Ensuring Rail Preparedness

Improving Responder Training and Resource Allocation for Rail Hazardous Materials Incidents

Report from the FEMA National Advisory Council

March 2018

FEMA

Message from the Chairman

March 13, 2018

Dear Administrator Long:

I am pleased to submit this report, *Ensuring Rail Preparedness: Improving Responder Training and Resource Allocation for Rail Hazardous Materials Incidents*, on behalf of the National Advisory Council (NAC), as required by the RESPONSE Act of 2016 (Public Law 114-321).

In November 2017, the RESPONSE Subcommittee provided the NAC with a report evaluating new and developing technologies and methods, the quality and application of training for emergency responders, and the availability and effectiveness of funding for such training. The report contained prosed recommendations for improving emergency responder training and resource allocation for hazardous materials incidents involving railroads. The NAC considered and voted on six of the proposed recommendations in a session held during its public meeting on November 29, 2017. In its discussion and deliberation of the RESPONSE Subcommittee recommendations, the NAC requested additional information regarding the potential impact of one of the proposed recommendations. Upon receiving the requested information, the NAC reconvened in a public meeting on February 23, 2018, to reconsider the final recommendation.

This report contains seven recommendations that the NAC approved, based on proposed recommendations submitted by the NAC Railroad Emergency Services Preparedness, Operational Needs, and Safety Evaluation (RESPONSE) Subcommittee.

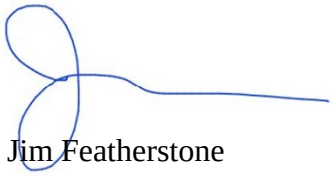
As indicated in the RESPONSE Act of 2016, the NAC is also providing this report to the RESPONSE Subcommittee co-chairpersons, the head agencies represented on the RESPONSE Subcommittee, and specified Senate and House of Representative Committees as follows.

- Kathleen M. Fox, Senior Official Performing the Duties of the Deputy Administrator, Protection and National Preparedness, NAC Response Subcommittee Co-Chair
- Howard McMillan, Executive Director, Pipeline Hazardous Materials Safety Administration, NAC Response Subcommittee Co-Chair
- Chris Howell, Director of Tribal Relations, BNSF Railway Company, NAC Response Subcommittee Co-Chair
- Kirstjen M. Nielsen, Secretary, U.S. Department of Homeland Security
- Howard Elliot, Administrator, Pipeline and Hazardous Materials Safety Administration
- Robert L. Sumwalt, Chairman, National Transportation Safety Board
- Ronald Batory, Administrator, Federal Railroad Administration
- David P. Pekoske, Administrator, Transportation Security Administration
- Paul F. Zukunft, Commandant of the Coast Guard, U.S. Coast Guard

- Scott Pruitt, Administrator, Environmental Protection Agency
- Committee on Homeland Security and Governmental Affairs of the Senate
- Committee on Commerce, Science, and Transportation of the Senate
- Committee on Homeland Security of the House of Representatives
- Committee on Transportation and Infrastructure of the House of Representatives

Please direct inquires related to this report to Deana Platt, Director, Office of the National Advisory Council, at (202) 646-2700.

Sincerely,



Jim Featherstone
Chairman, FEMA National Advisory Council

Ensuring Rail Preparedness: Improving Responder Training and Resource Allocation for Rail Hazardous Materials Incidents

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I. Legislative Requirement

This document responds to the reporting requirements set forth in the RESPONSE Act of 2016 (Public Law 114-321), Section 2, subsection (d) paragraph (7), which states:

Once the National Advisory Council approves the recommendations of the RESPONSE Subcommittee, the National Advisory Council shall submit the report to—

(i) the co-chairpersons of the RESPONSE Subcommittee;

(ii) the head of each other agency represented on the RESPONSE Subcommittee;

(iii) the Committee on Homeland Security and Governmental Affairs of the Senate;

(iv) the Committee on Commerce, Science, and Transportation of the Senate;

(v) the Committee on Homeland Security of the House of Representatives; and

(vi) the Committee on Transportation and Infrastructure of the House of Representatives.

II. Background

According to the Association of American Railroads (AAR), U.S. railroads transport approximately 2.3 million carloads of hazardous materials (HAZMAT) each year. A series of train derailments in 2013 and 2014 in Canada, Alabama, North Dakota, and Virginia involving crude oil shipments underscored the need for a renewed focus on the safe transportation of bulk HAZMAT, specifically flammable liquids by rail. In response to these incidents, former U.S. Department of Transportation (DOT) Secretary Anthony Foxx issued a "Call to Action" in January 2014, calling on rail company executives, associations, shippers, and others to discuss how stakeholders can prevent or mitigate the consequences of rail accidents that involve flammable liquids. Working together, federal, state, local, tribal, and territorial officials, industry partners, and training providers have taken action to ensure the safety of the American public and the environment.

In 2016, more than 99.998 percent of rail HAZMAT shipments reached their destination without a release caused by a train accident, reflecting a 66 percent reduction in the accident rate since 2000.[1] HAZMAT[2] comprises about 8 percent of the commodities shipped by rail in North America—roughly 31 million carloads each year. Crude-by-rail peaked at 493,146 carloads in 2014 and fell to 409,949 carloads in 2015 and 211,986 carloads in 2016 (about 8 percent of HAZMAT and 0.7 percent of total volume).[3] While the accident rate has reduced dramatically, incidents that do occur can pose tremendous challenges for public safety officials and may have significant and devastating consequences for the public, local communities, and the environment. It is important to continue efforts to buy down the risk of incidents through a strategic approach that promotes efficient and effective preparedness and response.[4]

As part of these efforts, the RESPONSE Act of 2016 directed the Federal Emergency Management Agency (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 included federal officials from the Department of Homeland Security (DHS),

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[1] Association of American Railroads, *Railroads: Moving America Safely*, July 2017. Accessed November 1, 2017. Available from https://www.aar.org/BackgroundPapers/Railroads%20Moving%20America%20Safely.pdf.

[2] HAZMAT are defined in DOT regulation as a group or class of materials that the Secretary of Transportation determines may pose an unreasonable risk to health and safety or property when transported in commerce in a particular amount and form. There are nine classes: explosives (Class 1); gases (Class 2); flammable liquids and combustible liquids, such as crude oil and ethanol (Class 3); flammable solid, spontaneously combustible, and dangerous when wet (Class 4); oxidizer and organic peroxide (Class 5); poison (toxic) and poison inhalation hazard (Class 6); radioactive (Class 7); corrosive (Class 8); and miscellaneous (Class 9).

[3] Association of American Railroads, *U.S. Rail Crude Oil Traffic*, May 2017. Accessed November 1, 2017. Available from https://www.aar.org/BackgroundPapers/US%20Rail%20Crude%20Oil%20Traffic.pdf.

[4] DOT/PHMSA, *Crude Oil Emergency Response Lessons Learned Roundtable Report*, PHMSA (Washington, D.C.: July 1, 2014). Available at: http://www.joinnsoar.com/pdf/Lessons_Learned_Roundtable_Report_FINAL_070114.pdf.

DOT, the National Transportation Safety Board (NTSB), and the Environmental Protection Agency (EPA), as well as other qualified individuals from non-federal entities (see Appendix A).

The Subcommittee met six times over seven months, including a pause during disaster operations for Hurricanes Harvey, Irma, and Maria, and a face-to-face meeting at the Security and Emergency Response Training Center (SERTC) to discuss the recommendations. As directed by the RESPONSE Act of 2016, the Subcommittee considered the following topics:

1. New and developing technologies and methods that may be beneficial to preparedness and response to rail HAZMAT incidents;
2. Quality and application of rail HAZMAT incident training for state, local, and tribal emergency responders, including those serving small communities near railroads;
3. Availability and effectiveness of federal, state, local, tribal and nongovernmental funding for rail HAZMAT incident training, including those serving small communities near railroads; and
4. Strategies for integrating commodity flow studies, mapping, and rail and HAZMAT databases for state, local, and tribal emergency responders and increasing the rate of responder access to existing or emerging communications technology.

The Subcommittee presented its findings and proposed recommendations to the NAC in November 2017. The NAC considered, deliberated, and voted on these recommendations at public meetings held November 27, 2017, and February 23, 2018. This report contains the final recommendations from the NAC to the FEMA Administrator.

As directed in the RESPONSE Act of 2016, FEMA will coordinate the implementation of the recommendations as appropriate and provide annual updates to the congressional committees named in the legislation regarding the status of the implementation of the recommendations for two years.

Jurisdictions (states, territories, tribes, and urban areas) frequently identify train derailments and HAZMAT releases as a concern in the annual Threat and Hazard Identification and Risk Assessment (THIRA) submitted to FEMA but these incidents rarely rise to a level requiring federal disaster assistance.

In 2016, 41 jurisdictions listed train derailments and 67 jurisdictions listed HAZMAT releases (fixed facility and transportation) as a concern out of 114 jurisdictions in the THIRA. There is some overlap between these lists – some train derailments lead to HAZMAT releases.

