

verified both locally and over the air using the wireless communication system. If this verification fails, alerts will be sent to dispatchers.

Electronic Shipping Documentation

- *Electronic Supply Chain Manifest System*—is a secure shipping manifest system that allows only authorized users, validated via biometric and smartcard identification to create or view hazardous materials shipping documentation or access loads. The system allows those with an essential role in the shipment to track the status of the shipments and know who had cargo access and when, from pickup to delivery.

Onboard Computers (OBCs)

- *Intelligent Onboard Computers with Vehicle Disabling and Cargo Locking*—integrates an OBC with wireless communications and vehicle operating systems to allow dispatcher-initiated remote vehicle disabling and trailer door locking/unlocking using electronic cargo locks.

Electronic Cargo Seals

- *E-Seals*—are intelligent cargo seals that can automatically alert dispatchers via wireless communications in the event of tampering. Alerts provide date, time, and location/position of the trailer when a seal is breached.



Project Benefits

The project will determine how the integration of technology applications can be used to reduce the likelihood of terrorist attacks, while improving business productivity and safety. An important component of the research is the documentation and analysis of attributes, benefits and costs of both the tested technologies and a wider array of commercially available technology products designed to enhance HazMat shipment safety, security and efficiency. Of equal importance, the project will identify and promote practical, real-world strategies and procedures (non-technology-based) that may simultaneously reduce the vulnerabilities and enhance productivity associated with the transport of hazardous materials.

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Hazardous Materials Safety and Security Operational Test



Overview

There are nearly 800,000 shipments of hazardous materials on U.S. highways each day. Safeguarding these shipments from possible terrorist use as weapons of mass destruction is the focus of the U.S. Department of Transportation-sponsored Hazardous Materials Safety and Security Operational Test.

Test Purpose

The purpose of the project is to test the safety and security of different technologies and procedures, and identify the most cost-effective means for protecting different types of hazardous cargo from attack by terrorists.

The test will include 100 trucks equipped with a variety of existing technologies. The project will test, singly or in combination, the capabilities of technologies such as:

- driver verification using password logins, fingerprint biometrics and smart cards;
- vehicle and load tracking, using satellites and other wireless systems;
- off-route and stolen vehicle alerts, using “geo-fencing;”
- cargo tampering alerts, using electronic seals;
- driver distress alerts, using driver panic buttons; and
- remote vehicle disabling, in instances of known terrorist attacks.

The test will also document “best practices” for security of hazardous materials used by shippers, carriers, and consignees, which will provide an effective toolbox of technical and non-technical methods of protecting the shipments.

Project Schedule

Deployment & testing to begin summer 2003.
Completion & final reports-September 2004.

Project Partners

Managed by the Federal Motor Carrier Safety Administration, the test is largely funded by the U. S. DOT’s Intelligent Transportation Systems Joint Program Office (JPO). The U.S. DOT team includes technical experts from the JPO as well as from the Research and Special Programs Administration, the Federal Highway Administration, and the USDOT Office of Intermodalism. The research team is led by Joe

DeLorenzo of FMCSA.

The Deployment Team is led by the Battelle Memorial Institute with support from American Transportation Research Institute, Commercial Vehicle Safety Alliance, and QUALCOMM® Incorporated. A separate, independent evaluation, funded by the U.S. DOT will coincide with the operational test.

Industry participants include numerous private shippers, motor carriers, and consignees. An advisory panel comprised of public and private hazardous materials stakeholders provides guidance to the project as well.

US DOT

- Federal Motor Carrier Safety Administration
- Intelligent Transportation Systems Joint Program Office
- Research and Special Programs Administration
- Federal Highway Administration
- US DOT Office of Intermodalism

Deployment Team

- Battelle Memorial Institute
- American Transportation Research Institute
- Commercial Vehicle Safety Alliance
- QUALCOMM Incorporated
- Total Security Services International
- Savi Technology
- Biometric Solutions Group, a division of ISS

Test Scenarios

The project will test the technology systems in four operational scenarios. The scenarios were developed to evaluate the systems’ ability to address critical vulnerabilities in a broad range of HazMat trucking operations. The vulnerabilities were identified using a sophisticated HazMat Risk/Threat Assessment conducted as part of the project. The four test scenarios are:

- Bulk fuel - flammable gases and liquids
- Less-than-truckload - high hazard materials
- Bulk - chemicals
- Truckload - explosives

During the test, 25 trucks for each scenario will be equipped with varying combinations of technologies to assess their ability to improve the safety and security of the shipments.

Support systems will also be installed at the trucking companies, shippers, and consignee locations.

Technologies

Many of the technologies being tested are commercially available and are already used in commercial operations to enhance safety and efficiency. This research project is combining the technologies in new ways to best meet the threats to hazardous materials transportation.

Tracking and Communications Technologies

- *Wireless Satellite or Terrestrial Communications with Global Positioning System*—in conjunction with the participants’ dispatch systems, the position/location and status of vehicles are automatically relayed to dispatchers at regular frequencies. Drivers and dispatchers are also able to communicate with each other through two-way text messaging.
- *Untethered Trailer Tracking*—uses sensors attached to trailers to relay reports of trailer connects/disconnects, trailer location, time, status, and other events to dispatchers.
- *Routing and Geo-Fenced Mapping Software*—with the vehicle/trailer position tracking technologies, sends alerts to dispatchers and provides frequent position reports if one of their trucks leaves a predetermined route (as might happen in a hijacking) or enters an area considered as high-risk (such as proximity to a national landmark).
- *Panic Buttons*—allow drivers to send emergency alert messages to dispatchers. If used with intelligent onboard computers, a driver-carried panic button unit can be used to remotely disable the truck.

Driver Authentication Technologies

- *Biometrics and Smartcards*—are used to positively identify drivers to shippers, consignees, and to their vehicles. Smartcards with predetermined driver-specific information will be used with biometric fingerprint scanners to validate drivers’ identities and record drop off, pickup, and truck start up events. When used in the truck, the “bio-login” process sends alerts to dispatchers if an unauthorized person attempts to operate the truck.
- *Driver Authentication with Global Login*—is an identification feature that requires a driver to enter a user id and password on a keypad in a truck. The login information is