



A Proposal from the National Association of State Fire Marshals to the Federal Transit Administration to Conduct Research and Recommend Best Practices Related to the Fire Performance of Materials and Products Used in Railcars in the United States.

OVERVIEW

United States Department of Transportation statistics reveal approximately 1,500 fires on heavy rail passenger vehicles. Experts tend to agree that these fires are seriously underreported. The New York City Fire Department alone reports responses to hundreds of fires in the city's extensive subway system.

Railcar fires may ignite from electrical sources, friction from braking systems, consumer carelessness and criminal activity. Improvised explosive devices may be easily concealed. Their use may prove fatal to those closest to an explosion, but the greater harm may come from the ensuing fire.

Whether accidental or intentional, these fires may grow rapidly in size and intensity because of combustible materials brought on board by riders and accumulated waste, but also because of the interior materials and products used in the construction of the railcars. In the time required to report a fire, stop the vehicle and initiate exiting, these fires may produce significant quantities of highly toxic gases, smoke to obscure vision and high levels of heat. A rapidly escalating fire impedes passenger escape and emergency response, especially in the confines of a subway tunnel.

Mass transit authorities work hard to maintain railcars and keep the infrastructure free of combustible waste. Mass transit and public safety authorities do their best to prevent criminal activity on board these vehicles, but it is virtually impossible to regulate riders' personal items, the vast majority of which are innocuous but nonetheless combustible.

The purpose of this project is to address a fire safety factor that is well within the control of the public sector – the fire performance of the materials and products used in the construction of the interiors of railcars. This project begins with research into the real-world adequacy of existing railcar fire safety standards, and then to an investigation of potential improvements in the test methods and criteria that may be used with railcars. An experts' panel will review the research and recommend best practices to reduce the contribution of the materials and products from future railcar fires.

The project will be managed under the auspices of the Safe Energy and Transportation Task Force of the National Association of State Fire Marshals (NASFM). More information on NASFM and its Task Force follows this proposal.

PROPOSAL

Objectives

- Review the current US requirements for fire performance for railcars
- Develop integrated fire performance metrics including ignitability, combustibility, and toxicity of combustion effluents in railcars
- Validate fire performance metrics with experimental data
- Recommend best practices to be used in the choice of materials and products used in railcars

Scope

The scope of this research will be limited to interior wall and ceiling lining materials. It is anticipated that the fire performance concepts and methodology developed may be used for other combustible items in a railcar.

Technical Plan

The technical plan will be coordinated by Pravinray Gandhi, Ph.D., Manager, Fire Research and Technology, Underwriters Laboratories (UL). The Technical Plan will consist of the following tasks:

Task 1 – Situation analysis

- Review of current US requirements
- Review of proposed EN requirements
- Comparison of the fire performance with available test data
- Review and identification of gaps in the fire performance requirements
 - Fire safety objectives and relevant measurements for railcars
 - Validation using large-scale fire test (e.g., NFPA 286 room corner test)
- Selection of material and products for the research

Task 2 – Development of fire performance data for products currently allowed in the US railcars

- Tests in accordance with Federal Railway Authority (FRA) document 49 CFR Part 238
- Tests in accordance with proposed EN 45545-2
- Toxicity testing with state-of-the-art ISO test methods
- Large-scale tests in accordance with NFPA 286, room corner tests

Task 3 – Analysis of data

- Correlation of fire and smoke growth between FRA tests and NFPA 286 fire tests
- Correlation of fire and smoke growth between EN 45545-2 tests and NFPA 286 fire tests
- Correlation of gas effluents in small-scale and NFPA 286 tests

Task 4 – Recommendation of fire performance metrics for wall and ceiling lining materials including:

- Ignitability
- Heat release
- Smoke release
- Gas effluent composition

Task 5 – Final research report

- Situation analysis
- Test procedures, data
- Data analysis
- Recommendations

Consensus Best Practices

Task 6 – Produce consensus best practices

- Establish experts' panel to review the progress of and final recommendations of the research project described above, and reach consensus on best practices reflecting those findings. This panel shall be appointed by the President of NASFM's Board of Directors and consist of two experts from each of the following: the American Public Transportation Association (APTA); the fire service; suppliers to the mass transit authorities; and the scientific community.
- Submit best practices by the end of calendar year 2007 to NASFM, APTA and the Federal Transit Administration (FTA).

Schedule

Complete project and final research report, four months after award of research.
Produce best practices, four months after conclusion of research.

Costs

Estimated to be \$210,000 based upon the following deliverables and activities:

- Situation analysis
- Development of fire performance data
 - 8 new materials/products will be tested
 - 49 CFR Part 238 tests
 - prEN 45545-2 specified tests
 - NFPA 286 tests
- Data analysis and correlations between small-scale and large-scale fire tests; fire modeling using FDS for fire growth in railcar (validation of input for FDS will be performed with results from NFPA 286 tests)

- Recommendations for fire performance of wall and ceiling lining materials in railcars
- Final research report
- Expert panel meetings resulting in consensus best practices.
- Project management

This estimate is contingent on UL's access to data produced by the National Institute of Standards and Technology for FTA and data produced by UL on behalf of a UL client.

Cost Sharing

NASFM will cover all costs related to the meetings of the experts' panel. These costs are being made "in kind" and are estimated to be \$60,000. In addition, NASFM will arrange for project management.

NASFM is seeking \$150,000 from FTA to cover the estimated costs of the research project described here.

Option

Research and recommendations related to the fire performance of bus interiors may follow the project described above. Upon satisfactory completion of this project, NASFM and FTA may elect to proceed with a similar project related to bus fire safety.

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About the National Association of State Fire Marshals and its Safe Energy and Transportation Task Force.

The National Association of State Fire Marshals (NASFM) consists of senior state-level public safety officials. NASFM's mission is to protect life, property and the environment from fire and other hazards. State Fire Marshals' responsibilities vary from state to state, but they tend to be responsible for fire safety code adoption and enforcement, fire and arson investigation, fire incident data reporting and analysis, public education and advising Governors and State Legislatures on fire protection. Some State Fire Marshals are responsible for fire fighter training, hazardous materials incident responses, wildland fires and the regulation of natural gas and other pipelines.

NASFM programs are conducted by three task forces. The Consumer Product Fire Safety Task Force addresses the threat of fire in the home. The Catastrophic Fire Prevention Task Force addresses very large fires capable of harming large numbers of persons very quickly. The Safe Energy and Transportation Task Force works primarily with the United States Department of Transportation to bring together emergency responders, federal and state regulators, industry and scientists on the safety of pipelines, LNG terminals and alternative energy. For more information, please visit NASFM's website at www.firemarshals.org.