Since 1953, FEMA has issued 3,585 disaster declarations. Only nine have been for toxic substances or chemicals, none for rail HAZMAT. Only one of the nine has occurred since 1992 (Michigan, 2016).

The safety record for transportation of HAZMAT by rail continues to improve; according to data from DOT, train accidents involving the release of HAZMAT reduced from 46 in 2007 to 10 in 2016. Many of these accidents occurred in rural areas.

III. Recommendations

The NAC approved seven recommendations related to rail HAZMAT, which focused on the location and level of training, maximizing efficiencies and effectiveness of training, increasing awareness of and access to training, and supporting outreach and engagement.

Recommendation 1

Federal agencies and training providers should place an emphasis on training in a local/regional/tribal setting with remote/mobile training opportunities.

Discussion
This recommendation addresses the diversity of the responder community (career/paid, volunteer/unpaid, urban, rural, and tribal), the need for multiple training options (competency level and delivery format), and accessibility. The terms "remote" and "mobile" are synonymous, referring to field rather than on-campus or residential-type delivery. Mobile delivery addresses course accessibility by bringing training to the local jurisdictions to reduce travel time, limit time away from other work, and ease the burden of lost wages for volunteer/unpaid emergency responders and backfill/overtime for career/paid emergency responders.

National standards require the majority of emergency responders in the U.S. to complete awareness and operational training. In addition to competency-level training that meets national standards, this remote/mobile training should address technical aspects of response, risk assessment, and planning processes for a HAZMAT rail incident.

Timeframe
Federal agencies could implement this recommendation within one to two years, based on program cycles and available funding.

Recommendation 2

Federal funding opportunities for HAZMAT emergency responder training should be awarded based on open competition from all qualified organizations, including for-profit organizations, ensuring the most efficient and effective use of taxpayer funds.

Before making changes to relevant programs, federal agencies should obtain input from a diverse range of stakeholders, and assess the costs, benefits, and other implications of such changes. Regardless of what type of organization is awarded funding, training will still be provided free of charge to emergency responders.

Discussion
Currently, many federal funding opportunities for HAZMAT emergency responder training providers are limited to universities and non-profit organizations. While FEMA funds some for-profit organizations using cooperative agreements, no federal grants are available to for-profit organizations for HAZMAT training. For-profit organizations can become subcontractors to non-profit organizations; however, this increases costs. By moving to open competition that

includes for-profit organizations, the federal government can ensure that the training provides the greatest benefit for the emergency responder while being the most cost-efficient for the taxpayer.

Altering funding allocations and corresponding eligibility requirements for training providers could have significant implications for the accessibility and availability of training for responders, as well as the capability and capacity for training providers. The NAC discussed the need for federal agencies to analyze data and establish metrics to determine the cost/benefit of for-profit versus non-profit training. They also discussed the need for federal agencies to establish specific parameters and guidance if they decide that for-profit companies can compete for federal funds.

Timeframe
Federal agencies could implement this recommendation within one to two years, based on program cycles and available funding. The move to open competition would require congressional action (authorizations and appropriations).

Recommendation 3

FEMA and DOT should consider allowing funding from grants, cooperative agreements, or other sources to cover a daily training attendance stipend for volunteer/unpaid emergency responders, based on demonstrated need.

Discussion
Volunteer/unpaid responders may attend training offered through online, mobile, and resident (on-campus) deliveries. In many cases, one or more government sources sponsor this training. Volunteer/unpaid responders must however weigh the need for training against the requirements of their full-time paid positions. Attending training can result in personal costs, such as the use of paid leave, vacation time, or lost wages. Revising grant guidance to authorize compensation for volunteer/unpaid emergency responders in the form of a stipend based on the demonstrated need of their departments would reduce this hardship and may result in more individuals attending training.

The NAC indicated the need for additional funding so that this recommendation would not affect other programs. Normally such recommendations are beyond the scope of the NAC, but the RESPONSE Act of 2016 specifically asked the NAC to identify recommendations that may require Congressional action.

Timeframe
This recommendation may require congressional action (appropriations).

Recommendation 4

FEMA and DOT should consider allowing funding from grants, cooperative agreements, or other sources to cover backfill/overtime payments for career/paid emergency responders to attend training, based on demonstrated need.

Discussion
Similar to volunteer/unpaid responders, career/paid responders may attend training offered through online, mobile, and resident (on-campus) deliveries, which one or more government source may sponsor. When career/paid emergency responders attend these classes during a duty shift, their employing department must arrange for other qualified individuals to perform their duties while they are away from the job. Typically, budgets are limited and response departments are unable to pay both the trainee and the individual performing the backfill function. Revising grant guidance to authorize compensation for backfill/overtime costs for career/paid emergency responders, based on the demonstrated need of their departments, would reduce this hardship and may result in more individuals attending training.

Before considering this recommendation, the NAC asked FEMA and PHMSA for projections on what effect this recommendation might have if applied throughout grants programs. In its response, FEMA indicated that the recommendation would not affect FEMA preparedness grants that allow training since these grants already cover backfill and overtime activities for eligible personnel to attend training. For the Pipeline Hazards Materials Safety Administration (PHMSA), the implementation of this recommendation (and recommendation 3) would affect its HAZMAT Emergency Preparedness (HMEP) grant program. This program awards relatively small dollar amounts to state, territorial, and tribal governments, and allowing stipends and backfill/overtime could exhaust available funds and potentially reduce the number of activities performed and responders trained. However, based on feedback from the RESPONSE Subcommittee and HMEP grantees, PHMSA is willing to reconsider its current policy.

Timeframe
This recommendation may require congressional action (appropriations).

Recommendation 5

FEMA should develop plans to coordinate increased communications about training opportunities to tribal communities through the FEMA Regional Tribal Liaisons and Tribal Consultation Coordinators. Coordinated communications with national and regional tribal emergency management organizations should also be included in the plans.

Discussion
The FEMA Tribal Consultation Policy, FP 101-002.01, identifies and outlines the responsibilities of the Regional Tribal Liaisons and Tribal Consultation Coordinators. These individuals should be familiar with the unique circumstances that affect Indian tribes and help the agency identify appropriate tribal officials to contact, methods for notification, and preferred methods of consultation. In its discussion, NAC members supported using these resources for this purpose.

Timeframe
FEMA could implement this recommendation within one to two years, based on program cycles and available funding.

Recommendation 6

FEMA should consult the National Tribal Affairs Advisor, Regional Tribal Liaisons, and Tribal Consultation Coordinators to develop recommendations, guidelines, or online training to assist any and all responders who will be working with tribal responders and tribal governments.

Discussion
FEMA should review the course content of the online class "Working Effectively with Tribal Governments" at https://tribal.golearnportal.org/. The course has an extensive unit in tribal government structure that could provide a starting point for the development of online training geared to responders that may respond to an incident on or near a tribal community or their historic homelands. In its discussion, the NAC also indicated that the FEMA Independent Study Course Building Partnerships with Tribal Governments (IS-650.A) is a valuable resource. Finally, FEMA and DOT should consider targeting grant funds for train-the-trainer programs for tribal communities.

Timeframe

Recommendation 7

Under the direction of PHMSA and FEMA, create a "railroad emergency response toolkit" in a format that allows for the widest possible dissemination of real-time information to the emergency responder and emergency management communities.

Discussion
This toolkit would serve as an informational resource for pre-incident planning and training for responding to railroad emergencies, with a focus on those involving HAZMAT. The intent is to maximize development and sharing of uniform information for responders and planners. The target audience for this toolkit would be fire department commanders and emergency managers at the state, local, and tribal levels. The toolkit should be a compendium of information and resources currently available to emergency responders and emergency managers from sources such as the railroads, HAZMAT shippers, and federal partners.

In terms of disseminating "real-time information," NAC members emphasized the need for the toolkit to include "real-time" data and dashboards to support assessment of unfolding events, and not just information that is historical in nature. While the AskRail® mobile application intends to meet this "real-time" information need, additional dissemination, outreach, and features based on user feedback could improve its utility.

Timeframe
FEMA and PHMSA could implement this recommendation within one to two years, based on program cycles and available funding.

IV. Subcommittee Research and Documentation

This section includes information provided by the NAC RESPONSE Subcommittee in its November 2017 report to the NAC.

New and Developing Technologies and Methods

Subcommittee members provided information related to new and developing technologies and methods that may be beneficial to preparedness and response to rail HAZMAT incidents, including the following points.

1. **AskRail®** is a beneficial smartphone/mobile application (app) for emergency response, planning, and awareness (www.AskRail.us). There are currently over 20,000 registered users (see Figure 1). Emergency responders can use a simple railcar identification (ID) search to access car level commodity, including HAZMAT, information, view the contents of the entire train in some cases, and obtain emergency contact information for all Class I railroads and Amtrak. The app currently updates train consist[5] information in near real-time as trains pass automated trackside car readers positioned at intervals along their routes. Emergency responders are still advised to obtain the latest consist documentation in an emergency from the train crew on-scene or direct communication with the railroad if necessary. Recent enhancements include a Geographic Information System (GIS) map feature that provides isolation zone and points of interest (street or satellite view), integrated access to the DOT Emergency Response Guide (ERG) Book and a list of the top 125 HAZMAT moved annually by the Class I railroads. A desktop version of AskRail® suitable for Emergency Operations Centers (EOCs) and laptops mounted in emergency response vehicles is also available. For security reasons, most users must complete training sponsored by the Class I railroads or SERTC before a railroad administrator grants them access. Access is device-specific and users cannot share user names and passwords. A daily report monitors usage.

