



# HIGHLIGHTS

Cambridge, Massachusetts

Nov/Dec 2006

National Transportation Systems Center



*Curtis J. Tomphuis*

## Letter from the Director

### Celebrating Our Employees

*At the Volpe Center, we view our employees as our most valuable asset. The skill, dedication, and enthusiasm of Center employees is critical to our mission of improving the nation's transportation system and meeting our customers' expectations.*

On December 20, 2006, the Center held its Thirty-Sixth Annual Awards Ceremony, celebrating all of our employees and recognizing outstanding contributions.

We have introduced a new process for selecting the Volpe Center Director's Recognition Awards. Every Volpe Center employee was encouraged to nominate either a peer or a team for an award. The response was overwhelming. It is extremely gratifying to be a part of an organization where people recognize the achievements of their peers and celebrate their success. This is true across the organization, from technical staff performing cutting-edge research to administrative employees providing key support activities. The nominations were reviewed by a volunteer panel that made the final selections.

In addition to 550 core federal employees, the Center staff is supplemented by 800 contractors from industry and

*Continued on back page*

## Focus



*The Volpe Center applies its intellectual capital, multidisciplinary approach, knowledge, and experience in the regulatory arena to help agencies meet DOT strategic objectives, notably in the area of safety regulations and standards.*

### Surface Transportation Safety Standards and Regulations: A Collaborative Approach

Ensuring the safety of the transportation system is the principal goal of the U.S. Department of Transportation. Accordingly, DOT has a major role in developing, promulgating, and enforcing regulations covering various aspects of transportation operations. The Volpe Center's ability to analyze complex situations and systems, combined with its long history of working in surface transportation, provides DOT agencies with a unique perspective on their safety regulatory missions. The Center has worked with several agencies on a wide variety of regulatory issues, ranging from development and enhancement of standards and regulations to compliance and enforcement.

DOT recognizes that the role of government is to balance public interest, safety, and the promulgation of enlightened regulations that encourage rather than discourage progress and economic development. The Department also understands that regulations work best when they are developed, modified, and enforced in an atmosphere in which government, industry, and the public are engaged in the process. *(Continued on page 3)*

## ***A Tribute to an Outstanding Public Servant***

Dr. Frank Tung, former Deputy Director of the Volpe Center and a highly respected colleague, died on November 15, 2006.

Dr. Tung worked at the Volpe Center from 1971 to 2002. In 1990, he was appointed Deputy Director. He retired in 2002 after 37 years of distinguished federal service. To all his roles at the Center, he brought his technical expertise, his management skills, and his personal integrity.

His early work with the Federal Aviation Administration (FAA) is particularly noteworthy. In the early 1980s, he created the Volpe Center's air transportation program, which he then directed for 20 years. During this time, the Center and the FAA became true partners, contributing to the enhancement of the safety, capacity, and effectiveness of the nation's air transportation system. This early support laid the groundwork for the Center's continuing support to FAA as it responds to the nation's growing aviation requirements. Key projects that started under Dr. Tung's guidance and continue to evolve to this day include the development of air-traffic management systems and of technologies to address airport runway incursions, and the study of aircraft wake-vortex problems.

Dr. Tung's contributions were widely recognized. He received numerous awards during his years of government service, including a Secretarial Award for Meritorious Achievement in 1979 and two Presidential Rank Awards for Meritorious Executive in 1985 and 1996. He also received the FAA Bulldog Award and the Air Traffic Control Association's prestigious Clifford Burton Memorial Award.

In addition to his many accolades and his contributions to the success of the Volpe Center, Dr. Tung will be remembered for his character. He also had a way of engaging each person with whom he talked and a gentle sense of humor. He had the ability to convey the excitement of acquiring new knowledge, and he continued his lifelong pursuit of learning into his retirement. Over the years he mentored many junior employees, several of whom have become national experts, in part because of his interest and tutelage. He made lifelong friendships with colleagues here. He made us take note of the human face of our institution. We are proud to have known him.

Dr. Tung exemplified the values of the Volpe Center, fostering innovation and collaboration while improving the quality of life for millions of Americans.



*Dr. Frank Tung, former Deputy Director of the Volpe Center*

Volpe Center staff have demonstrated expertise in participating in and promoting a cooperative rather than an adversarial style of regulation development and compliance. The Center has supported consensus building for several DOT agencies, with particular emphasis on safety issues. The Center brings unbiased technical knowledge to working groups chartered to develop and revise regulations and to determine standards for new technologies. Participants value this impartiality as they address the complex issues involved in shaping reasonable regulations and standards. The Center also brings expertise in organizational development to facilitate mutual understanding of diverse perspectives.

## ***Developing Regulations and Performance Standards*** **FRA Standards and Regulations**

The railroad industry's overall safety record has improved during recent decades. However, train accidents do still occur, and there is room for improvement. In 2005, DOT and FRA launched a National Rail Safety Action Plan. The Action Plan includes initiatives intended to reduce train accidents caused by human factors, improve track safety, enhance hazardous materials safety and emergency preparedness, better focus FRA resources, and improve highway-rail grade crossing safety. The Volpe Center has supported FRA in developing design and performance standards and regulations in each of these areas; selected examples follow.

### **Passenger Train Emergency Preparedness Standards**

FRA regulations are designed to ensure that passenger railroads plan for possible emergencies in order to minimize the potential consequences. Since 1993, Volpe Center experts have assisted the FRA Offices of Research and Development and Safety to ensure that passenger train rules (contained in 49 CFR, Parts 223, 238, and 239) reflect the current state of the art, are technically and economically feasible, and are enforceable.

