a report prepared by the Volpe National Transportation Systems Center, dated May 22, 2008. The report was not released to the public until almost one year later in April 2009.

The Volpe report is written in reference to the Hours-of-Service (HOS) exemption for operators within the agricultural commodity, utility, and selected other service sectors (film and water drilling) traveling within a 100 air-mile radius of their origin or depot. The phrase "short-haul HOS-exempt operators" or simply "HOS-exempt operators" will be used in this report to refer to carriers and drivers in these sectors operating under the less-than-100-mile HOS exemption.

This critique addresses the shortcomings of the Volpe analysis, analyzes crash data (old and new) and other research on the role of driver fatigue in short-haul trucking operations, describes more valid and comprehensive safety analyses, and suggests safety interventions more effective and targeted than those implied by the report. The principal sections and assertions of this critique of the Volpe analysis include:

1. **The Volpe analysis provided only gross, non-diagnostic statistics on truck crashes and violations.** The analysis looked only at gross crash and violation rates for two general categories of carriers, and used only three years data. It ignored several variables in the Motor Carrier Management Information System Crash File which would have more decisively tested their fatigue hypothesis and shed more light generally on crash causes and risk factors. Among these are fatigue itself as a crash cause, single- versus multi-vehicle crashes, and crash roadway type (divided versus undivided roads). Even without differences in actual driving safety, short-haul trucking entails higher crash risks because of its greater exposure on undivided roadways.

2. **Structural weaknesses in the Motor Carrier Management Information System (MCMIS) undermine the validity of the Volpe analysis**. The MCMIS carrier and crash reporting processes lack sufficient reliability and certainty to

support definitive safety analyses since they do not accurately identify whether a carrier is operating under the exemption. The reporting process is inherently inaccurate because it uses carrier self-reports, and because information can easily be out-of-date. In addition, only about 60% of large truck crashes were captured by MCMIS during the period of Volpe's analysis, and reporting varies across states, jurisdictions, crash types, vehicle types, and years.

3. **There is no crash causal information in the Volpe analysis**. The Volpe analysis ostensibly addresses HOS and driver fatigue. It is used to directly implicate HOS exemptions as the primary cause of higher crash rates for select groups of carriers, but in fact contains no direct information on driver fatigue or any other crash cause. If compliance and crash problems are not fatigue-related, the imposition of HOS rules would have no effect on them.

4. **Driver fatigue is not a principal cause of short-haul truck crashes**. When assessed objectively, driver fatigue and asleep-at-the-wheel are seen as relatively minor crash causes in short-haul trucking operators. Fatigue incidence in short-haul trucking crashes is a fraction of its incidence in long-haul trucking. The Federal Motor Carrier Safety Administration (FMCSA) itself has acknowledged the small role of driver fatigue in short-haul operations.

5. **HOS regulations would not address several major fatigue causes**. Apart from the size of the crash problem, HOS regulations are not a strong countermeasure to fatigue because they only partially address the causes of fatigue. Major fatigue factors *not* addressed by HOS rules include individual differences in fatigue susceptibility, time-of-day (circadian rhythms), and the driving environment. Imposing new HOS regulations would likely have little measureable effect on short-haul trucking safety.

6. **More informative and comprehensive analyses are possible and necessary**. Fairer and more comprehensive analyses could correct the above deficiencies, cover more years and more commodity types, and employ other data sources to better analyze short-haul transport safety questions. Most notably, two major truck crash databases contain comparative statistics on local (<100-mile) versus Over-The-Road (OTR, >100-mile) truck driving. These could have been analyzed by Volpe, but were not. For truly comprehensive and fair comparisons, new statistics are needed on local versus OTR exposure, including number of trucks and vehicle miles traveled. Finally, analyses should include cost-benefit assessment of envisioned regulations since they would entail economic costs and other possible societal disbenefits, including safety disbenefits.

