Department of Public Safety

Minnesota's Preparedness for Ethanol and Oil Transportation Incidents

January 15, 2017

About this report

Under legislation passed in 2014 and amended in 2015, the commissioner of public safety is required to submit an evaluation of response preparedness and funding and analyze preparedness regarding ethanol transportation by rail.

The Department of Public Safety (DPS) contracted with Minnesota Management and Budget's division of Management Analysis and Development (MAD) to conduct research and develop recommendations for DPS's consideration. DPS used funds from the Railroad and Pipeline Safety Account for this study.

MAD is Minnesota government's in-house fee-for-service management consulting group. MAD is in its 32nd year of helping public managers increase their organization's effectiveness and efficiency. MAD provides quality management consultation services to local, regional, state and federal government agencies and public institutions.

This report was submitted as required on January 15, 2017 to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation and public safety policy and finance.

This report is structured by topic area; legislative requirements addressed by each section are highlighted at the beginning of each section.

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Executive Summary

The Minnesota legislature directed the Department of Public Safety (DPS) to produce this report to accomplish the following:

- Update a 2015 DPS study about response preparedness for incidents involving oil transported by rail and pipeline;
- Evaluate training and response preparedness activities;
- Provide new information about preparedness for ethanol rail incidents;
- Examine funding sources, unfunded needs, and equity issues for response preparedness; and
- Make recommendations.

DPS contracted with the state's Management Analysis and Development (MAD) division for this report. MAD drew from a survey of first responders, reference research, and extensive interviews with key public and private sector contacts and stakeholders to compile the information included here.

Recommendations

DPS will consider and pursue the following recommendations, as appropriate.

Recommendations for Funds from the Railroad and Pipeline Safety Account

Exercises and drills: DPS should offer safety account funding to counties for exercises and drills for rail and pipeline incidents involving oil and other hazardous substances. Safety account funds should be used also to support continued efforts by the DPS Division of Homeland Security and Emergency Management (HSEM) to assist counties with exercise planning and coordination. And HSEM could use safety account funds to produce additional information to help county emergency managers plan and execute exercises. HSEM estimates the cost of support for local exercises at roughly $100,000 per year.

Support for exercises at Camp Ripley: If the Minnesota National Guard's Camp Ripley Training Center is expanded to allow for better simulated rail and pipeline incidents, DPS should consider using safety account funds for additional training staff at Camp Ripley, scholarships for training participants, and reimbursements to local fire departments for costs they would incur because of staff participation in exercises there. HSEM estimates costs for these expenditures at roughly $275,000 per year.

Local planning efforts: DPS should use safety account funds for local planning grants, including grants for evacuation planning, and to explore risk assessment needs and other potential planning gaps for counties and cities. In addition, HSEM could establish web-based planning information resources. HSEM estimates that roughly $150,000 per year would be needed for evacuation planning grants; no cost estimates are available for the other planning work noted here.

Community-focused communication and warnings: DPS should use safety funds for a targeted, preparedness-oriented public awareness campaign about oil and ethanol incidents involving trains and pipelines. In addition, safety account funds should be used to continue improvements for local warning

systems, notably the Integrated Public Alert and Warning System (IPAWS) for counties lacking this now. IPAWS can send out geographically specific emergency information through a variety of channels. HSEM estimates costs at roughly $25,000 for a public awareness campaign and $62,000 for support of local alert and warning systems.

Classroom training: HSEM should build from recent extensive training efforts and offer awareness and advanced training in the 10 southern Minnesota counties where ethanol likely moves via rail lines but where participation in this HSEM training has been limited. Additional awareness training sessions beyond these targeted counties may be needed in the future to serve new first responders elsewhere in the state. HSEM should tap existing ethanol training programs and work with the railroads to avoid duplication. MAD estimates that roughly $110,000 to $130,000 would be needed to offer 30 to 35 training sessions in the 10 targeted counties.