On August 24, 2006, FRA published a Notice of Proposed Rulemaking (NPRM) for Part 238 that is intended to enhance passenger train emergency system features, such as emergency exits, rescue access points, and emergency communications. Volpe Center experts played a key role by providing extensive technical assistance and demonstrations to FRA for the original 1998 and 1999 regulations and to the FRA Railroad Safety Advisory Committee (RSAC) Emergency Preparedness Task Force, which developed the basis for the NPRM. This consensus-based task force consists of a variety of stakeholders, including Amtrak and commuter railroad management, labor organizations, rail car manufacturers, other vendors, and other interested parties, such as the National Transportation Safety Board.

## **Developing Tools to Facilitate the Regulatory Process**

### *The 21st Century Rule: Building a Collaborative Review and Evaluation Tool*

*"We could not have completed the Notice of Proposed Rulemaking on the required schedule without this tool."*

—Customer team comment

The Volpe Center has developed tools for efficiently capturing comments on new and revised regulations. The 2006 Notice of Proposed Rulemaking on Statewide and Metropolitan Planning Requirements generated comments from transportation professionals and stakeholders across the country. FHWA and FTA faced the challenge of capturing these comments, writing responses, and modifying the draft Rule as appropriate, all in less than four weeks. Previously, much of this work was performed by hand. A Volpe Center team developed a database-driven technology application designed to make the process more efficient and reliable. The tool allowed federal staff in offices across the United States to share information in real time and to collaborate across modal agencies. It also enabled FHWA and FTA to complete the review and analysis of 1,058 comments. Its design made writing changes to the draft Rule easy while ensuring responsiveness to stakeholder input.



## U.S. Regulations

The U.S. Constitution prescribes the responsibilities of the government's three branches—executive, legislative, and judicial—all of which have roles that underpin the nation's transportation system. The U.S. Congress authorizes the executive branch to implement statutes and to develop and enforce regulations. Laws and statutes establish procedures to ensure that regulations are developed in a transparent, interactive manner with the public.

Rulemaking refers to the process that executive agencies use to create, or promulgate, regulations. By bringing detailed technical expertise to bear on policy, the rulemaking process has resulted in enlightened regulations that promote the greater good. This Focus article presents some examples of the Volpe Center's role in this process. There are two kinds of rulemaking—formal and informal. Formal rulemaking calls for a trial-like, on-the-record proceeding. Most federal agencies, however, develop rules through informal rulemaking. The main requirements for informal rulemaking are:

- Publication of a Notice of Proposed Rulemaking (NPRM) in the Federal Register
- Opportunity for public participation by submission of written comments
- Consideration by the agency of public comments and other relevant material
- Publication of a Final Rule not less than 30 days before its effective date, with a statement explaining its purpose

Source: <http://www.ombwatch.org/article/articleview/176/1/67>

Volpe Center experts also assisted the RSAC Task Force in revising the American Public Transportation Association/Passenger Rail Equipment Safety Standards (APTA/PRESS) for Emergency Lighting, Emergency Signs, and Low-Location Exit Path Marking. In 2007, FRA plans to publish an NPRM incorporating the three APTA standards by reference to further enhance the regulations contained in Part 238.

The foundation for the 1998 passenger train emergency preparedness regulations contained in Part 239 is a report, "Recommended Emergency Preparedness Guidelines for Passenger Trains," written by a Volpe Center expert and published in 1993 by FRA's Office of Research and Development.

### Locomotive Horns Final Rule

For the last decade, the Volpe Center has supported FRA in evaluating locomotive horn systems. This work was prompted by concerns about the audibility of locomotive horns at highway-rail grade crossings in modern sound-insulated highway vehicles. The Center provided FRA with the empirical information necessary to promulgate a final rule by applying its acoustic, engineering, human factors, and field-operational-test research into the safety implications of positioning horns on locomotives, alternate



*Passenger Train Emergency Evacuation Training: Emergency responders practice removing injured passengers on stretchers through rail car windows.*

solutions, and the comparative noise levels associated with different horn positions.

### Train Conspicuity

A final rule on locomotive auxiliary alerting lights was issued in 1995. As one strategy for reducing accidents at highway-rail grade crossings, the Volpe Center has supported FRA by investigating measures to make trains more visible to motor vehicle drivers at such crossings. Using engineering and human factors research, the Center has evaluated several external visual alerting devices. The results of field operational and laboratory tests indicate that the use of selected alerting light systems on locomotives rather than standard headlights alone is an effective means of enhancing locomotive visibility. Based on the Center's research, FRA's Final Rule identifies several types of auxiliary external alerting light arrangements as acceptable locomotive conspicuity measures.

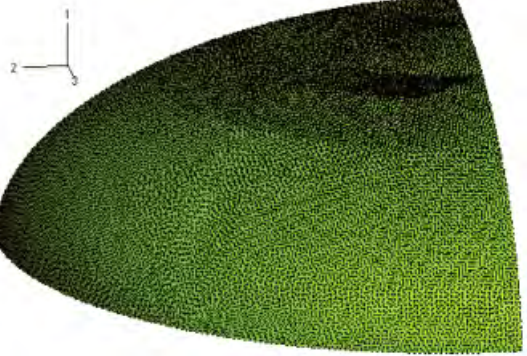
### Improving Tank Car Integrity

As trains get longer and heavier, FRA is investigating the need for enhancing tank car structural integrity. This research involves analyzing train forces in derailments to determine if the current design is adequate or if changes are needed. The first phase is development of a physics-based model to analyze the kinematics of railcars in a derailment; the second phase, development of a dynamic structural analysis model; and the third phase, assessment of the damage created by punctures, which entails application of fracture-mechanics testing and analysis methods. The Volpe Center is currently involved in the modeling work. This research will help to provide critical information to guide FRA rulemaking that will address the design of pressurized tank cars. A recent Volpe Center report, "Engineering Analyses for Railroad Tank Car Head Puncture Resistance," is available at <http://www.volpe.dot.gov/sdd/docs/puncture-1106.pdf>.

