Department of Transportation
Office of the Chief Information Officer

Supporting Statement B
Pilot Program to Allow 18-21-Year-Old Persons with Military Driving Experience to Operate Commercial Motor Vehicles (CMVs) in Interstate Commerce

Part B. Collection of Information Employing Statistical Methods

1. CIRCUMSTANCES REQUIRING INFORMATION COLLECTION

Section 5404 of the Fixing America's Surface Transportation Act, 2015 (FAST Act) requires the Secretary of Transportation to conduct a commercial driver pilot program to "…study the feasibility, benefits, and safety impacts of allowing a covered driver to operate a commercial motor vehicle in interstate commerce" (Pub. L. 114-94, 129 Stat. 1321, 1549, Dec. 4, 2015)(49 U.S.C. 31315 note). A "covered driver" is defined as a member, or former member, of the armed forces or reserve components between the ages of 18 and 21who is qualified in a military occupational specialty code to operate heavy equipment. Section 5404 requires the establishment of a data collection program to collect and analyze data regarding crashes involving covered drivers participating in the pilot program and commercially licensed, freight-carrying drivers under the age of 21 operating commercial motor vehicles (CMVs) in intrastate commerce.

The primary purpose of this pilot is to analyze the safety outcomes of covered drivers to determine whether their safety performance is similar to that of entry-level interstate freight-carrying drivers (between the ages of 21 and 24) who hold a commercial driver's license (CDL). Military personnel who are 18, 19 or 20-years old who are trained to operate heavy military vehicles are the focus of this pilot. The pilot will also compare the safety outcomes of covered drivers to those of 18, 19 and 20-year-old commercially licensed, freight-carrying intrastate CMV drivers, as allowed by current regulations. For the purposes of this research, safety outcomes refer to crashes (both Department of Transportation [DOT] reportable and non-DOT reportable), driver moving violations, violations from roadside inspections, and, when available, instances of unsafe driving behaviors (such as hard braking or sudden lane changes) that may be captured with existing onboard monitoring systems (OBMS) or engine control module (ECM) recording equipment.

Younger drivers comprise a small portion of the population of commercial vehicle drivers and those with military training in heavy vehicle operations are an even smaller subset. Identifying younger CMV drivers with relevant military training and recruiting them for participation in the pilot program will require a coordinated effort among the research team, FMCSA, representatives from the trucking industry, and military officials. To date, more than 70 carriers have expressed an interest in participating in the pilot program.

To achieve the stated research objectives, the research team will:

1. Accept carriers for participation in the pilot program.

2. Receive background information and signed informed consent forms for participating drivers from the carrier's point of contact (POC).

3. Monitor and collect driver activity and safety outcome data for the three pilot groups (covered drivers, intrastate 18- to 20-year-old drivers, and control group drivers) on a monthly basis over a 3-year period.

4. Conduct a statistical analysis of the safety outcomes to assess the safety implications of driver age, military training and relevant military experience, and other variables that may affect driving safety, such as vehicle configuration and operational setting (e.g., urban versus rural). Additional items will be reviewed for possible safety impacts, including gender and fuel-efficient driving, although there may not be a large enough sample size to determine statistically valid impacts of these variables. Gender has been shown to be a significant variable in driver safety, and fuel-efficient driving can be a mark of improved safety, lower speeds, and, non-aggressive driving (i.e., drivers with lower fuel efficiency may pose greater risks). These variables will be collected and analyzed as possible throughout the study.

2. DESCRIBE POTENTIAL RESPONDENT UNIVERSE AND ANY SAMPLING METHOD TO BE USED

The potential respondent universe for this pilot consists of 21- to 24-year-old entry-level freight-carrying CMV operators with a valid CDL; 18- to 20-year-old freight-carrying intrastate CMV operators with a valid CDL; and 18- to 20-year-old current or former military personnel with training in heavy vehicle operations who will obtain a valid CDL prior to enrollment. There are approximately 3.7 million interstate CMV drivers in the United States[1]. Regarding intrastate drivers, the Bureau of Labor Statistics estimates that there are about 15,000 persons between the ages of 16 and 19 employed in the truck transportation industry sector.[2] Given that the majority of States require a person to be at least 18 years old to operate a CMV, and drivers must be 21 or older to operate interstate, the majority of the laborers in this category are likely to be 18- or 19-year-old drivers who operate intrastate; because the category is limited to ages 16 through 19, there is no estimate of how many intrastate drivers are 20 years old.