Other Recommendations

Response equipment availability and gaps: This report makes no recommendation for local equipment purchases, in part because MAD uncovered little in the way of clear calls for crucial equipment. However, research for this report did reveal a lack of information about major response equipment and its availability for use if a rail or pipeline incident occurs. HSEM should explore ways to work with others to compile information about key response equipment, document availability of the equipment in the event of an incident, and identify gaps, if there are any. Of particular interest is information about the alcohol-resistant foam needed to suppress vapor and fire from an ethanol incident.

Access to state's ARMER communications system: DPS should consider providing railroad safety officials with ongoing access to the Allied Radio Matrix for Emergency Response (ARMER) system, the state's primary communications tool for first responders and public safety experts. HSEM should also explore the potential benefits of similar access to the system for pipeline officials.

Information about hazmat rail car contents: HSEM should continue to encourage emergency responders to adopt the relatively new AskRail software application from the Association of American Railroads, and also encourage emergency managers to use commodity flow reports from the railroads about the hazardous substances transported through their communities. AskRail is available to qualified emergency personnel and provides real-time information about car contents in the event of an incident, but railroad representatives report relatively limited adoption of this tool.

HSEM reporting on how Railroad and Pipeline Safety Account funds are spent: HSEM should make information publicly available about how the state spends funds from the Railroad and Pipeline Safety Account in order to demonstrate the usefulness of that special revenue fund and keep stakeholders updated. At present, some railroad representatives and public sector response officials report concerns about the account, mostly because of uncertainty about how DPS is using the funds.

Update to 2015 Study of Oil Incident Preparedness

The state appears better prepared for an oil transportation incident involving rail or pipelines than it was when DPS released its 2015 study on "Minnesota's Preparedness for an Oil Transportation Incident." State government organizations, private sector companies, and local governments all have

taken actions to enhance preparedness for oil incidents involving rail and pipelines among first responders, responsible parties, and government agencies.

DPS Strategy and Progress: Awareness and Operations Training

The 2015 DPS report on oil transportation includes recommendations and intended actions. The DPS implementation strategy for addressing those has focused on increasing the awareness of emergency responders and others to the transportation of Bakken crude oil, educating them about train derailment challenges, and clarifying roles and responsibilities. For this reason, HSEM has conducted awareness and advanced training for first responders, particularly in areas of the state with the potential for oil incidents involving railroads and pipelines.

Awareness training and effectiveness: Using funds from the Railroad and Pipeline Safety Account, DPS's HSEM division developed and conducted 279 training sessions from August 2014 through October 2016. A total of 5,844 participants attended the sessions, 82% of them firefighters, 9% law enforcement personnel, 6% emergency managers and public officials, and 3% emergency medical service workers. Participants came from at least 246 of the state's 463 high-priority communities located near railroad tracks and pipelines carrying oil. Aggregated evaluation scores from 4,478 training participants across all the evaluation questions averaged 4.7 on a scale with 1 as the lowest rating and 5 as the highest. Written comments from the participants were overwhelmingly positive.

Advanced training and effectiveness: Starting in January 2016, HSEM hired training contractors to offer more detailed, advanced training for emergency responders, again with funds from the Railroad and Pipeline Safety Account. In the 10 months from early January to mid-October 2016, these trainers conducted 41 sessions for 871 participants, 97% of whom were firefighters. Sessions were held in 28 high-priority communities. Advanced training continues. Participants on average rated their satisfaction with the sessions at just above 4 on a scale with 1 as the lowest rating and 5 as the highest. At some of the training sessions, participants were asked to rate gains in their knowledge and ability from where it was before the training to where it was afterward. Results show rather limited gains, ranging from a self-reported 15% gain for the ability to identify the contents of trains and pipelines to a 30% gain for feeling prepared for an incident.

