Research and Special Programs Administration

the VOLPE center

National Transportation Systems Center

HIGHLIGHTS

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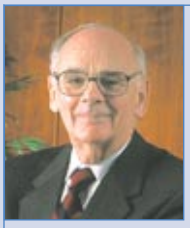

Director's Notes

Transit Safety and Security – An Evolving Role

For emergency response plans to succeed, there must be a seamless flow of information between people and agencies responding to disasters. Ensuring that this coordination is in place takes advanced planning. This issue of Highlights features the Volpe Center's support of the Federal Transit Administration, as it responds to the challenge of ensuring that communities can effectively respond to emergencies. The 'Connecting Communities' forums—developed and administered for the FTA by Volpe—encourages a community's emergency response personnel to meet, to share information, and to learn how to tackle problems together. These forums exemplify the Volpe Center's ability to provide a link for different organizations that need to come together to develop a unified perspective.

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Inside

Focus

The Volpe Center is planning the next phase of "Connecting Communities," a successful series of forums to help transit and emergency response agencies in communities across the nation prepare for emergency situations.

Connecting Communities: Emergency Preparedness and Security Forums (FTA)

Lessons learned from transit and emergency personnel who responded on September 11, 2001, indicate that three factors helped them make a difference that day: 1) they had emergency response plans in place; 2) they had practiced according to the plans; and 3) their leaders had formed trusted relationships. Since September 11, 2001, the Federal Transit Administration (FTA) has made it a priority to help ensure that every community knows how to respond to emergencies. Critical to this effort are emergency training programs that include the latest information on safety and disaster preparation planning.

Over the past year, the Volpe Center has supported the FTA by designing and administering a series of 17 forums across the country. The series, "Connecting Communities: Emergency Preparedness and Security Forums," has successfully engaged more than 1,800 professionals from local transit, police, fire, medical response, and city/state emergency management communities. Mr. Bob Adduci of the Railroad Systems Division leads the Volpe team.

Enabling Interagency Coordination

Transit systems rely heavily on other emergency responders during system emergencies, and in certain crisis situations, transit can play a key role in response. The Connecting Communities forums help transportation and emergency response agencies work together to prepare and protect their community with coordination, communication, planning, and practice of safety and security measures. The program has helped create local networks for the facilitation of future drills and emergency plans, with the objective of enhancing the nation's ability to respond to emergencies.

Volpe team leader Bob Adduci facilitates the Connecting Communities forums.

Who Attends

Participants include:

- Transit agency management, transit police, and security personnel;
- Police and fire personnel responsible for emergency management;
- Emergency medical service and hospital disaster relief coordinators; and
- State and local government emergency management coordinators.

What They Learn

Through interactive exercises including emergency scenarios, breakout discussions, and presentations, participants:

- Identify the people, organizations, procedures, equipment, and facilities needed for an effective emergency management program;
- Understand how the interaction of these elements affects the management of emergency situations;
- Learn about the existing local transit system emergency management, disaster recovery, and security plans;
- Understand the role of the transit agency in responding to emergency/disaster situations in the community; and
- Explore how to activate alternative transportation during a crisis.

Attendees develop useful networks with fellow transit, police, fire, medical response, and emergency management officials. They also receive educational resources to help them share the lessons learned from the forums with their agency's employees.

Building on Success

In response to the success of the program, the FTA has requested several additional forums, some of which will reach out to rural areas of the country. Accordingly, in April, Mr. Adduci facilitated a workshop to review the Connecting Communities Forums program with the core

Every community should know the answers to these questions.

- Who will lead incident command during a transit emergency: police, fire, or transit officials?
- Does your team know how to gain access to a disabled train or bus during an emergency?
- What role can your community's transit agency play during a non-transit emergency?
- Are you organized to share resources and assets during a regional emergency?
- Does your team know how to handle a biohazard event safely?
- Does your community's emergency response plan include all the right players? Can they communicate effectively during an incident?

team of forum facilitators and FTA Office of Safety and Security Director Harry Saporta. The workshop, held at the Volpe Center, focused on updating the program content according to recent security initiatives and developing materials relevant to small and rural communities.