Figure 1: AskRail® Registered Users by State

2. The **Computer-Aided Management of Emergency Operations (CAMEO®)** system (https://www.epa.gov/cameo) is widely used to plan for and respond to chemical

[5] The "train consist" is a term used to describe a document that reflects the current position in the train of each rail car containing HAZMAT as required by 49 C.F.R. § 174.26(a).

emergencies, and meet chemical inventory reporting requirements of the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III). The CAMEO® system integrates a chemical database and a method to manage the data, an air dispersion model, and a mapping capability. Working with the Bureau of Census and the U.S. Coast Guard (USCG), EPA and the National Oceanic and Atmospheric Administration (NOAA) continue to enhance the system. Recent enhancements include a tool to enter local information and develop scenarios to better prepare for chemical emergencies. Front-line emergency personnel, Local Emergency Planning Committees (LEPCs), State and Tribal Emergency Response Commissions (SERCs/TERCs), and others use CAMEO®.

3. The **Rail Crossing Locator app and Railroad GIS** developed by the Federal Railroad Administration (FRA) are also beneficial for planning and preparedness. The Rail Crossing Locator app (www.fra.dot.gov/Page/P0845) allows users to locate crossings by U.S. DOT Crossing ID, address or geo-location, access inventory records submitted by states and railroads, and view accident history. The Railroad GIS (http://fragis.fra.dot.gov/GISFRASafety) provides the railroad track and highway/road layers, which allows emergency personnel to identify the rail lines in their area of responsibility.

4. The introduction of small **Unmanned Aerial Systems (Drones)** will enhance responder capabilities for assessment while they remain within the safe zone. Some training providers have courses available or in development on how best to use this technology in incidents such as rail HAZMAT. As highlighted during a 2017 National Response Team (NRT) meeting, several federal agencies cannot use drones as part of a HAZMAT response because the use of drones requires agency-specific policies to be developed. Development of an overarching federal policy for the use of drones by responding federal agencies during response to HAZMAT incidents would be helpful.

5. **FirstNet** (https://www.firstnet.gov) will provide beneficial communications infrastructure over the long term. Authorized by Congress in 2012, its mission is to develop, build, and operate the nationwide public safety broadband network that equips emergency responders to save lives and protect U.S. communities. Additionally, establishing National Information Exchange Model (NIEM) standards will improve interoperability between responders.

6. Raising awareness of HAZMAT transported in communities remains a challenge despite efforts of the U.S. railroads and other stakeholders. PHMSA is working to establish **recommended practices** for persons engaged in HAZMAT transportation by rail t**o help raise awareness** of state and local emergency responders, appropriate federal, state, local, and tribal government organizations, and the public.

FEMA and PHMSA officials contacted several relevant agencies and groups for input, including entities engaged in federally funded research and academic institutions engaged in relevant work and research. For highlights of this input, see Figure 2.

IAEM-USA would like to point to an existing set of regulations developed by voluntary industry consensus in the area of pipelines, and suggest that similar recommended practices/regulations would be beneficial in the railroad environment. We would suggest that the American Petroleum Institute's Recommended Practice 1162, as incorporated into 49 Code of Federal Regulations (CFR) 192.616 and 49 CFR 195.440, would be a great place to start. While the application of new technology in responding to HAZMAT incidents on the railroad has obvious benefits, there is also a great benefit in making sure a baseline level of knowledge and awareness on the part of the public, emergency responders, and public officials is established. Toward that end, consideration in implementing rules and regulations based on the above-referenced CFRs and recommended practice would be of great benefit.

Randall Duncan, Past Chair, Government Affairs Committee
International Association of Emergency Managers (IAEM-USA)

Our biggest concern is avoiding death and injury to responders. The solution is better coordination between railroads and responders so they understand how to protect themselves and their communities while they wait for aid. The most important actions for FEMA and PHMSA would be to increase the ability of responders and community planners to attend industry programs [such as Transportation Community Awareness and Emergency Response (TRANSCAER®)]. This is not a matter of bringing the program to each community, but rather funding attendance in other communities and national training centers.

Timothy Gablehouse, President
National Association of SARA Title III Program Officials (NASTPPO)

AskRail® alone is not sufficient for planning and response. There are times we need to see the whole rail network. We can use the DHS Homeland Security Information Network (HSIN) portal for SSI, so that should not be an issue. Many decisions are coordinated at the EOC rather than the incident site. The EOC is the major node at the state level for planning and coordination, working with the fusion center, state emergency response commission, local agencies, and many others.

Jimmy Gianato, Director, West Virginia
Division of Homeland Security and Emergency Management,
National Emergency Management Association (NEMA)

Figure 2: Consultation Highlights

Quality and Application of Training

In 2015, DOT, EPA, 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 responder training. States attributed these shortfalls to shortages in local responder staffing, which prevent

responders from taking leave to attend specialized training courses.[6] FEMA, PHMSA, and EPA published a joint fact sheet on the available federally supported incident planning and response materials to enhance community preparedness for rail HAZMAT incidents.[7]

The U.S. Occupational Safety and Health Administration (OSHA) developed 1910.120, the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, which defines five levels of training to achieve competency for emergency response: [8]

1. **First Responder Awareness Level** (no minimum hours) is for personnel who are likely to witness or discover a hazardous substance release and who are trained to initiate an emergency response sequence by notifying the proper authorities of the release.

2. **First Responder Operations Level** (8 hours) is for personnel who respond to releases or potential releases of hazardous substances as part of the initial response in a more defensive fashion for the purpose of protecting nearby persons, property, or the environment from the effects of the release.

3. **Hazardous Materials Technician Level** (24 hours) is for personnel who respond to releases or potential releases in a more offensive fashion for the purpose of stopping the release.

4. **Hazardous Materials Specialist Level** (24 hours) is for personnel who respond with and provide support to HAZMAT technicians. They have specific knowledge of the various substances and can act as the site liaison with government authorities.

5. **Incident Commander Level** (24 hours) is for personnel who assume control of the incident scene beyond the awareness level.

OSHA 1910.120 provides the minimum legal requirements affecting HAZMAT training. In coordination with FEMA and the National Fire Protection Association (NFPA), PHMSA published the *2016 Guidelines for Hazardous Materials Response, Planning and Prevention/Mitigation Training*,[9] which cross-walks the minimum training requirements as defined by OSHA 19010.120(q) with the recommended training objectives reflected in other relevant national standards, including NFPA 472 and 473. Many jurisdictions pursue recommended levels of training as defined in these standards, which provide a current definition of competencies and are designed to address recent emergent hazards and response challenges.

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[6] United States, DHS/FEMA, *2016 National Preparedness Report* (Washington: DHS/FEMA, 2016) 71. Accessed November 1, 2017. Available from https://www.fema.gov/media-library-data/1476817353589-987d6a58e2eb124ac6b19ef1f7c9a77d/2016NPR_508c_052716_1600_alla.pdf.

[7] United States, DHS/FEMA, DOT, and EPA, *Preparedness Initiatives for Flammable Liquids/Crude by Rail Incidents* (Washington: DHS/FEMA, 2015). Accessed November 1, 2017. Available from https://www.fema.gov/media-library-data/1436796920966-e26c3e0ca7e0196fd919ef9d2b9c5c2e/FedPrepInitiativesForCrudeOilFactSheet_FINAL_20150624_508c.pdf.

[8] United States, OSHA, *Training Requirements in OSHA Standards (OSHA 2254-09R 2015)*, (Washington: OSHA, 2015) 21-24. Accessed November 1, 2017. Available from https://www.osha.gov/Publications/osha2254.pdf.

[9] See https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/00_Guidelines_Introduction.pdf.

Based on these standards, the majority of emergency responders in the U.S. should be trained to the First Responder Awareness and Operations levels. Training providers offer courses tailored to these competency levels. Awareness level training is suited to online formats (independent study and interactive), while Operations, Technician, and Specialist level training require hands-on activities available only in resident or mobile delivery formats. Incident Commander level training can be provided in online (mainly interactive), resident, or mobile delivery formats depending upon the learning objectives. Discussion of quality and application of training in this report will reference these levels and delivery formats.

Capacity and Ease of Access

Subcommittee members rated the quality of training at the Awareness and Operations levels of competence at 3.69 on average and the ease of access at 3.75 on average, on a scale of 1 to 5, with 5 being Excellent.