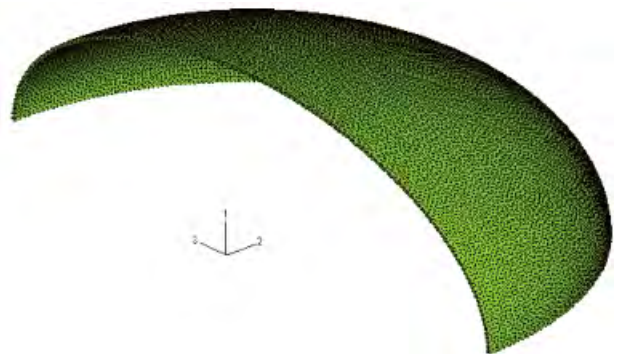
### Passenger Rail Equipment Crashworthiness

The Center conducts research into passenger rail equipment crashworthiness by applying analytical tools and testing techniques to evaluate the effectiveness of proposed strategies. The information from this research has been used to develop crashworthiness requirements for Amtrak's high-speed trainset as well as FRA's Passenger Equipment Safety Standards, and to draft revisions and additions to current FRA locomotive crashworthiness

Quarter-symmetric mesh for typical tank car head.



Half-symmetric mesh for typical tank car head.



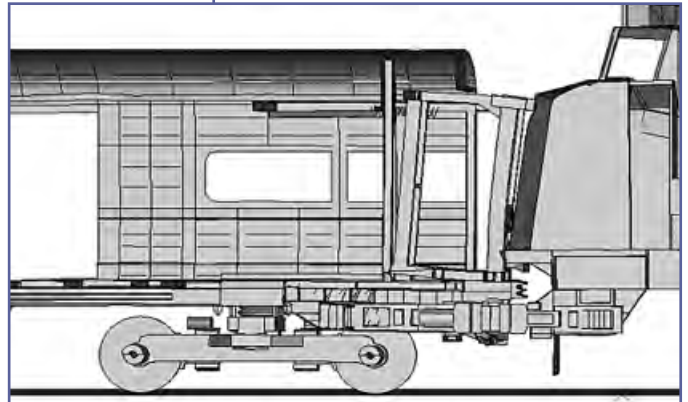
*Volpe Center engineers have used various engineering analyses to estimate the forces, deformations, and puncture resistance of railroad tank cars. One approach is to apply elastic-plastic finite element analysis. The figures above show the finite element meshes used to represent the ellipsoidal tank car head. The quarter-symmetric mesh is used for cases where the load is applied at the center of the head. The half-symmetric mesh is used for cases with off-center loading. The results from these approaches are compared with experimental data from impact tests and are shown to provide reasonable estimates of impact forces.*

regulations and the Association of American Railroads standards. The goal of the research is to develop and evaluate practical concepts for increasing survivability in passenger train accidents. Major activities include conducting field investigations of passenger train accidents to determine the causes of injury and fatality, developing alternative strategies for increased occupant protection, and conducting full-scale impact testing to compare the effectiveness of conventional and improved crashworthiness strategies.

In support of FRA's research into strategies for improving the crashworthiness of commuter and intercity rail passenger trains, the Volpe Center has designed and conducted a series of full-scale commuter train crash tests at the Transportation Technical Center in Pueblo, Colorado, and has analyzed the results of these tests. By crashing trains under test conditions, researchers are able to analyze the structural integrity of cab cars and to examine the effects of crashes on passengers and crew members. The Center has also developed computer simulations and models of these test scenarios that are integral to an understanding of the problem. Initial tests of conventional equipment resulted in serious damage. As a result, the test equipment was modified to include a crash energy management (CEM) crush zone. The modified equipment demonstrated that, by distributing the crush to unoccupied spaces within the train, the survivable impact speed could be more than doubled. As a result of this testing, FRA has imposed more stringent specifications for rail cars being purchased for commuter rail systems. Such specifications must now include CEM as a design strategy. Volpe Center staff are also assisting commuter rail systems and manufacturers in meeting these new specifications.

### Intelligent Transportation Systems Joint Program Office

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) established a federal program to research, develop, and operationally test Intelligent Transportation Systems (ITS) and to promote their implementation. The ITS Joint Program Office (JPO) coordinates DOT's multimodal ITS initiatives. The program focuses on intelligent vehicles, intelligent infrastructure, and the creation of an intelligent transportation system.



*The Volpe Center's ongoing research on rail equipment crashworthiness for FRA integrates computer modeling and full-scale test crashes. Top: 2002 crash test using conventional equipment. Center: Model predictions of CEM systems. Bottom: 2006 test of CEM equipment under the same conditions as the 2002 test.*



One area in which the Volpe Center supports the JPO is its comprehensive work on collision-avoidance systems.

