Federal Motor Carrier Safety Administration
Office of Analysis, Research and Technology
FY 2009 Accomplishments Report

The following discussion identifies accomplishments by the Office of Analysis, Research and Technology (ART) during FY 2009, and offers a preview of selected efforts currently underway. The ART Office completed studies in these strategic areas:

- Produce Safer Drivers
- Improve Commercial Motor Vehicle Safety
- Produce Safer Carriers
- Enable and Motivate Internal Excellence

Produce Safer Drivers

Driver Distraction in Commercial Vehicle Operations — This report combined and analyzed naturalistic data from two earlier studies that included 20,000 crashes, near-crashes, crash relevant conflicts (i.e., safety-critical events), and non-eventful baseline epochs. The data include 203 CMV drivers and about 3 million miles of continuously recorded kinematic and video data. The results show that commercial motor vehicle (CMV) drivers who were using cell phones to send and receive text messages were 23.2 times more likely to be involved in a safety-critical event while texting than when not texting. During 6-second intervals, texting drivers took their eyes off the forward roadway for 4.6 seconds, which equates to traveling the length of a football field at 55 mi/h without looking at the roadway. CMV drivers using a dispatching device while driving increased their risk of having a safety-critical event by 9.9 times. Other distracting activities included writing (9.0), using a calculator (7.0), looking at maps (7.0), dialing a cell phone (5.9), and personal grooming (4.5). In addition to analyzing risk, the report also analyzed how often these behaviors actually occurred. These findings prompted the Secretary of the U.S. Department of Transportation to host a Driver Distraction Summit in September 2009. Find the final report online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/FMCSA-RRR-09-042.pdf), as well as a summary TechBrief (http://www.fmcsa.dot.gov/facts-research/research-technology/report/FMCSA-RRR-09-045.pdf). A webinar on the preliminary findings is archived on the FMCSA Web site (http://www.fmcsa.dot.gov/facts-research/art-webinars-desc.aspx?webID=32).

Pilot Test of a Low-Cost Onboard Driver Behavior Monitoring System — Seeking to improve CMV driver performance, this pilot test provides an independent evaluation of a commercially available low-cost driving behavior management system, DriveCam. The study was conducted with two motor carriers (Carrier A, a long-haul carrier, and Carrier B, a short-haul carrier) and 100 outfitted trucks over a 17-week period. The results suggest the combination of onboard safety monitoring and behavioral coaching was responsible for the reduction in the mean rate of safety-related events/10,000 miles at Carriers A and B by 37 percent and 52 percent respectively. FMCSA held a webinar to share the preliminary findings, which is archived online (http://www.fmcsa.dot.gov/facts-research/art-webinars-desc.aspx?webID=34). The final report will be published in future.

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CMV Defensive Driving Tips for Fleet Safety Managers and Drivers — Online training materials were developed to raise the consciousness of CMV drivers about common driving errors and to provide valuable driving tips through an easily accessible tool, the Internet. This material augments existing training programs by providing supplemental defensive driving tips i.e., "do's" and "don't" to CMV drivers and fleet managers. The driving tips, ideas, and suggestions on this Web site are supported with real-world video clips (25- to 30-second video clips) recorded in a naturalistic (open roadway, non-test track) driving study. The video clips show real-world examples of driver errors that will serve to motivate CMV drivers to become safer drivers and thereby avoid dangerous driving situations. Also, as a training exercise, each video clip is followed by a set of questions about the driver's behavior. Find these tips on the FMCSA Web site (http://www.fmcsa.dot.gov/about/outreach/education/driverTips/index.htm). Also, FMCSA held a webinar on this topic, which is archived online (http://www.fmcsa.dot.gov/facts-research/art-webinars-desc.aspx?webID=40).

Assessment and Refinement of North American Fatigue Management Program — Fatigue management programs (FMPs) help carriers reduce driver fatigue. In this study, FMCSA and Transport Canada implemented a complete FMP program with three carriers, providing educational sessions at all levels of the trucking company, sleep disorders diagnosis and treatment, and interaction with dispatchers and management to improve dispatch practice regarding fatigue. The goal was to assess the feasibility of a company-wide approach to fatigue management and its impact on drivers' fatigue, performance, sleep duration and mood, as well as on company performance measures, scheduling policies and practices. The study found sleep-related improvements post-FMP vs. pre-FMP in subjective sleep quality, with the greatest effect on duty days and in sleep achieved during the main sleep period post-FMP vs. pre-FMP for duty days. The changes that occurred in sleep efficiency indicated a better balance between rest and duty days. Significantly fewer drivers reported one or more critical events (i.e., nod off or close call) from pre-FMP to post-FMP, and fewer critical events per kilometer driven for the two sites with available distance data. The final report will be published in future.

