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Demonstration Project 111
ITS/CVO Technology Truck
Final Project Report

December 2001

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DEMONSTRATION PROJECT 111 ITS/CVO TECHNOLOGY TRUCK FINAL PROJECT REPORT

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ABSTRACT

In 1995, the planning and building processes began to design and develop a mobile demonstration unit that could travel across the nation and be used as an effective outreach tool. In 1997, the unit was completed; and from June 1997 until December 2000, the Federal Highway Administration (FHWA)/Federal Motor Carrier Safety Administration (FMCSA) mobilized the Technology Truck, also known as Demonstration Project No. 111, "Advanced Motor Carrier Operations and Safety Technologies." The project featured the latest available state-of-the-practice intelligent transportation systems (ITS) technologies designed to improve both the efficiency and safety of commercial vehicle operations (CVO). The Technology Truck was designed to inform and educate the motor carrier community and other stakeholders regarding ITS technologies, thus gaining support and buy-in for participation in the ITS program. The primary objective of the project was to demonstrate new and emerging ITS/CVO technologies and programs, showing their impact on motor carrier safety and productivity. In order to meet the objectives of the Technology Truck project, the FHWA/FMCSA formed public/private partnerships with industry and with Oak Ridge National Laboratory to demonstrate and display available ITS/CVO technologies in a cooperative effort. The mobile demonstration unit was showcased at national and regional conferences, symposiums, universities, truck shows and other venues, in an effort to reach as many potential users and decision makers as possible. By the end of the touring phase, the ITS/CVO Technology Truck had been demonstrated in 38 states, 4 Canadian provinces, 88 cities, and 114 events; been toured by 18,099 people; and traveled 115,233 miles. The market penetration for the Technology Truck exceeded 4,000,000, and the website received more than 25,000 hits. In addition to the Truck's visits, the portable ITS/CVO kiosk was demonstrated at 31 events in 23 cites in 15 states.

Keywords: intelligent transportation systems, commercial vehicle operations, technology truck

1. INTRODUCTION

The Federal Motor Carrier Safety Administration (FMCSA) was established within the Department of Transportation (DOT) on January 1, 2000, pursuant to the Motor Carrier Safety Improvement Act of 1999 [Public Law No. 106-159, 113 Stat. 1748 (December 9, 1999)]. Formerly a part of the Federal Highway Administration (FHWA), the FMCSA's primary mission is to prevent commercial motor vehicle-related fatalities and injuries. Administration activities contribute to ensuring safety in motor carrier operations through strong enforcement of safety regulations, targeting of high-risk carriers and commercial motor vehicle drivers; improving safety information systems and commercial motor vehicle technologies; strengthening commercial motor vehicle equipment and operating standards; and increasing safety awareness. To accomplish these activities, the FMCSA works with federal, state, and local enforcement agencies, the motor carrier industry, labor safety interest groups, and others. [1]

The Technology Truck project team strived to support the FMCSA mission by developing and deploying a mobile exhibit consisting of a tractor and a 48-foot trailer with expandable sides (Fig. 1). Serving as a classroom and briefing facility on wheels — equipped with classroom presentations, interactive kiosks, hands-on demonstrations, and a cab simulator — this mobile unit provided a user-friendly environment featuring the latest available state-of-the-practice intelligent transportation systems (ITS) technologies designed to improve both the efficiency and safety of commercial vehicle operations (CVO).

Fig. 1. A side view of the Technology Truck.

2. OUTREACH

The Technology Truck's major outreach components included a multimedia classroom, a graphic demonstration wall, kiosks, a cab simulator, hands-on demonstrations, and a website. Some of the technologies that were mounted on the cab simulator were also operational on the tractor and trailer and were used in real-life situations.

2.1. COMPONENTS

2.1.1. Multimedia Classroom

The Technology Truck featured a multimedia classroom, which was equipped with a projection system supported by a computer and VCR and had seating for 20 participants (Fig. 2). The classroom also featured soundproof walls so that briefings could be held simultaneously with hands-on workshops, thereby maximizing the use of space and time.

Fig. 2. Multimedia classroom.

2.1.2. Graphic Demonstration Wall

The graphic demonstration wall (Fig. 3) was used to explain the major components of a central program area of the ITS/CVO Program. The graphic wall provided, in a pictorial format, the visual explanation for the roadside safety enforcement activity called "electronic screening and bypass." The wall also provided a visual depiction of the electronic credentialing process. Both of these activities have high benefit and value to state regulatory and enforcement agencies, as well as direct benefits to carriers applying for credentials or bypassing weighstations or ports of entry.

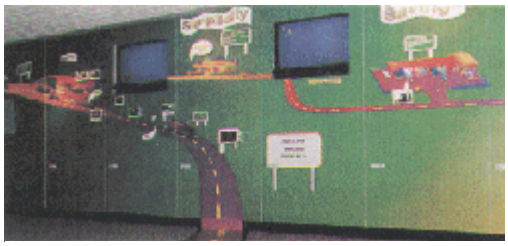

Fig. 3. Graphic demonstration wall.

2.1.3. Kiosks

In addition to the kiosks located inside the Technology Truck, a portable multimedia kiosk (Fig. 4) containing information on products, services and programs, and workshops appropriate for specific audiences was available for expositions, conferences, or other meetings where the trailer could not be scheduled. The weight of the kiosk is approximately 350 lb, and its dimensions are width, 24 in.; depth 31 in.; and height, 49 in. The mobile kiosk appeared at 31 events in 23 cities in 15 states.

Fig. 4. Portable kiosk.

2.1.4. Cab Simulator

The cab simulator (Fig. 5) offered participants, especially end users, the opportunity to see in-cab ITS technologies in a real-world environment. The cab featured two seats, a steering wheel, a dash, and a windshield that was capable of changing to three scenes representing driving down the road, leaving the terminal, and coming up on a weigh station. Technologies in the simulator included communication devices, on-board computers, collision avoidance systems, a transponder for weighstation bypass, a road-surface-temperature sensor, intelligent mirrors, ergonomic anti-fatigue seats, and other instruments.

Fig. 5. Cab simulator.

2.1.5. Hands-on Demonstrations

Fig. 6. Hands-on demonstrations.

The hands-on demonstration areas gave the participants the opportunity to interact with technologies firsthand and observe their capabilities. The hands-on demonstration area was divided into two sections, the computer area and the tabletop areas. The computer area included two computers with interactive software featuring logistics, weather, routing and mileage, tracking, communications, vehicle diagnostics, compliance, fleet management, public safety software for roadside enforcement activities, and other software. The tabletop areas included on-board driver- and systems-monitoring computers, automatic ice chains, on-board scales, automatic tire pressure monitoring and inflation systems, a hazardous materials spill containment kit, obstacle detection systems, brake monitoring systems, and other demonstration equipment. (Fig. 6)

2.1.6. Website

The Technology Truck website was developed and maintained to provide information about the project and the Truck's schedule. At the time of this report, the site is still operational and provides information in eight different areas that are accessible from the homepage:

- Tech Truck Inside and Out – Physical description, pictures, dimensions, and link to host guidelines.
- Project Briefing – Background, project information, and tour information with links to the current schedule and visit request form.
- News Room – Links to press releases, current media advisory, brochure, and host guidelines.
- Portable Kiosk – Information regarding the stand-alone, portable kiosk used during the duration of the project, with links for requesting the kiosk.
- Tour Schedule – Current schedule for the Technology Truck.
- Partners – Brief description of products showcased on-board the Technology Truck, links to partner websites, information on becoming a partner, and the partner synopsis.
- Request a Visit – Event/visit requirements, information, and links for requesting a demonstration of the Technology Truck.
- Tell Us What You Think – Electronic form for providing feedback on visits to the Technology Truck.

The website has received over 25,000 hits since March 1998. The URL for the website is www.ornl.gov/dp111 (Fig. 7).

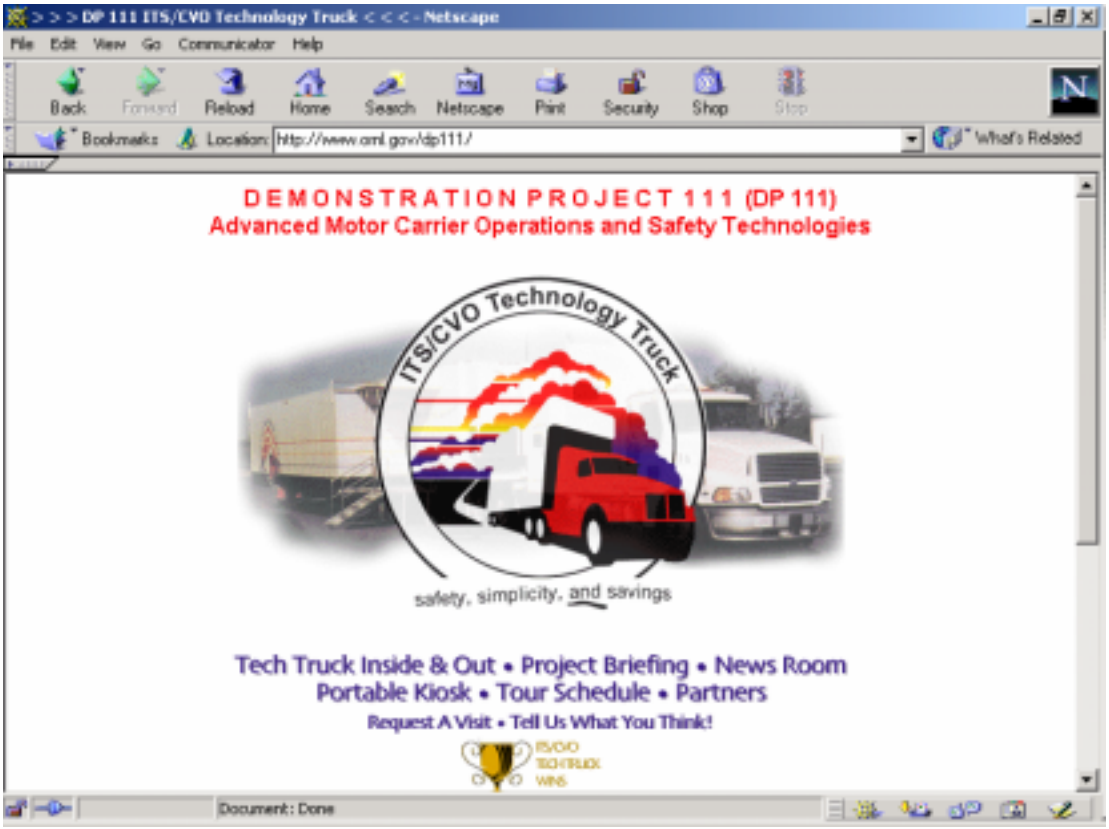

Fig. 7. View of the Technology Truck website homepage.

