



Ensuring Rail Security

Preparing for Hazardous Materials Transportation Incidents

December 19, 2017

Fiscal Year 2017 Report to Congress



Homeland
Security

Federal Emergency Management Agency

Message from the Administrator

December 19, 2017

I am pleased to present the following report, “Ensuring Rail Security: Preparing for Hazardous Materials Transportation Incidents,” which has been prepared by the Federal Emergency Management Agency.

This document has been compiled in response to language in Senate Report 114-264, which accompanies the Fiscal Year 2017 Department of Homeland Security Appropriations Act (P.L. 115-31).

Pursuant to congressional requirements, this report is being provided to the following Members of Congress:

The Honorable John R. Carter
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable Lucille Roybal-Allard
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable John Boozman
Chairman, Senate Appropriations Subcommittee on Homeland Security

The Honorable Jon Tester
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

Inquiries relating to this report may be directed to me at (202) 646-3900 or to the Department’s Deputy Chief Financial Officer, Stacy Marcott, at (202) 447-5751.

Sincerely,

A handwritten signature in blue ink, appearing to read 'B. Long', with a stylized flourish extending to the right.

Brock Long
Administrator
Federal Emergency Management Agency





Ensuring Rail Security: Preparing for Hazardous Materials Transportation Incidents

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I. Legislative Language

This document has been compiled in response to language in Senate Report 114-264, which accompanies the Fiscal Year (FY) 2017 Department of Homeland Security (DHS) Appropriations Act (P.L. 115-31). Senate Report 114-264 states:

FEMA is directed to provide a written report to the Committees no later than 90 days after the date of enactment of this act on its efforts to address the unique needs of first responders related to hazardous materials transportation (including crude oil) and response to incidents. The report shall include the effectiveness of training related to including any identified gaps in the need for additional training or curriculum improvements.

II. Discussion

The Federal Emergency Management Agency (FEMA) supports the National Preparedness System (NPS), which outlines an organized process for everyone in the whole community to move forward with their preparedness activities and to achieve the National Preparedness Goal. The National Training and Education System (NTES) supports the NPS and consists of the nationwide network of training and education providers and students who build and sustain capabilities for a more secure and resilient Nation. The NTES enables better outcomes for jurisdictions and students by aligning and simplifying access to the right resources and by ensuring that learning content is relevant and effective, and addresses the need.

A. Trends in Preparedness for Hazardous Materials Transportation Incidents

A combination of several preparedness resources, including the Threat and Hazard Identification and Risk Assessment (THIRA), State Preparedness Report (SPR), Biannual Strategy Implementation Report (BSIR), and National Preparedness Report (NPR), highlight preparedness trends related to transporting hazardous materials (HAZMAT).

Identifying Gaps: Threats, Hazards, and Risks Related to the Transportation of HAZMAT

Each year, states, territories, major urban areas, and tribes conduct a THIRA to better understand their threats and hazards and to set targets for their preparedness capabilities. As part of this assessment, jurisdictions identify the threats and hazards of primary concern to their communities and describe their potential impacts. In 2016, 42 out of 114 jurisdictions identified a potential chemical HAZMAT release involving rail transportation (including crude oil) as a threat or hazard in their THIRA.

Identifying Gaps: State Capabilities for Addressing HAZMAT Incidents

Jurisdictions also use the THIRA to set targets for building and sustaining each of the 32 core capabilities identified in the National Preparedness Goal. Each year, states and territories use the SPR to assess their capabilities, rating each of the core capabilities on a 1–5 scale to indicate the gap between their current capabilities and their THIRA targets. A rating of 5 indicates that the jurisdiction is close to or has met its target, whereas a rating of 1 indicates little-to-no capability and that substantial development still may be necessary to meet the capability target. FEMA considers ratings of 4 and 5 to indicate proficiency. Rather than a single overall rating, states and territories assess themselves in five different areas for each core capability: planning, organization, equipment, training, and exercises, with a 1–5 rating for each individual area.