Supporting Alternative-Fuel Vehicles in Transit (FTA)

Vehicles that run on alternative fuels offer many benefits, including lower vehicle emissions and less dependence on foreign fuel sources, but if this new technology is to be safely integrated into the nation's transportation system, critical issues must be addressed. For several years, the Volpe Center has been actively involved in work on codes, standards, and recommended practices for hydrogen and other alternative fuel vehicles, as well as related infrastructure. These activities are part of the ongoing technical support that the Volpe Center provides to the Federal Transit Administration (FTA), Office of Technology, to help ensure the safety and security of the public transit bus fleet and infrastructure.

In March 2003, the Volpe Center published a final report for the FTA's Clean Air Program: *Design Guidelines for Transit Systems Using Electric and Hybrid Electric Propulsion as an Alternative Fuel.* This document is the last in a series that describes recommended practices—particularly focusing on safety—for transit buses, operations, and infrastructure. Other documents in the series, also prepared by the Volpe Center, have focused on compressed natural gas, hydrogen, liquefied petroleum gas, liquefied natural gas, and methanol/ethanol.

The use of electric and hybrid electric buses is expected to increase dramatically over the next five years. The goal of this document is to offer transit operators the greatest chance of success when integrating these advanced technology buses into the transit system. Incorporating substantial input from many industry leaders and users, the report provides an overview of the state of the art, a set of lessons learned, and general guidance. The importance of training for operations, maintenance, and emergency response personnel is emphasized and suggestions for specific training, design, and procurement requirements are described.

Mr. William Chernicoff of the Volpe Center's Service and Operations Assessment Division and Volpe Center contractors from MJ Bradley Associates and TMS Inc. coauthored the report, available at *http://transit-safety.volpe.dot.gov/Publications/default.asp#CleanAir.*

The Volpe Center also supports the Department of Defense, the Department of Energy, and the National Park Service in efforts to safely deploy and evaluate fuel cell and advanced propulsion vehicles.

Assessing Safety and Security Readiness of Rail Transit (FTA)

Concern about catastrophic accidents or security incidents on rail transit systems led to the creation of the State Safety Oversight (SSO) Rule for Rail Fixed Guideways, which requires that states oversee the safety and security of rail transit systems. The Federal Transit Administration (FTA) developed the rule and monitors its implementation. The Volpe Center assists FTA in this effort through audits and compliance monitoring, policy and regulatory analysis, and information sharing.

A Volpe-led team recently reviewed the Tren Urbano rail transit system to help ensure that it is ready to provide safe and secure service when its first phase begins operating in late 2003.

To support Puerto Rico's State Safety Oversight Agency in meeting SSO requirements, an FTA-sponsored Transit Safety and Security team, led by Mr. Bob Adduci of Volpe's Railroad Systems Division, visited the Tren Urbano rail transit system. Now under construction, when finished Tren Urbano will serve Metropolitan San Juan; the first phase is expected to be complete in September 2003. The visit, conducted March 2 – 7, 2003, achieved the following objectives.

- Assessed Puerto Rico's SSO program and the level of compliance of the Tren Urbano system with Puerto Rico's program, including the system's readiness to provide safe and secure service at startup.
- Provided focused technical assistance using recommendations from "safety and security lessons learned" by other transit providers.
- Attended to safety and security concerns during the period from startup testing to revenue operations.
- Established the baseline for ongoing FTA technical assistance and for state actions to address concerns identified in the assessment.

Volpe led a similar assessment of the Utah Transit Authority's Olympic Transportation Plan in 2001 before the startup of light rail revenue service in Salt Lake City to transport spectators during the 2002 Olympic Games.

Volpe Report Gains Attention as Useful Resource (FTA)

During the last several months, a document developed by Volpe's Railroad Systems Division has been receiving attention. "FTA Drug and Alcohol Program Assessment," written for the Federal Transit Administration's (FTA) Office of Safety and Security, determines the progress of the FTA's Drug and Alcohol Compliance Program in meeting U.S. DOT and FTA strategic goals and objectives. Transit systems that receive funds from FTA must conduct drug and alcohol testing of employees who perform safety-sensitive functions.

The Volpe analysis allows FTA to determine whether the current program is operating effectively and efficiently while providing options to optimize results.