2.2. PARTNERS AND CONTRIBUTORS

2.2.1. Private Industry Partners

To achieve the goals of the Technology Truck, 86 private industry partners participated in the project by supplying state-of-the-practice technology for hands-on demonstrations and operations use, supplying graphics depicting the uses for ITS, and/or serving as resources for information on ITS/CVO technologies. The partners that were active at the end of the December 2000 tour are listed as follows.

@Track Communications, Inc.
Air-Weigh
ALK Associates, Inc.
American Mobile
Applied Arts Limited
ARCM Corporation
Armatron International/Echovision
Arsenault Associates
Atkins Technical, Inc.
BGI International
Brak Chek, Ltd.
Breg International
Cadec Corporation
CAPS Logistics, Inc., A Baan Company
CIE-TECH, Inc.
Clarion Sales Corporation
Collision Avoidance Systems, Inc.
Commercial Vehicle Systems, Inc.
Compcare Services
Control Module, Inc.
Cycloid Company
DAT Services

Data Entry Systems
Descartes Systems Group
Diversified Software Industries, Inc.
Eaton Corporation, Truck Components Operations
Eaton Corporation, Trucking Information Services
Engineering Animation, Inc. — The SENSE8 Product Line
Fleet Maintenance Technologies, Inc.
Fujitsu PC Corporation
Gates Are Everywhere
General Electrodynamics Corp.
Gooch Brake and Equipment Co.
Goodyear Tire and Rubber Company
HELP, Inc.
Hicklin Engineering
Highway Technologies, Inc.
Hunter Engineering
Infinity Systems, Inc.
Insta-Chain, Inc.
Interactive Solutions, Inc.
Intercomp Co.
Intermec Technologies Corporation — Amtech Systems Division
International Road Dynamics, Inc.
J. J. Keller & Associates, Inc.
JB Research, Inc.
JESS Safety Systems, Inc.
Kinetic Computer Corporation
Kleinschmidt, Inc.
Link Manufacturing, Ltd.
Loadometer Corporation
McLeod Software
Meritor Heavy Vehicle Systems, LLC.
Mettler-Toledo, Inc.
Michelin North America, Inc.
MSI (Measurement Specialties, Inc.)
Mystic Moment Software
National Seating
NORPASS, Inc.
ONSPOT of North America, Inc.
ORBCOMM
Orchid Systems, Inc.
Perceptics Corporation
Pressure Systems International
Prophesy Transportation Software, Inc.
QUALCOMM, Inc.
Racal NCS, Inc.
RADIX Corporation
Raytheon HTMS
Right Weigh, Inc.
RS Information Systems, Inc.
Ryder Transportation Services
Safety Check Systems, Inc.
Security Chain Company
Sprague Controls, Inc.
STC Technologies
Surface Systems, Inc. (SSI)
Synergistic Systems, Inc.
The Market Place, Inc.
Tripmaster Corporation
Ultra-View Systems, Inc.
USSC GROUP, INC.
Vulcan On-Board Scales
Weigh-Right, Inc.
WHEEL-CHECK SAFETY INC.
XATA Corporation

2.2.2. Other Contributors

Several contributors supported the Technology Truck from the conception of the idea to the design and operation of the Truck. These contributors included a concept working group, a concept development team, an operation team, and a driving team.

Concept Working Group

Dave Barry, National Private Truck Council
Rita Bontz, Independent Truckers and Drivers Association
Gary Capps, Oak Ridge National Laboratory
Zeborah English, Federal Motor Carrier Association, Office of Research and Technology
David Helman, Federal Highway Administration, Office of Travel Management
Richard Henderson, Commercial Vehicle Safety Alliance
Joel Hiatt, ITS/CVO Regional Representative
Farell Krall, NaviStar

Norm Littler, American Bus Association
Richard Pappi, RUAN
Dan Stock, American Trucking Associations
Jeff VanNess, Federal Highway Administration, Eastern Resource Center

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Trailer Technologies, Inc.

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Technology Truck Driving Team

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John Catron
Kenneth Maxfield
J. J. Mehall
Joseph Monson
William Seiber
Wilber Thomas, Team Leader

2.3. TECHNOLOGIES

The technologies featured in the Technology Truck emphasized safety, simplicity, and savings. Many of the devices, such as collision avoidance systems and intelligent mirrors, assist a driver with awareness and decision making while traveling on the roadways with other vehicles, making the roadways safer for passenger travel. Other technologies, such as transponders, allow compliant commercial vehicles equipped with weigh-station-bypass technology to bypass weigh stations, thereby making the roadways safer by preventing backups onto the main roadways and making transport more efficient by reducing wasted fuel while vehicles wait at weighstations for clearance. Devices such as the on-board computers, computerized fleet management systems, and communication devices simplify paperwork and provide the motor carriers and enforcement agencies with information, thus producing cost savings in addition to providing increased efficiency. The following technologies were represented in the Technology Truck project.

- Series 5000 Mobile Communications, TrackWare, MileMaster, EngineMaster, Rolling ETA, and Platinum Service
- On-Board Electronic Scales and WireLink On-Board Electronic Multiplexing Systems
- PC*MILER, PC*MILER/Streets, and PC*FUELTAX — Routing, Mileage, and Fuel Tax Software
- AMSC Multi-Mode Mobile Communications Service and AMSC Satellite Dispatch Voice Service
- Truckin' Buddy II and Fuel Tax Buddy Software
- Lanescan Automatic Remote Control Right Side Mirror
- Obstacle Detection System
- DOSSIER'32 Fleet Maintenance Management Software
- PM Minder Preventative Maintenance and Truck Information Monitor
- TMS-2000 Traffic Management Software and SmartDock Dock Scheduling Software
- EZ Chek Air Brake Adjustment Indicator and Brake Mate Brake and Clutch Applier
- Spill Containment Products
- 4000ST and 4000Plus Fleet Management Systems
- RoutePro Dispatcher, RoutePro Designer, TransPro, RoutePro Residential, and BidPro
- Load X-PERT Axle Load Calculation Software
- Rear-Vision and Right-Side Cameras and Monitors
- Blindsight Collision Avoidance System
- “Sweet Spot” Aspherical Convex Mirror
- Fleet Management Software
- Electronic Seal/Pad Lock
- CYCLOID ACS Self-Contained Air Compressor System
- Load Posting Service That Links Terminals to Satellites, Databases, Drivers, etc.
- MiniWriter Electronic Clipboard
- RIMMS Scheduling and Routing Support and Software
- In-Vehicle Information Systems
- Eaton Vorad Collision Warning System and Eaton Fuller Autoshift Advanced Automated Transmission
- Eaton Fleetadvisor On-Board Computer
- Software Development Tools — Truck DriVR and Drunk Driver — 3D Driver Evaluation Systems
- Brake-Sentry Dual-Function Brake Stroke Indicator and Chamber Seal
- Pen Tablet Computers
- RF Access Control and Data Collection Software
- Portable Weigh Scales
- Vehicle Inspection Trailer and Air System Response Analyzer
- Tire Optimization Software
- PrePass Electronic Clearance System
- Roller Brake Dynamometer
- WIZARD Work Zone Information and Alert Radio
- Computerized Brake Tester/Sideslip Tester
- LOGMATE Software for Truck Driver Logbook Auditing and Reporting Program
- Automatic Deploying Ice Chains
- iCommunicator Mobile Communications for the Hearing Impaired
- Wheel Load Scales and Axle Scales

- Intellitag Reader, Transponder, RF Antenna
- Weigh-In-Motion Technology
- DOT Safety and DOT HazMat Compliance Software
- TACT Tactile Alert Communication Technology Drowsiness Deterrent and In-Seat Driver Vibrotactile Touch Communication and ComfortAlert In-Seat Vibrotactile Massage and Heat
- JESS — Judge Early Safety System Monitor for Wheels and Brakes
- eTRUCK Internet-based, E-logistics Wireless Application Service
- EDI Network Services
- Ride Command Air Suspension System
- Haenni Low-Profile Wheel Load Weighers and Low-Speed Weigh-in-Motion Systems
- Comprehensive Transportation Software Design and Installation
- ZF-Meritor SureShift Transmission, RHP 11 Trailer Suspension, and Meritor-Wabco Anti-Lock Brake Systems
- Static Truck Scales
- Tires and Tire Software
- Shockwriter 3000 Shock and Temperature Recorder
- The Truckers Helper Software
- Ergonomic Truck Seats
- NORPASS — North American Preclearance and Safety System
- NSPOT Automatic Tire Chain System
- Global Satellite Data and Messaging Services
- Web Shaper Internet Access and Translation for Mobile Users
- License Plate Reader and Automatic Container Code Reader
- Automatic Tire Inflation System
- Prophesy Mileage and Routing System Software
- Advanced Mobile Communications Solutions
- TRACS TDMS — Radio-Based Tracking and Data Transfer System and TRACS SAT-C — Satellite-Based Tracking and Data
- Transfer System
- Portable Computing Devices
- DSRC Transponders and Communications Equipment
- Air Load Scale
- Electronic Credentialing System
- The Compliance Counselor — Software for DOT Compliance Self-Audits
- Safety Check Air Brake Adjustment Gauge
- Winter Traction Products
- RoadWatch Road Temperature Warning System
- On-Site Alcohol Detection
- Road/Runway Weather Information Systems
- Dispatch and Dock Operations Software
- DAS 2000 Computerized Infrared Detection System for Monitoring Lane Travel and Driver Fatigue
- Tripmaster On-Board Trip Recorder
- Automatic Mirror Tracking System
- On-Board Scales
- On-Board Truck Scale System and Easy Air Digital-Portable Suspension Meter
- WHEEL-CHECK Loose Wheel Nut Indicator
- On-Board Computers

2.4. EVENTS/MEDIA PENETRATION

2.4.1. Technology Truck Events

At the end of December 2000, the ITS/CVO Technology Truck had been demonstrated in 38 states, 4 Canadian provinces, 88 cities and 114 events; been toured by 18,099 people; and traveled 115,233 miles. Visitors who took the tour participated in an experience that lasted from a minimum of 30 minutes to a maximum of 2 hours, including time for a question-and-answer session and details on benefits of the ITS technologies. As a successful outreach tool, the Technology Truck has been on display for wide and varied audiences, including visitors from Mexico, Canada, Japan, Israel, Germany, Great Britain, the Netherlands, and the United Kingdom, as well as for U. S. government officials such as governors, U. S. and state senators and representatives, private-industry partners, university students, high school students, and members of the press. At the request of many host organizations, in addition to tours and hands-on demonstrations, executive briefings and presentations were given to their VIP audiences, and media briefings were provided for local press representatives.