7. **Employing CSA 2010 could potentially be a superior safety intervention**. FMCSA's new, showcase enforcement system, Comprehensive Safety Analysis 2010 (CSA 2010), is a fairer, better targeted, and more effective intervention to address trucking safety concerns. CSA 2010 is specific in regard to problem carriers, drivers, and safety performance areas, including fatigue. Given the

> variety of safety issues in all of trucking and the need for on-target safety interventions, exercising FMCSA's new CSA 2010 system is the greatest opportunity to correct any compliance and safety deficiencies in short-haul trucking and, indeed, across the entire industry.

1. The Volpe analysis provided only gross, non-diagnostic statistics on truck crashes and violations.

The Volpe crash analysis examined no crash causes, including driver fatigue. This is surprising, since the MCMIS Crash File does contain a Driver Condition variable which lists "fatigue" and "asleep" as data elements (coding choices). The Volpe statistics appear to show a safety concern, but there was no effort to parse the data in ways that would shed light on causal factors. There are a number of ways the MCMIS Crash File statistics could have been disaggregated to test the fatigue hypothesis and/or suggest other causes and risk factors. Below are a number of more in-depth data analyses which should have been performed or for which, if they were performed, findings should have been reported.

Driver Condition (Fatigue). The MCMIS Crash File contains a Driver Condition variable which includes "fatigue" and "asleep" as separate elements. Even though fatigue is likely undercounted and such data variables often have many unknowns, *comparative* statistics would be meaningful and probably valid. This analysis should have been performed, and the results reported.

Single- Versus Multi-Vehicle Crashes. The incidence of driver fatigue and other forms of driver impairment is much higher in single-vehicle crashes than in those involving another vehicle. When drivers fall asleep or otherwise lose consciousness, they typically drift off the road, resulting in a single-vehicle crash. In the Large Truck Crash Causation Study (LTCCS), 12.8% of large truck single-vehicle crashes involved asleep-at-the-wheel as the Critical Reason (proximal cause). Only 0.4% of truck drivers in multi-vehicle crashes were asleep-at-the-wheel. Thus, there was a 29-fold difference in asleep-at-the-wheel incidence. If fatigue were a significant factor in elevating crash risk for HOS-exempt short-haul operators, disaggregating the crash data by number of involved vehicles would likely yield different patterns for the two crash categories.

Time-of-Day. Similarly, the role of driver fatigue in crashes is much higher during the overnight hours than during the rest of the 24-hour data. This is true of both long-haul and short-haul truck drivers, even though overall fatigue percentages are much lower for short-haul trucks. Disaggregation of the crash data by time blocks (e.g., 9pm to 6am versus the remaining 15 hours) would be another strong test of the fatigue hypothesis.

Divided Versus Undivided Roads. Perhaps the most pervasive factor affecting motor vehicle crash risk is "Trafficway Flow," or, more simply, divided highways versus undivided roads. Vehicles on divided highways such as Interstates are all traveling at about the same speed, with minimal interaction. Undivided roads are narrower, with crossing paths and closer proximity among vehicles. There are road crossings, stops and starts, turns, pedestrians and bicyclists, narrower shoulders, and greater opportunities for driver mistakes. Divided highways have markedly lower crash rates. For all vehicle types, crash rates on undivided local and arterial roads are 2-3 times those on Interstates (FHWA, 2000). Naturalistic driving (instrumented vehicle) studies of truck crash/incident risk (e.g., Knipling et al., 2005) suggest that driving on undivided roads carries more than *five times* the risk per hour of driving than does driving on divided roads. To the extent that risk varies with roadway type, relatively small differences in the distribution of travel on those roadway types generates differences in bottom-line safety, even without differences in safety performance on the individual roadway types.

In its Table 1, the Volpe analysis compared gross crash rates for agricultural trucks operating entirely within a 100-mile radius to those consistently operating beyond 100 miles. No roadway type exposure statistics for these two contrasting operations exist, but there is no doubt that ≤100-mile short-haul trucks drive a far greater percentage of their miles on undivided roadways. Mileage or vehicle exposure data by trip length are not available. Fatal crash statistics on trip length and roadway type are available from TIFA, and they show that, during the years 1999-2006, 67% of fatal truck crash involvements during ≤100-mile trips occurred on undivided roads. This compares to just 39% for >100-mile trips. If Volpe had disaggregated their Table 1 by Trafficway Flow, their observed crash rate differences may have disappeared entirely for individual categories (divided and undivided). The average crash rate difference of 19% over the three years could easily be due entirely due to differences in the proportions of crash locations rather than any differences in driving safety.

