

Volpe  
National  
Transportation  
Systems  
Center

# Volpe Center Highlights

Cambridge, MA

February/March 1999



## Spotlight

Last month, Volpe Center Director, Dr. Richard John, and Research and Special Program Administration (RSPA) Deputy Administrator, Dr. Stephen Van Beek hosted Congressman Michael Capuano (Democrat, 8th District) and four members of his staff. After introductions and welcoming remarks in the Director's Conference

Room, three presentations —the Enhanced Traffic Management System, the MIT Microscopic Traffic Simulator, and the Enhanced Vessel Traffic Management System designed for the Panama Canal— gave the newly elected Congressional Representative a better sense of the work and mission of the Volpe Center. The Congressman and members of his staff (including the staff member responsible for transportation issues) asked questions throughout the briefings and expressed appreciation for the scope of the projects underway at the Volpe Center. The visit to the Volpe Center marked one of Representative Capuano's first visits planned to Cambridge employers' organizations. The National Association of Government Employees (NAGE) President, Mr. Michael Sheehan, also attended the presentations.



Left to Right: RSPA Deputy Administrator Dr. Stephen Van Beek, Congressman Michael Capuano, and Volpe Center Director Dr. Richard John

## Director's Corner

*"The widening availability of destructive technology and the growing complexity and consequent vulnerability of twenty-first century societies suggest that terrorism might make a quantum leap in the decades ahead, from airline hijacking, ordinary explosives, and hostage taking to attack with nuclear, chemical, biological, and cyber weapons of enormous destructiveness."*  
Preventive Defense, *A New Security Strategy for America*, 1999 by Ashton B. Carter and William J. Perry

The possibility of catastrophic terrorist activities has focussed attention on the vulnerabilities of both domestic and foreign transportation facilities and the potentially severe consequences of such a terrorist attack. Transportation facilities offer a very visible and attractive target, packed with innocents – with potential impact for major publicity.

In response to these and other security-related concerns, the federal government has taken several key steps. A 1996 Executive Order established the President's Council on Critical Infrastructure Protection (PPCIP). In October 1997, the commission issued *Critical Foundations: Protecting America's Infrastructures*. The report comprehensively assessed the potential threat to the entire range of the nation's key infrastructures – including transportation, energy distribution, telecommunications and information systems, banking and finance and vital human services. In May 1998, the Administration issued two related Presidential Decision Directives (PDDs). PDD-62 highlighted the growing threat of unconventional attacks against the United States and detailed a national program management approach to counter-terrorism efforts. PDD-63 called for a national effort to assure security of the increasingly vulnerable and interconnected infrastructures of the United States. The directive stressed the critical importance of cooperation between the government and the private sector by linking designated agencies with private sector representatives in key fields.

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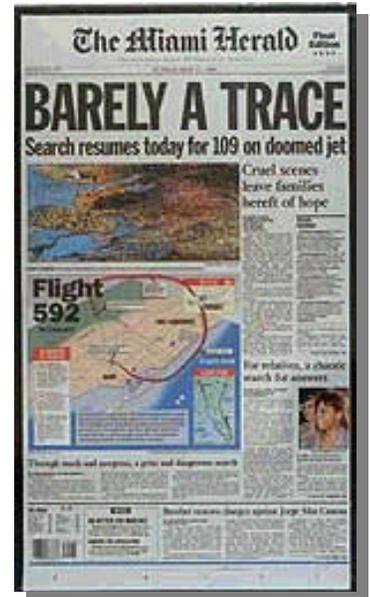
## Safety

*Promote public health and safety by working toward the elimination of transportation-related deaths, injuries, and property damage.*



### Hazardous Material in Aircraft Cargo Compartments Examined (RSPA)

The Volpe Center's Environmental Engineering Division provides analytical and technical support to RSPA's Office of Hazardous Materials Safety on the safe transport of hazardous materials. The Division has conducted a quantitative analysis to determine the probability that a life-threatening incident would occur as the result of transporting hazardous materials in aircraft cargo compartments. This project was initiated following the tragic May 1996 crash of ValuJet Flight 592 near Miami, FL, which has been linked to hazardous materials (chemical oxygen generators) shipped in violation of RSPA regulations. Results of the Volpe Center's research will help RSPA in determining the effectiveness of current regulatory activities, targeting specific threats for priority action, and developing effective countermeasures. Towards this end, the Volpe team developed a threat assessment model, using both "fault tree" and "event tree" methodologies, that calculates the probabilities of life-threatening incidents per flight based on the presence of a package containing the selected material, the specific cargo compartment, and a package's state of compliance. A panel of experts suggested countermeasures, experimental tests, and provided input data for the model, helping the team. The results for each scenario provided: a relative ranking of the threat for the selected hazardous materials over all the cargo compartment types; a breakdown of the threat by the specific events (fire, explosion, poisonous material release); and relative ranking of the threat by cargo compartment type.