The Technology Truck began touring on June 2, 1997, with the ribbon-cutting ceremony sponsored by FHWA and subsequent tours in Washington, D.C. Approximately 150 guests and visitors attended the event. A total of 3,727 people visited the Technology Truck at the 22 events in 1997 sponsored by organizations including four enforcement organizations, three state departments of transportation, ITS America, the Commercial Vehicle Safety Alliance (CVSA), and the Institute of Electrical and Electronics Engineers (IEEE). The events and locations for 1997 are listed in Table 1.

Table 1. Technology Truck Events in 1997 and their locations

Date of Event	City	State	Host/Event
6/1–6/1997	Washington	District of Columbia	International Highway Transportation Safety Week
6/2–5/1997	Washington	District of Columbia	ITS America
6/24–27/1997	Albany	New York	New York Department of Transportation
7/8–9/1997	Cincinnati	Ohio	Alliance for CVO
7/17–18/1997	Perryville	Maryland	Independent Truckers & Drivers Association
8/1–3/1997	Panama City	Florida	Louisiana Department of Transportation, Office of Motor Carriers
8/5–7/1997	San Antonio	Texas	Texas Motor Transport Association
8/12–13/1997	Arlington	Texas	Texas Transportation Institute
8/18–23/1997	Minneapolis	Minnesota	Challenge ‘97
8/26–29/1997	McLean	Virginia	Federal Highway Administration
9/9–11/1997	Portsmouth	New Hampshire	OMC Region 1
9/18/1997	Kansas City	Missouri	Center for Transportation Research and Education
9/24–25/1997	Woodburn	Oregon	Oregon Department of Transportation
9/26–27/1997	Sunriver	Oregon	Oregon Trucking Association
9/29–10/1/1997	Denver	Colorado	CVSA (annual meeting)
10/8/1997	Columbus	Ohio	Ohio State Highway Patrol
10/9–10/1997	Columbus	Ohio	ITS Ohio Annual Meeting
10/15–16/1997	Grand Rapids	Minnesota	Michigan State Police
10/21–23/1997	Atlanta	Georgia	North American Warehousing & Distribution Conference and Exposition
10/27–29/1997	Knoxville	Tennessee	International Large Truck Safety Symposium

11/9–12/1997	Boston	Massachusetts	IEEE Conference on ITS
12/3–5/1997	Absecon	New Jersey	Police Leadership Conference

In 1998, host organizations for the Technology Truck included an event sponsored by the Society of Automotive Engineers, the Canadian version of the American Association of Motor Vehicle Administrators (AAMVA), a visit with the Mexican trucking officials on the U.S./Mexico border, two universities and institutes, five state departments of transportation, and 14 trucking associations. A total of 5,419 visitors toured the Technology Truck at 35 events during the 1998 touring season. Event details are shown are in Table 2.

Table 2. Technology Truck events in 1998 and their locations

Date of Event	City	State	Host/Event
2/2–3/1998	Sacramento	California	United Motorcoach Association
2/5–6/1998	Sacramento	California	California State University
2/10–11/1998	San Bernardino	California	CALTRANS
2/17–19/1998	San Diego	California	Regional Transportation Technology Alliance of San Diego
2/23–27/1998	Phoenix	Arizona	Arizona DOT
3/4–6/1998	Albuquerque	New Mexico	NM DOT
3/11–12/1998	Arlington	Texas	Office of Motor Carriers (OMC) Region 6 Bus Summit
3/16–17/1998	Louisville	Kentucky	Mercer Transportation
3/19–21/1998	Louisville	Kentucky	Mid-America Trucking Show
4/1–2/1998	Linthicum Heights	Maryland	Maryland ITS Chapter
4/8–9/1998	Topeka	Kansas	Kansas Department of Transportation
4/13–14/1998	Indianapolis	Indiana	Indiana Dept. of Revenue, Motor Carrier Services
4/17–18/1998	Augusta	Maine	Maine Motor Transport Association
4/22–24/1998	McLean	Virginia	FHWA/OMC-Office of Technology Applications (OTA)
4/28–30/1998	Seven Springs	Pennsylvania	PA Traffic Institute for Police Services
5/4–7/1998	Monroe	Michigan	ITS America Annual Meeting (Michigan ITS Chapter)
5/11–12/1998	Detroit	Michigan	Michigan Intelligent Transportation Center
5/15–16/1998	Hershey	Pennsylvania	PA Motor Truck Association
5/20–22/1998	Coeur d'Alene	Idaho	Washington Trucking Association Northwest Movers (Annual Convention)
5/27–28/1998	Lakewood	Washington	FHWA-OMC-Region 10
5/31–6/2/1998	Victoria, British Columbia	Canada	Canadian Council of Motor Transport Administrators
6/15–17/1998	Phoenix	Arizona	Design Build Manufacturers Association
7/27–28/1998	Orlando	Florida	Florida Safety & Health Conference

8/18–19/1998	St. Paul	Minnesota	Minnesota Department of Transportation—Michigan Department of Transportation
8/23–25/1998	Billings	Montana	Montana Motor Carriers Association
8/27–28/1998	Sun Valley	Idaho	Idaho Motor Transport Association (Annual Convention)
8/31–9/1/1998	Lexington	Kentucky	Southern Association of State Highway Transport Officials
9/10–12/1998	Rapid City	South Dakota	South Dakota Trucking Assoc.
9/17–18/1998	Mt. Vernon	Illinois	1998 Trucker's Friend Tour
9/22–24/1998	Topeka	Kansas	Kansas Motor Carriers Association
10/2–3/1998	Ft. Wayne	Indiana	Tri State Truck Show
10/13–14/1998	Morton's Gap	Kentucky	1998 Trucker's Friend Show
10/25–27/1998	Nashville	Tennessee	Food Distributors International
11/16–18/1998	Indianapolis	Indiana	SAE Truck & Bus Meeting
12/9–10/1998	Baltimore	Maryland	Maryland Department of Transportation

Host organizations for 1999 included a national museum, a major legal association, AAMVA, four state departments of transportation, three major Canadian carrier organizations, two port authority offices, a second border briefing with Mexican government and carrier officials, and the Alaska Department of Transportation. There were 5,389 visitors who toured the Technology Truck at the 32 events, conventions, meetings, and expositions during the 1999 touring schedule. Those events are listed in Table 3.

Table 3. Technology Truck events in 1999 and their locations

Date of Event	City	State	Host/Event
2/6–8/1999	San Diego	California	United Fresh Fruit & Vegetable Association
2/12–13/1999	Las Cruces	New Mexico	New Mexico Department of Transportation and Federal Highway Administration
2/15–17/1999	Rio Rico	Arizona	Arizona Department of Transportation
2/21–24/1999	Baton Rouge	Louisiana	Louisiana Department of Transportation & Development
3/18–19/1999	Louisville	Kentucky	Transport America
3/22–23/1999	Louisville	Kentucky	Mercer Transportation
3/25–27/1999	Louisville	Kentucky	Overdrive Magazine – Mid-America Trucking Show
3/28–29/1999	Louisville	Kentucky	American Association of Motor Vehicle Administrators
4/6–7/1999	Edmonton, Alberta	Canada	Petroleum Services Association of Canada
4/14–16/1999	Las Vegas	Nevada	Association of Publicly Funded Truck Driving Schools
4/27–28/1999	Coral Gables	Florida	American Law Firm Association

5/3–4/1999	Long Beach	California	National Private Truck Council Management Conference
5/6–7/1999	St. George	Utah	Utah Motor Transport Association
5/21–22/1999	Carrollton	Georgia	Georgia Motor Trucking Association
5/24–25/1999	Columbia	South Carolina	Federal Highway Administration, Office of Motor Carriers
5/27–6/1/1999	Oak Ridge	Tennessee	ORNL Transportation Technology and Demonstration Development Team
6/5–6/1999	Kitchener, Ontario	Canada	Truckfest '99
6/11–12/1999	Moncton, New Brunswick	Canada	Atlantic Provinces Trucking Association Truck Show
6/16–17/1999	Concord	New Hampshire	New Hampshire Department of Transportation
7/8–9/1999	Tarrytown	New York	ITS New York
7/19–21/1999	Orlando	Florida	Florida Safety & Health Conference
7/23–24/1999	Tallahassee	Florida	Florida A&M University
7/26–28/1999	East Liberty	Ohio	ITS America and Transportation Research Center
8/16–19/1999	Fairbanks	Alaska	Alaska Department of Transportation
8/23–26/1999	Anchorage	Alaska	Alaska Department of Transportation
9/21–23/1999	Oak Ridge	Tennessee	American Museum of Science and Energy
9/26–28/1999	Nashville	Tennessee	Oil Price Information Service Fleet Fueling and Technology Expo
10/7–8/1999	Omaha	Nebraska	Nebraska Motor Carrier Association
10/11/99	Houston	Texas	American Trucking Associations Safety Management Council
10/21/1999	Jacksonville	Florida	Landstar System, Inc.
11/8/1999	Newark	New Jersey	Port Authority of NY & NJ
11/11/1999	Bordentown	New Jersey	Bordentown Junction Truckstop/Petro
11/15/1999	Staten Island	New York	Port Authority of New York & New Jersey

The final touring season for the Technology Truck began at an event sponsored by a motor coach association in Orlando, Florida, on January 14, 2000. Host organizations for the touring season included nine trucking associations; one state department of transportation; two trucking companies; and eight institutes, colleges, and universities. In 2000, a total of 3,564 visitors toured the Technology Truck at 24 events. Those events and locations are listed in Table 4.