Did training leave participants better off? It is difficult to determine if emergency response training leaves participants better off, in part because the only real test is performance during an emergency. This report, however, uses survey results as a useful—but limited and imprecise—gauge. A 2016 survey of fire chiefs, law enforcement officials, and emergency managers found that 63% reported better preparedness with classroom training now than before HSEM offered training. Comparisons of survey results in 2014 and 2016 show that a smaller percentage in 2016 (6%) rated their ability to respond to an oil transportation incident as poor than in 2014 (14%), and a greater percentage in 2016 (22%) rated their ability as very good to excellent than in 2014 (16%).

Other DPS Efforts

Because DPS focused its preparedness response efforts on training for first responders, it has yet to take action on many of the other recommendations from the 2015 report. Nonetheless, several developments are worth noting. DPS has worked with other state agencies to ensure that information about response

resources is available to emergency response leaders statewide through the federal Homeland Security Information Network. In addition, DPS has strengthened ties with North Dakota and Wisconsin regarding reciprocity arrangements for emergency response. DPS has helped local governments implement IPAWS to ensure communications with those in danger in an emergency. In addition, the agency has provided relevant training to state-sponsored, regional hazmat response teams.

Updates on the Oil Transportation Incident Response Situation

Other developments since the 2015 report have improved the situation in Minnesota when it comes to response preparedness for potential rail and pipeline incidents involving oil.

Survey results indicate progress: Results from surveys of fire chiefs, law enforcement officials, and emergency managers indicate preparedness improvements. As noted previously, a larger share of respondents in 2016 than 2014 rated the ability to respond as high, and a smaller share rated it low. In addition, the percentage of respondents indicating a high level of familiarity with the contents of trains passing through their areas has grown from 24% in 2014 to 45% in 2016. The percentage indicating a high level of familiarity with the contents of pipelines also rose, from 54% in 2014 to 67% in 2016. In addition, respondents to the 2016 survey indicated how their preparedness for an oil transportation incident now compares to preparedness in 2014. More than 60% reported that preparedness in 2016 had improved for the following: classroom training (63%), risk assessment (62%), evacuation planning (61%), and other preparedness planning (69%). More than half also reported improvements for public communications and awareness, coordination and mutual aid, and exercises and drills.

Governor's Council on Freight Rail: In July 2016, Governor Dayton established a Council on Freight Rail to elevate coordination and partnership between the State of Minnesota and the railroad companies. The council focuses on rail traffic safety and reduced risks, as well as economic development and community engagement. The council elevates the safety conversations to an actionable level and in this way aims to improve rail incident preparedness.

Federal rules for high-hazard flammable trains (HHFTs): Regarding prevention as well as preparedness, federal regulations from 2015 established new rules about train speeds, risk assessment of rail routes, enhanced braking systems, and notification procedures for hazardous materials moving through jurisdictions on long oil trains and other HHFTs. In addition, federal law and regulation now requires that new tank cars for HHFTs meet higher design and safety performance standards.

Notable private sector developments: Both pipeline operators and railroad companies have engaged in training that has improved preparedness in Minnesota. Through their cooperative support for Minnesota Pipeline Community Awareness Emergency Response (CAER), pipeline operators fund 25 to 30 training sessions in Minnesota every year, serving 1,100 to 1,200 participants annually. Similarly, the major Class I railroads have trained thousands of first responders in Minnesota to handle rail incidents involving oil and other hazardous substances. Some 4,300 first responders participated in railroad training in Minnesota in 2015 and in 2016 through October. From 2014 through October 2016, Class I railroads funded training for 259 of Minnesota's first responders in crude oil transport by rail at Colorado and Texas training centers. As noted earlier, the railroads and their association also have introduced the AskRail app to increase the real-time information about train car contents.