The Volpe assessment synthesizes economic and safety benefit models; it uses data from the Drug and Alcohol Program and the National Transit Database, as well as other benchmarks from the substance abuse

prevention industry and other government agencies. It demonstrates tremendous economic and safety benefits resulting from the testing program. The assessment has been the subject of lead stories in the journal *American College of Occupational and Environmental Medicine's Medical Review Officer Update* as well as the newsletter *FTA Drug and Alcohol Regulation Updates.* It has also been used as source material by several transit agencies to defend testing programs. Notably, it was employed as key evidence by the California State's Attorney's Office and Los Angeles County Metropolitan Transportation Authority Office of the Inspector General in defending a lawsuit related to the Authority's testing program. Mr. Jerry Powers of the Railroad Systems Division is the primary author of the report, which can be found at *http://www.transit-safety.volpe.dot.gov/publications/substance/DAPA/DAPA.pdf.*

Understanding Close Calls in the Railroad Industry (FRA)

A close call is "an opportunity to improve safety practices in a situation or incident that has a potential for more serious consequences." Analyzing close calls enables railroads to proactively manage safety. When individual events are analyzed collectively, railroads can identify safety hazards and develop solutions to these threats. On April 23 and 24, 2003, in Baltimore, Maryland, the Volpe Center conducted a meeting sponsored by the Federal Railroad Administration (FRA) to educate the railroad industry on the benefits of understanding close calls.

Presentations covered close call systems in the airline industry, the United Kingdom railway industry, and the Burlington Northern Santa Fe Railroad. Participants discussed lessons learned from their personal close calls, benefits and barriers to implementing a close-call system, and steps toward developing such a system. This effort is part of the Center's support to the FRA's Office of Research and Development. Dr. Jordan Multer of Volpe's Operator Performance and Safety Analysis Division and Dr. Thomas Raslear of the FRA's Equipment and Operating Practices Division organized the workshop.

Common Features of Successful Close-Call Systems

Encouraging employees to disclose safety-critical information requires a sense of trust. Features of successful systems include:

- Confidential reporting
- Collection and storage of information by a third party
- Limited protection of sources from liability or enforcement.

Sustaining Coast Guard Cutters (USCG)

The U.S. Coast Guard operates five classes of cutters and four classes of aircraft in its Deepwater operations. Effective assets in their day, these platforms are technologically obsolete and require excessive maintenance. The Deepwater Project was established to modernize and replace this aging fleet as well as its supporting command-and-control

and logistics systems. Because the current acquisition plan indicates that some legacy cutters are to remain in commission for up to 20 years, the Coast Guard's Engineering and Logistics Center asked the Volpe Center to help develop plans to keep these cutters operating at maximum efficiency through their remaining life.

April 1 through 3, 2003, a Volpe team conducted a workshop at the Engineering Logistics Center in Baltimore, Maryland with Coast Guard naval engineers to develop a sustainment plan for the 270' Medium Endurance Cutter (WMEC). Dr. Rachel Winkeller of the Planning and Policy Analysis Division and Mr. Bob Pray of the Technology Applications and Deployment Division led the group through a detailed analysis of the major issues facing the 270' WMEC and helped them develop a recommended set of projects to maintain the cutters' operational readiness through their projected life expectancy, as well as strategies for funding and sequencing the projects. Volpe plans to conduct similar workshops for the 210' Medium Endurance Cutter and the 378' High Endurance Cutter.

The Coast Guard's 270' Medium Endurance Cutter fleet, commissioned between 1983 and 1991, is scheduled for decommissioning between 2018 and 2022. Volpe is helping the Coast Guard develop plans to keep aging cutters fit for service until they are decommissioned.