This is consistent with U.S. Government Accountability Office (GAO) findings. According to data collected by GAO in 2015 from 23 local planners representing 12 urban and 11 rural counties across 17 states with high volumes of crude oil and other HAZMAT transported by rail, most local planners reported that the rail HAZMAT training was useful in helping their emergency responders prepare for and respond to rail HAZMAT incidents. Some planners told GAO that training that involved "hands on" experience was particularly helpful because it facilitated direct interaction with devices and props that responders would not normally encounter except in a real-world incident. Other planners told GAO that training provides a way for responders to interact face to face with some of the stakeholders they might normally encounter in an incident, such as railroad HAZMAT experts and personnel from other fire departments. Such interaction can facilitate relationships among stakeholders by increasing familiarity and building trust.[10]

Subcommittee members discussed the data indicating that access to training has vastly increased since 2015 (in response to the DOT Call to Action referenced on page 1) for both career/paid and volunteer/unpaid responders. Federal agencies, state, local, and tribal agencies, private academic institutions, non-profits such as TRANSCAER®, and professional associations provide training. In addition, the rail industry supports training in communities along their routes.

Caveat: Data collected by the Subcommittee members are provided in the tables below for training funded and provided by FEMA, PHMSA, and TRANSCAER®. The tables do not include training funded and provided by other organizations such as state fire training academies (e.g., Louisiana State University (LSU), Texas A&M Engineering Extension Service (TEEX), and others). FEMA is working with training partners to develop the National Training and Education System (NTES) to establish a source for comprehensive information on training requirements and opportunities, to help decision makers prioritize investments based on risk and need for all hazards including rail HAZMAT incidents.

[10] GAO, *Hazardous Materials Rail Shipments: Emergency Responders Receive Support, but DOT Could Improve Oversight of Information Sharing*, GAO-17-91 (Washington, D.C.: November 17, 2016), page 14. Available at: http://www.gao.gov/products/GAO-17-91.

FEMA-Funded Training

FEMA provides cooperative agreements to training providers to develop and deliver training to state, local, tribal, and territorial (SLTT) emergency personnel. Relevant rail HAZMAT training is listed in Table 1 below. FEMA funded training for 4,678 responders over the two-year period 2015-2016, with an average of 2,338 trained annually. The decrease in total number of students trained at SERTC from 2015 to 2016 can be attributed to an increase in travel costs rather than a decrease in demand. The cooperative agreement covers the cost of the course itself and the cost of travel. While the basic cost of the course has remained unchanged, the travel costs, especially airfare, have increased. Also factoring into the increased cost per student is the addition of courses offered in Spanish. These have tended to draw students from higher travel costs areas, such as Puerto Rico. When looking at costs per student from 2015 to 2016, the average cost rose by 18 percent, almost entirely due to travel.

Provider and Course	2015	2016	Total Trained
Transportation Technology Center, Inc. (TTCI) Security and Emergency Response Training Center (SERTC)			
Tank Car Specialist (Performance) (40 hours)	204	156	**360**
Highway Emergency Response Specialist (Performance) (40 hours)	295	205	**500**
Leadership and Management of Surface Transportation Incidents (Performance) (40 hours)	62	44	**106**
HAZMAT/WMD Technician for Surface Transportation (Performance) (80 hours)	124	66	**190**
Surface Transportation Emergency Preparedness and Security (STEPS) for Freight by Rail or Highway (Performance) (Mobile) (16 hours)	33	42	**75**
STEPS for Mass Transit and Passenger Rail (Performance) (Mobile) (16 hours)	47	0	**47**
STEPS for Senior Officials or Administrators (Performance) (Mobile) (4 hours)	58	21	**79**
Crude by Rail (CBR) Emergency Response (Performance) (24 hours)	819	423	**1,242**
Sub-Total	1,642	957	**2,599**
Rural Domestic Preparedness Consortium (RDPC)			
Rail Car Incident Response (Awareness) (8 hours)	1,060	677	**1,737**
Emergency Management Institute (EMI)			
VTTX: Gasoline Transportation and Bakken Oil Rail Transportation (Performance) (Web-based) (4 hours)	154	188	**342**
Total Trained	**2,856**	**1,822**	**4,678**

Table 1: FEMA-Funded Training

PHMSA-Funded Training

PHMSA, in collaboration with the FRA, FEMA, EPA, USCG, TRANSCAER®, AAR, rail industry owners and operators, the American Petroleum Institute (API), the Renewable Fuels Association (RFA), and the emergency response community developed a training program called Transportation Rail Incident Preparedness and Response (TRIP-R). TRIP-R is designed to provide critical information on best practices related to rail incidents involving Class 3

flammable liquids, such as crude oil and ethanol. TRIP-R materials are available for download at http://dotHazMat.vividlms.com/tools.asp. DOT/PHMSA does not collect information on the number of emergency responders trained using these materials; however, they do record the number of users logged (over 34,000 as of November 2017). As an example, EPA Region V uses the TRIP-R materials in a one-day workshop with an instructor team representing EPA, USCG (if pertinent), PHMSA, Class 1 railroads in the area, state agencies, and local emergency responders and emergency managers. As of November 2017, EPA has coordinated 12 TRIP-R workshops, with over 1,419 participants. The intent is to learn from past experiences and leverage the expertise of public safety agencies, rail carriers, and industry experts to jointly prepare emergency responders to safely manage incidents involving flammable liquid unit trains. This workshop format has been well received and represents a best practice. See https://response.epa.gov/site/site_profile.aspx?site_id=11306.

TRANSCAER® Training

TRANSCAER® and member organizations delivered training for 102,473 responders over the two-year period 2015-2016, with an average of 51,236 trained annually (see Table 2).[11] Subcommittee members from the rail industry reported a no-show rate of nearly 50 percent for some courses, which results in high costs that are borne primarily by the private sector. Anecdotal evidence suggests that the time commitment to attend training and backfill, overtime, and lost wages were driving factors.

In addition, railroads sponsor thousands of responders to attend courses at SERTC, TEEX,[12] and other state training facilities. Railroads communicate with communities along the right-of-way, offering in person meetings and training. Railroads have also developed online training and fund the SERTC CBR course to increase access to training for responders. Railroads have established partnerships with regional training facilities, such as the Illinois Fire Service Institute (IFSI) CBR program, Mississippi State Fire Academy, and Alabama Fire College. Railroads assisted in the technical review of the training material, conducted train-the-trainer sessions for IFSI instructors, and attended training to assist IFSI instructors in delivery. Similar partnerships have been made with federal agencies (i.e., PHMSA, FRA, EPA) to deliver TRIP-R training to thousands of responders in the last year. Railroads have demonstrated a commitment to assist local, regional, and national training facilities with development of training material, training of local instructors and delivery of training to emergency responders.

TRANSCAER® Member	2015	2016	Total Trained
BNSF Railway (Class I)	10,209	9,601	**19,810**
Canadian National (CN) Railway (Class I)	6,090	8,137	**14,227**
Canadian Pacific Railway (Class I)	7,500	4,048	**11,548**
Central California Traction Company	1,017	--	**1,017**

[11] TRANSCAER® 2016 Fact Sheet (TRANSCAER, 2016). Accessed November 1, 2017. Available from https://www.transcaer.com/docs/general/TRANSCAER-FactSheet2016-WEB-FINAL-HighQ.pdf.

12 Rail HAZMAT training delivered by TEEX is outside of the NDPC and contracted between TEEX and the organization receiving training.

TRANSCAER® Member	2015	2016	Total Trained
Chemours (Memphis Plant)	--	233	**233**
CSX Transportation (Class I)	6,086	6,730	**12,816**
DANA Transport Inc.	888	533	**1,421**
Kansas City Southern Railway (Class I)	--	1,060	**1,060**
Norfolk Southern Railway (Class I)	4,792	5,573	**10,365**
Renewable Fuels Association	793	1,066	**1,859**
Tanner Industries, Inc.	305	815	**1,120**
The Chlorine Institute	986	1,298	**2,284**
The Dow Chemical Company	1,223	723	**1,946**
Union Pacific Railroad (Class I)	8,181	8,000	**16,181**
Wheeling and Lake Erie Railway (Class II)	197	182	**379**
Canadian TRANSCAER® Regional Committee	4,207	2,000	**6,207**
Total Trained	**52,474**	**49,999**	**102,473**

Table 2: TRANSCAER® Training

SERTC Training

SERTC delivers 26 courses, including 17 residential (on-campus), 4 mobile, and 5 web-based courses (see Table 3). Ten courses (38 percent of the curriculum) are federally funded. As a member of the National Domestic Preparedness Consortium (NDPC),[13] SERTC receives funding from FEMA. FEMA funds five residential and three mobile courses (see Table 1), while PHMSA funds one mobile and one web-based course. Based on calendar year 2015 and 2016, SERTC trained an average of 7,013 state, local, and tribal responders annually. Of those, 38 percent (2,649) were trained annually using federal funding, with FEMA covering 19 percent (1,300) and PHMSA covering 19 percent (1,349). Sixty two percent (4,364) of participants were trained annually by SERTC using funding from the rail industry. As of June 22, 2017, 396 responders are on a waiting list to attend one or more courses. Approximately 300 responders on average are waitlisted each year. Seats for both residential and mobile delivery are available; however, costs associated with backfill/overtime/lost wages limit the ability of many responders to participate. Additional funding, including greater flexibility to fund backfill/overtime/lost wages from all sponsors,[14] would allow SERTC to reduce this waiting list. Data shows that web-based courses are not as well attended as residential or mobile courses. Where possible, SERTC reallocates funds to offer additional residential or mobile courses to meet emergency responders' needs.