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### Center Analyzes Low Speed Derailments (FRA)

The Volpe Center has been providing support to the FRA in evaluating the potential causes of, and corrective actions for, low speed derailments that have been experienced by Commuter Railroads in the New York City Area. In cooperation with the Metro-North Commuter Railroad, the Volpe Center's Structures and Dynamics Division recently conducted two weeks of measurements and tests at an instrumented test site in Manhattan's Grand Central Terminal. The primary purpose of the tests was to obtain data to better understand the mechanics of commuter railroad truck designs. Several types of vehicles were tested on a section of sharply curved track, instrumented with strain gauges that measure lateral and vertical wheel loads. The collected data, which will be used to calibrate computer simulation models being developed by the Volpe Center, will assist in the development of safety-related procedures in high curvature track conditions and for track and equipment maintenance in yard and terminal areas. It is anticipated that the results of these studies and tests will be incorporated into the recommendations of the American Public Transit Association's Passenger Rail Equipment Safety Standards Task Force's Working Group on Low-Speed Derailments.

### Fatigue Research Exhibited at White House Conference on Transportation Safety (FRA)

Fatigue based vehicle operator error has been identified as the primary factor in millions of transportation crashes and incidents each year. During the White House's National Transportation Safety Conference, the Volpe Center's Operator Performance and Safety Analysis Division exhibited and demonstrated several new technologies that can help ensure operator vigilance on duty, such as fitness-for-duty testing and alertness monitoring. Attending the conference were Secretary of Transportation Rodney Slater, most of the Modal Administrators, a few members of Congress, hundreds of DOT managers, and numerous Congressional and Office of Management and Budget staffers. There were also representatives of most of the transportation trade associations and unions, as well as various safety groups. Volpe's research in this field is sponsored by the Federal Railroad Administration (FRA); however, these technologies are expected to find application in all different transportation modes.



## Volpe Staff Presents Safety ITS Crash Avoidance Research at 1999 SAE Exposition (NHTSA)

The Society of Automotive Engineers (SAE), a resource for "technical information and expertise used in designing, building, maintaining, and operating self-propelled vehicles for use on land or sea, in air or space," recently held the 1999 SAE International Congress and Exposition in Detroit, MI. The Exposition is a significant annual, automotive engineering event that addresses current technical and business disciplines, introduces new products from global suppliers, and disseminates information through 250 information sessions. Mr. Joseph Koziol, Accident Prevention Division, attended the conference and presented his paper (co-authored by Mr. Andrew Lam) entitled "The Application of State Space Boundaries in the Safety Evaluation of Collision Avoidance Systems." The paper describes the development of a new measure for indicating the safety effects of longitudinal collision avoidance systems based on data from a field test of an Intelligent Cruise Control System for automobiles and other light vehicles. The paper will also be published in a special SAE publication titled "Intelligent Transportation Systems."

## Volpe Center Effort to Reduce Switching Operations Fatalities (FRA)

The Switching Operations Fatalities Analysis (SOFA) Committee is a collaboration of the Federal Railroad Administration (FRA), American Association of Railroads (AAR), and railroad industry representatives committed to finding ways to eliminate switching fatalities. During the last Committee meeting in Las Vegas, NV, Mr. David Skinner, of the Volpe Center's Operator Performance and Safety Analysis Division, presented data gathered on railroad worker fatalities involved in switching operations from 1992 to 1997. In April, Mr. Skinner will provide additional analyses to the SOFA Committee at their meeting in Dallas, TX. This work is sponsored by the FRA's Office of Research and Development.

<h3>Mobility</h3>	
<p>Ensure that the transportation system is accessible, integrated and efficient, and offers flexibility of choices.</p>	

## Volpe Center Participates in GPS Risk Assessment Study (FAA)

Dr. Richard John, and Ms. Karen Van Dyke of the Center for Navigation, participated in a meeting with Federal Aviation Administrator Jane Garvey and other DOT administrators on the Global Positioning System (GPS) risk assessment study for aviation performed by Johns Hopkins University. The study addresses the question of whether GPS, with augmentations, is sufficiently robust to serve as a sole means of navigation for aviation and thus as the only navigation service provided by the FAA. The Volpe Center is already performing a related study for OST that addresses GPS vulnerability for transportation modes.

Now the Center will be able to incorporate the findings of the John Hopkins study and other ongoing evaluations to develop a report applicable to all modes of transportation. The effort will also involve collecting additional information on the integration of GPS with other navigation systems and GPS interference mitigation techniques.