Agricultural production under the HOS exemption occurs largely in rural areas where the overwhelming percentage of travel is on undivided roads. Not surprisingly, a 1999-2006 comparison of trucks identified as carrying agricultural products to other trucks yielded similar results to those above. Seventy-one percent (71%) of the fatal crashes of agricultural trucks identified in the University of Michigan Transportation Research Institute (UMTRI) Trucks in Fatal Accidents (TIFA) database occurred on undivided roads, versus 51% of the fatal crashes of other trucks. The presence of trafficway flow as a confounding factor requires that short-haul exemption-related comparisons of crash rates (e.g., ≤100-mile versus >100-mile, agricultural versus other) control for this variable to be valid.

Other Uncontrolled Variables. The Volpe analysis failed to control for several other variables which were potentially confounding and/or which would suggest alternative explanations for observed effects. For example, ≤100-mile carriers and >100-mile carriers may differ in safety-relevant ways that have nothing to do with regulation differences. Carriers of these two extremes may be of different sizes, be distributed differently geographically, and use different mixes of fleet vehicles. Certainly, they drive in different roadway environments. Further, the MCMIS Crash File is inherently deficient for most causal assessments. It has no variable for crash fault and no crash configuration variables that might factor out crashes with unlikely relevance to driver fatigue or other driver factors. For example, utility trucks are parked on shoulders during most of their work usage. Crashes involving parked or otherwise stopped utility trucks are not likely to be relevant to truck driver fatigue.

2. Structural Weaknesses in MCMIS Undermine the Validity of the Volpe Analysis

The validity of the MCMIS Crash file depends upon the accuracy of carrier reporting, crash form completion, and state reporting of crash data. Every two years, carriers provide data on the size and nature of their trucking operations to the MCMIS Census File using Federal Form MCS-150. Unfortunately, the voluntary information they provide on their operations may be incorrect, or quickly become out-of-date.

There is no verification of carrier-provided data other than that provided by FMCSA or State compliance reviews, which affect less than 2% of carriers annually. Carriers may misinterpret Form MCS-150 items, or may intentionally provide misleading data. For example, a motor carrier could voluntarily check up to 30 different “cargo classification” boxes, indicating their “intent” to haul general freight, building materials, dry bulk, farm supplies and “other” (from among the 30 listed), but actually end up carrying only U.S. Mail (another cargo classification) because that’s the business available. That motor carrier, however, has checked a category (Farm Supplies) which might have flagged the carrier for inclusion as agricultural carrier. Some carriers may incorrectly believe that checking all cargo types on the form actually permits them to carry those cargo types.

Out-of-date information is probably a bigger problem. Trucking is a dynamic industry where carrier size and operations types may change rapidly. A growing carrier may be cast in an unfavorable light if its actual number of trucks (and therefore crash risk) is greater than that shown on their Form MCS-150. The cargo classification that a carrier self-reports on MCS-150 is not audited by U.S. DOT for accuracy. It *may* be updated, without penalty, by FMCSA during a compliance review and has absolutely no impact or restriction on what the carrier actually hauls on a given trip.

Violation rates (e.g., Volpe Tables 3 and 4) are also subject to confounding based on inaccurate carrier information in the MCMIS Census File. In addition, roadside inspections are selective rather than random, adding an additional possible confound.

Apart from accuracy of carrier data, there is the question of state reporting of crash data to the centralized MCMIS file. UMTRI has conducted a series of MCMIS-related state data assessments in which they match and compare obtained MCMIS Crash File records to state Police Accident Report (PAR) files. Individual state assessments are available on the UMTRI website (www.umich.umtri.edu). Based on 27 assessments conducted up to 2008, the average state reporting completeness for truck crashes was only 62%. The 27 states varied widely from above 80% to below 40%. Further, within states, there have been large variations in data completeness based on such factors as vehicle size/type, crash severity, state of vehicle registration, jurisdiction, and reporting agency. Underreporting often results from problems in interpreting and applying reporting criteria, with large jurisdictions often having greater problems than smaller ones. Each state has problems specific to its system. For example, some states actually overreport certain cases, due to duplicate records.