### Determining Functional Requirements of Crash Avoidance Systems

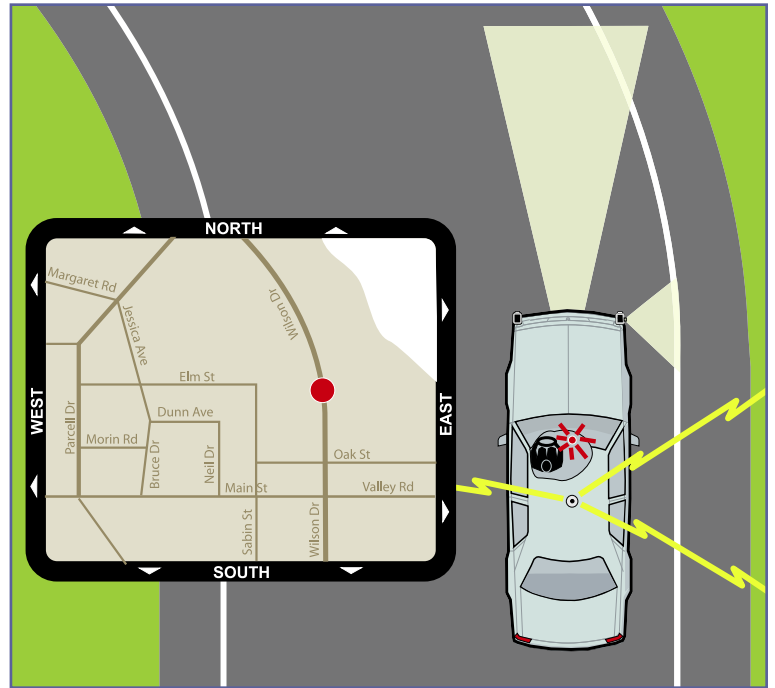
The Volpe Center's crash-avoidance work provides a foundation upon which industry can design and deploy safe and effective products. Through rigorous analysis of crash scenarios, Volpe Center researchers have gained a thorough understanding of collision types and causes. From this analysis, Volpe Center staff determine the functional requirements for a potential crash-avoidance system and assess existing technologies. Industry then designs and builds new systems based on these requirements.

### Assessing Industry Prototypes

In its role as an independent evaluator, the Volpe Center assesses industry prototypes for safety benefits, driver acceptance, system capability, and deployment potential. The Center is currently evaluating three crash-avoidance systems. Two of these systems target a specific type of crash—rear end or road departure—and use sensors to detect potential danger, a computer to evaluate the possibility of a collision, and a *driver interface* to relay information to the driver who can then act on it before the collision is inevitable. The third system is designed to alert a driver when it detects signs of drowsiness; it uses low-level infrared signals to monitor eye closure.

### Regulatory Impact Analyses

The Volpe Center's economic and industry analysis specialists support DOT's agencies in preparing Regulatory Impact Assessments of proposed rulemaking. These assessments are key tools for delivering better regulations and successful policy because they present an analysis of the likely impacts of a policy change and the range of options for implementing it. For example, Center staff recently conducted a regulatory assessment of a proposed regulation for the Federal Motor Carrier Safety Administration (FMCSA) designed to ensure that motor carrier operators with a pattern or practice of noncompliance are identified and prevented from establishing new carriers or working for existing carriers until all agency requirements for corrective actions have been met. The regulation will reduce the likelihood of fatalities, injuries, and property and other damage resulting from incidents involving these unsafe carriers.



*One crash-avoidance system that the Volpe Center is evaluating warns drivers of impending road-departure crashes.*

### **Enhancing Regulations and Allowing Waivers**

Equal in importance to developing standards is the Center's expertise in helping the government to change those standards as technology evolves and circumstances change. Modernizing regulations is an ongoing process, and changes support the original intent of enhanced safety. The Volpe Center understands the complex regulatory change process, from preparing the technical requirements through publication of the Final Rule.

### **Track Safety Standards**

The Center has supported FRA in the area of Vehicle-Track Interaction for more than 25 years. The Center's role has been pivotal in establishing and modifying safety standards designed to reduce the number of track-geometry-related derailments. In the 1992 FRA reauthorization, Congress specifically mandated a comprehensive review of FRA Track Safety Standards, and in 1998 new track standards were issued. Since then, FRA continues to reexamine the standards in light of new conditions and to identify deficiencies in current laws and regulations, and it has issued several amendments. The Volpe Center has supported FRA's RSAC Track Vehicle Interaction Working Group and conducted numerous simulation studies designed to identify critical geometry irregularities associated with unsafe wheel forces and acceleration. The results are being used as the technical basis for developing track-geometry standards.

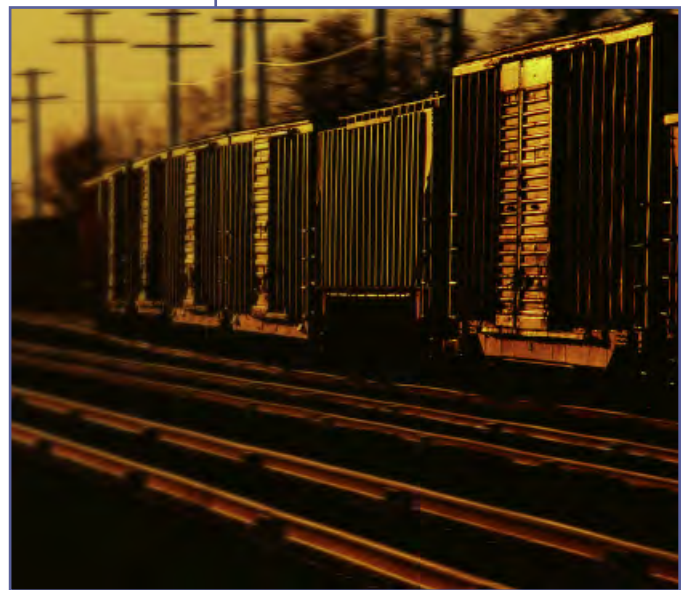
### **Regulatory Waivers**

Federal agencies have the power to waive regulatory requirements under certain circumstances. The Center plays an important role in providing agencies with impartial analyses of the impact of the waivers. For example, FRA's Track Safety Standards require railroads to periodically inspect rail on lines where operating speeds exceed 40 mph and to take immediate action to preserve operational safety whenever a rail defect is discovered. The Volpe Center assisted FRA's Office of Safety in evaluating a Union Pacific Railroad request for a waiver. The railroad had proposed that, for defects not exceeding a specified size, deferral of repair or other action be permitted. The Center concluded that there are potential benefits to delayed action, such as an increase in the average number of track miles inspected per day by the detector car. This could in turn lead to a decrease in the number of rail failures. FRA took these findings into consideration in granting a test waiver. A copy of the report is available at <http://www.volpe.dot.gov/sdd/docs/fail/delayed.pdf>.

