

Hazardous Materials Cooperative Research Program

December 2008

Announcement of FY 2009 Hazardous Materials Research Projects

Excluding movements by pipeline and oceangoing vessels, more than 800,000 hazardous materials shipments, totaling more than 5 million tons, are made daily in the United States. Hazardous materials shipments vary in size and type, from small parcels containing a few ounces of infectious or radioactive substances to barges or railroad tank cars carrying tons of flammable, toxic, and corrosive materials. Although virtually all hazardous materials shipments occur without incident, there has been a long-standing gap in the system for conducting hazardous materials safety and security research. Acknowledging this gap, in 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) authorized a pilot cooperative research program on the transport of hazardous materials.

The Hazardous Materials Cooperative Research Program (HMCRP) is sponsored by the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration and managed by the National Academies, acting through the Transportation Research Board (TRB). The HMCRP Technical Oversight Panel, the governing board for the program, met on December 9, 2008, and selected projects for the Fiscal Year 2009 program. The purpose of this announcement is to inform the research community of these projects.

This announcement contains three problem statements that are preliminary descriptions of the selected projects. Panels are being formed to develop detailed project statements and oversee these projects. Recommendations for panel members may be made by sending an e-mail indicating the project of interest and a resume to Ms. Adrienne Blackwell (ablackwell@nas.edu) by February 6, 2009. **Detailed project**

statements, formally soliciting proposals for these projects, are expected to be released starting in April 2009.

HMCRP project statements will be available only at the program website:

<<http://www.trb.org/hmcrp>>.

Each project statement will be announced by e-mail, and information on registering for this service and other details on the HMCRP are available at that site.

The HMCRP will conduct research and disseminate timely findings that will inform the safety and operations decisions affecting the performance of the hazardous materials transportation system. Proposals should detail strong capabilities gained through extensive, successful experiences. Any research agency interested in submitting a proposal should first make a frank and thorough self-appraisal to determine whether or not it has the capability and experience necessary to ensure successful completion of the project. The specifications for preparing proposals are set forth in a brochure, [*Information and Instructions for Preparing Proposals*](#), available on the website referenced above. Proposals will be rejected if they are not prepared in strict conformance with the section entitled, "Instructions for Preparing and Submitting Proposals."

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Summary of Research Projects

- **Project 07**

Accident Performance Data of Bulk Containers Used for Hazardous Materials Transportation

Allocation: \$400,000

HMCRP Staff: William C. Rogers (202-334-1621 or wrogers@nas.edu)

The expected performance of a package that is involved in a transportation accident is critical in the evaluation of risks within and between modes, as well as in improving designs to reduce the chance of a spill during an accident. Of particular interest is the performance of bulk packages in hazardous materials transportation. A long-standing private-sector initiative managed by the Railway Supply Institute (RSI) and the Association of American Railroads (AAR), known as the RSI-AAR Railroad Tank Car Safety Research and Test Project, has collected and analyzed damage reports on tank cars that are involved in railroad accidents, whether or not damage resulted in a leak of contents. The data has been used to develop conditional release probabilities for tank cars with different design specifications and features. However, no such project exists for tank trucks, portable tanks, tank barges, or tank ships, and risk estimates for these types of containers are often based on widely varying estimates and anecdotal information rather than hard data.

The objective of this research is to provide recommendations, guidance, and specifications for the collection and analysis of bulk transportation performance data for hazardous materials transportation by road, rail and water. This includes, without limitation, performance data on (as applicable) releases from various designs/ thicknesses of the shell, head, and fittings from bulk containers. The research will identify and evaluate funding alternatives as well as institutional barriers to data collection and recommendations for overcoming them. Forms and a process for collecting the data will be proposed with a view toward creating a standardized incident reporting system for each mode that will allow analysis within that mode and meaningful comparisons between modes.

- **Project 08**

Feasibility of a Single Transportation Worker Identification Credential and License

Allocation: \$250,000

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Workers in the transportation sector, including commercial drivers, pilots, airline and other aviation sector personnel, vessel officers and crew members, harbor workers and others, continue to face multiple security credentialing requirements. In addition to the Transportation Workers Identification Credential (TWIC), these workers may also have to undergo separate security threat assessments and credentialing for the Hazardous Materials Endorsement (HME), air cargo and private facility access (such as to chemical

manufacturing plants), the Free and Secure Trade (FAST) program for border crossings, access to Department of Defense facilities, and a myriad of state and locally administered security and threat assessments such as the Florida Unified Port Access Card. In addition, during national emergencies, truck drivers deliver the vast majority of relief supplies; however, they have faced challenges in accessing disaster areas because of conflicting federal, state, and local access control policies. This was particularly evident in the response to hurricane Katrina. On the other hand, during hurricane Gustav, the Department of Homeland Security was able to coordinate access protocols with state and local officials to recognize the TWIC as a valid access credential.

The objective of this research is to identify the steps that can be taken at the state and national levels to enable the TWIC to serve as the single security threat assessment of a worker in the transportation sector, as well as the national secure access control credential. The research would identify the relevant legal authorities, programs, and policies; identify overlapping requirements; analyze the steps needed to convert the Commercial Drivers License (CDL), pilot's license, merchant mariner's document, Coast Guard License(s) and similar licenses and credentials into a TWIC, or vice versa; and identify policy options for achieving the objective of a single, universally recognized credential that establishes identity, eligibility to access secure areas, authority to enter particular secure areas and transportation related licenses, credentials and other government certifications required of transportation workers in the various modes. The research would also consider the costs and benefits of the current program as well as the alternatives, and address tradeoffs that may exist between safety and security in the various options.

- **Project 09**

- *Dry Ice Limits on Aircraft*

Allocation: \$250,000

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A variety of perishable commodities are transported by air with dry ice for preservation: food products, biomedical supplies, biological samples, and even some industrial products such as adhesives. According to the Federal Aviation Administration (FAA), the carriage of dry ice on aircraft must be limited by the ventilation capacity of the aircraft itself, so that the concentration of carbon dioxide in the aircraft cabin or cockpit does not exceed 0.5%. The air carrier industry has struggled with effective calculations for dry ice capacity on aircraft for a number of reasons. FAA has calculated the sublimation rate for dry ice as 2% per hour; however, there are questions about the real rate. Factors that influence sublimation include the form of the dry ice itself (e.g., block, pellet, or snow), the nature and quality of the packaging and insulation, and the initial temperature of the contents. Also, the ventilation rate of aircraft varies by aircraft type. For example, new aircraft engines or retrofitted air conditioning systems may influence dry ice sublimation. The number of air conditioning packs operated during flight also influences the rate of ventilation. Finally, the configuration of the aircraft also influences the quality of cabin air. For example, passenger aircraft and cargo-only aircraft are

capable of widely varying dry ice loads. In addition, some older generation aircraft have no ventilation between the cargo and passenger decks, while newer generation aircraft recirculate air through the cargo deck compartments. The industry needs reliable guidance on dry ice capacity for the various types of aircraft currently in operation.

The objective of this research is to develop guidance for passenger aircraft and cargo-only aircraft that evaluates the influence of dry ice capacity on the air quality in the cockpit and passenger cabin. In both cases, maximum loading capabilities by aircraft should be defined on the basis of empirical research that can form a model for use by aircraft operators who have not performed their own testing. The model should consider operational conditions such as: the extent of insulation in packages; the number of operational air conditioning packs; ambient air temperatures at the time of aircraft loading; and percent occupancy of the cargo area.