Five core capabilities that are particularly relevant to preparing for, responding to, and recovering from a threat or hazard related to HAZMAT transportation are: 1) Environmental Response/Health and Safety; 2) Public Health, Healthcare, and Emergency Medical Services;

3) Critical Transportation; 4) Infrastructure Systems; and 5) Logistics and Supply Chain Management. Table 1 highlights the 2016 SPR proficiency ratings (the percentage of ratings that were 4s or 5s in 2016) for these relevant core capabilities. States and territories also indicate specific gaps in each core capability, expressed as functions or activities related to the capability. Table 1 indicates the activities and functions in which states and territories most frequently reported capability gaps.

Table 1: 2016 HAZMAT SPR Proficiency Ratings and Gaps by Core Capability

| Core Capability | Proficiency (% of 4/5 Responses) | Most Frequently Reported Capability Gaps |
|---|--|---|
| Environmental Response/Health and Safety | More than half (58%) of the ratings indicate proficiency | <ul style="list-style-type: none"> • Health and Safety Monitoring and Assessment • Hazardous Material Cleanup • Responder Safety |
| Public Health, Healthcare, and Emergency Medical Services | More than half (57%) of the ratings indicate proficiency | <ul style="list-style-type: none"> • Medical Surge • Emergency Medical Services • Medical Countermeasures |
| Critical Transportation | Less than half (48%) of the ratings indicate proficiency | <ul style="list-style-type: none"> • Evacuation • Delivery of Response Assets • Transportation Safety and Condition Assessments |
| Infrastructure Systems | Less than half (34%) of the ratings indicate proficiency | <ul style="list-style-type: none"> • Infrastructure Site Assessments • Water Treatment and Provision • Transportation Infrastructure |
| Logistics and Supply Chain Management | Less than half (34%) of the ratings indicate proficiency | <ul style="list-style-type: none"> • Donation Management • Resource Delivery • Resource Management |

B. Addressing Gaps Related to HAZMAT Incidents through Training

FEMA has invested \$15.1 million in FYs 2015, 2016, and 2017, as shown in Table 2, to support 10 training courses related to HAZMAT transportation incidents. Training includes classroom and Web-based deliveries. From 2015 to 2016, FEMA supported 136 classroom sessions and trained more than 2,400 first responders and emergency management personnel. Web-based courses trained an additional 69,000 individuals. FEMA also provided training in other skills and capabilities needed for incident response, including the Incident Command System. Training details are provided in Tables 3 and 4 on the following pages. FEMA preparedness grant recipients also are authorized to address HAZMAT core capability gaps through training as an allowable cost under their awards.

The Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) has the lead in the interagency training on rail security. Information on PHMSA’s Transportation Rail Incident Preparedness and Response Web Resource, which provides emergency responders with critical information on best practices related to rail incidents involving hazard class 3 flammable liquids such as crude oil and ethanol is available at: <https://www.phmsa.dot.gov/safe-transportation-energy-products/transportation-rail-incident-preparedness-and-response> and <http://dothazmat.vividlms.com/tools.asp>.

Table 2: FEMA Investments in Transportation of HAZMAT-Related Training

| Training Provider | FY 2015 | FY 2016 | FY 2017 |
|---|--------------------|--------------------|---------------------|
| Transportation Technology Center, Inc. (TTCI) | \$5,000,000 | \$5,000,000 | \$5,000,000 |
| Emergency Management Institute (EMI) ¹ | \$46,366 | \$57,456 | |
| Total: | \$5,046,366 | \$5,057,456 | \$5,000,000 |
| Grand Total: | | | \$15,103,822 |

Methodology for Determining Training Needs

FEMA applies a training needs assessment to identify and prioritize gaps by analyzing the following training-related data:

- Threats and hazards (e.g., crude-by-rail, high flammability hazards);
- The student (i.e., profession, position, and level of responsibility);
- Applicable policy, doctrine, and statutes such as National Fire Protection Association standards;
- Type of training gap (i.e., knowledge or skills, or both);
- Existing training resources;
- Reports from industry;
- Lessons learned from exercises;
- After-action reports addressing actual HAZMAT incidents; and
- Supply and demand factors such as seasonal and production fluctuations.