Investigation into Motor Carrier Practices to Achieve Optimal Driver Performance — This study examined the effectiveness of the current 34-hour restart provision in restoring driver performance under "best case" (day-time driving) and "worst case" (night-time driving) scenarios. This research is in support of the hours of service rule. Preliminary findings indicate that the 34-hour restart was effective at mitigating sleep loss and consequent performance impairment for day-time drivers, but not effective for night-time drivers. Further, the 34-hour recovery period is not long enough for night-time drivers to obtain two full nights of recovery sleep. The final report will be published in future, and a webinar is expected later this year.

SmartPark Truck Parking Availability System Field Operational Tests — The SmartPark project seeks to demonstrate the functionality of technology for providing information about the availability of parking spaces at rest areas to truckers on the road in real-time. Under this initiative, FMCSA completed field operational tests (FOTs) on two technologies: magnetometry and video imaging. Based in the findings, neither technology will be selected for continuation into Phase II. FMCSA plans to repeat Phase I of SmartPark with another, more accurate technology that combines a laser profile with Doppler radar to determine truck parking space occupancy count. The final FOT reports will be published in future.

Skid Pad Project — FMCSA's skid pad project involved construction of a large, paved surface area and control center to train CMV drivers how to control maneuvers involving apparent loss of "vehicle control" (e.g., on slippery surfaces or jackknifing) using a specially manufactured vehicle with skid technology (instead of wetting the pavement surface). Lewis-Clark State College, in Lewiston, ID, has completed the project, and FMCSA produced a webinar on the project, which is archived on the FMCSA Web site (http://www.fmcsa.dot.gov/facts-research/art-webinars-desc.aspx?webID=26)

Motor Carrier Efficiency Study — This study identified key freight movement inefficiencies in the motor carrier industry and identified promising wireless technologies that showed significant estimated benefits to address these inefficiencies. FMCSA is currently overseeing four Phase II field demonstrations of wireless technologies to document real-world benefits in order to promote their use by motor carriers. The study is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/RRT_09_015_MCES.pdf)

Wireless Roadside Inspection Proof-of-Concept — The results of this research demonstrated the technical feasibility of wirelessly inspecting a truck or bus as the vehicle travels at highway speeds past a fixed roadside site and next to a State police cruiser. Technical efforts dealt with the ability of a wireless inspection system to collect driver, vehicle, and carrier information; format a safety data message set (SDMS) from this information; and wirelessly transmit a SDMS to a roadside receiver unit or mobile enforcement vehicle. The report concluded that wireless roadside inspection holds considerable promise in increasing the safety of our highways by: improving the quality of the inspections performed, allowing more inspections to be conducted, and providing industry benefits for these technologies that encourage early adoption. The final report is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/FMCSA-RRA-09-007_WRI-POC.pdf).

Santa Teresa, NM Radio Frequency Identification FOT — The results of this FOT demonstrated the time savings and safety enforcement benefits of integrating radio frequency identification (RFID) roadside readers into the safety assurance and inspection operations at international border crossings. This project demonstrated a system that reduced the current manual safety screening process by FMCSA inspectors from 15 minutes to 1 second by scanning existing RFID tags already present on the windshields of all Mexican trucks entering the U.S. and correlating the tag ID with FMCSA safety data files. The final report for this project is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/Santa-Teresa-RFID-E-Screening-Demonstration.pdf), as is a summary TechBrief (http://www.fmcsa.dot.gov/facts-research/research-technology/tech/Santa-Teresa-RFID-E-Screening-Demonstration.pdf).

Driver Fatigue, Distraction, and Alerting Technology — The objective of this Small Business Innovative Research (SBIR) Phase I development project was to develop a multi-variable drowsy driver mitigation system (DDMS). This unobtrusive, in-vehicle, real-time system combined many indicators of drowsiness and alertness into a composite drowsiness score. Advisory and warning messages presented to the driver and supplemental notifications to fleet management are also supported. A demonstration of a real-time DDMS concept was developed that determines driver alertness via multiple measures. The concept combines measures that independently indicate drowsy or distracted driving and that indicate driver alertness. The demonstration was

successful and showed the potential of this new DDMS concept to provide the basis for a viable commercial system. The project final report is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/Emerging_Detection_Measures_508.pdf), as is a summary TechBrief (http://www.fmcsa.dot.gov/facts-research/research-technology/tech/Emerging-Detection-Measures-508.pdf).