Ethanol Preparedness and Response Framework

In its 2015 session, the Minnesota legislature amended its directive for this study to include a focus on ethanol. Crude oil began moving through Minnesota in high volumes only after fracking recently led to an oil boom in nearby North Dakota. But ethanol has been transported by rail in the state for decades. Minnesota's 21 ethanol plants, mostly in southern Minnesota, ferment and distill ethanol from corn, generally. They produce more than 1 billion gallons of ethanol per year, ranking the state fourth for ethanol production and generating significant economic benefits. The plants are located along rail lines, and producers ship ethanol by rail to be mixed with gasoline as a renewable fuel for vehicles.

Like crude oil, ethanol is a Class 3 flammable liquid regularly transported by rail. Compared to Bakken crude oil, ethanol is more uniform in nature, so its characteristics are more predictable, but it also has a lower flashpoint, meaning the temperature at which it produces enough vapor to form a flammable mixture with air. Ethanol mixes with water, making it practically impossible to contain when leaked into water. In addition, it is practically impossible for firefighters to dilute ethanol with water to a point where it will no longer burn. Producers mix their pure ethanol with 2-5% gasoline to denature it before shipment. (The U.S. Environmental Protection Agency (EPA) classifies this denatured ethanol as oil.) As with crude oil, denatured ethanol is usually shipped via unit trains, generally meaning that 20 or more tank cars of ethanol in the train form a continuous block. While dangerous, ethanol is one of many hazards Minnesota must be prepared to handle.

Preparedness Response, Players, and Roles

MAD's fall 2016 survey of fire chiefs, law enforcement officials, and emergency managers found that most respondents who have or might have ethanol moving through their jurisdictions reported they are as prepared for a potential ethanol transportation incident as for other hazmat transportation incidents (61%), although one-quarter (26%) said they were less prepared. The majority (59%) also reported they are more prepared now for an ethanol rail incident than they were in 2014.

The State of Minnesota has a comprehensive legal framework for emergency preparedness and response, detailed later in this report. Relevant state laws include the Minnesota Emergency Management Act, Minnesota's Spill Bill, and the Hazardous Materials and Incident Response Act. State law covers, among other areas, state agency responsibilities, local government roles in planning and response preparedness, preparedness requirements for railroad companies (and pipeline operators), environmental response and liability, and coordination, mutual aid, and assistance.

Response to an ethanol rail incident involves key players from the private and public sectors. Their roles may be summarized as follows:

Railroads: Under federal rules and regulations, railroads are ultimately responsible for responding to an emergency involving the substances they transport. Class I railroads own or contract for emergency response equipment that they employ in the event of an incident, and they have personnel both in-house and under contract who respond. With an ethanol rail fire or explosion, railroad responders would be charged with controlling and suppressing fire on the tracks, while local firefighters would likely concentrate their efforts on fighting structural fires that might result from the incident.

Local governments: Minnesota's local governments are primarily responsible for meeting citizens' immediate health and safety needs when a major emergency occurs, taking action to evacuate areas as needed and providing direct firefighting when called for, particularly if a rail car fire spreads to structures in the community. In all but the most catastrophic incidents, the commander of the local firefighting unit is the incident commander overall.

State government: The State of Minnesota participates in emergency hazmat response through its locally based statewide regional hazmat response teams. In addition, state agencies and agency personnel play roles in planning, preparedness, and response. HSEM and the Minnesota Pollution Control Agency (MPCA) in particular are active in incident response, although other agencies may play roles as well. In general, the State of Minnesota and its partners at county and local governments and the railroad companies address concerns about ethanol, and oil, in the context of an all-hazards approach, assessing preparedness for response to all types of potential hazmat incidents.

Federal government: The federal government's primary role in preparedness and response to an ethanol rail incident is in regulating the rail industry in ways that impact all phases of emergency management. The EPA and the U.S. Coast Guard may become involved in incident response in cases of hazmat spills and releases. Additionally, federal guidelines and best practice recommendations underpin many state and local response frameworks and preparedness efforts.

Response Capacity and Needs for Ethanol Incidents

Significant private and public sector resources exist to respond to an ethanol rail incident in Minnesota, including equipment, personnel, and mutual aid arrangements, but also plans and the training resources that build response capacity in the state. MAD compiled capacity inventory information about these resources, to the extent feasible. MAD also explored needs for training and equipment.