Courses are created, modified, or archived on the basis of needs assessment results. Instructional systems design experts use the information from the training course needs assessment to create learning objectives for FEMA’s HAZMAT training courses.

FEMA Training Providers

FEMA’s Transportation of HAZMAT training courses are developed and delivered through a network of providers that includes the following:

- TTCI Security and Emergency Response Training Center (SERTC); and
- EMI.

¹ EMI calculates the cost for Web-based courses at \$1.80 per course completion and conducts the virtual tabletop exercises with government employees rather than with contract support.

FEMA Courses related to Transportation of HAZMAT

The list below provides a summary of FEMA training that addresses HAZMAT incident response. Course descriptions are provided in Appendix A.

- Crude by Rail Emergency Response (TTCI)
- Emergency Support Function (ESF) 10 – Oil and Hazardous Material Response (EMI)
- Hazardous Materials/Weapons of Mass Destruction Technician for Surface Transportation (TTCI)
- Highway Emergency Response Specialist (TTCI)
- Introduction to Hazardous Materials (EMI)
- Leadership and Management of Surface Transportation Incidents (TTCI)
- Orientation to Hazardous Material for Medical Personnel (EMI)
- Tank Car Specialist (TTCI)
- The Surface Transportation Emergency Preparedness and Security (STEPS) involves three courses: (1) STEPS-Freight, (2) STEPS-Mass Transit and Passenger Rail, and (3) STEPS-Senior Officials (TTCI)
- Virtual Tabletop Exercises (VTTX): Gasoline Transportation and Bakken Oil Rail Transportation (EMI)

C. Assessing the Effectiveness of FEMA’s HAZMAT Training

FEMA applies the results of the previously described needs assessment with training evaluation data to determine if training programs are achieving desired results. FEMA evaluates training using the Kirkpatrick Model, a worldwide standard for determining the effectiveness of training. As part of this evaluation, students complete a survey pre- and post-training to identify gains in the student’s knowledge, skills, and abilities. FEMA analyzes the evaluation data along with the learning objectives and testing materials, resulting in curriculum improvements and/or modifications as required to support increased and improved learning.

The following tables summarize the results of FEMA’s evaluation of the Transportation of HAZMAT-related training programs previously listed. Course names also include their categorization as “performance” or “awareness” level courses. Awareness-level courses are designed for responders who require the skills necessary to recognize and report a potential catastrophic incident or who are likely to witness or investigate an event involving the use of hazardous and/or explosive devices. Performance-level courses are designed for first responders who perform tasks during the initial response to a catastrophic event, such as safeguarding the at-risk public, rescuing survivors, or decontaminating survivors.

Table 3: Survey Results – TTCI Courses (2015 – 2016)

| Course | Number of Classes | Total Trained 2015 – 2016 | Percent Reporting Increase in Knowledge, Skills, and Abilities |
|--|-------------------|---------------------------|--|
| Tank Car Specialist (Performance) | 23 | 336 | 51.5% |
| Highway Emergency Response Specialist (Performance) | 24 | 479 | 66.7% |
| Leadership and Management of Surface Transportation Incidents (Performance) | 13 | 96 | 36.5% |
| HAZMAT/Weapons of Mass Destruction Technician for Surface Transportation (Performance) | 15 | 183 | 51.8% |
| STEPS for Freight by Rail or Highway (Performance) | 4 | 52 | 66.1% |
| STEPS for Mass Transit and Passenger Rail (Performance) | 3 | 47 | 25.4% |
| STEPS for Senior Officials or Administrators (Performance) | 6 | 79 | 66.9% |
| Crude-By-Rail Emergency Response (Performance) | 48 | 1,135 | 21.7% |