Bus Operator Types and Driver Factors in Fatal Bus Crashes: Results from the Buses Involved in Fatal Accidents Survey — This study focuses on factors associated with driver errors in fatal bus crashes involving different bus operator types. Five different carrier types are identified: School, transit, intercity, charter/tour, and "other" bus operators. There are substantial differences between these carrier types that are reflected in rates of bus driver errors in crashes and in the previous driving record of the bus drivers. Many factors are identified that are associated with driver error, including bus operation type, age, sex, hours driving, trip type, method of compensation, and previous driving record. The report is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/FMCSA-RRA-09-041_BIFA.pdf).

Improve Commercial Motor Vehicle Safety

Assessment of Exposure Risks of Trucking Occupational Hazards — This study simultaneously measured air pollution concentrations, noise, and vibration inside new model truck cabs and sleeping berths driven in different speeds and idling at a truck stop. This study identified that newer CMVs do not poise significant health risks to drivers. Parking in congested trucks stops does, however, increases exposure to diesel particulate matter. The final report will be published in future.

Factors That Affect the Service Life of Cargo Tanks — This report will provide guidelines for testing, inspection, assembly, and repairing cargo tanks, as well as information needed to update the FMCSRs regarding cargo tanks. The final report will be published in future.

Onboard Safety System Benefit-Cost Analyses — Three reports analyzed the economic costs and benefits for three commercial motor vehicle onboard safety systems: Forward Collision Warning Systems (FCWS), Lane Departure Warning Systems (LDWS), and Roll Stability Control Systems (RSC). The purpose of the benefit-cost analyses was to provide return-on-investment information for the motor carrier industry in support of future purchasing decisions of the onboard safety system. The final reports are online (FCWS: http://www.fmcsa.dot.gov/facts-research/research-technology/report/09-021-RP-Forward-Collision.pdf, LDWS: http://www.fmcsa.dot.gov/facts-research/research-technology/report/09-022-RP-Lane-Departure.pdf, RSC: http://www.fmcsa.dot.gov/facts-research/research-technology/report/09-020-RP-Roll-Stability.pdf) as is a summary TechBrief (http://www.fmcsa.dot.gov/facts-research/research-technology/tech/09-023-TB-Onboard-Safety-Systems-508.pdf)

Onboard Safety System Industry Demographics Analysis Project —FMCSA completed a study on small carrier usage of onboard safety systems. This work included case studies of 12 carriers as well as interviews with numerous other carriers on whether they use these systems and why or why not. By working with the trucking industry, the FMCSA envisions a future of smart technologies that support the expanding role of the trucking industry to transport the Nation's

goods and products safely, securely, and efficiently. These technologies or safety systems include lane departure warning systems, stability control systems, and collision warning systems. The final report will be published in future.

Tracking the use of Onboard Safety Technologies Across the Truck Fleet — To estimate estimating the penetration of onboard safety technologies, this project surveyed U.S. trucking companies to measure current penetration, future use, and the advantages available to companies employing these technologies. Interviews were also conducted with companies with high penetration of the technologies as well as system suppliers of the technologies to gather more detailed information about usage and future technology direction. The main factors noted by participants for using the technologies that vary little among the technologies include: proven safety benefits of the technologies, positive feedback by drivers, driver improvement, improved safety culture, reduced cost of accidents, and insurance benefits. The interviews yielded important views about the cost advantages of usage, the difficulty of justifying the purchase of the technologies, alternatives to safety technologies, and the future of technology integration. The final report will be published in future.

Fleet Study of Brake Performance and Tire Pressure Sensors — This field study of brake performance and tire pressure monitoring systems on commercial heavy-duty vehicles operating under real world conditions evaluated six systems in total—three brake performance and three tire pressure monitoring systems. Transit bus platforms were selected for this field test because of the severe urban, stop/start duty cycle under which transit buses operate—an environment that accelerates both brake and tire wear thus allowing the sensor systems to be heavily "exercised" over the study period. Both systems held up to the rigors of an urban city environment, and provided fleet managers with information to improve vehicle safety and maintenance practices. The final report is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/FMCSA-PSV-09-001_%20BrakeTireSensors.pdf).