### **Supporting DOT Regulatory Work in All Strategic Areas**

#### *Fuel Economy Standards*

The Energy Policy and Conservation Act of 1975 established corporate average fuel economy (CAFE) standards for new passenger cars. In 2005, the National Highway Traffic Safety Administration (NHTSA) issued a notice of proposed rulemaking to explore raising the CAFE standard for light-duty trucks. CAFE rulemakings are important undertakings that affect the automobile industry, petroleum consumption, and drivers. It is essential that underlying analysis be viewed as credible and objective. Building on three decades of experience, the Center has supported NHTSA's recent efforts by integrating data sources and developing and applying computer models to help estimate the potential effects of new standards. This technical work has played a major role in the consideration and (in 2006) the publication of major changes to standards for light trucks.





### ***Enforcing Regulations and Monitoring Compliance: Information Systems and Data Analysis Tools***

Regulatory authorities must provide effective and consistent oversight and enforcement. DOT federal and state regulatory agencies employ a variety of tools for measuring compliance with transportation safety regulations.

A key element in both enforcement and industry engagement is the availability of safety databases and automated analytical tools that support effective program decisions and allow both government and industry to assess and monitor compliance and take corrective actions. The Volpe Center has proven expertise in developing safety databases that record the performance of carriers for several transportation modes. In 1985, following a tragic accident in Gander, Newfoundland, where a charter flight carrying more than 200 U.S. military personnel home for the holidays crashed and killed all on board, the Volpe Center worked with the Department of Defense (DoD) to develop a safety performance monitoring system for air carriers. This provided DoD with a methodology for evaluating the safety of carriers. The Center expanded this capability by creating the Safety Performance Analysis System for scoring all air carriers. Similar techniques were subsequently used by Center staff to develop SafeStat, a system for assessing the relative safety of motor carriers. The structured data analysis tools described here support enforcement and compliance with safety regulations.



*The crash in Gander, Newfoundland, of a chartered plane carrying American soldiers became the impetus for a safety database project.*

### **Analysis and Information (A&I) Online: Web-based Motor Carrier Safety Information Resource**

A&I Online provides useful motor carrier safety information quickly and efficiently via the Internet to FMCSA and state personnel, motor carriers, insurers, shippers, and other agencies to promote analytically sound, safety-conscious decisions. The system continues to evolve in response to technological advances and user needs.

The A&I Online website was initially developed in 1997 by the Volpe Center to provide FMCSA headquarters and field staff with access to current motor carrier safety data via the FMCSA Intranet. It soon became clear that this innovative tool could also promote motor carrier self-improvement. In 1998, A&I became publicly available on the Internet. A&I Online continues to expand in scope and audience and is updated monthly based on user feedback and program goals. As it improves communication among government agencies, industry, and the public, A&I Online encourages a proactive approach to safety. One of the most

<http://www.ai.fmcsa.dot.gov/mcspa.asp>

popular U.S. DOT websites, it logged more than 1.5 million visits in 2006. Find it at <http://ai.fmcsa.dot.gov/> or via the FMCSA homepage at <http://www.fmcsa.dot.gov/>.

A&I Online provides comparative analysis, summary reports, and state and national rankings derived from multiple data sources. The site is organized into modules so that users can easily select their areas of interest.

- *SafeStat Online* is used by FMCSA field staff to identify and monitor carriers with safety deficiencies, and by carriers to obtain their own safety status measured relative to their peers. It provides detailed data on crashes, out-of-service inspections, moving violations, compliance review results, and enforcement cases.
- *Crash Profiles Online* provides summarized crash statistics for large trucks and buses involved in fatal and nonfatal crashes that occurred in the United States.
- *Program Measures* provides reports on a variety of performance data for three key FMCSA safety programs: On-Site Compliance Reviews, Roadside Inspections, and Traffic Enforcement.
- *Passenger Carrier Safety* provides easy-to-understand safety information about for-hire passenger carriers for school trip planners, senior citizen groups, and other buyers of bus services.
- *NAFTA Safety Stats* provides information and statistics on the U.S. operations of all nationally registered interstate motor carriers and hazardous materials intrastate motor carriers.
- *Data Quality* provides information and resources related to improving the quality of state-reported crash and inspection data.
- *Analysis Results & Reports* provides links to the FMCSA periodic publication MCSAFE (Motor Carrier Safety Analysis, Facts, and Evaluation), the SafeStat Effectiveness Study, the New Entrant Safety Fitness Assurance Study, Analysis Briefs, and other reports.

### State Safety Data Quality

FMCSA shares a safety goal with the states to reduce the number and severity of crashes involving large trucks and buses on our nation's highways. To meet this common goal, it is essential that states collect and report to FMCSA complete, accurate, and timely data on motor carrier crashes and inspections. In turn, FMCSA uses this data to measure safety programs and monitor safety performance more effectively. The Volpe Center supports FMCSA efforts to improve the quality of state-reported data, which include raising awareness, measuring data quality, and disseminating results online.

FMCSA's State Safety Data Quality (SSDQ) methodology, developed by the Volpe Center, evaluates the completeness, timeliness, accuracy, and consis-



<http://www.ai.fmcsa.dot.gov/DataQuality/dataquality.asp?redirect=staterating.asp>

tency of state-reported crash and inspection data, comparing the quality of state-reported data with standards set by FMCSA. The results of the analysis are disseminated via FMCSA's A&I Online website and are updated on a quarterly basis; this analysis helps states to determine where to focus their improvement efforts.

Improved data quality supports more efficient FMCSA data systems and enhances FMCSA's ability to identify potentially unsafe carriers and drivers.