Figure 1: Student location of TTCI Course Completions (2015 – 2016)

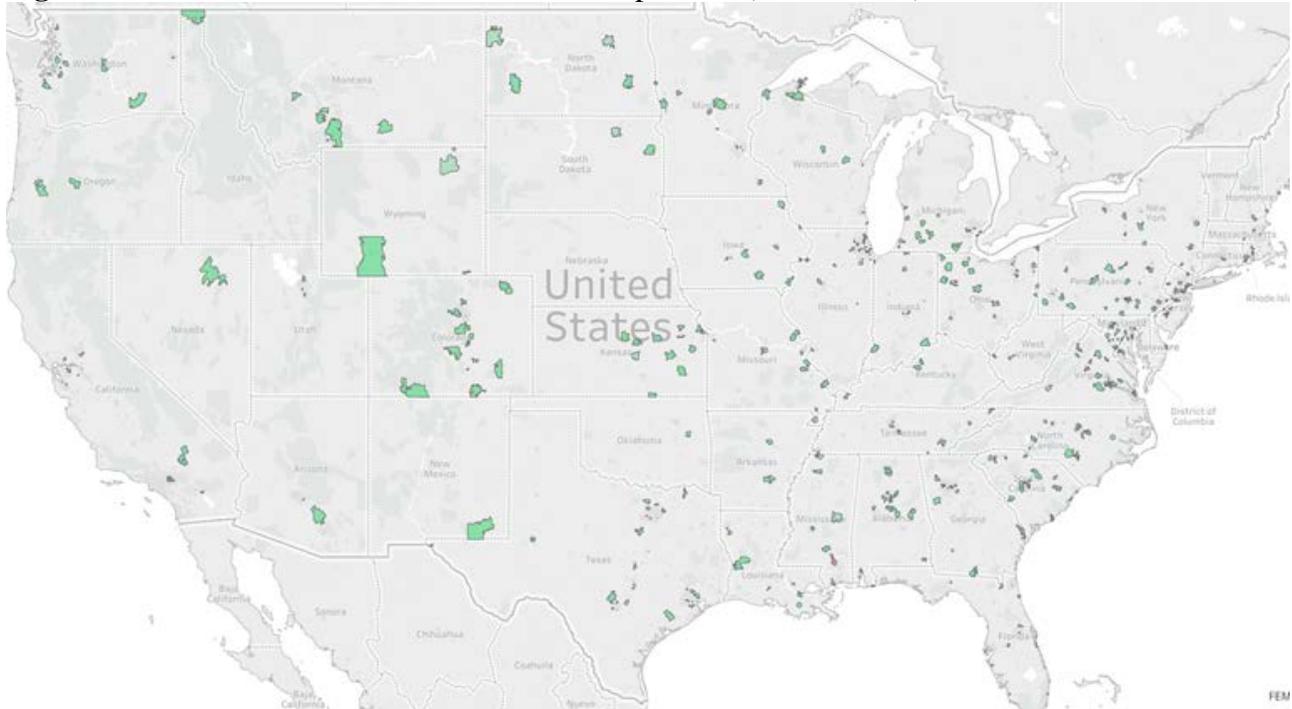


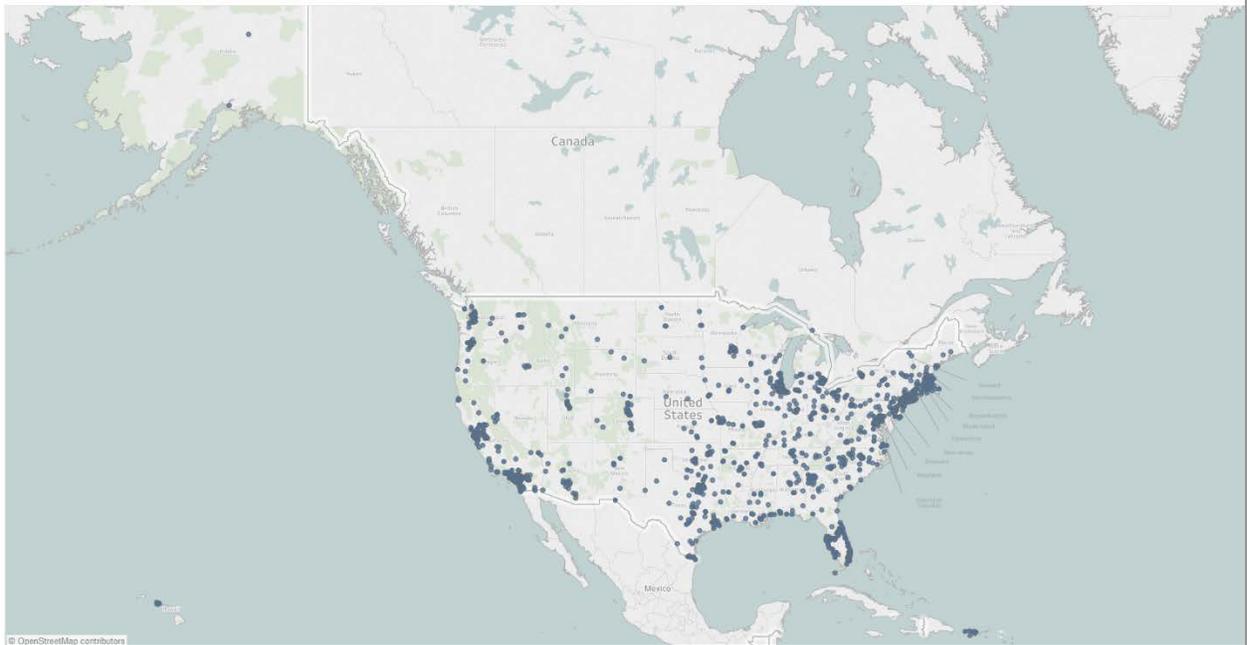
Figure 1: The size of shaded areas represent the zip code boundaries of each student's work address.

Table 4: Survey Results – EMI Courses (2015 – 2016)²

| Course | Number of Classes | Total Trained 2015 – 2016 | Percent Reporting Increase in Knowledge, Skill, and Abilities |
|--|---|---------------------------|---|
| An Introduction to Hazardous Materials (Awareness) | Self-Study (start time determined by student) | 57,679 | N/A |
| Orientation to Hazardous Materials for Medical Personnel (Awareness) | Self-Study (start time determined by student) | 9,496 | N/A |
| ESF #10 – Oil and Hazardous Materials Response (Awareness) | Self-Study (start time determined by student) | 2,102 | N/A |
| VTTX: Gasoline Transportation and Bakken Oil Rail Transportation (Performance) | 3 | 188 | N/A |

Figure 2: Student location of EMI Course Completions (2015 – 2016)

Map - HazMat Transportation - Online Courses



² EMI conducts Kirkpatrick Level 2 learning assessment on courses that are a minimum of 2 days or 16 contact hours in duration. These courses do not meet the criteria for this assessment.

Evaluation Results Analysis

The majority of FEMA’s performance level training for HAZMAT transportation incidents is provided through TTCI’s SERTC. SERTC has the largest collection in the United States of full-sized rail cars that are used as training aids. Demand for TTCI’s training is high. TTCI currently has reached full operational capacity and has more than 400 students awaiting slots for five of the eight courses, including more than 190 students for the Highway Emergency Response Specialist course and more than 80 students for the Crude-by-Rail Emergency Response course.