Table 4. Technology Truck in 2000 and their locations

Date of Event	City	State	Host/Event
1/14–15/2000	Orlando	Florida	Motorcoach Expo 2000
2/3–5/2000	Nashville	Tennessee	National Association of Truck Stop Operators
2/17–19/2000	Springfield	Illinois	Mid-West Truckers Association
2/25–27/2000	Mercedes	Texas	South Texas International Truck Expo
3/1–2/2000	Tallahassee	Florida	Florida A&M University
3/16–18/2000	Scottsburg	Indiana	Transport America
3/23–25/2000	Louisville	Kentucky	Overdrive Online – Mid-America Trucking Show
4/3–4/2000	Lexington	Kentucky	Federal Motor Carrier Safety Administration
4/6–7/2000	Atlanta	Georgia	National Summer Transportation Institute
4/18–20/2000	Los Angeles	California	2000 Tech Expo
4/25–27/2000	Seven Springs	Pennsylvania	Pennsylvania Traffic Institute for Police Services
5/9–11/2000	Edmonton, Alberta	Canada	Alberta Fleet Maintenance Supervisors Association
5/17–19/2000	Casper	Wyoming	Wyoming Trucking Association
5/25–26/2000	Mountville	Pennsylvania	Transport International Pool, Inc.
6/10–11/2000	Pomona	California	AbilityFirst Trucking Expo
6/15–16/2000	Tacoma	Washington	Bates Technical College
6/23–24/2000	Eau Claire	Wisconsin	Chippewa Valley Technical College
6/29–30/2000	Orangeburg	South Carolina	South Carolina State University National Summer Transportation Institute
7/20–25/2000	Fredericton, New Brunswick	Canada	American Association of Motor Vehicle Administrators
8/28–30/2000	Madison	Wisconsin	North American Travel Monitoring Exhibition and Conference
9/26–27/2000	College Station	Texas	Texas Association of Accident Reconstruction Specialists
10/22–25/2000	Minneapolis	Minnesota	Food Distributors International
10/30–31/2000	Charleston	West Virginia	West Virginia University
12/6–8/2000	State College	Pennsylvania	Pennsylvania Department of Transportation, Penn State, and Federal Highway Administration

During the time the Technology Truck was touring the country, many host organizations requested repeat visits because of previous successful events. Repeat visits to host organizations that coincided with time, budget, and the schedule restrictions included the American Association of Motor

Vehicle Administrators, Arizona Department of Transportation, FHWA Office of Motor Carriers, Florida A&M University, Florida Safety & Health Conference, Food Distributors International, Mercer Transportation, Mid-America Trucking Show (under sponsorship of Overdrive Magazine), New Mexico Department of Transportation, Transport America, and the United Motorcoach Association. The visits to these host organizations accounted for approximately 23% of the total visitor count to the Technology Truck from June 1997 through December 2000.

2.4.2. Portable ITS/CVO Kiosk Events

The portable ITS/CVO kiosk appeared at 31 events in 23 cities in 15 states, (Table 5).

Table 5. Events at which the ITS/CVO kiosk appeared and their locations

Delivery Date	Pick-up Date	City	State	Event
10/19/1998	10/22/1998	Toledo	Ohio	Transportation Summit
11/5/1998	11/7/1998	Norwich	Connecticut	Northeast Traffic Safety Education Association (NETSEA)
11/16/1998	11/17/1998	Fairfax	Virginia	Technology Fair
12/7/1998	12/7/1998	Warrendale	Pennsylvania	Intelligent Vehicles Day
12/8/1998	12/11/1998	University Park	Pennsylvania	Pennsylvania Transportation Engineering & Safety Conference
1/6/1999	1/8/1999	Linthicum Heights	Maryland	Crossroads 99
1/10/1999	1/14/1999	Washington	District of Columbia	TRB Annual Meeting
2/6/1999	2/7/1999	Minneapolis	Minnesota	Government on Display Expo
2/11/1999	2/16/1999	San Francisco	California	ATA Meeting
2/15/1999	2/19/1999	McAllen	Texas	South Texas Intl Truck Expo
2/24/1999	2/24/1999	Arlington	Virginia	Learning Center Open House
2/25/1999	2/27/1999	Coronado	California	Parents Against Tired Truckers
3/22/1999	3/26/1999	Washington	District of Columbia	Safety Integration Conference
3/23/1999	3/28/1999	Louisville	Kentucky	Mid America Trucking Show
4/6/1999	4/9/1999	Washington	District of Columbia	National Association for Equal Opportunity in Higher Education Conference
4/13/1999	4/16/1999	Lancaster	Pennsylvania	ATA Eastern Region Meeting
4/22/1999	4/26/1999	Columbia	South Carolina	SC Truck Association
5/5/1999	5/7/1999	Fargo	North Dakota	ND Motor Carriers Association Meeting
5/5/1999	5/6/1999	Perryville	Maryland	Industry Day
6/1/1999	6/1/1999	Washington	District of Columbia	International Highway Safety Week
6/8/1999	6/11/1999	Sheridan	Wyoming	Wyoming Trucking Association Meeting
8/21/1999	8/25/1999	Charleston	South Carolina	Southeastern Association of State and Highway Transportation Officials (SASHTO)
8/31/1999	9/2/1999	Nashville	Tennessee	National Transportation Safety Board (NTSB) Public Hearing
9/9/1999	9/11/1999	Dallas	Texas	Great American Truck Show
9/19/1999	9/21/1999	Columbus	Georgia	ITS Georgia
10/5/1999	10/8/1999	Breinigsville	Pennsylvania	National Association of Traffic Accident Reconstructionists
1/9/2000	1/13/2000	Washington	District of Columbia	Transportation Research Board (TRB)

1/31/2000	2/3/2000	Minneapolis	Minnesota	Minnesota DOT Transportation Conference
4/5/2000	4/7/2000	Columbus	Ohio	Ohio Trucking Association
1/7/2001	1/11/2001	Washington	District of Columbia	TRB Annual Meeting
1/11/2002	1/16/2002	Washington	District of Columbia	TRB Annual Meeting

2.4.3. Media Penetration for Technology Truck

A media advisory was issued for each demonstration event of the Technology Truck. The media advisory gave the name, date, and location of the event; the name of the host and the hours the Technology Truck would be open each day; and the media team contact for media briefings and interviews. This media advisory was sent to FHWA and FMCSA offices as well as local media outlets. Many newspaper and television stations visited the Technology Truck, published articles, took pictures, and broadcast information on the successful outreach efforts of the DOT through the Technology Truck's state-of-the-practice technologies for commercial vehicles.

Additionally, several ITS-related magazines published featured articles on the Technology Truck highlighting the usefulness of the Truck as a DOT outreach tool and the awards given because of its outreach capabilities. Table 6 gives a sampling of the market penetration gained from the media coverage of the Technology Truck (sorted by state).

Table 6. News media coverage of the Technology Truck

Host Organization	Media Outlet	Media Type	City	State	Date of Story	Market Penetration
Alaska Dept. of Transportation	Fairbanks Daily News-Miner	Newspaper	Fairbanks	AK	August 15, 1999	16,205
Commercial Vehicle Safety Alliance (CVSA) Annual Meeting	Overdrive Online	Magazine	Tuscaloosa	AL	October 1997	141,969
n/a	Overdrive Online	Magazine	Tuscaloosa	AL	December 1997	141,969
Arizona Dept. of Transportation	Green Valley News & Sun	Newspaper	Green Valley	AZ	February 26, 1999	11,500
Design Build Manufacturers Association	KNXV-TV (ABC)	Television	Phoenix	AZ	June 15, 1998	794,223
Arizona Dept. of Transportation	KPNX-TV (NBC)	Television	Phoenix	AZ	February 24, 1998	794,223
CALTRANS	The Sun	Newspaper	San Bernardino	CA	February 17, 1998	77,366
Alberta Fleet Maintenance Supervisor's Association	Edmonton Journal	Newspaper	Edmonton, Alberta	Canada	May 19, 2000	143,196
Petroleum Services Association of Canada	Edmonton Journal	Newspaper	Edmonton, Alberta	Canada	April 7, 1999	143,196
Petroleum Services Association of Canada	Edmonton Sun	Newspaper	Edmonton, Alberta	Canada	April 7, 1999	74,367
American Association of Motor Vehicle Administrators (AAMVA)	Daily Gleaner	Newspaper	Fredericton, New Brunswick	Canada	July 22, 2000	28,172
AAMVA	Telegraph Journal	Newspaper	Saint John, New Brunswick	Canada	July 22, 2000	49,436
Georgia Motor Trucking	Times-Georgian	Newspaper	Carrollton	GA	May 23, 1999	10,040
1998 Trucker's Friend Tour	Register-News	Newspaper	Mt. Vernon	IL	September 19-20, 1998	10,688
Tri-State Truck Show	Journal Gazette	Newspaper	Fort Wayne	IN	October 3, 1998	61,833
Tri-State Truck Show	News-Sentinel	Newspaper	Fort Wayne	IN	September 28, 1998	46,495
Kansas Dept. of Transportation	Topeka Capital-Journal	Newspaper	Topeka	KS	April 9, 1998	59,559
Southern Association of State Highway Transport Officials	WTVQ News Channel 36 (ABC)	Television	Lexington	KY	August 31, 1998	204,165
Overdrive Online	Louisville Courier Journal	Newspaper	Louisville	KY	March 25, 2000	227,117
1998 Trucker's Friend Tour	The Messenger	Newspaper	Madisonville	KY	October 14, 1998	9,162