[13] NDPC is a professional alliance of seven training institutions that serve as national centers of excellence for unique focus areas relevant to preparedness and response for incidents involving HAZMAT and weapons of mass destruction. SERTC focuses on Surface Transportation.

[14] Backfill and overtime for career/paid responders and compensation for lost wages for volunteer/unpaid responders are allowable expenses under several FEMA grant programs.

Format and Course		2015	2016	Total Trained
Residential				
FEMA-funded courses (see Table 1 above)		1,504	894	**2,398**
PHMSA-funded courses		0	0	**0**
Industry-funded courses		1,380	999	**2,379**
	Sub-Total	2,884	1,893	**4,777**
Mobile				
FEMA-funded courses (see Table 1 above)		138	63	**201**
PHMSA-funded courses		0	1,784	**1,784**
Industry-funded courses		0	0	**0**
	Sub-Total	138	1,847	**1,985**
Online (Web-Based Training)				
FEMA-funded courses (see Table 1 above)		0	0	**0**
PHMSA-funded courses		0	914	**914**
Industry-funded courses		3,802	2,549	**6,351**
	Sub-Total	3,802	3,463	**7,265**
	Total Trained	**6,824**	**7,203**	**14,027**

Table 3: SERTC Training

Current Challenges

As one Subcommittee member noted, *if* you know where to go, there are a number of good training sources out there. Given the diversity within the emergency responder community (i.e., career/paid, volunteer/unpaid, urban, rural, and tribal), it is best to provide a variety of training options, using a tiered approach based on competency level (awareness through commander) and delivery format (online, mobile, resident). Many local communities are struggling to keep their fire departments running. Seventy percent of firefighters across the country are volunteers.[15] Volunteer fire departments struggle with funding for basic equipment and protective gear; for most, training involves emergency medical services (EMS) and very little HAZMAT, ordinarily a class or two on the basics, not on rail issues. In the current fiscal environment, it is difficult for volunteer departments to commit resources to prepare for low probability/high consequence events they may never face, like rail HAZMAT. Some Subcommittee members noted that funding alone will not resolve current challenges with participation. For example, North Dakota's legislature set aside funding during the 2015-2016 biennium for career/paid and volunteer/unpaid firefighters to attend training at SERTC. Although the funding included backfill, only $14,000 of the $500,000 (2.8 percent) was spent. While backfill/overtime/lost wages are often cited as challenges, participation ultimately depends upon available staffing levels and the relevance of the topic to the trainee's normal duties.

[15] J.G. Haynes Hylton and Gary P. Stein, "The U.S. Fire Department Profile through 2015," National Fire Protection Association (NFPA). NFPA, April 2017. Accessed November 1, 2017. Available from http://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/the-fire-service/administration/us-fire-department-profile

This is consistent with GAO findings. According to data collected by GAO in 2015 from 23 local planners representing 12 urban and 11 rural counties across 17 states with high volumes of crude oil and other HAZMAT transported by rail, local planners reported that various obstacles impede their emergency responders' participation in training to the First Responder Operations Level.[16] Factors discouraging participation included:

- Time commitment (reported by all 23 planners, 11 rural and 12 urban)
- Unpaid time off work (reported by 14 planners, 8 rural and 6 urban)
- Not excused from duty (backfill/staffing) (reported by 12 planners, 4 rural and 8 urban)
- Must travel outside the county (reported by 8 planners, 4 rural and 4 urban)
- Training offered at inconvenient times (reported by 6 planners, 3 rural and 3 urban)
- Responders are not aware of training available (reported by 3 planners, 1 rural and 2 urban)

According to the data collected by GAO, the leading factor discouraging participation was the time commitment to attend training. Participation depends on responders being able to attend without neglecting other professional and personal responsibilities. The second leading factor discouraging participation was the requirement in some cases to take unpaid time off work to attend training, which is particularly challenging for rural counties with largely volunteer/unpaid firefighter workforces. Even when training is offered during weekends or non-work hours, it can be difficult to get participants because of family commitments and other responsibilities. Another obstacle to participation is backfill—a replacement worker to cover the shift of the person attending training. According to one planner from an urban county, most fire departments operate with the bare minimum workforce so sending anyone away to training has a big impact on the budget because the county may need to pay existing staff overtime to work an additional shift. Backfill and overtime can cost up to three times as much as the cost of the training itself. As a result, some fire departments can be unwilling to send responders to training, even if the cost of the training is covered by other entities. A consequence of such obstacles is that fire departments are not able to train their entire force at one point in time and that their responders have varying levels of training. Sending the entire force—volunteer/unpaid or career/paid—to training is cost prohibitive and otherwise impractical.

Given the factors cited above, Subcommittee members discussed several options. One potential solution could be to allow greater flexibility to use federal grant funding to pay for attendance of emergency responders at HAZMAT training approved by FEMA or PHMSA, to include mileage for travel, backfill/overtime, and a stipend to compensate volunteers for their time and lost wages. As a general rule, FEMA and PHMSA have the legal authority to allow for the payment of travel, backfill, overtime under most existing programs. In practice, the decision to exercise the authority is effectively limited by the availability of funding appropriated by Congress. Under most grant programs, adding a stipend for lost wages without reducing the number of responders trained would require congressional action through the appropriations process. Given that 70 percent of the nation's firefighters are volunteers, a stipend to compensate them for lost

[16] GAO, Hazardous Materials Rail Shipments: Emergency Responders Receive Support, but DOT Could Improve Oversight of Information Sharing, GAO-17-91 (Washington, D.C.: November 17, 2016), page 16. Available at: http://www.gao.gov/products/GAO-17-91.

wages would help achieve the desired outcome of more firefighters trained to national standards. Another potential solution could be to implement a regional approach to training, in which training providers schedule mobile deliveries for a single- or multi- state geographical area and work with local agencies to ensure all SLTT communities bordering rail routes are invited to participate. This solution would reinforce a regional approach to preparedness and response for rail incidents, and help SLTT communities to develop and strengthen peer relationships, mutual aid agreements, and requirements for follow-on training and exercises. Greater targeted outreach to tribal organizations could help to improve tribal awareness and participation. Several federal agencies and at least one railroad have tribal liaisons who could advise and assist with this effort.

Projected Needs

The majority of emergency responders for rail HAZMAT incidents are firefighters. The NFPA surveyed U.S. fire departments in 2015 as part of their fourth needs assessment (see Table 4).[17] According to the NFPA, there were **26,322** fire departments and **1,149,300** local firefighters in the United States in 2015.

- 30 percent (341,150) were career/paid firefighters.
- 70 percent (808,150) were volunteer/unpaid firefighters.

Based on NFPA data, roughly 78 percent of all departments (18,769) perform HAZMAT response, ranging from 100 percent of departments serving communities with 500,000 or more population to 60 percent of departments serving communities with less than 2,500 population. This 2015 estimate of 78 percent is largely unchanged from 77 percent in both 2001 and 2010. EPA and OSHA requirements specify that all assigned personnel must have formal training. An estimated 60 percent of all departments (15,793) provide HAZMAT response but have not formally trained all their assigned personnel; this is up from 57 percent in 2001 and 50 percent in 2010. Among departments protecting populations under 2,500, HAZMAT ranked as one of the top three training needs (68 percent of those departments). Among departments protecting populations of 500,000 or more, HAZMAT ranked as one of the top four training needs (22 percent of those departments). Because newly hired personnel and personnel newly assigned to HAZMAT must be trained, the percentage of assigned personnel with formal training can vary greatly over time for an individual department. In addition, departments new to HAZMAT may begin providing service before all involved personnel are formally trained. Many of these departments do not protect areas directly involved in transportation of HAZMAT by rail; some may be involved through mutual aid, which points to a gap in the data. Based on the data, requests for HAZMAT training (both rail and non-rail) will continue to grow, especially for courses that meet requirements for certification or annual refresher training as identified in relevant national standards, including OSHA 1910.120, NFPA 472 and NFPA 1072.