Produce Safer Carriers

Pilot Test and Independent Evaluation of a National Employer Notification Service — Section 4022 of the Transportation Equity Act for the 21st Century, Improved Flow of Driver History Pilot Program, requires the FMCSA to "carry out a pilot program in cooperation with one or more States to improve upon the timely exchange of pertinent driver performance and safety records data to motor carriers." To address these requirements, a prototype Employer Notification Service was developed and tested in a real-world environment for 18 months. The pilot test report and independent evaluation provide the results; both will be published in future.

Efficacy of Web-Based Instruction for Training CMV Regulations and Best Practices — This study examined the efficacy of using Web-based instruction (WBI) to disseminate information and train personnel within the motor carrier industry regarding Federal Motor Carrier Safety Regulations. The study suggests that that technology-based instruction, including WBI, is less costly and potentially more effective than traditional instructional methods, and can be a powerful training tool in CMV operations when properly developed. The study also presented an experimental design framework for evaluating the success of future Agency WBI activities. The final report will be published in future.

Hazardous Material Shipper Prioritization — This study reviewed, documented, and refined an algorithm to identify hazardous material (HM) shippers who should receive safety compliance reviews. The final report will be published in future.

Hazardous Materials Serious Crash Analysis — This Phase III project further developed and updated a database of serious HM truck crashes. Additional years of data, including calendar years 2002–2006, and previously established crash causes and effect categories were entered into the Final Hazmat Database, including: Crash Severity, Vehicle, Driver, Package, Infrastructure, and Situational variables. Potential HM truck crashes in the Motor Carrier Management Information System (MCMIS) and Hazardous Material Information System (HMIS) were selected from calendar years 2002–2006 until a sample of 4,999 HM truck crashes were entered into the Final Hazmat Database. Police accident reports for each HM truck crash in the Final Hazmat Database were requested to validate the information in the database as well as add new information not included in MCMIS and HMIS. Moreover, each involved HM carrier was contacted to verify information and collect additional information on the HM driver, spill, and package. It is anticipated that learning about the circumstances and conditions of serious HM truck crashes included in this report will inform the development of new technologies, enforcement and legislation, and safety management techniques to reduce these types of crashes. The final report will be published in future.

Enable and Improve Organizational Excellence in the ART Office

CMV Roadside Technology Corridor — FMCSA's CMV Roadside Technology Corridor is deployed at a series of operational weigh and inspection stations along I-81 and I-40 in Tennessee. At these stations, FMCSA facilitates testing new truck and bus safety inspection technologies in partnership with the Tennessee Departments of Safety and Transportation, Oak Ridge National Laboratory, and the University of Tennessee. The technologies currently being tested are Wireless Roadside Inspection, Performance-Based Brake Tester, Smart Infra-Red Inspection System. The latest information on these CMV Roadside Technology Corridor projects can be found in the *Technology Corridor News*, the newsletter of the CMV Roadside Technology Corridor, which is online (http://www.fmcsa.dot.gov/facts-research/art-CMV-Roadside-Technology-Corridor.htm)

Analysis Division

The Analysis Division provides analytical reports on trends, costs, and fatalities and injuries in large truck and bus crashes. The division also monitors data quality to ensure an accurate measurement of safety performance, so effective countermeasures can be developed to reduce the occurrence and severity of commercial motor vehicle crashes. In addition, the Analysis Division prepares all the economic and environmental analyses for FMCSA's significant rulemakings to ensure changes to motor carrier regulations are based on sound analysis and data. Much of its data is available to the industry (http://ai.fmcsa.dot.gov/default.aspx).

Large Truck Crash Facts — This annual report contains descriptive statistics about fatal, injury, and property damage only crashes involving large trucks and buses in 2007. Selected crash statistics on passenger vehicles are also presented for comparison purposes. In addition, the report includes 10 tables that show bus crash statistics. The report is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/2007-LT-BCFs.pdf).

2007 Large Truck Crash Overview — This annual report contains descriptive statistics about fatal, injury, and property damage only crashes involving large trucks in 2007. The overview is online (http://www.fmcsa.dot.gov/facts-research/research-technology/report/2007LargeTruckCrash Overview.pdf).

Analysis Division studies expected to publish this year include:

Medication Usage and Large Truck Crash Involvement — The purpose of this study was twofold: first, to analyze the Large Truck Crash Causation Study (LTCCS) data to estimate the usage of potentially impairing over-the-counter and prescription drugs among drivers of large trucks involved in crashes; and second, to explore the relationship between drug usage by the driver and the risk of assignment of the critical reason associated with a crash. This study examined all large truck crashes as well as two subsets of these crashes (i.e., single vehicle truck crashes and crashes where the first crash event was between a large truck and a passenger vehicle).