## Volpe ITS PCB Work Recognized in *ITS International*

A recent article in the January/February 1999 issue of *ITS International* entitled *Waiting for the Train: How the U.S. is facing up to an ITS Crisis*, highlighted the work of the ITS Professional Capacity Building (PCB) team at the Volpe Center. In the summer of 1997, the first PCB needs assessment was undertaken by a cross-divisional Volpe team including Ms. Maureen Luna-Long, Mr. John O'Donnell and Ms. Suzanne Sloan, of the Economic and Analysis Division, Ms. Cynthia Maloney and Mr. Gary Ritter, of the Policy and Technology Analysis Division, Dr. Sylvia Harris, of the Telecommunications Division, Mr. Terence Smith of EG&G, and contractors from Brattle Systems. Their work resulted in a report that synthesized the previous literature on PCB needs in ITS, reported on a series of field interviews with ITS practitioners, and presented the higher level programmatic issues for the U.S. DOT's ITS PCB Program. The *ITS International* article summarized the results of the Center's research and PCB Needs Assessment which showed, among other findings, that "well-qualified professionals at high level sites are a precious resource and are not easily replaced."



## Volpe Center Conducts ITS Training for Florida DOT and ITS Florida (ITS JPO)

Intelligent Transportation System (ITS) technologies promise to improve the safety and efficiency of surface transportation. The U.S. DOT's PCB Program, a joint Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) program directed by the DOT ITS Joint Program Office, has been tasked with promoting ITS deployment through the development of

appropriate ITS knowledge and skills for government agencies as well as the transportation industry. The Volpe Center, at the request of the FTA, acts as Program Manager for the FTA ITS PCB program. In that role, the Center develops and delivers awareness training on the application of ITS to public transportation. One of the training resources developed by the Volpe Center's Telecommunications Division is the "ITS in Transit Awareness Seminar," a one-day course that was recently presented at the Florida DOT Training Facility in Jacksonville, FL. The presentation was requested by the Florida DOT and ITS Florida, and was attended by representatives from city transit and traffic agencies, Florida DOT, the University of Florida, and the FHWA Florida Division.

### Volpe Center Staff Present at the Fast Ferry International Conference (DOD)

Mr. Robert Armstrong of the Economic Analysis Division, Mr. Michael Dyer of the Environmental Engineering Division, and Mr. Krishna Jain, of EG&G, are providing support to the United States Navy's Office Of Naval Research by conducting an analysis of the market for fast ferries. In support of this work, the team recently attended the 15<sup>th</sup> Fast Ferry International Conference and Exhibition in Boston, MA, where over 700 conference attendees received information from representatives of the commercial high speed marine craft sector. During a panel session moderated by Mr. Dyer, Messrs. Armstrong and Jain presented an overview entitled, "The Operator's Fast Ferry Decision: To Buy or Not to Buy." The panel also included a general overview of the Volpe Center Fast Ferry research. Other panel members included ferry operators, shipyards, and members of the financial community, all of whom presented different perspectives on the high-speed ferry market.



### Economic Growth & Trade

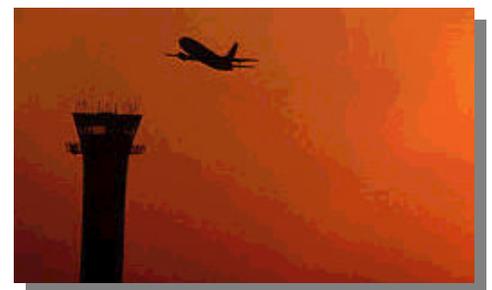
*Advance America's economic growth and competitiveness domestically and internationally through efficient and flexible transportation.*



### Volpe Verifies FAA Communications System is Y2K Compliant (FAA)

The Volpe Center's Telecommunications Division provides systems development and infrastructure support to the FAA's Telecommunication Information Management System (TIMS) program. TIMS is a central repository of information on the FAA's communications circuits and equipment that allows FAA personnel to collect, organize, and report telecommunications equipment information more effectively. Since TIMS has been designated by the FAA as a mission-critical system, the Volpe Center's Y2K compliance activity has been under intense scrutiny. After successfully completing a series of validations and certification tests, the Center has entered the final phase of the TIMS Y2K compliance effort—deploying the renovated TIMS system to the field. In order to meet the FAA's

accelerated target date (recently moved from April 30<sup>th</sup> to March 31<sup>st</sup>, 1999), the Volpe Center sent three parallel teams of Federal and contractor staff to perform system installation and testing at the nine FAA regions, FAA Headquarters, the FAA William J. Hughes Technical Center, and the FAA Mike Monroney Aeronautical Center. Although the teams encountered numerous problems including weather delays, software bugs, coordination and scheduling difficulties, all aspects of the project were eventually completed successfully, assuring that the deployed TIMS system is now fully Y2K compliant.