Papers & Presentations

- A paper written by Ms. Melissa Laube of the Service and Operations Assessment Division and Mr. Michael Dyer of the Technology Applications and Deployment Division, "Ferry Service Market Analysis: National Parks of New York Harbor," was recenty published in the Journal of the Transportation Research Board, *Transportation Research Record* No. 1793. The paper discusses the Volpe Center's analysis of the feasibility of developing a water transportation system to serve the National Parks of New York Harbor. An innovative approach to predicting demand was developed based on the estimation of market thresholds needed for the service to be financially viable. The approach is applicable in a wide range of situations where the data to perform traditional transportation demand analysis are lacking, and where planned services are expected to attract riders with substantially different socioeconomic and travel behavior characteristics than existing transportation markets.
- On March 3, 2003, Volpe Center staff presented two papers on collision avoidance research at the 2003 Society of Automotive Engineers World Congress in Detroit, Michigan. Dr. Wassim Najm and Mr. Andy Lam, of the Accident Prevention Division, and Dr. David Smith, of the National Highway Traffic Safety Administration (NHTSA), presented "Analysis of Braking and Steering Performance in Car-Following Scenarios," which describes the Volpe Center's independent evaluation of an automotive rear-end crash avoidance system. Mr. Jonathan Koopmann, Accident Prevention Division, and Dr. Najm presented a paper titled "Identification of Traffic States from Onboard Vehicle Sensors." This paper describes the development of a data processing algorithm for the Center's evaluation of the crash avoidance system.
- Ms. Jane Lappin of the Economic and Industry Analysis Division recently delivered a lecture titled "Consumer Response to Advanced Traveler Information

The papers result from the Center's work for NHTSA under the DOT's Intelligent Vehicle Initiative Program.

Services" to Professor Joseph M. Sussman's "Introduction to Intelligent Transportation Systems" class at the Massachusetts Institute of Technology.

- Ms. Karen Van Dyke of the Center for Navigation recently addressed a class of electrical engineering students at the University of Massachusetts at Lowell. Her lecture described the operation characteristics of the Global Positioning System (GPS); the current status of the GPS constellation; differential GPS augmentation systems; and the projected evolution of GPS over 30 years.
- In support of the U.S. Army Tank-Automotive and Armaments Command, the Volpe Center is developing a supplemental environmental assessment for the deployment of Modular Causeway Systems (MCS) in the Puget Sound area in Tacoma, Washington. MCS are standardized components used to build floating piers, floating offshore platforms for discharging ship cargo, and powered ferries for transporting vehicles and containers ashore. As part of this effort, on March 10, 2003, Dr. Amishi Joshi of the Environmental Engineering Division and Ms. Deirdre Carrigan of the Technology Applications and Deployment Division completed a feasibility report describing potential storage and training sites for the MCS. The report is available on the Volpe Web site at *http://www.volpe.dot.gov/enviro/pubs.html.*
- From March 12 through 14, 2003, Mr. Gregg Fleming of the Volpe Center's Environmental Measurement and Modeling Division participated in the Federal Aviation Administration's (FAA) Annual Symposium held in Berkeley, California. At the invitation of Carl Burleson, Director, FAA Office of Environment and Energy, Mr. Fleming presented the paper "The Federal Aviation Administration's System for Assessing Aviation's Global Emissions (SAGE)." The Volpe Center is supporting the FAA's Office of Environment and Energy by improving, enhancing, and validating air-quality modeling tools.
- In March 2003, Volpe Center staff delivered the final report, "Water Transportation Planning for Eastern Massachusetts: A Strategic Assessment of Passenger Ferry Services" to the Commonwealth of Massachusetts Executive Office of Transportation and Construction. Mr. Michael Dyer of the Technology Applications and Deployment Division performed a feasibility analysis of eight potential ferry and water shuttle routes within the Boston Harbor and Massachusetts Bay Area. Other contributors include Mr. Eric Plosky of the Service and Operations Assessment Division, Ms. Deirdre Carrigan of the Technology Applications and Deployment Division, and Mr. Charles Norris of Norris & Norris Associates (a Volpe Center contractor). The Center also developed a strategic assessment tool that examines the infrastructure, access, intermodal connectivity, vessel reconfiguration, environmental and economic development policy, and operational finance aspects of proposed services. This tool will assist the Commonwealth in making resource decisions for future water transportation projects.
- On March 18, 2003, Mr. William Chernicoff of the Service and Operations Assessment Division moderated the panel "How Does the Transportation Sector Affect Fuel Cell Commercialization?" at the Fuel Cell Investment Summit held in Uncasville, Connecticut and sponsored by the Connecticut Clean Energy Fund, the U.S. Fuel Cell Council, and Fuel Cells 2000. As part of the World Fuels Conference held March 25 – 27, 2003, in San Antonio, Texas, Mr. Chernicoff participated in an expert panel, "Fuel Cell Vehicles—Is the Hydrogen Economy Real?" He discussed perspectives on the development and emergence of fuel cell vehicles and their deployment into the transportation system.