There is no estimate of the number of 18- to 20-year-old CMV drivers with military training in heavy vehicle operations. However, there are approximately 538,330 active duty and 272,930 reserve enlisted members of the armed forces that are 25 years of age and younger.[3] Therefore, the number of current 18- to 20-year-old CMV drivers with military training is less than 811,260 (811,260 = 538,330 + 272,930).

The pilot program will not allow the participation of any driver currently operating under a Federal Motor Carrier Safety Administration (FMCSA) exemption, medical or otherwise. FMCSA allows some drivers to operate in interstate commerce under various exemption programs—most commonly diabetes, vision, and hearing. These drivers will not be included in

[1] Federal Motor Carrier Safety Administration (FMCSA). (2017). 2017 Pocket Guide to Large Truck and Bus Statistics. Retrieved from: https://www.fmcsa.dot.gov/safety/data-and-statistics/commercial-motor-vehicle-facts

[2] U.S. Bureau of Labor Statistics, Labor Force Statistics from the Current Population Survey, Household Data Annual Averages, 18b. Employed persons by detailed industry and age, 2016. https://www.bls.gov/cps/cpsaat18b.htm.

[3] U.S. Department of Defense, *2015 Demographics: Profile of the Military Community*, http://download.militaryonesource.mil/12038/MOS/Reports/2015-Demographics-Report.pdf.

the control or experimental groups in order to limit the influence of confounding factors on the results of the study.

3. DESCRIBE PROCEDURES FOR COLLECTING INFORMATION, INCLUDING STATISTICAL METHODOLOGY FOR STRATIFICATION AND SAMPLE SELECTION, ESTIMATION PROCEDURES, DEGREE OF ACCURACY NEEDED, AND LESS THAN ANNUAL PERIODIC DATA CYCLES

3.1 HYPOTHESES

The hypotheses associated with the study can be stated as:

> Null hypothesis (H_0): Allowing covered drivers to operate a CMV in interstate commerce would provide a safety level greater than, or equivalent to, the current safety levels experienced by requiring CMV drivers to be at least 21 years old to operate a CMV in interstate commerce.
>
> Alternative hypothesis (H_1): Allowing covered drivers to operate a CMV in interstate commerce would provide a safety level that is below current safety levels experienced by requiring CMV drivers to be at least 21 years old to operate a CMV in interstate commerce.

The hypothesis test associated with this study will contain two steps. First, statistical testing will be done utilizing a Poisson Regression to determine differences between two groups at a time, namely comparing covered drivers to intrastate drivers and comparing covered drivers to control group drivers. This analysis will be done by considering the crash rate per 100,000 miles for the three groups as the primary dependent variable in the analysis, though the analysis will also examine other safety outcomes as dependent variables. These include driving violations per 100,000 miles of travel, inspection violations per 100,000 miles, inspection violations per total number of inspections, and safety critical events (or SCEs, such as hard braking or sudden lane changes) per 100,000 miles, as available from OBMS logs or ECM recorded events.

The FAST Act requires a comparison between the covered drivers and current 18-21 year old intrastate drivers; however, FMCSA is aware that the driving profiles of intrastate and interstate drivers can vary significantly in terms of factors that can impact crash rates (including total vehicle miles traveled, time of day driving, and hour of duty cycle driving occurs in). Therefore, FMCSA has included a third group (“control” group) in the analysis to assess current entry-level interstate drivers to the covered group. FMCSA will also compare the control group drivers to the intrastate drivers to determine if these groups are comparable. In the event that they are, FMCSA may choose to compare covered drivers to the combined group in an effort to increase the sample size and statistical power of the analyses conducted. FMCSA may also choose to use a one-way Analysis of Variance (ANOVA) to analyze the differences between covered drivers, control drivers, and intrastate drivers at the same time.

After the statistical testing is completed, the analysis and supporting data, as required by the FAST Act, will be provided to a Federal Advisory Committee Act (FACA) working group, which will be formed and overseen through through the Motor Carrier Safety Advisory Committee (MCSAC). This working group will consist of representatives from the armed forces, motor carriers, CMV operators, safety advocacy organizations, and State licensing and enforcement officials. The working group will make recommendations to the Secretary of Transportation regarding the feasibility, benefits, and safety impacts of allowing a covered driver to operate in interstate commerce.