Weather and Climate Impacts on CMV Safety — The purpose of this report is to provide the Federal Motor Carrier Safety Administration (FMCSA) with an analysis of how existing weather conditions may affect the safe operation of commercial motor vehicles (CMVs). Further, it also looks at the general impacts projected by climate change studies and hypothesizes how possible changes in weather patterns and extreme storms could affect future CMV operations. This includes changes that increase the potential of weather-related CMV crashes and impacts that may change trucking industry practices that could require a response in FMCSA regulatory enforcement.

Environmental Costs of CMV Crashes — This report explores the potential for using traffic modeling to estimate congestion, emissions, and time delay caused by commercial motor vehicle crashes. FMCSA is seeking better congestion estimates from these crashes for cost and environmental estimations. This is the first investigation of traffic modeling for congestion estimates by the FMCSA

Investigating Factors Contributing to Large Truck Lane Departure Crashes Using the FMCSA's LTCCS Database — Lane departure crashes account for a significant number of motor vehicle crashes and fatalities. However, information specific to large truck lane departures is not well documented. This project evaluated lane departure crashes and the related independent variables and attempted to derive causal relationships that can be used to identify preventative measures for reducing large truck lane departure crashes. Data from the LTCCS were evaluated to determine both the common causes and the circumstances leading to lane departure crashes. Causes and circumstances may include driver, vehicle, roadway, and environmental factors. Simple statistics, a simple odds ratio, and logistic regression were used to evaluate the crashes, and driver, vehicle, environmental, and roadway factors contributing to large truck lane departure crashes were identified.

Truck Mechanical Condition and Crashes in the LTCCS — This study examines relationships between heavy truck mechanical condition and crash risk using \LTCCS data in order to test two hypotheses: 1) Trucks with defects and out of service (OOS) conditions are statistically more likely to precipitate a crash than trucks with no defects or OOS conditions; 2) Defects in specific systems (e.g., the brake system) are associated with crash roles in which those systems are primary in crash avoidance, and that there is a physical mechanism that links the vehicle defect with the crash role.

Assessment of States' Roadside Inspection Methods — The purpose of this study was to identify the methods employed throughout the country to select commercial motor vehicles for roadside inspections, to evaluate the differences between the different methods, and to assess the safety impacts of these differences. The analysis focused primarily on comparing the Inspection Selection System–Driver (ISS–D) and PrePass selection methods.

A Driver-Focused Truck Crash Prediction Model — The Driver Crash Prediction Model project was initiated in 2008 to expand understanding of the key factors that contribute to an increased likelihood of a commercial truck crash. The research advances a driver-focused truck crash prediction model. Its spotlight is on drivers: their individual characteristics, their employment history, and their roadside inspection record in terms of both driver and vehicle safety violations. The model investigates the contribution of each driver factor on the dependent variable—the number of State reportable crashes in which the driver was involved. The findings suggest that driver age, weight, height, gender, and employment stability as well as previous driver and vehicle violations and past crashes are significantly related to the likelihood of a crash occurrence.

Also n the works …

The ART Office has dozens of projects underway at this time. Below is a selection of some of particular interest.

Onboard Monitoring FOT — The goal of this effort is to develop and evaluate an onboard monitoring system (OBMS) that allows for direct measurement of a set of driving characteristics that are indicators of unsafe driving behavior. FMCSA will use a prototype suite developed to provide real-time feedback to CMV drivers or provided to carrier management via a roll-up report for discussion with the driver regarding their driving performance. The system has the potential to improve drivers' attentiveness and enhance their safety performance. An 18-month FOT started in 2009 involving 250 trucks equipped with the OBMS suite of technologies and including as many as 1,000 CMV drivers and atleast two large motor carriers. This naturalistic study (capturing real-world data as drivers are on their revenue-producing trips) will answer research questions regarding the value of providing feedback to drivers regarding their safety performance.

Synthesis of Literature & Operating Safety Practices Relating to Cell Phone/PDAs Use in Commercial Truck and Bus Operations — The objectives of this study are to synthesize findings relating to cell phone use in automobiles, and any research findings and conclusions relating to commercial vehicle operations. Further, the project will identify current cell phone practices (including limitations on the use of personal data assistants [PDAs]) of motor carrier

operations to identify the magnitude of the use in the industry. Consideration will be given to the applicability of findings relating to car drivers to truck and bus driving environments, as well as to the rationale and driving factors that have led fleet managers to restrict or manage cell phone and/or PDA use.