FEMA Collaboration

In 2015, DOT, the Environmental Protection Agency, and FEMA collected information from 48 states and the District of Columbia on their preparedness efforts for responding to, and mitigating the impacts of, crude-oil-by-rail incidents. The majority of states reported that their response plans for HAZMAT are sufficient to manage a crude oil train derailment. However, 23 states—including seven with primary rail lines designated for crude-by-rail shipments—reported shortfalls in first responder training. States attributed these shortfalls to shortages in local responder staffing, which prevent responders from taking leave to attend specialized training courses.

D. Next Steps: Optimizing FEMA’s Transportation of HAZMAT Training

P.L. 114-321 directs FEMA to establish the Railroad Emergency Services Preparedness, Operational Needs, and Safety Evaluation (RESPONSE) Subcommittee under its National Advisory Council (NAC) to provide recommendations for improving emergency responder training and resource allocation for HAZMAT incidents involving railroads. The RESPONSE Subcommittee comprises federal officials from DHS, DOT, the National Transportation Safety Board, and the Environmental Protection Agency, as well as other experts from nonfederal entities.

Specifically, the subcommittee will examine (per P.L. 114-321):

- The quality and application of training for state and local emergency responders related to rail HAZMAT incidents, including training for emergency responders serving small communities near railroads;
- The availability and effectiveness of federal, state, local, and nongovernmental funding levels related to training emergency responders for rail HAZMAT incidents, including emergency responders serving small communities near railroads; and
- The strategy for integrating commodity flow studies, mapping, and rail and HAZMAT databases for state and local emergency responders and increasing the rate of access to the individual responder in existing or emerging communications technology.

The full subcommittee began meeting in May 2017 and will submit a report to the NAC not later than December 16, 2017, that includes recommendations for review, approval, and submission as

appropriate to the FEMA Administrator on the above topics; specified timeframes for implementing the recommendations; and proposed recommendations for congressional action.

Curriculum Improvements

FEMA will use the NAC recommendations to inform work through NTES—this work includes specific curriculum improvements such as better alignment of learning objectives to core capabilities and specific threats and hazards, and an improved training needs assessment process that leads to a more targeted curriculum (e.g., performance objectives more closely match the conditions likely to be encountered by first responders).

FEMA created NTES to help implement the Post-Katrina Emergency Management Reform Act of 2006 (P.L. 109-295). This act calls for “a national training program to implement the national preparedness goal, National Incident Management System, National Response Plan, and other related plans and strategies.” FEMA uses NTES to optimize training and education investments and activities through analytics and enhanced partnerships; this includes the efforts to address transportation of hazardous materials. NTES partnerships include FEMA engagement with a network of stakeholders in federal, state, and local agencies, the transportation industry, training providers, national and international associations, and academia.

NTES data collection and analysis activities include THIRA and SPR, as well as congressional reports, U.S. Government Accountability Office documents, federal and local program data, industry reports, research studies, after-action reports, and lessons-learned studies. Results of this NTES effort will be used to review and potentially to reprioritize resource allocations in order to modernize coursework where necessary and to increase training capacity.

E. The Way Ahead – A Comprehensive All-Hazards Approach

FEMA advocates a community-based, all-hazards approach for protecting lives, property, and the environment. Although the causes of emergencies can vary greatly, many of the effects do not. For example, a rail transportation incident could lead to an evacuation of a community or mass care for individuals—in the same way that chemical spills, floods, wildfires, hazmat releases, and radiological dispersal devices may lead a jurisdiction to issue an evacuation order and open shelters. Even though each hazard’s characteristics (e.g., speed of onset, size of the affected area) are different, the general tasks for conducting an evacuation and mass care operations are the same.³ Therefore, FEMA is exploring ways to improve evacuation and mass care within the all-hazards construct to complement the rail safety programs.