3.2 INFORMATION COLLECTION TOOLS

The information collected will provide data on driver safety outcomes, driver activity, and driver and motor carrier demographics. The primary dependent variable in the study is the crash rate per 100,000 miles for each driver group. In a study that examined the link between obesity and crash rates for novice heavy truck drivers, Anderson et al. (2012) reported that average crash rates ranged from 1.385 to 2.191 crashes per 100,000 miles of travel across driver groups categorized by obesity level. For this pilot program, each group's crash rates per 100,000 miles will be examined relative to activity and demographic correlates that have been documented in scientific literature.

Carriers will submit information on driver activity, crashes, and other safety outcomes on a monthly basis. The research team will work with the carrier to identify whether they would like to submit this data on a standardized form, or whether they already have records containing this data that they would prefer to send to the research team for data reduction. The data submission will summarize the number of crashes, moving violations, the total number of roadside inspection violations, the total number of inspections, and the total number of motorist incident reports (complaints filed against participating drivers by other motorists using the toll-free phone number on a driver's CMV) for each driver (covered, intrastate, and control groups) during the reporting period. In the event of a crash, motor carriers will also submit the findings of their post-crash investigations and post-crash drug and alcohol tests, as required by the Federal Motor Carrier Safety Regulations, as well as the investigation report from the investigating law enforcement agency.

When available, safety outcomes will also be measured using OBMS logs or ECM recorded events. Onboard monitoring systems or ECM recording equipment are not a requirement for participation in the study, but many carriers already have these systems installed on their CMVs. The project team will be asking carriers who have these systems installed to submit the logs for additional data points. Motor carriers will be asked to submit the OBMS logs or a summary of recorded events for every driver in each group of the pilot program, allowing the project team to identify non-crash safety outcomes, namely SCEs. SCEs include instances of hard braking, rollover stability activation, and excessive speed relative to the posted speed limit. Carriers do not need a camera based safety system for participation in this study.

Carriers will also submit monthly data on each study driver, including vehicle miles traveled (VMT), time of day when driving, and trip lengths. VMT is essential for analyzing driving safety records, as it informs each driver's level of exposure to potential poor safety outcomes. Trip-level information for the participating drivers will allow the project team to categorize driver activity by time of day and day of week, and to measure the number of hours since an individual driver's last break. These types of variables have been documented in the scientific literature as correlative to safety outcomes (Campbell, 1991). The project team will provide standardized forms as an option for data submission and will work with each carrier to identify a preferred method for submitting their data.

Demographic data on motor carriers will be collected via application forms to participate in the study. Carrier demographic information includes company contact information (i.e., motor carrier name, motor carrier [MC] and/or U.S. Department of Transportation [USDOT] number, place of business address, and phone number) and information on the scope and scale of their operations. This includes whether they operate interstate or intrastate (or both), their fleet size, the number of drivers they employ, and how many of those drivers could be employed for the covered group. Participating drivers will be required to fill out a background information form that contains demographic data (e.g., gender, branch of military service in which heavy vehicle operations training was completed [if applicable; drivers in the control and intrastate groups may not have had military training], place of employment, years of experience operating heavy vehicles, etc.) that could be correlative to safety outcomes.

3.3 INFORMATION COLLECTION PROCEDURES

The plan for data collection is to recruit motor carriers to participate in the study who would then identify and employ covered, intrastate, and/or control group drivers and report safety and driver activity data to the project team. A participating carrier must provide at least one covered driver and at least one intrastate or control driver to minimize the influence of external variables in the analysis. To achieve a statistically valid sample, approximately 200 participants are desired for each group (covered, intrastate, and control).

Carriers are expected to collect data on driver demographics, driver activity, and safety outcomes. Carriers will then submit the collected data to the project team on a monthly basis. All data will be submitted electronically via a secure online file-transfer site maintained by the contractor. A monthly data reporting period will allow the project team adequate time to observe any changes in the driver pool that may affect the validity of the sample, such as a driver turning 21 years of age.

The information collection will take place over three steps:

1. Motor carriers wishing to participate in the pilot program will submit a completed application to the contracted research team, who will send these applications to FMCSA for final approval.
2. Motor carriers will collect driver background information forms and signed informed consent forms for all participating drivers and send these (electronically) to the contracted research team.