Driver Distraction in Commercial Trucks and Buses: Assessing Prevalence in Conjunction with Crashes and Near-crashes — The purpose of this research is to conduct an analysis of naturalistic data collected by DriveCam over a 1-year period on commercial trucks (3-axle and tractor-trailer) and buses. These data will provide descriptive data on the adverse consequences of cell phone use and other distractions while driving. In addition, all valid cell phone events within the last 90 days will be reviewed to determine the frequency of the several cell-phone activities. The results of these analyses will provide information on the scope of cell phone use, and other distractions, during valid safety events and crashes.

Driver Fatigue, Distraction, and Alerting Technology — During the SBIR Phase I project (see above), a DDMS concept was successfully developed, combining indicators of drowsiness and alertness into a composite drowsiness score. The Phase II project will complete the development and commercialization of the system. The required tasks include machine vision eye and head tracking software development, continued algorithm development to detect behaviors of interest and combine them into a composite drowsiness score, development of an appropriate human machine interface, modifying existing software to include the drowsiness data into the immediate supervisor notification, driver risk scoring, and driver coaching functionalities, and testing the system in a sizable field operational test involving several real operating carriers. The impact of the DDMS on fleet management, safety supervisors, and drivers will also be assessed and reported.

Effectiveness of Fostering Safety Culture in Motor Carriers — This project will evaluate the effectiveness of proactive FMCSA regulation training for new entrant motor carriers on their pass rate of the required safety audit and their ongoing safety performance. Past experience documented that most new entrants do not have any business knowledge, so FMCSA is partnering with the Service Corps of Retired Executives to provide business training. In keeping with the recommendations of the TRB Synthesis report 14 (*The Role of Safety Culture in Preventing Commercial Motor Vehicle Crashes*, available online: http://www.trb.org/Publications/Public/PubsCTBSSPSynthesisReports.aspx), the goal is to evaluate effectiveness of fostering development of a culture for making daily operating decisions based on both good business practices and FMCSA regulatory requirements. The final report will be published in future.

IntelliDrive Program — The U.S. Department of Transportation's IntelliDrive program has an ultimate vision of "crashless" vehicles operating on an information-rich transportation system. IntelliDrive is a suite of technologies and applications that use wireless communications to provide connectivity that can deliver transformational safety, mobility, and environmental improvements in surface transportation with and among vehicles, between vehicles and the roadway infrastructure, between infrastructure and wireless devices (i.e., consumer electronics, such as cell phones and PDAs) carried by drivers, pedestrians, and bicyclists. Four initial categories of IntelliDrive applications for commercial vehicles include:

- Safety technologies that reduce CMV crashes, and improve response to crashes that do occur (e.g., driver condition monitoring, collision avoidance, and trucker advisory systems).
- Travel information technologies that reduce travel times and make trip time estimates more reliable for commercial vehicle drivers and dispatchers, such as commercial vehicle-specific routing and interactive maps.
- Fleet management technologies that provide total asset visibility for motor carriers, shippers, and receivers as well as real-time diagnostic monitoring of commercial vehicles for motor carrier maintenance, operations, and safety managers.
- Wireless inspection and enforcement technologies that enable more efficient operations at inspection stations, intermodal facilities and border crossings; and improved security and tracking for high-risk/regulated cargo, such as vehicle and driver e-screening and credentialing.

Case-Control Commercial Driver Individual Differences Study — The purpose of this study is to identify the most critical driver risk factors through a case\control study approach. The primary factors to be examined include demographic characteristics, medical conditions, personality traits, personal attitudes, work environmental conditions, and behavioral history. The study will link the characteristics of individual drivers with their driving records with a focus on crashes and moving violations. This study will consist of a medical examination and battery of psychological and behavioral history measures administered to 21,000 drivers with the expectation that at least 2,000 cases (drivers that have been in crashes) and 2,000 controls (drivers that have not been in crashes) can be identified. A recently completed pilot study proved the methodology for this larger study and produced some preliminary findings. This effort will be a full-scale CMV driver case-control study.

Wireless Roadside Inspection —Pilot testing the concept (see details above) in Tennessee, Kentucky and New York, running from June 2010 and until December 2010.

Testing and Evaluation of Truck-Based Cargo Theft Technologies — As part of the Motor Carrier Efficiency Study, FMCSA funded a project to evaluate commercially available truck-based cargo theft prevention technologies, which will conclude in September 2010. The final report will include a literature review, analysis and results of data generated infield demonstrations as well as interviews with fleet users of these systems.