FMCSA has had underway a long-term program to improve the completeness, timeliness, and accuracy of state reporting (Benkowski, 2009). States have varied widely in their data quality, with general improvements over the past five years. Data quality is much better today than just a few years ago during the years covered by the Volpe analysis. But as late as September 2007, near the end of the Volpe analysis period, 16 states were rated only "fair" in their performance, and eight states were rated as "poor." The fact that reporting quality has changed over recent years means that year-to-year comparisons are likely confounded.

In regard to the reliability of MCMIS Crash File, it is notable that the FMCSA 2005 HOS Final Rule analysis of short-haul truck driving did not employ MCMIS crash data. Rather, their analysis was based on statistics from TIFA and from special research studies employing focus groups and naturalistic driving (instrumented vehicle) observations of actual short-haul driving. These sources have more rigorous data collection as well as more information on crash causes. Without rigorous data collection, including actual commodity hauled, it is not possible to accurately identify whether a short-haul truck trip was operating under the agricultural HOS exemption.

Given the above sources of MCMIS unreliability, it seems unwise to base a regulatory and economic decision as significant as revocation of the short-haul agricultural HOS exemption solely on statistics from the MCMIS crash file.

3. There is No Crash Causal Information in the Volpe Analysis

HOS rules are intended to reduce commercial driver fatigue and, specifically, asleep-at-the-wheel crashes. Thus, assessments of the short-haul HOS exemption should include critical and relevant questions such as these:

- Is driver fatigue a prevalent cause of short-haul exemption operator crashes?
- Has the exemption caused an increase in driver fatigue crashes for short-haul exempt operators?
- Is the exemption otherwise associated with a higher incidence or risk of driver fatigue crashes?
- Would imposing HOS rules and enforcement significantly reduce short-haul HOS-exempt driver fatigue crashes?
- Would imposing such regulations and enforcement be justified in relation to the economic costs and likely safety disbenefits?

None of the above questions were addressed by the Volpe analysis. The report contains no information on fatigue, asleep-at-the-wheel, or any other causes of large truck crashes. There is no specific linkage to HOS regulations or any other applicable safety solutions. Successful crash countermeasures are those that directly target and address critical crash causes. Accurate specification of safety interventions requires investigative crash causation data as well as *in-depth* analysis of crash and violation statistics.

4. Driver Fatigue is Not a Principal Cause of Short-Haul Truck Crashes

Crash causation analysis in reference to HOS rules should focus on the rates and likelihoods of *fatigue-related* crashes for different types of trucking operations. A variety of crash data sources indicate that driver fatigue as a crash cause is much less frequent in short-haul trucking operations than in long-haul operations. Thus, it is appropriate that these operations types have different HOS regimens.

FARS/GES Statistics. The Fatality Analysis Reporting System (FARS) and the General Estimates System (GES) are the primary national crash databases, addressing, respectively, fatal crashes and all police-reported crashes. FARS and GES do not classify trucks by trip length, but they do identify single-unit trucks (SUTs) and combination-unit trucks (CUTs). For gross national comparisons, truck body type (SUT versus CUT) can be used as a surrogate for operations type (short-haul versus long-haul). Truck type *per se* has little effect on driver fatigue, but operation patterns have a big effect. Table 1 below provides comparative fatigue crash percentages, rates, and likelihoods for SUTs and CUTs. The data shown are two-year averages for the years 2003-2004, based on an American Transportation Research Institute (ATRI) analysis (Dick et al., 2006). The last column shows the ratio between the SUT and CUT statistics.

Table 1. Comparison of Fatigue Crash Percentages, Rates Per 100 MVMT, and Rates Per 1,000 Vehicles for SUTs and CUTs, Averages for 2003-2004.