### Data Quality Improvement System

In support of FMCSA's emphasis on data quality, the Volpe Center recently developed DataQs, a web-based system that makes it easier for motor carriers to challenge the accuracy and completeness of safety data that has been disseminated to the public and to facilitate corrections to that data. This online system also makes it easier for FMCSA and state personnel to manage and take action on challenges to federal and state motor carrier data. With DataQs, FMCSA successfully streamlined the data-challenge process while meeting the needs of each user, from those filing the challenges to those managing them.

### Motor Carrier Safety Enforcement

SafeStat (short for Motor Carrier Safety Status Measurement System) is an automated, data-driven analysis system designed by the Volpe Center to measure relative motor carrier safety fitness. The system is designed to maximize the use of state-reported data and centralized federal data systems. SafeStat allows FMCSA to continuously quantify and monitor changes in the safety status of motor carriers, especially those that are unsafe. This enables FMCSA enforcement and education programs to allocate resources efficiently to carriers that pose the highest risk of crash involvement.

### Safety Program Effectiveness Measurement

The Volpe Center supported FMCSA in developing analytical models to measure the effectiveness of its safety programs. These models provide a baseline and an ongoing measurement tool through the use of standard safety performance measures. They also provide FMCSA with the information it needs to address the requirements of the Government Performance and Results Act (GPRA) of 1993, which obligates all federal agencies to measure the effectiveness of their programs as part of the budget cycle process. To date, two models have been developed: the Compliance Review Effectiveness Model and the Intervention Model, which measures the effectiveness of the Roadside Inspection and Traffic Enforcement Programs. Both models measure the benefits of these programs in terms of crashes avoided, lives saved, and injuries avoided.



<https://dataqs.fmcsa.dot.gov/login.asp>

<http://www.ai.fmcsa.dot.gov/SafeStat/SafeStatMain.asp>

<http://www.ai.fmcsa.dot.gov/ProgramMeasures/PM/PM.asp>



### Identifying and Targeting High-Risk CMV Drivers

Research on commercial motor vehicle (CMV) crashes has highlighted driver behavior as an increasingly important factor. Since there was no centralized source of data on the regulatory compliance and safety performance of CMV drivers available to FMCSA and state enforcement personnel, the Volpe Center, in support of FMCSA, developed the Driver Information Resource (DIR), a web-based lookup capability providing crash and inspection histories on 3.8 million CMV drivers.

For a more detailed description of the Volpe Center's work on DIR, see the article on page 13.

### Supporting the Revised Hours-of-Service Rule

In 2003, FMCSA issued a revision to its Hours-of-Service rule as a result of concern about the effect of fatigue as a contributing factor in CMV crashes. The success of FMCSA's enforcement and education operations for the new rule depends in large part on reliable, up-to-date safety information systems. Center staff worked with FMCSA to ensure smooth implementation of the new regulations into existing FMCSA IT systems.

### Pipeline Safety Monitoring and Reporting Tool

Volpe Center staff are currently developing a web-based safety monitoring tool for the Pipeline and Hazardous Materials Safety Administration (PHMSA). The Safety Monitoring and Reporting Tool (SMART) is an information technology project that will provide PHMSA with an integrated information source for identifying pipeline safety trends, targeting solutions, and measuring performance. SMART improves oversight of the pipeline industry by providing an easy-to-use single point of access to pipeline information. The tool can reduce the reporting burden on pipeline operators by fully implementing electronic data collection, using the Internet where possible, and sharing that information with state pipeline safety agencies and other federal agencies.

### Conclusion

The Volpe Center's work supporting surface transportation regulations is an ongoing effort. As objectives change, the regulations must change as well. The Center has supported several administrations in developing regulations and performance standards involving detailed collaborative engineering and testing. The staff has also been heavily involved in developing guidelines to modify those standards as needed. The design



*Increasing Driver Alertness: Driver fatigue can contribute to commercial motor vehicle crashes. The Volpe Center supports FMCSA's enforcement of the Hours-of-Service rule, which was developed to help ensure that commercial drivers get an appropriate amount of rest.*

of collaborative websites and data sources has provided practical tools to help ensure compliance and enforcement. The link between federal and state organizations is crucial to the successful enforcement of regulations; the Center's work for FMCSA in this arena provides a realistic model that could be applicable in other administrations. The Center is proud of its role in supporting the necessary agility of the regulatory process.



### ***Identifying and Targeting High-Risk Drivers with DIR (FMCSA)***

Research on crashes involving CMVs has identified driver behavior as an increasingly important factor, highlighting the need for tools to assist federal and state enforcement personnel in addressing this issue. Accordingly, in November 2005, FMCSA outlined an effort to expand the purview of its safety programs beyond the performance of motor carriers to include the behavior of CMV drivers.

Since there was no centralized source of data on the regulatory compliance and safety performance of CMV drivers, the Volpe Center, in support of FMCSA's Analysis Division, developed the Driver Information Resource (DIR), a web-based lookup capability providing crash and inspection histories on 3.8 million CMV drivers. These histories are developed using an innovative process of matching the driver identification information to 13 million crash and inspection "event" records in FMCSA databases.

DIR is now available to all FMCSA and state enforcement personnel by means of secure access on the Volpe Center-developed website, Analysis and Information Online (A&I Online).

The Center is also using DIR to support other FMCSA projects, including:

- Conducting analyses on the relationships of regulatory compliance and crash risk
- Addressing SAFETEA-LU requirements for providing driver information to motor carriers to enable better hiring decisions
- Laying the foundation to support new safety measurement systems to identify unsafe individual CMV drivers and motor carriers

The Volpe Center DIR team is led by Ms. Courtney Stevenson of the Motor Carrier Safety Division and includes Ms. Amy Olanyk and Ms. Nancy Kennedy, also of the Division; Mr. Dennis Piccolo, Ms. Nai Lian, and Mr. Brian Baker of the on-site TRACX contract; and Ms. Nancy Davis of the on-site TRIPS contract.