3. Each carrier's point of contact will submit the required data for each participating driver on a monthly basis through the secure file-transfer site.

The specific data items that will be collected are described in Table 1.

Table 1. Driver activity data to be collected monthly.

Data Item	Description
Vehicle Miles Traveled	The number of miles driven, per driver, during the reporting period.
All Crashes	The total number of crashes, per driver, that occurred during the reporting period. This includes non-reportable crashes that were property-damage only crashes and where the vehicle did not need to be towed.
FMCSA Reportable Crashes	The total number of FMCSA-reportable crashes, per driver, that occurred during the reporting period.
Carrier Post-Crash Investigation Summary	Post-crash reports that provide more detailed crash information (e.g., date, time, location, conditions, etc.) as well as driver information, such as the number of hours since the driver's last break.
Roadside Inspection Violations	The total number of inspection violations (including hours of service, unsecured load, etc.) per driver, recorded with corresponding Compliance, Safety, Accountability (CSA) points accrued during the reporting period.
Moving Violations	The total number of driving violations (e.g., speeding, illegal lane changes, etc.) per driver during the reporting period.
Motorist Incident Reports	The total number, per driver, of complaint calls from motorists during the reporting period.
Time of Day	The proportion of vehicle miles traveled during the daytime and the nighttime, per driver.
Day of Week	The proportion of vehicle miles traveled by day of the week, per driver.
Hours Since Last Break	The number of hours between break periods, per driver, during the reporting period.
Truck Type	The proportion of vehicle miles traveled by truck type, per driver.
OBMS or ECM Safety Critical Events Recorded *(as available)*	The total number of SCEs, per driver, as recorded by drivers' OBMS or ECM recording equipment during the reporting period (e.g., hard braking events, rollover stability activation, excessive speed relative to the posted speed limit, near crash events), if available.
Fuel-Efficient Driving *(as available)*	Miles-per-gallon performance of each driver during the reporting period as recorded by drivers' OBMS, if available.

3.4 ANALYSIS METHODOLOGY

In past transportation safety studies, regression models such as the Poisson or Negative Binomial have been utilized (Washington et al., 2011). These approaches allow researchers to properly model count data (non-negative integers), which is the typical form of driver-level safety data, while controlling for the bias that can result from having a dependent variable with a large proportion of observations equal to zero. As previously mentioned, crashes are relatively rare events which results in several zero observations in statistical analyses of crash data. Therefore, analysis will be done comparing two groups at a time utilizing a Poisson Regression Model.

The FAST Act requires a comparison between the covered drivers and current 18-21 year old intrastate drivers; however, FMCSA is aware that the driving profiles of intrastate and interstate drivers can vary significantly in terms of factors that can impact crash rates (including total vehicle miles traveled, time of day driving, and hour of duty cycle driving occurs in). Therefore, FMCSA has included a third group ("control" group) in the analysis to assess current entry-level interstate drivers to the covered group. Poisson regression models will be used to compare the covered drivers to intrastate drivers (as required by the FAST Act) and covered drivers to control group drivers. FMCSA will also compare intrastate drivers to control group drivers to determine whether these groups can be comebined into one larger control group for comparison against the covered drivers.

In summary, multiple poisson regression models will be looked at to test the following hypothesis ("Hypothesis Test 1"):

H_0: $\lambda_2 - \lambda_1 \leq 0$

H_A: $\lambda_2 - \lambda_1 > 0$

Where λ_2 represents the average crash rate of the covered drivers, while λ_1 represents the average crash rate of control group drivers for one hypothesis test, and represents the average crash rate of intrastate drivers for a separate hypothesis test.

Additionally, the following hypothesis test ("Hypothesis Test 2") will be used to evaluate the comparison of control group and intrastate drivers:

H_0: $\lambda_2 - \lambda_1 = 0$

H_A: $\lambda_2 - \lambda_1 \neq 0$

Where λ_1 represents control group drivers and λ_2 represents intrastate drivers. If we fail to reject the null argument for Hypothesis Test 2, Hypothesis Test 1 may be repeated with λ_1 representing the combined control and intrastate group to increase sample size.

Additionally, an Analysis of Variance (ANOVA) may be conducted to compare the crash rate across all three driver groups (Hogg et al., 2005). An ANOVA model will allow for three-group comparisons and directly determines if the observed differences in crash rates between the three groups are statistically significant.