Independent Truckers & Drivers Association	Baltimore Business Journal	Newspaper	Baltimore	MD	July 28, 1997	9,139
n/a	ITS World	Magazine	Duluth	MN	January/February 1998	180,000
Montana Motor Carriers Association	KULR-TV 8 (NBC)	Television	Billings	MT	August 24, 1998	133,000
New Mexico Dept. of Transportation	Albuquerque Journal	Newspaper	Albuquerque	NM	March 6, 1998	110,710
New York Dept. of Transportation	WTEN-TV10	Television	Albany	NY	June 1997	65,566
FHWA– Office of Motor Carriers (OMC)	ITS World	Magazine	Eugene	OR	May/June 1997	180,000
American Museum of Science & Energy	WBIR Channel 10	Television	Knoxville	TN	September 21, 1999	187,533
n/a	The Oak Ridger	Newspaper	Oak Ridge	TN	June 7, 2000	10,000
American Museum of Science & Energy	The Oak Ridger	Newspaper	Oak Ridge	TN	September 21, 1999	10,000
Oak Ridge National Laboratory	ORNL Review	Magazine	Oak Ridge	TN	Vol. 32, No. 2, 1999	6,100
Texas Transportation Institute	Arlington Star-Telegram	Newspaper	Arlington	TX	August 13, 1997	225,737
United Fresh Fruit & Vegetable Association	Refrigerated Transporter	Magazine	Houston	TX	April 99	12,022
Utah Motor Transport Association	New Dixie Commentary	Television	St. George	UT	May 1, 1999	38,000
n/a	Private Carrier	Magazine	Alexandria	VA	October 1998 Volume 36, Number 10	11,000
FHWA–OMC	Transport Topics	Newspaper	Alexandria	VA	June 30, 1997	27,725
Society of Automotive Engineers Truck & Bus Meeting	Transport Topics	Newspaper	Alexandria	VA	Week of November 23, 1998	27,725
West Virginia University	WOWK-TV	Television	Charleston	WV	October 30, 2000	57,287
Wyoming Trucking Association	The Wyoming Trucker	Magazine	Casper	WY	Second Quarter – 2000, Volume 48, Number 2	3,800
					Total Market Penetration	4,340,255

2.5. TARGET AUDIENCES

Target audiences for the ITS/CVO Technology Truck have included

- ITS/CVO stakeholders
- ITS/CVO technologists
- State legislators
- FMCSA/FHWA officials
- US DOT employees
- FMCSA/FHWA field staff (state and regional staff members)
- State trucking associations
- State regulatory agencies (e.g., state revenue offices, departments of motor vehicles)
- State police organizations
- Truck and bus drivers
- ITS America state chapters
- Truck manufacturing groups
- Engineering organizations (e.g., IEEE)
- CVO consortium organizations
- University students
- Students in summer transportation program
- Members of the media

3. ACCOMPLISHMENTS

In May 1998, ITS America announced the selection of the ITS/CVO "Technology Truck" project as the winner of the Achievement Award for "Outstanding Achievement in ITS Awareness Campaign by a Public Agency." In May 2000, the Technology Truck received the 2000 ITS America Achievement Award for "Most Innovative ITS Education and Training Program."

The Technology Truck was received so enthusiastically that more than 179 requests were received for visits during its tour. Because of the overwhelming number of requests, 65 requests had to be declined. The demanding schedule provided for downtime only when it was absolutely necessary for maintenance and planned upgrades. Feedback from host organizations indicated that there was enthusiastic interest from participants regarding ITS/CVO technologies that were demonstrated in the Truck. Hosts also felt the mobile platform provided a very effective mode to keep the target audiences up to date on technological advances in the ITS/CVO arena.

The feedback from private industry partners indicates that they felt the Technology Truck was, and could continue to be, a good investment. The visibility of products in the Technology Truck resulted in increased sales for some of the partners, while others reported that their customers increased their knowledge of ITS and the associated technologies after visiting the Truck. Partners believed that because the Technology Truck was mobile and traveled to its target audiences, it gave customers/end-users an opportunity to see new technologies in their own back yards without spending valuable time out of the office and without finding the "hard to come by" funds for traveling to industry trade shows. This meant that end-users/decision makers were able to see technologies in action and make decisions about whether the technologies were suitable for their applications.

4. REPORTS

4.1. OVERVIEW REPORT – DRIVER TEAM MANAGER

Three contracted road team members were required to effectively serve the needs of the Technology Truck. The breakdown of road team members consisted of two qualified driver/facilitators and one facilitator. Three people were needed to safely set up and tear down the Truck. In order to prevent damage to equipment or injuries to members, all road team members were trained in the safe and proper setup and tear-down of the Truck. Training in presenting the technologies to the designated audience was also required. All members were required to be knowledgeable of the technologies that were demonstrated and were required to be proficient in public speaking and presenting themselves in an intelligent and professional manner.

Two drivers were required for the project to stay in compliance with federal, state, and local laws that regulate the number of hours a driver can drive and be on duty, along with many other driver safety requirements, including illness.

All drivers were required to have a class "A" Commercial Driver License (CDL) with medical examination, a clean driving record, proven experience in operating a combination vehicle, and were required to participate in a drug and alcohol screening program.

It was particularly important to have two drivers when the Truck had to cover a long distance where there were time limitations. Time constraints often required two drivers during the touring schedule. A second driver was also needed any time that the first driver was unable to safely perform the duties of a driver because of illness, unforeseen emergency, or many other reasons. Drivers were required to have mechanical knowledge and to be knowledgeable about roadside emergencies in order to take charge of on-the-road maintenance, whether routine or non-routine. The second driver, at times, was needed to go ahead of the Truck to ensure that the planned route and parking locations designated by hosts would accommodate the Technology Truck requirements. This responsibility was also designated

to the non-driver member when necessary. The duty of scouting out the exhibit area before the Truck arrived was extremely important when the vehicle was to be placed inside a convention center or any inside parking arena.

This overview report includes only contracted road team personnel and does not include the activities of the FHWA/FMCSA project team manager, who also traveled with the Truck.

4.2. OVERVIEW REPORT – HOST FEEDBACK

4.2.1. Host Survey Feedback

A host survey was created to gather opinions from former hosts of the ITS/CVO Technology Truck. The survey consisted of a total of ten questions and was sent to a core number of former hosts for each year, with a minimum of five per tour year sent.

Twenty-six former hosts of the ITS/CVO Technology Truck were selected at random and sent the host survey. Responses were received from 14 hosts. Of this number, two hosts could not be located, but replacement hosts were found, providing at least five successful transmissions via facsimile or e-mail for each tour year. Responses were received for each tour year of the ITS/CVO Technology Truck. The responses received were

Tour year	Number of responses received
1997	3
1998	3
1999	5
2000	3

The questions with responses are as follows:

1. *Did the Technology Truck make a significant contribution to your event? (yes/no)*

   Yes = 14 No = 0

2. *Do you feel that the value from having the Technology Truck at your event outweighed the effort and cost of hosting the Truck? (yes/no)*

   Yes = 13 No = 1

3. *Did your agency make any equipment changes (i.e., purchase equipment or software) or implement any policy changes as a result of hosting the Technology Truck? (yes/no/not applicable)*

   Yes = 3 No = 2 N/A = 9

4. *Given the opportunity, would you host another demonstration vehicle? (yes/no)*

   Yes = 12 No = 0
   Comments:
   "No longer working in position to be part of that decision"
   "Maybe, we no longer have this conference by itself."

5. *Was the Technology Truck staff cooperative in planning your event? (yes/no)*

   Yes = 14 No = 0

6. *Was the Technology Truck staff cooperative in accommodating your agency's requests for classes and hours of operation? (yes/no)*

   Yes = 14 No = 0

7. *Would you recommend that the U. S. Department of Transportation continue utilizing this type of educational outreach methodology in the future? (yes/no)*

   Yes = 13 No = 0
   Comments: "Unsure"

8. *Are there any areas that you would suggest be changed for future demonstration vehicles? (yes/no) If yes, what changes would you suggest?*

   Yes = 3 No = 9 No Answer = 2
   Comments:
   "Include driving simulation products. More GSP and ECM stuff."
   "Easing of bureaucratic red tape in reserving the vehicle and receiving confirmation that it is available."
   "Great program!"

9. *Based on feedback from your event participants what is the likelihood they will look into the use of safety technology to support their motor carrier CVO activities? (good/fair/poor)*

   Good = 11 Fair = 3 Poor = 0

10. *Do you have any other comments or suggestions?*
    "The staff both before and during the event was very helpful and cooperative."
    "The Technology Truck is a perfect way to showcase and demonstrate technology that can improve highway safety and promote efficiency within industry."
    "Zeborah English and her staff not only completely accommodated us but also were very knowledgeable on vendor's products."
    "Staff was excellent and very helpful from planning stages, through the event. We are sorry it is being discontinued."
    "The event worked out very well."
    "Great job!!"
    "Visitors found the truck to be interesting. However, due to cost considerations I do not believe many, if any, adopted the safety technology presented."
    "Bring it back to life!"
    "The Tech Truck generated a tremendous interest, so much interest that in 2001 we requested the Tech Truck visit our event but was unavailable. Many of our members were disappointed. Firstly by not seeing the Tech Truck in 1999 because of the volume of people attending that booth in the show and secondly the unit was not available for 2001 as the project was winding down. Such vehicles give insight to the trucking industry's future and educate the public of the technology in trucking."
    "Hope the program is revived to include any new technology!"

4.2.2. Visitor and Host Comment Card Feedback

During the time the Technology Truck was touring, visitor feedback cards were made available on the truck. An electronic feedback form was also available on the DP111 website. A total of 106 responses were received. Twenty of the responses were letters, and the remaining responses were feedback cards from the truck and website. Feedback was requested as to the overall opinion of the truck, facilitation staff, areas visited, whether the visitor would recommend that others visit the truck, and whether the visitor desired to become a partner. All letters were noted to be positive, negative, or positive on some points and negative on others, and are not included in the result percentages. The final feedback card, number 106, pertained only to the website and is not included in the numerical results. It is included in the notes.

The results of the feedback cards with the percentage of overall response are as follows:

Overall Opinion:
- Very informative – 55%
- Informative – 20%
- Not very informative – 3%

Facilitators:
- Very knowledgeable – 57%
- Knowledgeable – 20%
- Not very knowledgeable – 2%

Areas Visited
- Classroom – 49%
- Kiosks – 36%
- Hands-On demos* – 58%
- *cab simulator, hands-on demos, and computer demos

Twenty-seven of the feedback cards contained comments. Fourteen cards had comments complimentary to the Technology Truck and/or the staff. Two response cards indicated the person completing the card did not visit the Technology Truck. No reason was given for one, but the other writer reported making two attempts to visit and the Truck was closed both times. No times for attempted visits were noted. One visitor to the Truck thought the technologies were outdated; he did not like the structured tour and felt more hands-on demos were needed. Eight responses gave negative feedback on one or more members of the facilitation team. One response was regarding a visit to the DP111 Technology Truck website. The gentleman commented that while he is not a trucker, he found the idea of the Technology Truck to be an “exciting idea.”