Large Truck Body Type: Truck Driver Fatigue-Related Crash Statistic:	SUTs	CUTs	SUT/CUT Ratio
Fatal Fatigue Crash Statistics (FARS):			
Percentage of Fatal Crashes	**0.9%**	**1.8%**	**0.50**
Fatal Fatigue Crash Rate Per 100 MVMT	**0.013**	**0.042**	**0.31**
Fatal Fatigue Crash Rate Per 1,000 Registered Trucks	**0.0018**	**0.0304**	**0.06**
Injury/PDO Fatigue Crash Statistics (GES):			
Percentage of Injury/PDO Crashes	**0.11%**	**1.78%**	**0.06**
Injury/PDO Fatigue Crash Rate Per 100 MVMT	**0.48**	**1.53**	**0.31**
Injury/PDO Fatigue Crash Rate Per 1,000 Registered Trucks	**0.0640**	**1.1156**	**0.06**

PDO = Property Damage Only

By all metrics, SUT involvements in truck driver fatigue-related crashes are just a fraction of CUT involvements. For example, SUT fatigue crash rates per mile traveled for both fatal and injury/PDO crashes are just 31% of those of CUTs. Per 1,000 vehicles, the SUT rates are about 6% of the CUT rates. The primary factor causing these dramatic differences is not the truck body itself but rather the inherent nature of the trucking operation – short-haul versus long-haul. HOS-exempt short-haul operations employ both SUTs and CUTs, but by definition they are 100% short-haul. Thus, their driver fatigue picture resembles the national picture for SUTs.

A caveat relating to the statistics in Table 1 and all other police-reported statistics is that they undercount driver fatigue as a crash cause. One comparison of in-depth crash investigations to police-reported fatigue percentages for the same types of crashes found that in-depth investigations generally identify two to three times as many fatigue-related crashes (Knipling & Shelton, 1999). Nevertheless, police undercounting of fatigue crashes appears to be uniform across various crash categories, leaving the relative values in Table 1 still valid.

1991-1993 TIFA and TIUS Analysis. The above statistics compared SUTs to CUTs as surrogate categories for short-haul and long-haul. The University of Michigan Transportation Research Institute (UMTRI) Trucks in Fatal Accidents (TIFA) database contains a variable classifying the trip length of fatal-crash-involved trucks. Below, fatigue crash statistics for trucks on short-haul trips (here defined as 100 miles or less) are compared to those involving longer trips.

An analysis by UMTRI (Massie, Blower, & Campbell, 1997) compared TIFA fatigue statistics for local (≤ 50 miles) and over-the-road (OTR; > 50 miles) trucks for the three-year period 1991-93. As with the previous FARS/GES analysis, the statistics compared were fatigue percentages, involvement rates per 100 MVMT, and involvement rates per 1,000 trucks. Deriving the latter two exposure-related statistics for these years was possible through the use of the U.S. Census Trucks In-Use Survey (TIUS). Unfortunately, TIUS is no longer operative and no similar truck exposure data exists for more recent years.

Table 2 shows these fatigue crash comparisons between local and OTR truck trips. Trucks with unknown trip lengths have been omitted. The last column in Table 2 shows the ratio between the local trip statistic and the OTR statistic.

Table 2. Comparison of Fatigue Crash Percentages and Rates for Trucks on Local (< 50 miles) and OTR (> 50 mile) Trips. TIFA Averages for 1991-93.

Trip Type/Distance: Truck Driver Fatigue-Related Crash Statistic:	Local (≤50miles)	OTR (>50miles)	Local/ OTR
Percentage of Fatal Crashes	**0.4%**	**3.0%**	**0.13**
Fatal Fatigue Crash Rate Per 100 MVMT	**0.022**	**0.095**	**0.23**
Fatal Fatigue Crash Rate Per 1,000 Registered Trucks	**0.0028**	**0.0501**	**0.06**

Source: Massie, Blower, & Campbell (1997). Includes all Class 3-8 large trucks. Trip length unknowns omitted.