[17] NFPA, *Fourth Needs Assessment of the US Fire Service*, November 2016. Accessed November 1, 2017. Available from http://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/the-fire-service/administration/needs-assessment

Population Protected	Total # Paid	Total # Volunteer	Total # Depts.	# HAZMAT Depts.	# HAZMAT Depts. That Need Training	% Personnel Certified in HAZMAT Depts.		
						Not Certified	Awareness Level	Operations Level
500,000 or more	72,850	6,300	56	56	12	0.0%	14.2%	56.6%
250,000 to 499,999	25,550	3,550	61	60	10	0.5%	21.9%	51.9%
100,000 to 249,999	48,450	3,700	250	233	15	0.5%	16.1%	61.7%
50,000 to 99,999	41,850	6,900	483	449	58	1.7%	15.4%	56.2%
25,000 to 49,999	48,550	22,800	1,103	977	254	2.2%	17.0%	57.5%
10,000 to 24,999	52,200	77,300	2,960	2,613	1,302	4.7%	21.6%	56.6%
5,000 to 9,999	17,350	108,050	3,703	2,996	2,185	10.3%	33.9%	51.3%
2,500 to 4,999	16,850	201,300	4,773	3,631	3,246	12.6%	42.7%	40.6%
Under 2,500	17,500	378,250	12,933	7,554	8,795	19.0%	46.5%	31.5%
Total	341,150	808,150	26,322	18,769	15,793	13.7%	39.0%	40.7%

Table 4: Summary of Data from NFPA Needs Assessment

PHMSA currently identifies the bulk shipment of flammable liquids as a priority transportation risk and constantly examines this and other emerging risks (such as the shipment of other energy products like liquefied natural gas).[18] The U.S. Energy Information Administration (EIA) reports that 175,181 barrels of crude oil and 236,867 barrels of fuel ethanol were moved by rail in 2016, with total production and transport by rail of both flammable liquids projected to rise in 2017. For crude oil, the volume transported by rail depends on several factors, including production volumes, pipeline capacity, and price spreads. For ethanol, the volume transported by rail aligns well with production volume, as rail is the primary mode used to transport ethanol.[19] This trend suggests that, going forward, training for response to rail HAZMAT incidents needs to address all Class 3 liquids.[20]

Several Subcommittee members expressed concern about projecting needs based on a single threat or hazard (e.g., ethanol or crude oil) or a single mode of transportation (e.g., rail or pipeline). Instead, communities could use a risk-based approach such as the THIRA, which helps the whole community understand its risks and estimate capability requirements. Using a

[18] U.S. Department of Transportation, PHMSA, *2013-2014 Biennial Report to Congress (*Washington, D.C.: PHMSA, 2015) 56. Available at: https://www.phmsa.dot.gov/news/hazardous-materials-transportation-biennial-report-2013-2014.

[19] U.S. Energy Information Administration, *Recent data show divergent trends for rail shipments of crude oil, ethanol, and biodiesel*, June 6, 2016. Accessed November 1, 2017. Available from https://www.eia.gov/todayinenergy/detail.php?id=26512.

[20] For more information, please refer to a new report issued in October 2017 by the National Academy of Sciences, Engineering, and Medicine. Available from: http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=24923&_ga=2.191722536.325209052.1507910158-506492114.1506975596.

risk-based approach,[21] jurisdictions can project needs and set priorities for HAZMAT preparedness and response.

Availability and Effectiveness of Funding for Training

Funding Levels

Since 2015, FEMA has invested $10.8 million to support training related to HAZMAT transportation incidents. Training includes classroom and web-based deliveries. Funding details are provided Table 5 below.

Training Provider	FY2015	FY2016
TTCI/SERTC[22]	$5,000,000	$5,000,000
Rural Domestic Preparedness Consortium	$336,000	$450,000
Emergency Management Institute[23]	$0	$0
Total:	**$5,336,000**	**$5,450,000**
Grand Total:		**$10,786,000**

Table 5: FEMA Investments in HAZMAT Related Training

In addition, FEMA awards nearly $2 billion annually in grants to SLTT governments under six programs (see Table 6) that cover training for rail HAZMAT incidents as an allowable expense. Funds can be used to provide backfill/overtime/lost wages to attend FEMA-approved courses. An informal key word search of grant reporting data indicated that grantees used at least $1.5 million over the two-year period 2015-2016 for rail HAZMAT-related expenses.

Program	FY2015	FY2016	Total Awarded
Assistance to Firefighter Grant (AFG)	$306,000,000	$217,024,524	$523,024,524
Emergency Management Performance Grant (EMPG)	$350,100,000	$350,100,000	$700,200,000
State Homeland Security Grant Program (SHSP)	$402,000,000	$402,000,000	$804,000
Urban Area Security Initiative (UASI)	$587,000,000	$580,000,000	$1,167,000,000
Staffing for Adequate Fire and Emergency Response Grants	$340,000,000	$228,979,898	$568,979,898
Tribal Homeland Security Grant	$10,000,000	$10,000,000	$20,000,000
Subtotal Awarded	**$1,995,100,000**	**$1,788,104,422**	**$3,783,204,422**

Table 6: Relevant FEMA Preparedness Grants

Since 2015, PHMSA has awarded $45.5 million in grants to SLTT governments to plan and train for rail HAZMAT incidents (see Table 7). Funding is awarded bi-annually.

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[21] NFPA 472 defines the risk-based response process as a systematic process by which responders analyze a problem involve HAZMAT/WMD, assess the hazards, evaluate the potential consequences, and determine appropriate response actions based upon facts, science, and the circumstances of the incident.

[22] SERTC became a member of the NDPC in 2007, receiving $4.8 Million in FY 2009 and 2010, and $5 Million annually since FY 2014.

[23] EMI conducts the virtual tabletop exercises with government employees rather than contract support.

Program	FY2015	FY2016	Total Awarded
Assistance for Local Emergency Response Training (ALERT)	$5,941,146	--	$5,941,146
University of Findlay (All Hazards Training Center), Findlay, OH	$611,491	--	
International Association of Fire Chiefs, Fairfax, VA	$2,654,235	--	
Center for Rural Development, Somerset, KY	$2,675,470	--	
Hazardous Materials Emergency Preparedness Grants (HMEP)	$19,922,952	$19,645,000	$39,567,952
Total Awarded			**$45,509,098**

Table 7: PHMSA Grants

In 2015, PHMSA awarded $5.9 million under the ALERT grant. These grants went to three non-profit entities to train emergency responders to effectively respond to incidents that involve shipments of crude oil, ethanol, and other flammable liquids by rail with a specific focus on volunteer or remote emergency responders. Biannual reports from ALERT grantees indicated the following:

- **Center for Rural Development (CRD)** – CRD developed and delivered two courses:
  - *Introduction to Incidents Involving Flammable Liquids Transported by Rail* is a four-hour self-guided, web-based training geared for individuals with a HAZMAT operations level background. The course went live on February 6, 2016. As of September 2017, CRD trained a total of 1,050 responders.
  - *Responding to Incidents Involving Flammable Liquids Transported by Rail* is an eight-hour, instructor-led mobile training at sites across the nation. The training includes trailers designed to expose the participants to the most common types of housings, valves, and pressure relief devices found on railcars used in the transportation of flammable liquids. The course went live on May 7, 2016. As of September 2017, CRD reported a total of 142 remote deliveries and 2,483 completions.
- **International Association of Fire Chiefs (IAFC)** – The IAFC partnered with other fire service organizations to develop a blended learning program (a combination of online and in-person training) for emergency responders to effectively manage incidents involving the transportation of crude oil, ethanol, and other flammable liquids by rail. As of September 2017, IAFC has conducted the following training:
  - Regional Rail Response Mobile Course (8 hours). IAFC trained 437 emergency responders, exceeding the goal of 200.
  - Ethanol Safety Seminars Course (8 hours). IAFC trained 774, exceeding the goal of 450.
  - Online Hydrogen Response (2 hours): IAFC trained 669 responders.
  - Online Ethanol Response (2 hours): IAFC trained 910 responders.
- **University of Findlay (UF) –** UF offers 50-to-70 deliveries of the eight-hour Rail HAZMAT Response Operations Level course within a 500-mile radius, focusing on volunteer and remote emergency responders. As of March 30, 2017, UF has conducted 58 deliveries with 1,203 trained.
  - Hydrogen Response Online Course (2 hours), as of September 2017, UF had conducted 96 deliveries with 1,849 trained.

In October 2017, PHMSA awarded $2.4 million for the second round of ALERT grants. Recipients include the CRD ($950,000), the IAFC ($500,000), and the UF ($950,000). Further information on the ALERT grant is available at https://cms.phmsa.dot.gov/grants/hazmat/assistance-local-emergency-response-training-alert.

In addition, PHMSA awards approximately $20 million annually in HMEP grants to states, territories, and tribal governments for HAZMAT transportation preparedness related activities (i.e., updating emergency response plans, conducting commodity flow studies, and providing response training in accordance with the NFPA-472 standards).[24] Grant funding for states and territories are based on an allocation formula factoring in incident data, known commodity flow, and registered shippers. Grant funding for tribal nations are based on applicant submissions. Regarding training, the grants enable states and tribes to develop and deliver training and fund travel (lodging and per diem) for participants. HMEP grants do not cover backfill/overtime/lost wages. On average, over 90,000 responders are trained annually using HMEP funds. Further information on the HMEP grant is available at https://www.phmsa.dot.gov/news/phmsa-awards-20m-hazmat-emergency-preparedness-grants-states-territories-and-tribes.