Evacuation and Shelter-in-Place Planning

Many communities designate evacuation zones and routes to get citizens to safety in the event of a hurricane or major storm. Evacuation planning principles and decision practices can apply to other threats and hazards that a community may face. Situations such as wildfires, power plant emergencies, dam failures, and hazardous material releases may require officials to order

³ Comprehensive Preparedness Guide 101

residents to evacuate. FEMA continues to explore the most effective means for planning, ordering, and conducting evacuation events. FEMA's activities will produce guidance, technical assistance, and optimized learning that reflect improved approaches to evacuation for the whole community.

FEMA's National Integration Center Technical Assistance Program provided direct support to the Baltimore Urban Area Security Initiative from 2015 to 2017 to help with its evacuation planning efforts, and currently is working with the Georgia Emergency Management Agency and participating counties to develop and/or refine their evacuation plans and to incorporate emerging concepts and principles for evacuation planning. These emerging concepts and principles include, but are not limited to, the following:

- Move the fewest number of people the shortest possible distance.
- Consider shelter-in-place the first/default option when feasible.
- Conduct zone-based evacuation targeting the most vulnerable areas, limiting the need for evacuating large areas that are not under the threat of a hazard.

Relating technical assistance to rail safety, Ware County, one of the counties participating in the current evacuation and shelter-in-place technical assistance with Georgia, is home of the largest CSX computerized railyard on the East Coast.

The efforts of the National Integration Center's Technical Assistance Program are consistent with FEMA's six-step planning process outlined in Comprehensive Preparedness Guide 101: Developing and Maintaining Emergency Operations Plans (Version 2.0). This planning process is flexible and allows communities to adapt it to varying characteristics and situations as appropriate on the basis of their size, known risks, and available planning resources. Building off of the evacuation and shelter-in-place technical assistance, the National Integration Center also is working to develop state planning guidance and an executive-level decision analysis checklist.

Mass Care

The term mass care refers to a wide range of activities that provides support to individuals and families who temporarily are displaced or otherwise affected by a disaster or emergency that disrupts their ability to provide for their basic needs. Mass care services, to include the activating and operating shelters, begin as soon as a disaster is imminent or occurs and continue through the recovery phase. Mass care may involve living with many people in a confined space, which can be difficult and unpleasant. Similar to the focus on improving evacuation, FEMA has opportunities to improve approaches to mass care through research, guidance, technical assistance, and optimized training to reflect the mass care best practices for the Nation.

III. Conclusion

FEMA has taken major steps to advance preparedness for HAZMAT transportation incidents, including crude-oil-by-rail incidents. In FYs 2015, 2016, and 2017, FEMA has invested more than \$15 million in HAZMAT-related training for thousands of first responders and other personnel, as well as in training for other skills and capabilities necessary for incident response. FEMA remains dedicated to supporting state, local, tribal, and territorial efforts to prepare for all hazards, including HAZMAT transportation incidents, by providing world-class and doctrinally sound training and education. Using the NTES, FEMA will continue to engage the Nation's first responders and other stakeholders to refine and improve training to address their needs and to strengthen the Nation's capabilities to respond to HAZMAT transportation incidents and other hazardous events.

Appendix: HAZMAT Training Providers and Course Information

FEMA's hazardous materials (HAZMAT) training courses are developed and delivered through a network of providers that include the following:

- The Transportation Technology Center, Inc. (TTCI), Security and Emergency Response Training Center; and
- The Emergency Management Institute (EMI).

FEMA offers courses at the awareness, performance, and management and planning levels to accommodate different job functions of the first responder community. Awareness-level courses are designed for responders who require the skills necessary to recognize and report a potential catastrophic incident or who are likely to witness or investigate an event involving the use of hazardous and/or explosive devices. Performance-level courses are designed for first responders who perform tasks during the initial response to a catastrophic event, such as safeguarding the at-risk public, rescuing victims, or decontaminating victims. Management and planning-level courses are designed for managers who build plans and coordinate the response to a mass consequence manmade or natural event.