### Volpe Center Hosts Aviation Modeling and Simulation Workshop

Under the direction of Mr. Robert Wiseman, Transportation Strategic Planning and Analysis Division, the Volpe Center hosted the "Aviation Modeling and Simulation Needs and Requirements Workshop." Over forty invited guests, including recognized experts from the Department of Defense, the FAA, the National Aeronautics and Space Administration, and academia, attended. The objectives of the workshop were to address modeling and simulation compatibility and integration capabilities issues as well as to identify tools that could give decision makers insight into the capacity, safety, and environmental and economic consequences of alternative air transportation futures. The workshop consisted of a series of briefings and facilitated discussions that identified the requirements for models and simulations and their strengths and weaknesses. There was full agreement at the workshop that the most important purpose of analysis, modeling, and simulation was to serve as a knowledge base for high level policy evaluations for decision makers.

## Human and Natural Environment

*Protect and enhance communities and the natural environment affected by transportation.*



### Climate Change Report Completed; Technical Assistance Provided to Argentina (RSPA, EPA)

Mr. Kevin Green, of the Transportation Strategic Planning and Analysis Division, completed a report by the DOT Global Climate Change Task Force entitled "A Preliminary Consideration of General Climate Change Policy and Selected Strategies for Transportation in the United States." The report provides an overview of current climate change policy, identifies specific greenhouse gas mitigation strategies for the transportation sector, and makes several administrative recommendations for DOT headquarters. The report is currently being circulated

among mid-level managers in each operating administration and is expected to be the primary point of reference for forthcoming discussions by the Department's senior management. In a related effort funded by the U.S. Environmental Protection Agency, Mr. Green is supporting the interagency U.S. Country Studies Program, which assists developing countries with their efforts to quantify and reduce Greenhouse Gas Emissions. Mr. Green recently traveled to Buenos Aires to participate in a bilateral meeting with Argentine government officials to discuss technical issues associated with Argentina's planned adoption of a target to reduce greenhouse gas emissions. U.S. participation was led by staff from the U.S. Embassy and the Department of State, and included representatives from the EPA, the Department of Energy (DOE), and the United States Department of Agriculture. Mr. Green's presentation addressed models for transportation sector energy demand, transportation technologies, and mitigation policies for the transportation sector. Future work should entail at least one additional trip to Buenos Aires in 1999 to follow up on actions identified during this meeting.

### One DOT Leadership Conference

The ONE DOT Management Strategy seeks to invigorate and integrate the various modes within the U.S. DOT and the transportation sector to address the changing needs of our Nation's transportation system. Dr. Richard John and Ms. Edith Boyden, Chief of the Policy and Technology Analysis Division, attended the ONE DOT Leadership Conference held in Chantilly, VA, to discuss various Departmental flagship initiatives for the next two years, and how best to relate them to the Department's goals and long term strategic planning effort. Also attending were Secretary of Transportation Rodney Slater, Deputy Secretary Mortimer Downey, Modal Administrators and their Deputies, and a selected group of senior career civil servants from headquarters and the field.



### Environmental Remediation Support Provided to EPA Region VIII (EPA)

The Volpe Center provides ongoing support to the Region VIII EPA by providing logistics and systems engineering expertise for the removal, transport, and disposal of approximately 40,000 tons of lead and arsenic contaminated soil from 28 residential properties in Stockton, UT. The Volpe Center is assisting the EPA with the identification and utilization of practices and technologies for these activities to protect the environment more fully. As part of this effort, Messrs. Glenn Goulet and John McGuiggin, of the Environmental Engineering Division, participated in a public outreach meeting to present technical information to local residents regarding the environmental studies conducted to date and to discuss future environmental remediation activities. Residents were consulted on the general approach towards the cleanup activities, schedule, and additional coordination requirements. Overall, the information was well received and Stockton residents appeared to understand the need for the emergency cleanup measures.

**Director's Corner Continued...** The Volpe Center, I am proud to say, has, and continues to play an active role in the federal government's response to the terrorist threat. The Center provided significant technical support to the Department of Transportation's input to the President's Council on Critical Infrastructure Protection and has completed a well received surface transportation vulnerability assessment. Volpe Center staff has also supported the FAA's response to Presidential Decision Directive 63; has held and is planning future workshops and symposia on detection, mitigation and response to cyber, chemical and biological threats; and is an active participant in activities of the government/industry/community concerned with anti-terrorism and security technologies.

Looking to the future, it is essential that we continue to enhance and expand capabilities in the areas of: (1) threat assessment and risk; (2) information security; (3) validation of new countermeasure capabilities; and (4) assistance to the responder community in the acquisition and application of the most advanced and affordable levels of protection and response. As in the past, I am sure that we will again rise to the nation's need and respond to this challenge.