Of the 20 letters received through the U. S. mail and e-mail, all were positive regarding the success of the mission of the Technology Truck. One letter from a participant who visited the truck included negative comments about a conversation she had with a certain member of the facilitation team, but went on to say the rest of the team were “really neat people.” She closed the letter with thanks “for a super job with the presentation and work done by the Technology Truck.”

4.3. OVERVIEW REPORT – ORNL ADMINISTRATIVE COORDINATOR AND WEBMASTER

4.3.1. Overview

The design and manufacture of an expandable trailer is the beginning process for a mobile demonstration project. While the finishing touches are being applied to the expandable unit, a schedule should be taking form and invitations sought. Initially, letters are sent to prospective hosts outlining the benefits of the project and highlighting how hosting the mobile vehicle will enhance their events or increase productivity among office staff.

There is also a need to determine criteria for evaluating how events will help fulfill the mission of the mobile demonstration vehicle and determining those things required before an event will be considered successful. A determination must be made as to the projected attendance when evaluating events. For example, an event that will promote the project mission but will only have 30 to 40 possible end-users should probably be declined unless it could be a stop when enroute to another location. Driving several days and many miles to such a small event could not be considered utilizing the vehicle for maximum exposure when weighed against the cost to the project.

Another important aspect that should be determined is the minimum and maximum number of days the vehicle will be demonstrated in each location. The amount of time required to set up and tear down the vehicle at each location is an important factor in deciding the customary length for exhibitions. The number of days the vehicle will be exhibited, under usual circumstances, should be not less than 1.5 days nor more than 3 days. Fewer days would not be maximizing the full potential of the mobile demonstration vehicle. However, more than 3 days is generally too much. Ideally, 2 full days at each location will provide technology exposure to the core audience.

Hours of operation should coincide with exhibition times at structured events. When the vehicle is being displayed at a federal or state agency, or other hosting organization, hours of operation should fall within or meet the core working hours of the technology end users. Occasionally a host will request lengthy sessions for particular groups, but most of the time employees feel pressured to absorb as much information in as little time as possible. For that reason, brief technology demonstrations and open-house-type tours give end users the option to see the technology available and spend time in areas of their interest.

When prospective hosts respond, the event is evaluated to determine if it fits within the goals of the project mission. If so, the event is added to a tentative schedule and negotiations begin regarding waiver of fees, cost of electrical hookups, and complimentary admission for the facilitation staff to the exhibit portion of the event. If, after investigation and careful consideration, the event is deemed as being outside the scope of the project, a tactful decline is issued. Events would not be scheduled or declined based on personal preference, but rather consideration is given for fitting the event into the schedule to allow the maximum number of events in the most efficient manner. Careful consideration would also be given to preventing undue stress on the tractor drivers and facilitation staff. To avoid such stressors, events should be scheduled regionally to reduce the travel required of staff and equipment.

Once a firm schedule is in place, confirmation packages outlining the level of project commitments, requirements for setup, and suggestions for a successful presentation are issued. These should be sent at least 2 months prior to the beginning of the event; although in some instances less time is acceptable, as circumstances sometimes require less time between the confirmation and presentation of the mobile demonstration vehicle. Information is gathered from the host through the use of event information forms to assist in planning for setup, type of demonstrations desired, number of visitors to prepare for, and number of staff members to assign to the event. The host organization should provide the name, telephone number, and e-mail address (when available) of a contact person to be used by the logistics coordinator and facilitation staff prior to and during each event. Working with the host contact, a travel route is then developed to maximize safety for the driving team and mobile demonstration vehicle and to minimize wear and tear on the equipment.

After events have been scheduled, the webmaster prepares and publishes a list of the events, dates, and their locations so website visitors will have this information. This information is very useful to individuals who would like to plan a visit to the demonstration vehicle. (An important point to remember is that the website should be checked at least once a week, if not more often, to verify schedule information.) Many people, including hosts, potential hosts, visitors, sponsors, and others rely on this method for receiving current schedule information on the demonstration vehicle. Maintaining the most current schedule information on the website is crucial to the success both of the project and the website.

Before the mobile demonstration vehicle is sent to a location, advance preparation is crucial. The setup location for the vehicle is the first issue to be addressed. Frequent contact with the host organization is necessary to determine the surface type, grade of the setup location, and space required for the expanded vehicle (including an additional 3-foot perimeter for safe ingress/egress), and availability of the setup location. For indoor events, additional consideration must be given to the capability of the building to house a vehicle of this size and weight, how the vehicle will enter the building, and where it will be situated inside the exhibit hall. (A good example is a conference center that is ideal for exhibiting the vehicle and has ample space and the proper arrangements for electrical hookup, but where the host has proposed bringing the vehicle in through a doorway with a steep ramp.) This arrangement presents a problem with overhead clearance and possibly of undercarriage clearance. Additionally, a decision must be made as to whether or not the tractor will be used as part of the exhibit. In instances where the tractor is positioned inside an exhibit hall, careful planning is extremely important to avoid having more than one-eighth or one-quarter tank of fuel on arrival. Otherwise, the truck will have to dump fuel before it enters the exhibit hall. Most building fire codes require special precautions in addition to the fuel levels, such as taping the fuel tank caps. These examples are just a few of the considerations for each event of the vehicle schedule. The requirements for each event will differ, and the team must be able to quickly judge what actions are necessary to avoid problematic setups.

In planning the touring schedule, routine maintenance for the vehicle and equipment must be managed. Basic maintenance on the tractor can often be performed at dealerships during a touring cycle. However, extensive maintenance for all equipment should be handled at one location where the type and quality of work can have oversight by an experienced staff member. This practice will ensure that all equipment is kept in excellent condition to prevent delays and cancellations due to breakdowns. It will also ensure that warranty requirements are fully met, thus preventing liability questions on warranty repairs. Precise records should be kept to further protect the equipment and preserve the warranty.

Once preliminary work is completed and the vehicle has been delivered and set up at an event location, the facilitation staff will be able to concentrate on carrying out the mission of the project through their hands-on presentations and technology overviews. Frequently, when decision makers tour the vehicle, they will return to their region and request that the vehicle be brought to an event or agency for demonstrations. One of the marks of a successful event is to receive more requests than can be fulfilled within the scope of the project. This means that a target audience has experienced the technologies on display and feels the message is important enough to carry to their area.

4.3.2. Lessons Learned

Teaming – Flexibility is one of the key issues to a successful schedule. Each event will have its own set of problems, however minor; and the entire team, from the logistics coordinator to the driver/facilitators, must be able to make minor changes as required with each set of circumstances. Failure to ensure this capability will result in friction among the team and event organizers. It is not possible to have a totally successful demonstration if the event organizers are unhappy with the team to the point that they will not cooperate beyond the absolute minimum required of hosts. This consideration makes picking a driver/facilitation team that can work well together extremely important, since they will be spending most of their working and off-duty time together. The logistics coordinator must also be flexible regarding the team's needs and be available even after official working hours. When problems

arise that require help from "the home front," someone must be available to work with the team and resolve these issues.

Schedule – One important lesson learned is the need to set and publish a final schedule as close to the beginning of the touring season as possible. This allows sufficient time for advance preparation and also gives the host ample opportunity to include the event in pre-event publicity. It also allows time for the host to prepare a guest/invitee list and issue invitations with enough advance notice for guests to plan on including a visit to the exhibit vehicle. While it is not always possible to do so, as many events as practical should be placed on the final schedule early in the touring season.

Events **–** While it is most desirable to schedule events regionally, this is not always possible or practical. Occasionally, events will be desirable and an excellent match to the project mission but are outside a scheduled region. These events would draw a large number of technology end-users and should be given a great deal of consideration although they require additional travel and expense. These events are beneficial to the overall mission of these projects, which is to reach as many end users as possible. This mission goal would justify additional time, effort, and money required to make the mobile demonstration vehicle available for potential end-users' benefit.

While exhibiting the vehicle, it is extremely important that facilitators focus on brief hands-on technology demonstrations during structured tours, omitting personal experiences and highlighting those aspects that fit within the mission of the project. Most visitors will not have unlimited time to spend touring the vehicle and want to focus on areas of their interest. If too much time is consumed at any one area during a structured tour, the visitor tends to lose interest and will possibly leave without seeing some areas of interest. For that reason, it is recommended that unless a host organization requests lengthy, structured tours, the facilitation team focus on brief overviews and allows time for visitors to come and go at their leisure to see the various technologies being displayed.

Routing – With ever-changing roadways, construction, weather, and many other considerations to take into account, many tools are required to develop an efficient route plan. A trucker's atlas and interstate guides such as a truck stop guide or a trucker's exit guide are necessary in addition to electronic routing programs. The electronic routing programs will plan for a cost-effective trip, but additional investigation is required to avoid low overpass problems, areas where trucks are forbidden to travel, municipal congestion, and other problems that would slow the travel time or endanger the driving team or equipment. Depending strictly on electronic means for planning would not necessarily result in the most efficient route.

4.4. OVERVIEW REPORT – ORNL EDUCATION COORDINATOR AND TECHNOLOGY VENDOR LIAISON

4.4.1. Education

The foundation for the education modules development for the ITS/CVO Technology Truck was based on ITS technologies and programs that pertain to motor carrier safety and productivity. Safety and productivity were the primary emphases for the public sector and the trucking industry modules. Each module was adaptable, dependent on the target audience and the time available for presentation. Instructional methodologies answered the following participant questions: what is the technology, why should I consider using this technology, how do I use it, how does it work, and how can I become a user of the technology? More specific tasks performed in developing the modules are listed below:

Data Analyses/Collection

Data were collected by researching technical and/or administrative documents, interviewing and surveying subject matter experts identified by the Technical Working Group (TWG), and contacting

private industry partners. After the data were collected, they were analyzed to determine their relevance to the multimedia segments and/or instructional material.

Modules Design

After data from technical and/or administrative documents, subject matter experts, and private industry partners were analyzed, the main objectives (knowledge that the participants should walk away with) and the enabling objectives (steps to achieve the main objectives) were identified and designed to be consistent with the TWG objectives.