Resources located statewide: MAD compiled a list of locations for equipment and personnel using information from the 2015 DPS report about preparedness for oil transportation incidents and using updated information about additional resources. The results indicate significant resources for response throughout the state and in nearby locations, although some of the resources applicable to crude oil incidents may be less useful for ethanol ones. Resources in southern Minnesota are of particular interest because ethanol rail traffic primarily moves through that region. Additional resources for response to an ethanol rail incident also may be available from ethanol producers and possibly from some of Minnesota's larger airports.

Private sector personnel and equipment: The railroads are required under federal law and regulations to respond to oil and hazardous substance incidents that occur because of rail cars on rail tracks. As a result, the private sector is responsible for most of the major emergency response equipment and equipment staging locations for potential ethanol rail incidents, and it also secures or provides qualified personnel to handle ethanol-by-rail situations. In addition, railroad companies participate in cooperative CAER organizations with spill equipment caches. Representatives of the major Class I railroads in Minnesota report that they have the equipment and personnel needed to respond to an ethanol incident. They are required to provide information to federal regulators about the adequacy of

their response capacity. In the case of ethanol, Minnesota's 21 ethanol production plants constitute another important private sector player involved in emergency preparedness and response.

Public sector resources through state government: State agency responders—on call 24/7—provide expert advice to first responders by phone or in person in some cases, and they can deploy state or regional resources to a scene if needed. HSEM and MPCA would be the primary responders from the state for an ethanol rail transportation incident, although the state's Departments of Agriculture, Health, and Transportation, as well as the State Patrol, may also be involved. Personnel with MPCA's Emergency Management Unit respond to environmental releases, including ethanol rail incidents. HSEM funds and coordinates regional hazmat response teams that can assist with rail incidents involving ethanol, as well as the much broader range of hazmat emergencies. Minnesota has 11 of these Chemical Assessment Teams (CATs), with four of the CATS operated by local fire departments that also field larger hazmat Emergency Response Teams (ERTs). CATs and ERTs focus their attention, advice, and assistance on the hazardous substances involved in an ethanol or other hazmat incident, not on fires that may result.

Local first responders: Minnesota's 780 local fire departments, with their 20,600 firefighters, constitute an obvious and important resource for response to ethanol rail incidents, as do law enforcement agencies, emergency management offices, and emergency medical services. In terms of personnel, local fire department commanders take charge of incident scenes and firefighters play important roles. In the case of a rail incident, local first responders most often should focus less on rail cars, rail tracks, and ethanol and more on protecting life and property in their communities, through evacuation measures and by fighting the structural fires that might result from the incident. For local fire departments, equipment concerns are less about owning and maintaining specialized equipment for an ethanol rail incident and more about knowing what is available, who will bring it to the scene, and how fast. Where the risk of an incident is higher, as it is for communities near ethanol plants or major rail hubs, some local fire departments may choose to purchase specialized equipment, particularly alcohol-resistant foam for use in vapor and fire suppression.

Mutual aid: Results from MAD's fall 2016 survey show that four in five (81%) of the respondents from communities where ethanol might be a concern report mutual aid agreements that would allow the local responders to call upon first responders in nearby jurisdictions for personnel and equipment if needed for an ethanol rail incident. The state makes provisions for mutual aid even in the absence of a formal agreement.

Plans: Emergency plans are an important element of the capacity inventory for responding to an ethanol rail incident. Rail companies are required by both the federal government and Minnesota to have emergency response plans, which they structure to apply to all types of potential hazards, not just ethanol or oil. Communities and first-responder divisions engage in a number of planning efforts. The MAD 2016 survey found that 61% of the survey respondents who either have or might have ethanol trains in their area reported that their emergency plans include ethanol incident response.