### **Fast-Tracking the Driver Information Resource (DIR)**

In response to overwhelmingly positive feedback from beta testers, FMCSA fast-tracked DIR's release; the Volpe Center accelerated the implementation schedule and released DIR ahead of schedule in July 2006.

FMCSA now has the data and the tools to incorporate driver behavior into its safety programs, which support the agency's mission of reducing crashes, injuries, and fatalities involving large trucks and buses.

## Published & Presented

- **The Safety of Push-Pull and Multiple-Unit Locomotive Passenger Rail Operations.**

This June 2006 report, written with support from the Volpe Center, was delivered by the Federal Railroad Administration (FRA) to the House and Senate Appropriations Committees. The report was prepared in response to a request from Congressman Adam Schiff (D-California) who had voiced safety concerns arising from a train collision on January 26, 2005, in Glendale, California, in which 11 people were killed. The report has received numerous mentions in the California and national media. Contributors included Ms. Karina Jacobsen, Mr. David Tyrell, Mr. Brian Marquis, Mr. Eloy Martinez, and Mr. Dan Parent of the Structures and Dynamics Division; Ms. Anya A. Carroll and Mr. Paul Bousquet of the Rail and Transit Systems Division; and Mr. Bob Dorer, Deputy Director of the Office of Surface Transportation Programs. The report can be downloaded at <http://www.fra.dot.gov/downloads/safety/062606FRAPushPullLetterandReport.pdf>.

- **Security Implications of Changing Trends in Containerization.** At the 81st Annual Conference of the Western Economic Association International held in San Diego, California, June 29-July 3, 2006, Dr. Bahar Barami of the Economic and Industry Analysis Division presented “The Changing Economics of Containerization: Implications for Homeland Security” to a panel on Economic Impacts from Terrorism and Improved Security Measures, organized by the U.S. Coast Guard. The paper focused on how the economics of U.S. freight transportation in the last two decades have been shaped by three trends: an escalation in global trade demands for containerized goods, post-deregulation shifts in logistics costs, and growing security concerns at the nation’s container gateways.

- **Tire/Pavement Noise Studies.** Dr. Judith Rochat of the Environmental Measurement and Modeling Division participated in the Transportation Research Board’s Summer Meeting held in Williamsburg, Virginia, July 9-12, 2006. As chair of the Highway Noise Subcommittee, Committee on Transportation-Related Noise and Vibration, Dr. Rochat presented a paper, “Volpe Center Update on Tire/Pavement Noise Studies.” The Volpe Center supports the Federal Aviation Administration (FAA), the Federal Highway Administration (FHWA), and other federal, state, and local agencies in developing measurement and modeling techniques pertaining to the mitigation of transportation-related noise and exhaust emissions.

- **Motor Carrier Data Quality Improvements.** The Volpe Center supports the Federal Motor Carrier Safety Administration’s (FMCSA) Data Quality Improvement Program, which uses a multifaceted approach to improve the quality of data reported by states. Volpe team members delivered presentations about various aspects of the program at the 32nd International Forum on Traffic Records, held in Palm Desert, California, July 30-August 3, 2006.





- **“State Data Quality Review Program.”** Ms. Beth Deysher of the Motor Carrier Safety Division described the on-site state review and how it can be used to identify areas to improve the quality of state-reported data.
- **“FMCSA State Safety Data Quality: Enhancing the Evaluation.”** Ms. Courtney Stevenson of the Motor Carrier Safety Division discussed proposed enhancements to existing methodology currently used to evaluate the completeness, timeliness, accuracy, and consistency of state-reported crash and roadside-inspection data.
- **“FMCSA Tools To Improve State Data Quality.”** Mr. Walter Zak of CASE LLC, a Volpe Center on-site contractor, demonstrated online reports and tools available to states to assist them in managing and improving data reported to FMCSA.
- **Roadway Departure Crash Warning Study.** At the Transportation Research Board’s Strategic Highway Research Program II Safety Research symposium in Washington, D.C., August 16, 2006, Mr. Jonathan Koopmann of the Advanced Safety Technology Division presented analytic techniques for assessing safety benefits and overall lessons learned from the recently completed roadway departure crash warning independent evaluation.
- **Final Report on Railroad Bridge Security.** For the FRA, Mr. Marco DaSilva of the Advanced Safety Technology Division, Ms. Anya Carroll of the Rail and Transit Systems Division, and Mr. William Baron of the Infrastructure Protection and Operations Division contributed to a three-year demonstration of an automated prototype security system on a railroad bridge. The main objective was to demonstrate a stand-alone video-based trespass monitoring and deterrent system for railroad infrastructure applications using Commercial-off-the-Shelf (COTS) technology. The report, “Railroad Infrastructure Trespassing Detection Systems Research in Pittsford, New York” (Report No. DOT/FRA/ORD-06/03; Washington, D.C.: FRA, August 2006), can be downloaded at <http://www.fra.dot.gov/downloads/Research/ord0603.pdf>.
- **Next Generation Air Transportation System.** Dr. Thomas B. Sheridan and Dr. Judith Bürki-Cohen of the Human Factors Division and Dr. Kevin Corker of the National Aeronautics and Space Administration (NASA) coauthored “Human Transient into-the-Loop Simulation for NGATS,” which was published in the proceedings of the American Institute of Aeronautics and Astronautics Modeling and Simulation Conference held in Keystone, Colorado, August 21-24, 2006. (AIAA-2006-6114) The paper was prepared as part of the “Human Automation Interaction in NGATS” project, sponsored by the NASA Airspace Systems Program.
- **Integrated Crash Warning System.** Dr. Wassim Najm of the Advanced Safety Technology Division coauthored a paper presented at the Performance Metrics for Intelligent Systems (PerMIS) workshop held at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland, August 21-23, 2006. “Performance Evaluation of Integrated Vehicle-Based Safety Systems” was coauthored by Mr. Jack Ference of the National Highway Traffic Safety Administration (NHTSA) and Mr. Sandor Szabo of NIST. The paper, presented by Mr. Ference, describes a program to develop and test an integrated crash warning system that addresses rear-end, lane-change, and roadway-departure collisions for passenger cars and heavy commercial trucks. The paper can be downloaded from [http://www-nrd.nhtsa.dot.gov/departments/nrd-12/pubs\\_rev.html](http://www-nrd.nhtsa.dot.gov/departments/nrd-12/pubs_rev.html).
- **Air Quality Monitoring Tool.** Mr. Gregg Fleming of the Environmental Measurement and Modeling Division presented a paper, “Using the Federal Aviation Administration’s SAGE Model to Conduct Global Inventories and to Access Route-Specific Variability in Aviation Fuel Burn, Emissions, and Costs,” at the 25th Congress of the International Council of the Aeronautical Sciences, held in Hamburg, Germany, September 2-9, 2006. The Volpe Center supports the FAA