The statistics in Table 2 are more than a decade old, and the definition of "local" differs from that of the HOS short-haul exemption (i.e., 50 versus 100 miles). Nevertheless, the statistics clearly demonstrate order-of-magnitude differences between local and OTR trucking operations in the incidence of driver fatigue as a coded factor in fatal crashes. Fatal crashes in local operations have a fatigue percentage that is just 13% of the OTR percentage, and a fatigue fatal crash rate per 100 MVMT that is just 23% of the OTR rate. The starkest difference is in fatal fatigue crashes per 1,000 trucks. Here the local operations rate is just 6% of the OTR rate. The local-trip rate of 0.0028 per 1,000 registered trucks translates to one fatal fatigue crash per 357,000 vehicle-years of local/short-haul trucking operations.

1999-2006 TIFA Analysis. The TIFA database for recent years can be employed to compare trip lengths of ≤100 miles to longer trips. Of course, 100 miles is a better cutoff for the comparison because it corresponds to the short-haul HOS exemption. Table 3 below compares fatigue crash percentages for local versus OTR trips using the 100-mile trip-length cutoff. The statistics represent the eight-year period 1999-2006. The lack of mileage or vehicle exposure data for trip length prevents the calculation of crash rates, such as those shown in Table 2 for earlier years.

Table 3. Comparison of Fatigue Crash Percentages on Local (≤ 100 miles) and OTR (> 100 mile) Trips. Averages for 1999-2006.

Trip Type/Distance: Truck Driver Fatigue-Related Crash Statistic:	Local (≤100miles)	OTR (>100miles)	Local/OTR Ratio
Percentage of Fatal Crashes	**0.88%**	**2.75%**	**0.32**

Source: TIFA (1999-2006)

Table 3 corroborates the earlier finding that driver fatigue is a much smaller crash factor in local than in OTR truck driving. The police-reported local trip fatigue percentage in fatal crashes is less than 1% and is less than one-third the OTR percentage. Further, this data uses recent years and a local/OTR cutoff corresponding to the short-haul HOS exemption.

FMCSA itself has reached the conclusion that fatigue plays a minor role in short-haul trucking safety. In its August 25, 2005 Final HOS rule, FMCSA stated that, “The research and data reviewed by the Agency demonstrate that fatigue has relatively little impact on short-haul trucking. The comments [to the HOS docket from industry and other stakeholders] also strongly support that conclusion.”

5. HOS Regulations Would Not Address Several Major Fatigue Causes

Driver fatigue and asleep-at-the-wheel are strongly affected by non-HOS factors, such as time-of-day (circadian rhythms), individual susceptibility differences, and environmental factors. Time-of-day is not addressed by HOS rules but strongly affects fatigue crash risk. For both local and OTR trucks in the 1991-93 TIFA analysis (Massie, Blower, & Campbell, 1997), the nighttime (9pm to 6am) fatigue percentage was several times that of the day/evening rate. In the recent Large Truck Crash Causation Study, which involved both fatal and serious injury crashes, the percent of crashes attributed to truck driver fatigue was more than ten times greater during these same nine nighttime hours compared to other times. In the DOT Driver Fatigue and Alertness Study (Wylie et al., 1996), time-of-day was a much stronger predictor of driver fatigue than was amount of prior sleep or hours driving.

Both naturalistic driving (instrumented vehicle) and controlled sleep deprivation studies indicate that fatigue susceptibility varies sharply among individuals (Hickman et al., 2005; Knipling, 2005, 2009). A person’s likelihood of falling asleep-at-the-wheel may reflect personal susceptibility more than his or her work schedule. In a naturalistic driving study involving 95 commercial drivers, 84 of 127 high-fatigue incidents (66%) were experienced by just 14 of the 95 drivers. In contrast, 52 of the 95 drivers were never observed to be drowsy (Knipling, 2005; 2009).