FRA provides TRANSCAER® roughly $75,000 annually in grant funding for rail HAZMAT training. This grant is funded from general appropriations and is not guaranteed annually. Private sector members provide resources in kind.

In 2014, the Class I railroads supported SERTC with a $5 million donation towards building the props and curriculum for the CBR course and training 1,500 responders in 2015. Railroads have also donated numerous tank car props to facilities across the nation for state and local training and continued to fund responder training. For example, in the 2015-2016 period, the railroads provided additional funding for tuition and travel for 2,379 responders who attended the CBR course at SERTC (see Table 3). SERTC provided a rough estimate for the railroad funded tuition cost (not travel) at $4.4 million, roughly $1,850 per responder. The rail industry does not cover backfill/overtime/lost wages for responders attending training. This partial estimate does not reflect the total amount of funding expended by the rail industry in all of the various HAZMAT training provided by the member railroads individually, through TRANSCAER or at SERTC.

Potential Cost Saving Measures to Increase Training Opportunities

Data shows that emergency responders prefer in-person training to online training. Greater use of online deliveries, while less expensive, may not result in greater participation.

For command officers and senior leadership, the TRIP-R Workshop format used by EPA Region 5 has been very effective, based on participant evaluations and surveys, in getting the right people in the room, facilitating networking, and providing the latest findings, observations, and gaps to the attendees. Some Subcommittee members noted that TRIP-R is a best practice.

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[24] Information on HMEP funding awarded to States, Territories, and Native American Tribes for FY 2016 is available on the PHMSA web site at: https://www.phmsa.dot.gov/news/dot-announces-over-238-million-fy-2017-hazardous-materials-planning-and-training-grants.

One potential cost saving measure is greater use of open competition and public-private partnerships to allow both for-profit and non-profit organizations to apply for grants and cooperative agreements. For example, TTCI/SERTC has managed to maintain a low rate of management and administrative costs by using some private monies for curriculum development and materials through public-private partnership with the railroad industry. With the CBR course, the rail industry provided a significant portion of the development funding, donated tank cars at scrap value, and moved the cars to the site. As a for-profit organization, TTCI/SERTC reinvests profits to develop the site and procure equipment for this course, so that grant funding can be used solely for training. Greater use of open competition and public-private partnerships would allow federal agencies to control costs and leverage available funding from all sources

Another potential cost-saving measure is expanded use of training needs analysis. FEMA and its training partners developed the Readiness Training Identification Preparedness Planning (RTIPP) course to teach a consistent process for state, local, and tribal jurisdictions to identify their own training needs and gaps and develop multi-year training and education plans to fill the gaps using courses from all available providers. Since 2011, FEMA and its training partners have conducted the training with 103 jurisdictions and four states have produced training plans. Florida, Kentucky, Indiana, and the U.S. Virgin Islands have all adopted RTIPP as part of their statewide strategies. The success of RTIPP depends on active participation and commitment at the state level. Expanded participation in RTIPP would enable FEMA to compile national training demand data to inform decisions about course development and delivery schedules. This would help to improve efficiency and reduce unintended duplications.

Strategies

Integrating Commodity Flow Studies, Mapping, and Databases for Responders
While a variety of information resources are available to assist emergency responders and emergency managers with planning and response, they are not organized for easy access via a single website or smart phone app. Some Subcommittee members felt that the lack of a single website or smart phone app is not a major issue and presented several perspectives.

Emergency Responder Perspective: Subcommittee discussion on this topic focused on the differences between information needs for planning, training, and response. While having a "one stop shop" for all information regarding rail incidents might be convenient, it may not be the best solution. During planning and training, it is often useful to access different resources to consider all the different perspectives and reasoning that encompass how and why things are done the way they are. Rather than focus on easy access to information tools, it is more important to develop relationships with railroad representatives (i.e., HAZMAT / Dangerous Goods Officers) and have them participate in planning and training. They have access to loads of information and the experience to address issues that the plans may not cover.

Academic Perspective: Many communities perceive rail HAZMAT transport as one of their top preparedness challenges. Local HAZMAT commodity flow studies can help communities reduce uncertainties about the types and quantities of materials that are in the transportation

system. These studies often use information provided by Class I railroads to LEPCs;[25] they may also be supplemented with or based exclusively on observational counts of railcar and HAZMAT placards. These studies are often conducted with support of the PHMSA HMEP grant, which requires a 25 percent match from non-federally sourced funds.[26] The utility and value of this information for local emergency planning and response depends substantially on how the information is compiled, summarized, and provided by the railroads. Emergency planners can use it to identify most-frequently transported materials by name, United Nations/North American (UN/NA) number, and class, as well as materials that require specialized response considerations, procedures, or equipment. Emergency responders can use this information to identify the most-likely materials they would encounter or materials that would require special responder considerations in a rail HAZMAT incident. Planners and responders can develop most-likely and worst-case release scenarios and consequences for rail HAZMAT incidents, update plans and procedures, identify training needs and gaps, and exercise the plans. They can work with public and private partners (described under EPCRA and FEMA guidance) to ensure that mutual aid agreements and emergency communications protocols are up-to-date. Planners and responders can evaluate resources that may be needed, where those resources are, and how they will be accessed. Maps of potentially affected populations and critical infrastructure that are in proximity to rail lines can help communicate risk to local officials and other decision-makers who may not think about consequences on a daily basis. Most importantly, responders and their public and private partners should work together frequently on a face-to-face basis, so that the first time they meet is not at the scene of an incident.

Rail Industry Perspective: Information and tools are available from a variety of sources for preplanning by jurisdictions, similar to preplanning for other hazards. AAR Circular OT-55-P: "Recommended Railroad Operating Practices for the Transportation of Hazardous Materials," states that AAR members will assist LEPCs when requested in assessing the HAZMAT moving through their communities and the safeguards that are in place to protect against unintentional releases. Upon formal written request, AAR members will provide bona fide emergency response agencies or planning groups with specific commodity flow information covering all HAZMAT transported through the community for a 12-month period in rank order by number of shipments. Commodity flow information may change over time. The rail industry considers this to be sensitive security information (SSI) and requires recipients to agree to release it only to bona fide emergency planning and response organizations and not to distribute it publicly in whole or in part without written permission. Track maps are readily available online as public information on the FRA website, with crossings, mileposts and other structures. FRA also developed a Rail Crossing Locator app, which allows users to locate highway rail crossings by U.S. DOT Crossing ID, address, or geo-location; access inventory records submitted by states and railroads; and view accident history. In addition, various HAZMAT databases are available

[25] Data summaries and project reports that include rail HAZMAT transport information provided by Class I railroads must abide by Sensitive Security Information (SSI) labeling and distribution requirements, which are covered under 49 CFR Parts 15 and 1520. SSI designation eliminates the ability to provide detailed briefings in LEPC and other public meetings, but emergency planners and other officials with a need-to-know may be briefed separately upon request.

[26] Match funding is a significant barrier for many communities. PHMSA and State Emergency Response Commissions should education for local communities about match funding, which will benefit HMEP Planning Grants and many other grant programs.

online which are free to use. Responders can use the commodity flow information, track maps and other online resources to develop plans.

Increasing the Rate of Access to Communications Technology for Responders

Increasing the rate of access to communications technology for emergency responders is part of a broader public safety communications strategic environment, which is going through unprecedented change with the deployment of cellular broadband networks (e.g., First Responder Network Authority capabilities). DHS Office of Emergency Communications (OEC), working with partners across all levels of government and in the private sector, recognizes the need to develop standard operating procedures on how to use broadband communications capabilities, multimedia information interoperability standards, and information sharing standards.

In 2016, SAFECOM and the National Council of Statewide Interoperability Coordinators (NCSWIC) established a joint working group to provide the public safety community with leadership, education, and guidance on Identity, Credentialing, and Access Management (ICAM) standards and best practices. Immediate access to critical information will provide public safety personnel with the ability to make informed decisions and better protect themselves and the public. Collectively, the public safety community lacks a nationwide interoperable information sharing system to coordinate across all public safety disciplines. As a result, information is stored in disparate systems, making it difficult for federal, state, local, and tribal agencies to access and share information. A federated approach promotes mutual trust and interoperability between public safety agencies and communities of interest. Federated organizations have the autonomy to set agreed-upon rules for establishing trust and conditions for sharing information. Currently, there are many trust frameworks in place to support various ICAM needs and identity federations. SAFECOM and the NCSWIC are committed to working with ICAM providers to communicate public safety needs and establish a nationwide ICAM solution.

Subcommittee members identified various internet-based applications that are critical to effective management of rail HAZMAT incidents. Incident command also relies on video and sensor data and increasingly on access to video from drones. All of these tools require access to reliable broadband data. Because it is critical to establish and maintain effective communication capabilities to support incident management, the incident communications support component must have the capacity and the established role within the Incident Command System (ICS) to manage and support both voice and data communications. In 2017, OEC in collaboration with SAFECOM and NCSWIC, established a working group to identify and update the functions, roles, policies, governance and training required to enable the incident communications function to support the expanding incident voice and data requirements. This working group will make recommendations to FEMA in 2018.