*Railroad Bridge Security: Video image of a trespasser on a railroad bridge.*

Office of Environment and Energy by improving, enhancing, and validating evaluation and modeling tools. The FAA seeks international acceptance of these tools for determining potential impacts of policy, technology, and operations on global aviation-related noise, emissions, and fuel burn.

- **Travel Model Improvement System.** At the Transportation Research Board's "Tools of the Trade 10th National Conference on Transportation Planning for Small and Medium-Sized Communities" held in Nashville, Tennessee, September 13-15, 2006, Ms. Ann Steffes of the Planning and Policy Analysis Division presented "Issues and Lessons Learned from the TMIP Peer Review Program." The paper covers methodological lessons extracted from 13 peer reviews of regional travel-demand models. The peer reviews are sponsored by FHWA's Travel Model Improvement Program (TMIP). The Volpe Center supports the program by working with host agencies (metropolitan planning organizations and state departments of transportation) to plan the events and write a report summarizing the proceedings.
- **Track Safety Standards.** Mr. Brian Marquis of the Structures and Dynamics Division presented a paper, "Recent Studies in Support of the Federal Railroad Administration's (FRA) Track Safety Standards," at the track safety symposium "Improving the Track Safety Rules—A Roadmap for Improvements," held in Louisville, Kentucky, September 20-21, 2006.
- **Human-Computer Interaction in Aeronautics.** At the International Conference on Human-Computer Interaction in Aeronautics, held in Seattle, Washington, September 20-22, 2006, Dr. Michelle Yeh and Dr. Divya Chandra, both of the Human Factors Division, presented two papers, "Pilot Stereotypes for Navigation Symbols on Electronic Displays" and "Evaluating Electronic Flight Bags in the Real World."
- **Final Report on Red Light Violations.** For NHTSA, Dr. Wassim Najm of the Advanced Safety Technology Division and Dr. David Yang, formerly of the Division, produced a final report, "Analysis of Red Light Violation Data Collected from Intersections Equipped with Red Light Photo Enforcement Cameras," to support the development of effective crash countermeasures. The goal of this analysis was to understand the correlation between red light violations and various driver, intersection, and environmental factors. The report can be downloaded at <http://www.nrd.nhtsa.dot.gov/departments/nrd-12/IntelligentTransportationSystems.html>.
- **Disassembly Expert Contributes to Scholarly and Management Studies.** Product disassembly takes place prior to remanufacturing, recycling, or disposal. An efficient disassembly line requires a mathematical approach to the disassembly line-balancing problem. Dr. Seamus McGovern of the Terminal and Surface Systems Division recently coauthored:
  - "Deterministic Hybrid and Stochastic Combinatorial Optimization Treatments of an Electronic Product Disassembly Line," a chapter in a peer-reviewed book, *Applications of Management Science, Volume 12*, published by Elsevier Science-North Holland, Amsterdam, 2006.
  - "Ant Colony Optimization for Disassembly Sequencing with Multiple Objectives," a peer-reviewed research paper published in the September 2006 issue of *The International Journal of Advanced Manufacturing Technology*.

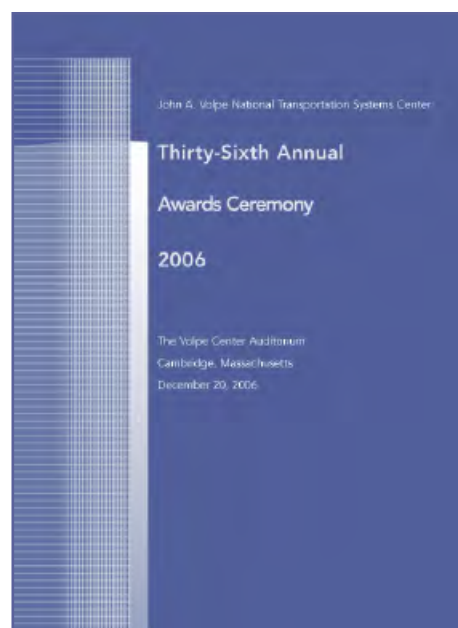
## Letter from the Director

*Continued from page 1*

academia who bring their own skills and work closely with our staff to achieve the Center's mission. We value their contributions and the trust that has evolved in this collaborative environment.

Many of our employees and teams also were recognized by the Secretary of Transportation for their meritorious and excellent contributions; others were acclaimed by our customers in the DOT administrations. Several staff members were recognized for their contributions to the local community.

The Center's success depends on every person carrying out his or her role, and we are committed to developing and sustaining a culture of continuous improvement. The talents of each of our employees contribute to the Center's immediate and long-term goals.



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