One of the first large scale naturalistic driving studies focused on local/short-haul truck driver fatigue (Hanowski et al., 2000). That study found marked individual differences, and also found that, overall, drivers were most likely to be fatigued on *Monday mornings* after a full weekend off. Drowsiness was actually less frequent later in the work week. Another larger scale naturalistic driving study (Blanco et al., 2008) also found incidents to be greatest during the first day after several days off. Based on an earlier study by the same research group, the U.S. DOT Office of Motor Carriers Research and Standards (1998) concluded that, "concerning fatigue, L/SH [local/short-haul] drivers are more like workers of non-driving than long-haul drivers. In this case, fatigue may not result from work, but may be influenced by personal choices . . . "

The greatest influences on driver alertness are probably not work schedule factors but rather personal sleep habits (sleep hygiene) and biological factors like circadian rhythms, individual susceptibility, and health. HOS rules are seen by some as a natural government response to fatigue-related crashes, but the above statistics and research findings indicate that truck driver fatigue often reflects factors not addressable by HOS rules. In the case of short-haul trucking, imposing HOS rules would thus be a partially off-target countermeasure to a relatively small safety problem. Imposing new HOS regulations would likely have little measureable effect on short-haul trucking safety.

6. More Informative and Comprehensive Analyses Are Possible and Necessary

As noted above, the Volpe analysis did not fully employ the MCMIS Crash File to identify possible factors associated with the observed gross crash rate differences between ≤100-mile and >100-mile agricultural carriers.

This critique has already cited TIFA statistics on local versus OTR truck driving. Trip length has a major effect on the likelihood a crash was caused by driver fatigue. As seen earlier in Table 3, the fatal crash fatigue percentage for local trips is less than one-third the OTR percentage. There are likely many more dramatic differences between local and OTR truck crashes. Volpe should have used TIFA and performed comprehensive comparisons of local and OTR truck crashes.

A variable for one-way trip length also exists in the LTCCS, although data for this variable has not been made available to the public for analysis. Unlike other crash databases (including MCMIS, TIFA, FARS, and GES), the LTCCS was based on in-depth multi-disciplinary crash investigations. This makes an LTCCS analysis of local versus OTR truck crashes even more essential. The LTCCS contains a full complement of primary crash causes (called critical reasons) and additional relevant variables such as hours driving, hours working, and fatigue as an associated factor. An LTCCS analysis should precede any consideration of short-haul trucking safety regulations.

Although GES and FARS are PAR-based and do not contain trip length variables, they should have been examined thoroughly to identify any statistics relevant to this issue. Some state crash data files may identify cargo types and thus provide relevant statistics. If granted research-related subject protection and/or anonymity, individual carriers might voluntarily provide data on their operations and crashes which may be useful for better understanding crash characteristics and causes. In addition, naturalistic driving (instrumented vehicle) studies of ag/food and/or utility operations could identify causal factors in crashes as well as near-crashes and other incidents. The potential information value of each of these would need to be assessed based on specific data variables within each and practical factors such as ease of use and potential costs. An effort to fairly and fully analyze safety in particular trucking segments should consider multiple information sources such as these, rather than relying on limited and potentially confounded data from a few data sources.

This critique has disparaged the analytical value of the MCMIS Crash File, but even MCMIS could provide more meaningful information if it were analyzed in-depth instead of superficially. In addition, a fair assessment should cover more than three years. Within the three years of the Volpe analysis (their Table 1), the crash rate difference between the two categories declined each year, and by nearly one-half from 23% to 13% over the three years. A longer-term analysis might verify this trend toward smaller safety differences.

Crash data alone cannot provide a full picture of short-haul trucking safety. Newer and better exposure data is needed to support the determination of crash *rates* for local versus OTR truck driving. Crash counts and percentages reveal only part of the crash picture. A full picture is possible when statistics are known about the number of trucks in each operations category, and their annual mileages. Based on TIFA and TIUS data from the early 1990s, the fatal fatigue crash risk for a short-haul truck may be as low as 6% of that of an OTR truck (see Table 2). Given the possibility of such extreme differences in risk, it is incumbent on the U.S. DOT to more thoroughly and fairly analyze the safety of short-haul trucking operations before seeking to restrict them.