Director's Notes

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This issue of *Highlights* also describes how the Volpe Center helps transit agencies to include safety and security concerns in their planning. Volpe teams provided such support recently in San Juan, Puerto Rico for a new rail transit system and in 2002 for the transit system that was used to transport Olympic games spectators in Salt Lake City, Utah. Volpe Center engineers are also playing a leading role in providing guidelines for transit agencies that are planning to introduce alternative fuel vehicles. In another important safety effort, the Center has published a well-received assessment of FTA's Drug and Alcohol program.

The Volpe Center's support to FTA began in the 1970s when it was called the Urban Mass Transit Administration. The achievements of space exploration created a new sense of possibilities for solving the nation's other challenges. In urban and transportation arenas there was an interest in developing transit solutions, especially in providing fast urban transit links that would help alleviate congestion, noise, and air pollution, and a strong focus on how urban transportation could influence how cities thrive. New mass transit systems were being planned and built; Volpe developed methods for stabilizing soils and instrumenting underground structures to detect ground motion, and evaluated tunneling methods for slurry wall construction. A major engineering effort was devoted to urban rail noise reduction. Volpe staff also helped transit authorities investigate electromagnetic interference on new subway lines; this has become critical to the safety of modern control systems. The transit portion of the Transportation Technology Center, a research and testing facility in Pueblo, Colorado, was developed and run by Volpe Center staff.

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- Dr. Aviva Brecher of the Office of Environmental Preservation and Systems Modernization, and 2002-2003 Distinguished Sigma Xi Lecturer, recently presented invited lectures at two universities. At Syracuse University in Syracuse, New York, she presented "Electromagnetic Fields, Health and Environmental Issues in Transportation" and "Balancing Transportation, Energy and Environment" and met with faculty and graduate students in the Global Affairs Institute and Center for Environmental Policy. At Northern Illinois University in DeKalb, Illinois, she presented "Transportation in 2050: Technologies and Outlook" at the Annual Sigma Xi Banquet.
- FAA-sponsored, flight-deck human factors research performed by Volpe's Operator Performance and Safety Analysis Division was presented at the 12th International Symposium on Aviation Psychology held April 14 – 17, 2003, in Dayton, Ohio. Dr. Judith Burki-Cohen presented "Flight Simulator Fidelity: An Update on Motion Requirements," which reports on Volpe's efforts to obtain scientific data on the platform motion simulation requirements for training and evaluation of airline pilots. Dr. Michelle Yeh presented "Determining Minimal Display Element Requirements for Surface Map Displays," which describes the results of an information analysis assessing the value of airport surface attributes when presented on electronic map displays. Also presented was Dr. Michael Zuschlag's "Hidden Markov Models as a Tool to Measure Pilot Attention Switching During Simulated Instrument Landing System Approaches," which covers the development of a means of inferring a pilot's current cognitive task from a sequence of eye fixations on cockpit instruments.

Volpe staff use this general aviation simulator with surface map display in human factors research. The simulator is on loan to the Volpe Center from the FAA's William J. Hughes Technical Center.

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At the same time, advanced, innovative technologies for urban transit were emerging. Volpe teams performed engineering evaluations and socioeconomic assessments for automated guideway systems, such as people movers that introduced driverless vehicles that operate over exclusive guideways—in congested downtown areas, such as Los Angeles, St. Paul, Detroit, and Miami—and took the lead in developing and testing prototype high-speed transit systems such as the Urban Tracked Air Cushion Vehicle.

Inexpensive ways to improve service and expand ridership were in high demand. In the 1970s and 1980s, the Center served as the evaluation arm for FTA's Service and Methods Demonstration Program. More than 70 demonstration projects and case studies of innovative management and service approaches in use throughout the country were evaluated. The demonstrations covered accessibility for elderly and disabled riders, user subsidies, paratransit variations, fare and pricing policies, reserved lanes for buses and carpools, and transit malls. During this time, the Center established its reputation as an impartial technical resource.

As new technologies and issues emerge, the Center keeps pace. In the areas of operations, environmental streamlining, and intelligent transportation systems, Volpe teams supply FTA with a range of services as diverse as analysis, vehicle testing, policy development, outreach, and training. The Center's comprehensive approach and multidisciplinary capabilities will enable our staff to continue meeting the evolving needs of FTA and other agencies.

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