Modules Development – Multimedia Segments and Instructional Material

Two high-quality videos lasting approximately 3 minutes were prepared to show the benefits of ITS/CVO technologies and programs while providing an overview of the project. The first video segment addressed the needs of the public sector, and the second video segment addressed the needs of the trucking industry. Specific tasks performed were script preparation, recording, and editing.

Three instructional modules were developed to provide additional information beyond the video segments. The first segment was a general overview, the second addressed the needs of the public sector, and the third module addressed the needs of the trucking industry. Instructional media and materials developed were computer-generated slides, course notes, instructions on operating the interactive multimedia, instructions for a self-guided tour, instructions for hands-on demos, and a booklet describing the private industry partners' technologies.

Instructor Manual

A manual developed for the instructor(s) included the following: an outline of course objectives, content, duration, a copy of each visual aid with accompanying instructor's remarks with key points, instructions for the operation of interactive components of the trailer, course notes, and helpful hints.

Education Modules Evaluation and Modification

After each module was developed, internal "dry runs" were performed to ensure that the demonstrations were compatible with the TWG objectives. Participants and instructor(s) were solicited for feedback during the mobilization period. Feedback was collected and analyzed. After analysis, modifications were made as needed.

4.4.2. Technology Vendor Liaison

A market search was conducted to identify private industry partners that either manufacture or are the sole distributors of off-the-shelf, proven ITS/CVO technologies that were consistent with the TWG objectives. After an individual technology, product, or program was selected for demonstration, the project team developed a demonstration format compatible with the target audiences. Each major demonstration topic area (e.g., collision avoidance, communications, and software) was reviewed as needed with sponsors or individual TWG members prior to development of the demonstration to ensure continuity and completeness. In many cases, vendors were provided a briefing from the Oak Ridge National Laboratory (ORNL) staff that conveyed the preferred format of the demonstration hardware/software. Agreements between FHWA/FMCSA and the private industry partners were put in place. Updates to partner information and equipment were made every 90 days. Follow-up discussions and reviews were conducted on an as-needed basis.

4.4.3. Lessons Learned

In the education modules design phase, the input was extremely enthusiastic and the breadth of information to be presented to the target audiences expanded quickly. After the mobilization phase began, it was realized that because of the limited time that the target audiences could spend in the Truck, the full 1- to 2-day workshop sessions originally planned were not feasible. The motor carrier and public

safety presentations were also shortened to give as much information as possible in a shorter amount of time.

Input from the facilitators indicated that visitors to the Truck were very interested in a hands-on experience with the demonstration equipment, which brought on the concern for safety and damage to the equipment. For future projects where public and private sector visitors will be touring mobile vehicles such as the Technology Truck, agreements should include statements that allow hands-on use without repercussion to the project.

4.5. OVERVIEW REPORT – ORNL FACILITATOR

4.5.1. Overview

The duties of the ORNL facilitator were extremely broad. The ORNL facilitator not only had to possess some mechanical ability, but also had to be effective in presenting knowledge of the transportation industry as well as the equipment that was demonstrated. Pre-event duties prior to the arrival to the Truck were a must for the facilitator. Even though each host received excellent details as to the amount of space and any restraints they had to consider for a successful visit, there were times when the Truck could not be set up for logistical reasons. In those cases, it was necessary for the ORNL facilitator to meet with the host and find a new location before the Truck arrived in order to avoid causing physical damage to the equipment. If the Truck was being set up at an indoor location, it was necessary to meet with the event manager to make sure that there was enough space for the Truck to enter the building, as well as make any necessary adjustments to the location in order to ensure that electricity was available.

When the Truck arrived at an event, the ORNL facilitator had to spot the trailer and prepare the area for setup. For safety and to prevent damage to any equipment, it was necessary to have three facilitators to complete the setup task. From time to time, because of time constraints, the facilitators would not have been able to set up in time for the presentation if there had not been three people working. Facilitators needed to be knowledgeable about both the equipment as well as the partners in order to make intelligent and professional presentations. Scheduling sometimes made it difficult to get the Truck from one event to another and set up in a safe and timely manner because the team had to set up and facilitate on the same day. This situation would cause the facilitators to feel that they were not at their best professionally. It was also necessary that the ORNL facilitator be capable of answering any questions about his/her involvement in the ITS/CVO Technology Truck project, as well as their abilities in other areas involving FMCSA and FHWA.

At some events, several large groups tried to come into the trailer at the same time. Because of the layout of the technologies in various areas, the groups would overlap, making it difficult to demonstrate the equipment. It would have been helpful if a signup sheet could have been provided limiting the number of people and asking visitors to show a preference of interest so that each group could have the opportunity to spend more time in its area of interest (i.e., over-the-road drivers were not necessarily interested in the computers and software, as most office personnel did not care about the on-vehicle equipment).

4.5.2. Lessons Learned

One suggestion is to investigate more of the geographic areas before a schedule is set into place. This project was lucky that it did not miss any events due to tight schedules, distance between locations, or weather. Also, the effectiveness of the Truck would have been elevated if there had been more hands-on interaction with the equipment. At several times, visitors voiced the opinion that if they could damage any of the technologies that were set up for demonstration, then they would not want the technologies on their trucks.

4.6. OVERVIEW REPORT – ORNL PROJECT MANAGER

4.6.1. Overview

In formulating a successful approach to a project that required such a diverse set of technical skills, it was decided to structure two sets of personnel. This allowed each staff set to have a more focused and somewhat more limited skill set. The first set, the Technical Support Staff, was responsible for all home-based functions and some mobile functions. These functions included logistics, vendor partners recruiting, technology integration, education development/training, ITS/CVO expertise, website design/maintenance, vehicle maintenance, project troubleshooting, and project oversight. The second set, the Road Team, was responsible for transport, site interface, setup, tours/presentations, workshops, and local media interface. In the formulation of both teams, it was decided to keep teams as small as possible and utilize more of each team member's available time. This was done to increase an individual's cross-task value, reduce total personnel costs (with many personnel doing small independent tasks), and make the annual available hours attractive to contract personnel for better staff retention.

The Technical Support Staff (ORNL-based) consisted of three members who interacted with the project on a daily basis (project manager, logistics specialist, and training specialist) and one staff member (kiosk segment developer) who worked on a quarterly schedule. As expected, the project manager was responsible for all financial; environmental, safety, and health (ES&H); and staffing issues. Additionally, the project manager was tasked with project engineering support, new vendor partner recruiting, vehicle and equipment maintenance, technology integration, ITS/CVO technology advice, on-call emergency support, back-up facilitation, and crew training. The logistics specialist was tasked with pre-trip routing and planning, team reservations, host interaction, daily team interaction, and media packages. Additional tasks included website maintenance for the crew and public websites, crew training, and kiosk support. The education specialist was responsible for the development of all education and workshop materials. These included PowerPoint presentations, videos, and workbooks. Additional tasks included vendor partner liaison, kiosk support, crew training, and back-up facilitator. The kiosk segment developer worked as the number of new partners dictated each quarter to prepare videos, animation, and technical information to be integrated into the kiosk.

In a given operational day for the Technology Truck, the ORNL staff interacted with the project on a variety of levels: some relating directly to a particular event that was in session, some relating to coming events, and some relating to coming technology updates and maintenance. The ORNL Technical Support Staff was cross-trained to a degree that would allow one (or two in emergency situations) of the staff to be away from the project for a given period of time (for sickness, vacation, inclement weather, etc.). At no time during the project did lack of ORNL Technical Support Staff affect the project schedule.

The Road Team staff consisted of an ORNL liaison and contracted driver/facilitators. The ORNL liaison was tasked with conducting pre-event site visits, setup assistance, event facilitation, media interface, and site ES&H and served as a primary conduit between ORNL, the facilitation staff, and the FHWA/FMCSA project manager (while on the road). The driver/facilitators were responsible for transporting the Technology Truck from event to event, setup/teardown at each event, and event facilitation. The project team consisted of only one liaison person. During times of leave, this position was filled by adding a third driver/facilitator. All driver/facilitators were cross-trained to allow any of the pool of four to support any related task at any event. Each member of the Road Team was given specialized training concerning the operation of the generator, trailer, and the technologies.

It was determined that to safely and effectively conduct a mobile project such as this, personnel allowed to interface with the project in the transport and setup/teardown modes would have to be limited to the trained personnel called out above. This requirement limited the total number of personnel who were allowed to assist in the deployment and prevented incidental staff and event personnel from offering support, but it proved to be key in preventing accidents and injury to both equipment and personnel. To further reduce the chance of an accident, it was decided to schedule the Technology Truck in warmer parts of the nation as much as possible during the winter months.

Accessibility to project information and to the ORNL Support Staff was paramount to the smooth operation of the Technology Truck. A website was developed for the use of the crew only. It allowed any team member to quickly obtain information about the schedule, lodging, the contact person's phone number, crew rotation information, and other logistics information. In case of a problem or emergency, the logistics specialist served as the primary contact for the Road Team during normal business hours, and the project manager was available during off-hours via cellular phone and pager.

In order to keep the project fresh and of interest to the ITS/CVO community, recruiting of potential new partners was ongoing throughout the project. This included searches via the internet, trade publications, and media announcements. Trade shows were regularly visited to see new technologies first hand. Updates to the project were done quarterly and included integration of new vendor partners, updates to training and handout materials, and training of staff to reflect changes to the project's operation and technologies.

4.6.2. Lessons Learned

We found that recruiting qualified driver/facilitators was because of the required computer skills and speaking skills, required CDL and clean driving record, and the fact that the position was not full-time employment. We found that many of our visitor participants do not have large blocks of time to commit to the tour of the Technology Truck, so our staff had to be flexible to construct shorter presentations. Also, we found that visitors did not like long presentations while they were on their feet, and preferred a "faster-paced" tour.