Finally, any government initiative to impose regulatory restrictions on transport operations and commerce should include a balanced cost-benefit analysis. HOS log-keeping requirements would be a particular time burden on short-haul drivers because their frequent shifts between driving and non-driving activities would require many more entries on their HOS logs. These non-driving activities include transport-related tasks such as loading and unloading, and also tasks unrelated to transport such as utility repairs. In the case of HOS-exempt agricultural carriers, there would be significant economic loss if the imposition of HOS rules affected the efficiency of transport operations during peak planting and harvest periods. This could result in an economic impact on consumers by increasing food cost. There could also be a negative impact on safety by placing more trucks on local roads with more, and possibly less-experienced, drivers during an intense period of work. This must be weighed against the likely minimal occurrence of driver fatigue in short-haul operations.

For utility carriers, there are clear safety disbenefits from halting or disrupting restoration-of-service repairs. For example, ongoing electrical outages may affect area traffic lights and signals. Local hospitals and other care-giving facilities may need power to provide life-saving medical care. Local residents without electrical power or other utility services may suffer adverse consequences. The imposition of HOS rules would likely have such unintended consequences outside the realm of traffic safety. In this regard, it is notable that FMCSA's regulatory impact analysis for the 2003 HOS rule concluded that, "the costs of imposing that rule on short-haul carriers would far exceed any safety benefits resulting from a reduction of fatigue-related crashes. . . [In contrast], the net benefits of imposing those rules on long-haul carriers were quite positive . . ." (FMCSA HOS Final Rule, 2005).

7. Employing CSA 2010 Could Potentially be a Superior Safety Intervention

The compliance and safety differences identified in the Volpe analysis could be artifacts of the confounding factors discussed above. To the extent that Volpe's reported differences are real, they are almost certainly due to a relatively small number of higher-risk operators – carriers and drivers – within the industry. Their findings point not to regulatory changes but rather to improved compliance with existing regulations and general safety improvements among higher risk operators, *regardless of their industry sectors*.

Applying uniform regulations and enforcement practices to all commercial vehicle and operation types might simplify the job of the enforcer, but does not reflect the reality of markedly different operations with different levels and types of risk. HOS-exempt short-haul carriers and drivers should be encouraged and required to reach and maintain the same levels of overall safety performance as other carriers and drivers, while maintaining the needed schedule flexibility for their unique operations. In this regard, FMCSA's new Comprehensive Safety Analysis 2010 (CSA 2010) initiative seems a more appropriate and targeted safety intervention than making regulatory changes affecting entire industries. CSA 2010 is intended to provide more diagnostic carrier and driver evaluations and deliver more effective enforcement interventions. Per its website (*http://www.fmcsa.dot.gov/safety-security/csa2010/home.htm*), CSA 2010 is designed to:

- Use more and better data to measure performance and identify high-risk operators per both carrier and driver safety measurement systems.
- Diagnose seven specific areas of deficient performance, which encompass driver fatigue but include many other safety areas:
  - Unsafe driving
  - Fatigued driving (HOS-related violations)
  - Driver fitness
  - Drugs/alcohol
  - Vehicle maintenance
  - Cargo securement
  - Crash experience.
- Increase safety-relevant contacts with carriers and drivers, engaging many more operators, engaging them earlier, and specifically targeting the above deficiency areas.
- Employ a range of progressive interventions to reduce high-risk behaviors and practices.
- Influence and improve not just the worst carriers, but also the majority of carriers with average, but improvable, performance.

CSA 2010 is tailored to address and correct any valid compliance and safety concerns identified in the Volpe analysis. HOS rules address only driver fatigue, which is not a major cause of crashes for short-haul trucks and drivers. CSA 2010 is both comprehensive in scope and specific in its safety diagnoses and interventions. It targets operators who are not performing to legal and industry safety standards, but also influences carriers with average, but improvable, performance. CSA 2010 is operational in four states and will expand to nationwide operation next year. It is a far more flexible and applicable safety intervention than would be the blanket imposition of HOS rules, which would target only one element of safety while being imposed indiscriminately on all carriers with current HOS exemptions. FMCSA has been designing and planning CSA 2010 for more than five years, and it appears to be succeeding. It should be uniformly implemented and exercised to ensure the safety of all motor carriers.

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