TTCI

TTCI, located in Pueblo, Colorado, offers eight courses addressing planning and response for HAZMAT transportation incidents.

The ***Tank Car Specialist*** course focuses on fundamental knowledge and skills associated with an emergency response to a rail surface transportation incident involving HAZMAT. The course provides technical knowledge pertaining to tank cars, including damage assessment, oversight for product removal, and movement of damaged tank and other rail cars present. (Performance Level)

The ***Highway Emergency Response Specialist*** course focuses on fundamentals and skills associated with an emergency response to a highway emergency involving HAZMAT. This course teaches the technical skills and knowledge required for the safe response to incidents involving highway transportation, including cargo tanks, containers, and freight vans. Participants conduct incident site assessments, container damage assessments, and containment of leaking containers. (Performance Level)

The ***Leadership and Management of Surface Transportation Incidents*** course is designed to enhance the participants' knowledge that will help them establish effective objectives, strategies, tactics, and decisions when assuming the command and/or general staffing roles that are critical when responding to various modes of surface transportation HAZMAT incidents. The curriculum also augments the participants' knowledge of terrorist and other criminal attacks that potentially could be used against surface transportation. (Performance Level)

The ***Hazardous Materials/Weapons of Mass Destruction (WMD) Technician for Surface Transportation*** course provides students with the training necessary to analyze the chemical and physical properties of HAZMAT transported in various surface transportation containers and includes extensive hands-on practice of actions and a full-scale exercise to simulate surface transportation incidents. (Performance Level)

The ***Surface Transportation Emergency Preparedness and Security (STEPS)*** is three courses: (1) ***Freight***, (2) ***Mass Transit and Passenger Rail***, and (3) ***Senior Officials***. The goal is to provide participants with the training necessary for emergencies involving surface transportation freight and passenger systems. Participants are trained to identify the hazards and apply this information to prioritize organizational management needs, resource allocation, evacuation strategies, and response operations. Participants demonstrate proficiency during an incident while providing solutions to minimize the impact to the responders, the citizens, the environment, and the critical infrastructure of a community. (Performance Level)

The ***Crude-by-Rail (CBR) Emergency Response*** course provides first responders with the basic knowledge, skills, and abilities to respond to incidents involving CBR. The program is delivered over 3 days (24 hours) with more than 60 percent of the course delivered as a field exercise. The course covers the history of crude oil, chemical and physical properties of the different crude oil transported, basic site and damage assessment, tank car design and construction, tactical product control methods including the application of firefighting foam agents, water and spill control procedures, planning for crude oil incidents, and the environmental impacts. The practical training evolutions culminate in a full-scale derailment exercise. (Performance Level)

EMI

EMI, located in Emmitsburg, Maryland, provides an independent study course intended to provide a general introduction to HAZMAT that can serve as a foundation for more specific studies in the future. This 10-hour course, ***An Introduction to Hazardous Materials*** (Awareness Level), provides information regarding the roles of federal, state, local, and tribal governments in reducing HAZMAT risks and the processes to identify possible terrorist targets of opportunity in the use of toxic industrial chemicals as WMDs to identify what communities can do to increase their preparedness to respond to HAZMAT incidents. The 10-hour course, ***An Orientation to Hazardous Materials for Medical Personnel*** (Awareness Level), provides information to medical personnel on the different modes of transportation and how to identify hazardous material properly. The 30-minute course, ***Emergency Support Functions (ESF) #10 - Oil and Hazardous Materials Response Annex***, provides instruction on the types of partnerships formed between ESF #10 and response agencies and organizations dealing with HAZMAT and various modes of transportation. EMI also conducts ***Virtual Tabletop Exercises (VTTX)*** (Performance Level); two, in particular, address ***Gasoline Transportation*** and ***Bakken Oil Rail Transportation***. These VTTX events are discussion-based exercises conducted with multiple remote video teleconference sites over a period of 3 days, in separate 4-hour sessions (12 hours total).