4.7. INCIDENT REPORTS

Table 7. Incident reports for the Technology Truck

Report Number	Date Filed	Date Corrected or Closed	Description of Event	Corrective Action
1	11/14/1997	11/17/1997	RoadWatch sensor giving erratic readings	Cleaned sensor lens, tightened mount
2	11/9/1997	11/17/1997	Items stored on top of cabinets in office are falling down during transit	Items stored within cabinets
3	11/141997	1/16/1997	Ultraview mirrors acting erratically	New mounting hardware added
4	11/18/1997	1/21/1997	Shutdown procedure items not followed	Reviewed and stressed in team training
5	11/17/1997	12/16/1997	Tractor electronic package producing error codes, air leak in dash	Replaced computer module and heater control valve
6	11/81997	1/14/1997	Kiosk speaker connection loose, VCRs need cleaning	Reconnected speaker, cleaned VCRs
7	12/61997	12/6/1997	Tractor front bumper scratched at truck stop	No action
8	3/1998	7/21/1998	Graphic panels coming loose, trailer off-tracking, tractor shock loose, office door sticking	Panels reattached, trailer aligned, shock tightened, office door adjusted
9	3/13/1998	3/13/1998	Trailer hydraulic leak at pump	Connection tightened
10	3/15/1998	3/29/1998	Trailer rear panel dented by high curb	Panel straightened
11	3/24/1998	3/27/1998	Shutdown procedure items not followed	Reviewed with facilitator

12	3/27/1998	3/27/1998	Trailer airline ruptured due to rubbing	Airline replaced and re-routed
13	3/31/1998	4/2/1998	Tractor front wheel seal leaking	No leak found, no repair made
14	3/31/1998	4/2/1998	Trailer wheel dented from passing through road construction	Wheel was checked, not a safety hazard
15	4/7/1998	4/29/1998	Tractor after-cooler hose clamp broke	Replaced hose clamp
16	4/13/1998	4/29/1998	VCR not working, electronic lock not working	Returned lock to manufacturer for repair, VCR cabling repaired
17	4/14/1998	5/8/1998	Damaged and stained ceiling tiles	Replaced tiles
18	4/20/1998	4/29/1998	Tractor parking brake valve leaking	Repaired brake valve
19	4/20/1998	5/8/1998	Trailer hydraulic leak	Repaired by manufacturer
20	5/18/1998	7/20/1998	Blown trailer tire and related damage to ABS diagnostic cabling	Tire replaced 5/18/2001, cabling replaced 7/20/1998
21	5/18/1998	8/25/1998	Failure to lower rear landing legs during set up	Reviewed with facilitator
22	8/22/1998	8/25/1998	Trailer airbag bracket broken	Bracket welded and bag replaced
23	11/1/1998	11/4/1998	Unusual front tractor tire wear	Tire replaced and alignment done
24	11/1/1998	9/17/1998	Trailer wheel hubs low on oil	System manufacturer inspected and filled hubs
25	11/20/1998	9/23/1998	Blown trailer tire	Tire replaced
26	10/6/1998	10/9/1998	Tractor windshield chipped by gravel	Spot repaired
27	10/9/1998	9-Oct-98	Trailer hubs low, two trailer tires cracked and wearing unevenly, brake chamber air leak, battery box latch broken	Hubs filled, tires replaced, air lines replaced, latch re-attached
28	2/21/1999	3/30/1999	Trailer contacting tires, batteries getting low, Eaton Vorad needs adjusting, RoadWatch not working, Qualcomm not tracking	Suspension stop blocks added; batteries replaced, Vorad, RoadWatch, and Qualcomm all corrected by manufacturer
29	3/27/1999	6/1/1999	Chrome wheel covers stolen at truck show	Replaced by Cycloid
30	4/6/1999	4/7/1999	Kiosk not working	Directed problem to Avalon
31	4/16/1999	4/21/1999	Articulating arm damaged underpinning	Repaired by trailer manufacturer
32	4/17/1999	4/20/1999	Tractor air governor loose	Governor mounting bolts tightened
33	4/18/1999	4/21/1999	Rivets worked loose from genset cover	Replaced rivets
34	4/27/1999	5/27/1999	Office printer failed	Repaired by printer manufacturer
35	4/27/1999	6/1/1999	HVAC system not cycling down properly	Rewired by Archer Co.
36	4/29/1999	5/12/1999	Genset door came open and was bent by contacting trailer	Hinges replaced
37	4/29/1999	5/13/1999	Video monitor cables are coming loose during transit	Access holes cut, cables reconnected and restrained
38	5/17/1999	5/20/1999	Tractor-trailer failed to couple	Proper procedures were followed, discussed event with facilitators

39	5/22/1999	5/26/1999	Trailer battery charger failed	Charger removed from system, replaced with a portable charger
40	8/4/1999	8/9/1999	Sleeper mattress damaged by spilled juice	Mattress replaced
41	2/3/2000	2/22/2000	Team noticed possible problem with expanding side during deployment	Problem could not be quantified – no action taken
42	2/27/2000	3/6/2000	Generator oil leak	Replace valve cover gasket
43	3/21/2000	3/23/2000	Generator alternator belt damaged by uptake of plastic bag	Belt replaced. Staff cautioned not to store anything in genset enclosure
44	4/25/2000	7/28/2000	Minor damage to rear underside of trailer from road debris	No action taken
45	4/28/2000	5/4/2000	Damage to wheel well covering by motor home at truck stop.	Witness did not get license plate number. Repaired wheel well covering.
46	6/14/2000	7/28/2000	Scrape at top of trailer from limb	No action taken
47	9/21/2000	9/21/2000	Exhaust stack heat shield brackets broken and HVAC top cover broken, both from vibration.	Replace brackets and repair top cover
48	9/28/2000	1/31/2001	Graphic wall monitor working intermittently	Decision not to repair because the project was ending soon

4.8. UPGRADES AND MAINTENANCE ON TRACTOR AND TRAILER

Because of the mobile nature of the Technology Truck, maintenance of the tractor, trailer, and generator required a considerable amount of planning to prevent impact to the operating schedule. Breakdowns were handled on a case-by-case base and did impact the schedule on some occasions. Unplanned repairs were reduced by the fact that the tractor, trailer, and generator were new at the start of the project and maintenance was given top priority.

A dedicated mechanic was used on a contract basis to perform as much of the periodic maintenance and as many of the repairs as possible. The approach allowed the mechanic to become more familiar with the history of the equipment, an approach that provided better predictive maintenance over the life of the project. Many of the repairs to the trailer were of a special nature (because of its design) and were handled under the direct supervision of the ORNL project manager. During the buildup of the project, the ORNL project manager was tasked to design and specify the Technology Truck for construction. This experience made him uniquely qualified to lead these repairs.

During the life of the project, the tractor was driven 130,000 miles and the generator was operated 3,500 hours. It is estimated that the trailer was set up and torn down more than 150 times (including shows, repairs, and scheduled updates). Table 8 represents the maintenance of the Technology Truck during its lifetime.

Table 8. Maintenance history for the Technology Truck

Regular Maintenance Interval		
Equipment	**Type Maintenance**	**Interval**
TRACTOR	Service	Every 15K miles
	Major Service	Every 50K miles
	Inspection	Semi-annually

GENERATOR	Service	Every 250 hours
	Major Service	Every 500 hours
TRAILER	Service and Inspection	Semi-annually

Unscheduled Repairs		
Item	**Action**	**Date**
TRACTOR		
On-board Computer	Replaced Sensors	June 1998
Tires	Replaced All Tires	October 1998
Tires	Replaced Damaged Tire	June 2000
Rear Brakes	Replaced Broken Housing Arm	August 2000
Exhaust System	Repaired Broken Heat Shield	September 2000
TRAILER		
Wheel and Tire	Replaced Damaged Wheel and Tire	October 1997
Hydraulic System	Replaced Defective Pump	May 1998
Roof	Repaired Improper Bonding of Roof	May 1998
Axles	Installed Stop Blocks	May 1998
Handicap Lift	Repaired Pump Leak	May 1998
Tires	Replace Failed Tire	July 1998
Anti-lock Brakes	Repaired Damage From Tire Failure	July 1998
Brake Chamber	Replaced Failed Bag	August 1998
Wheel	Replaced Stress Crack Wheel	September 1998
Tires	Replaced All Tires	October 1998
Handicap Lift	Repaired Pump Leak	March 1998
Hydraulic System	Replaced Pump	April 1999
Wheel Wells	Enlarged Openings	April 1999
HVAC Unit	Replaced Defective Timer	June 1999
Brakes	Replaced Broken Air Line	January 2000
Tires	Patched Puncture	January 2000
HVAC Unit	Replace Fan Motor	July 2000
Brakes	Replaced Leaking Wheel Seal	July 2000
GENERATOR		
Thermostat	Replaced Defective Thermostat	February 2000
Battery	Replaced Dead Battery	February 2000
Alternator Belt	Replaced Broken Belt	March 2000

5. CONCLUSIONS AND FUTURE DIRECTIONS

The tour duration for the Technology Truck was more than 3 years (June 1997 until December 2000). During that time, the market penetration exceeded 4,000,000, and more than 18,000 people visited the Truck for tours. In addition, more than 25,000 hits received on the website. The mobile platform served as a unique outreach tool providing information to diverse motor-carrier-industry and public-sector audiences within the United States and Canada and near the border of Mexico. These audiences experienced an environment that encouraged learning and sharing of ideas by focusing on hands-on interactive demonstrations provided by more than 80 private industry partners. The success of the Technology Truck was demonstrated by the support provided by the private-industry sector and their continued commitment to provide thousands of dollars of equipment, support, and services at no cost to

the government in exchange for an opportunity to have their equipment displayed and demonstrated. These participants came together with the FMCSA to form a partnership that facilitated the goals of improving safety while increasing productivity and cost savings.

In October of 2000, an action plan for the development of an FMCSA Safety Truck Working Team was developed. As a result of that action plan, a working team was created. The team was tasked with establishing requirements for the redesign of the Technology Truck for use as a mobile showcase to educate targeted audiences regarding the safety goals of the FMCSA. The team was composed of headquarters and field staff and also received input from private industry. The FMCSA Technology Truck project manager is assigned to serve as the working team coordinator. The recommendations of the working team will determine the future direction of the Technology Truck project.

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EXTERNAL DISTRIBUTION

1. Zeborah English, Federal Motor Carrier Safety Administration, Office of Research and Technology, 400 Virginia Avenue, SW, Suite 600, Washington, DC 20590
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3. David Helman, Federal Highway Administration, Office of Travel Management, 400 7th Street, S.W., Room 3404, Washington, DC 20590
4. Christine Johnson, Federal Highway Administration, Intelligent Transportation Systems Joint Program Office, 400 7th Street, S.W., Room 3401, Washington, DC 20590
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