In general, the appropriateness of these or any other models will be determined based on the actual data collected and checking the models' results for any violations of the statistical assumptions on which they are premised. Thus, the evaluation will be dictated by the actual data collected given the unknown factors surrounding the data collection, such as the number of drivers that will participate, the number of drivers that will transition out of the pilot, and carriers' abilities to provide information on safety outcomes and driver activity.

3.5 POWER CALCULATION

For this pilot, we desire a significance level of 5 percent and a statistical power of 80 percent.

For the comparison of covered drivers to the control group utilizing a Poisson Regression, we are interested in a one tailed test (i.e., whether the covered drivers are significantly less safe than control group drivers). For a total sample size of 400 drivers (200 covered drivers and 200 control drivers), holding the significance level at 0.05, the rate of occurrence parameter held at 0.85 (the default value), and the detectable effect size at 1.14, the achieved power level is 0.80. Therefore, the developed sample size will achieve the desired significance of 0.05, with statistical power of 80 percent, and will be able to detect an effect size of 14 percent. The same would hold true for the comparison of covered drivers to intrastate drivers, as the desired sample sizes are equivalent across all three groups.

4. DESCRIBE METHODS TO MAXIMIZE RESPONSE RATE AND TO DEAL WITH THE ISSUES OF NON-RESPONSE

To increase the level of participation in the pilot program, the project team will conduct outreach to motor carriers and the various branches of the armed services. During the pilot, if a carrier is not submitting the monthly data reports in a timely manner, the research team will reach out to the carrier to try and remedy the situation by ensuring the carrier understands how and when to submit the data (as well as what data to submit). If no data are submitted, FMCSA will be immediately notified. If this should continue for a second month, FMCSA will reach out to the carrier and attempt to work with the carrier to obtain the data. If a carrier fails to submit information for a third month, they will be removed from the pilot. The research team will work throughout the month to ensure the data sets received are complete and accurate. If necessary, carriers may be asked to submit additional information or clarifying information in the next month's data delivery.

5. DESCRIBE TESTS OF PROCEDURES OR METHODS TO BE UNDERTAKEN

There are no planned pilot tests of procedures or methods.

6. PROVIDE NAME AND TELEPHONE NUMBER OF INDIVIDUALS WHO WERE CONSULTED ON STATISTICAL ASPECTS OF THE INFORMATION COLLECTION AND WHO WILL ACTUALLY COLLECT AND/OR ANALYZE THE INFORMATION

FMCSA is sponsoring this information collection. The FMCSA point of contact is:

Nicole Michel
1200 New Jersey Avenue, SE
Washington, D.C. 20590
202-366-4354
nicole.michel@dot.gov

The contact persons at MaineWay Services and Cambridge Systematics are:

Gene Bergoffen
P.O. Box 166
Fryeburg, ME 04037
207-935-7948
bergoffen@roadrunner.com

Dr. Christopher Lindsey
730 Peachtree Street NE, Ste. 500
Atlanta, GA 30308
404-460-2602
clindsey@camsys.com

Don Osterberg
P.O. Box 166
Fryeburg, ME 04037
207-935-7948
don.osterberg@gmail.com

7. REFERENCES

Andersen, J., Govada, M., Steffen, T., Thorne, C., Varvarigou, V., Kales, S., and Burks, S. (2012). Obesity is associated with the future risk of heavy truck crashes among newly recruited commercial drivers. Accident Analysis and Prevention 49, pp. 378-384.

Campbell, K. (1991). Fatal Accident Involvement Rates by Driver Age for Large Trucks. Accident Analysis and Prevention 23 (4), pp. 287-295.

Cohen, J. (1969). *Statistical Power Analysis for the Behavioral Sciences*. New York: Academic Press.

Faul, F., Erdfelder, E., Buchner, A., and Lang, A.-B. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses, Behavior Research Methods 41 (4), pp. 1149-1160.

Hogg, R., McKean, J., and Craig, A. (2005). *Introduction to Mathematical Statistics, 6th edition*. Upper Saddle River, N.J.: Pearson Prentice Hall.

Yandell, B.S. (1997). *Practical Data Analysis for Designed Experiments*. Boca Raton, FL: Chapman and Hall.

Washington, S., Karlaftis, M., and Mannering, F. (2011). *Statistical and Econometric Methods for Transportation Data Analysis, 2nd edition*.

8.