The OEC Technical Assistance program serves all 56 states and territories and provides direct support to state, local, and tribal responders and officials through development and delivery of training, tools, and onsite assistance to advance public safety interoperable communications capabilities. Technical assistance offerings include instruction and assistance with the planning, governance, operational, and technical aspects of developing and implementing interoperable communications initiatives to help responders communicate during disasters or large-scale planned events. OEC will develop and deliver training to the nation’s responders when the new

functions, roles, policies, governance, and training requirements for the incident communication support component are established.

Conclusion

FEMA and PHMSA, working with other federal partners, the rail industry, and other relevant agencies and organizations, have taken steps to advance preparedness for HAZMAT transportation incidents, including crude-by-rail. The NAC RESPONSE Subcommittee examined the topics identified in the RESPONSE Act of 2016 and identified recommendations that could help to increase participation as well as the overall cost-effectiveness and impact of relevant training offered by public and private organizations.

Since 2015, federal and private partners have invested more than $11,375,000 annually in responder training for rail HAZMAT incidents, including FEMA with more than $5.4 million, PHMSA with more than $5.9 million, FRA/TRANSCAER® with more than $75,000 (which does not include industry contributions), and the rail industry with more than $2.2 million for the SERTC CBR course alone. Using these funds, training providers have trained more than 62,936 responders annually, including FEMA with 2,338 responders, PHMSA with 8,172 responders, FRA/TRANSCAER® with 51,236 responders, and the rail industry with more than 1,190 responders for the SERTC CBR course alone. This training is provided in a variety of delivery formats (online, mobile, and resident), with varying costs per student. FEMA and PHMSA have also provided more than $1.9 billion annually in preparedness grants to SLTT governments, including more than $1.89 billion from FEMA for all-hazards and more than $19.8 million from PHMSA for rail HAZMAT specifically. Using these grants, SLTT governments have invested in a variety of activities, including training. While the FEMA grants have a broader scope and audience, making it difficult to estimate the number of responders trained annually in rail HAZMAT, PHMSA grants are used to train more than 90,000 responders annually. Based on the NFPA data, requests for HAZMAT training (both rail and non-rail) will continue to grow, especially for courses that meet requirements for certification or annual refresher training as identified in relevant national standards. While the report is focused on rail HAZMAT, the FEMA NAC has an opportunity to provide recommendations to the FEMA Administrator and other senior leaders, consistent with their roles and responsibilities, which could help to strengthen preparedness for all HAZMAT incidents.

As one Subcommittee member put it:

> *This Subcommittee represents the nation. Our concerns are for the safety and well-being of emergency responders who protect our citizens and communities. There has to be shared responsibility by all stakeholders (i.e., federal, state, local, tribal, and territorial agencies, industry, labor, and training providers) to ensure responders are trained for the dangers that they will face during rail HAZMAT incidents. Ideally, after the FEMA NAC has completed its work, states and tribes will take advantage of the programs to help them train and sustain their emergency responders. The objective of the Subcommittee was to present the best recommendations possible so that after each response, emergency responders go back safely to their homes and families—because in our hearts we all care that they are making sacrifices each time the tones sound.*

Appendix A: Acronyms

AAR	Association of American Railroads
ALERT	Assistance for Local Emergency Response Training
API	American Petroleum Institute
App	Application
CAMEO®	Computer-Aided Management of Emergency Operations
CBR	Crude by Rail
CFR	Code of Federal Regulations
CRD	Center for Rural Development
DHS	Department of Homeland Security
DOT	Department of Transportation
EIA	Energy Information Administration
EMI	Emergency Management Institute
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERG	Emergency Response Guide
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
GAO	Government Accountability Office
GIS	Geographic Information System
HAZMAT	Hazardous Materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
HMEP	HAZMAT Emergency Preparedness
IAEM	International Association of Emergency Managers
IAFC	International Association of Fire Chiefs
ICAM	Identity, Credentialing, and Access Management
ICS	Incident Command System
ID	Identification
IFSI	Illinois Fire Service Institute
LEPC	Local Emergency Planning Committee

LSU	Louisiana State University
NAC	National Advisory Council
NASTPPO	National Association of SARA Title III Program Officials
NCSWIC	National Council of Statewide Interoperability Coordinators
NDPC	National Domestic Preparedness Consortium
NEMA	National Emergency Management Association
NFPA	National Fire Protection Association
NIEM	National Information Exchange Model
NOAA	National Oceanic and Atmospheric Administration
NRT	National Response Team
NTES	National Training and Education System
NTSB	National Transportation Safety Board
OEC	Office of Emergency Communications
OSHA	Occupational Safety and Health Administration
PHMSA	Pipeline Hazards Materials Safety Administration
RDPC	Rural Domestic Preparedness Consortium
RESPONSE	Railroad Emergency Services Preparedness, Operational Needs, and Safety Evaluation
RFA	Renewable Fuels Association
RTIPP	Readiness Training Identification Preparedness Planning
SERC	State Emergency Response Commission
SERTC	Security and Emergency Response Training Center
SLTT	State, Local, Tribal, and Territorial
SSI	Sensitive Security Information
TEEX	Texas A&M Engineering Extension Service
TERC	Tribal Emergency Response Commission
THIRA	Threat and Hazard Identification and Risk Assessment
TRANSCAER®	Transportation Community Awareness and Emergency Response
TRIP-R	Transportation Rail Incident Preparedness and Response
TTCI	Transportation Technology Center, Inc.
UF	University of Findlay
USCG	U.S. Coast Guard

Appendix B: FEMA NAC RESPONSE Subcommittee Membership

Subcommittee Leadership

Ms. Kathleen Fox, Co-Chair
Washington, DC
Title: Senior Official Performing the Duties of the Deputy Administrator, Protection and National Preparedness, FEMA, DHS
Category: Named Federal Official

Mr. Howard McMillan, Co-Chair
Washington, DC
Title: Executive Director, PHMSA, DOT
Category: Named Federal Official

Mr. Chris Howell, Co-Chair
Fort Worth, TX, and Kansas City, KS
Title: Director of Tribal Relations, BNSF Railway Company
Category: NAC (NAC Response & Recovery Committee Vice Chair)

Subcommittee Members

Mr. Karl Alexy
Washington, DC
Title: Director, Office of Safety Analysis, FRA, DOT
Category: Named Federal Official (designee)

Dr. David Bierling
College Station, TX
Title: Research Scientist, Texas A&M Transportation Institute
Category: Technical Expert

Mr. Patrick Brady
Fort Worth, TX
Title: General Director, HAZMAT Safety, BNSF Railway
Category: Rail Industry

Mr. Robert Wayne "Bobby" Breed
Fort Worth, TX
Title: Vice President and General Manager, Specialized Response Solutions, National Response Corporation
Category: Vendors, Developers, and Manufacturers for Emergency Responder Services and Training Provider

CAPT William Carter
Washington, DC
Title: Deputy Director, Incident Management and Preparedness Policy, USCG, DHS
Category: Named Federal Official (designee)

Mr. Reggie Cheatham
Washington, DC
Title: Director, Director, Office of Emergency Management, Office of Solid Waste and Emergency Response, EPA
Category: Named Federal Official (designee)

Mr. Rick Ferguson
Houston, TX
Title: Senior Specialist Emergency Response, Land Transportation, Shell Oil Company
Category: Oil for Transport by Rail

Mr. Peter Ginaitt
Providence, RI
Title: Environmental Health and Safety Officer and Emergency Manager, Rhode Island Public Transit Authority
Category: NAC (NAC Preparedness & Protection Subcommittee Member)

Mr. Scott Gorton
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Ms. Kaylynn Gresham
Oneida, Wisconsin
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Category: Tribal Organizations

Mr. Robert Hall
Washington, DC
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Category: Named Federal Official

Ms. Yvonne Hayes
Surfside, FL
Title: Assistant General Chairman for GC 851 and Chairperson for Local 1138, International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART) Transportation Division
Category: Rail Labor

RADM Ronald Hewitt, USCG (Retired)
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Ms. Renee Loh
Bismarck, ND
Title: Executive Director, North Dakota Firefighters' Association (Retired)
Category: Emergency Response Provider (Association) and Training Provider

Chief Timothy McLean
Casselton, ND
Title: Chief, Casselton Volunteer Fire Department
Category: Emergency Response Provider

Chief Joseph Molina
Vancouver, WA
Title: Chief, Vancouver Fire Department
Category: Emergency Response Provider

Mr. Gregory Noll
Lancaster, PA
Title: Chair - NFPA Technical Committee on Hazardous Materials/WMD Response Personnel, Interagency Board
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Chief William Offerman
Elwood, IL
Title: Member, National Volunteer Fire Council (NVFC) Board of Directors
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Ms. Sonya Proctor
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Mr. Roland Shook
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Ms. Lisa Stabler
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Title: President, Transportation Technology Center, Inc., Association of American Railroads
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