Training resources: Training resources play an important role in expanding Minnesota's response capacity and keeping it up to date. First responders in Minnesota have access to a variety of ethanol training, available from state and federal agencies, railroad companies, ethanol producers and their

national groups, other national associations, and national training centers. Much of the available training is relevant to but broader than ethanol rail incidents. At the state level, HSEM provides or sponsors relevant training, and the Minnesota Board of Firefighter Training and Education (MBFTE) provides reimbursement to fire departments for training fees, if any, and personnel costs incurred as a result of participation by their department staff in the training.

Training needs: Based on survey results and interviews, MAD identified needs for training in ethanol incident preparedness and response. Specifically, those interviewed noted a need for exercises, and survey respondents identified exercises and drills as a high priority for funding. Interviewees repeatedly mentioned both discussion-based tabletop exercises and full-scale exercises, which are resource-intensive, operations-based activities involving multiple entities. MAD's research showed strong interest in exercises and in funding to support them. Classroom training for ethanol rail incidents garnered interest as well, but less so than exercises. For classroom training, interviewees indicated a preference for targeted efforts rather than broad ones, with a focus on areas of the state where ethanol trains travel but where HSEM participation in HSEM oil incident training has been limited. (Some of what is covered in the HSEM oil training relates to ethanol as well.) MAD identified 10 southern Minnesota counties that fit this criteria.

Equipment needs: As with the 2015 DPS study on oil transportation incidents, research for this 2017 study into potential ethanol rail incidents offered little support for significant equipment purchases by fire departments. Instead, as noted earlier, the research pointed to a need among first responder units for more detailed information about nearby specialized incident response equipment, including types, locations, how fast equipment might arrive, and documented information about its availability for use. HSEM officials and firefighters said that while local departments take a lead role in overseeing incident response to ensure public safety, they don't have primary responsibility for putting out tank car fires on rail tracks (railroads do) and wouldn't necessarily have the resources and training needed to do so.

Unfunded Preparedness Needs: Oil and Ethanol

MAD used a survey and interviews to examine unfunded needs for preparedness activities for rail and pipeline incidents involving oil, ethanol, and other hazardous substances. While some of those interviewed reported no unfunded needs, many noted potential uses for funds. These findings shaped the recommendations above for spending from the Railroad and Pipeline Safety Account.

Leaving aside equipment, which is discussed above, the results from interviews and from both the oil and ethanol questions on the 2016 survey show interest for funding in the following areas:

- Exercises and drills, including discussion-based tabletop exercises and full-scale, operational exercises, but also perhaps operations-based functional exercises and drills. Some of those interviewed said funding is needed to support exercise training at Camp Ripley if the facility is expanded and enhanced to better host rail and pipeline simulations.
- Community preparedness, including evacuation planning, warning systems, risk assessment, and public communications and awareness efforts to better inform and prepare citizens for potential incidents.

- Classroom training, with several of those interviewed calling for classroom training that includes information about the incident command structure.

Funding Sources and Equity Issues: Oil and Ethanol

Both the private and public sectors fund preparedness activities in Minnesota, sometimes in coordination or partnership but also separately.

Highlighted State Funding for Rail and Pipeline Incidents

Some state funding is aimed specifically at rail and pipeline risks, while other state preparedness funding supports efforts that are broader but include potential rail and pipeline situations.

The Railroad and Pipeline Safety Account: This special revenue account is of particular interest. The legislature established it in 2014 to fund training and response preparedness activities for train and pipeline incidents involving oil or other hazardous substances. The account includes general funds from the State of Minnesota and assessments levied on both pipeline operators and the Class I and Class II railroads in Minnesota. Assessments are scheduled to end by June 30, 2017. DPS projections show that of the $9.074 million that will flow into the account by that date, $2.328 million will have been spent in fiscal years 2015 through 2017, with $6.746 million remaining to be spent in later years. Account funds have been used to cover training costs, reimbursements to fire departments for training-related personnel expenditures, funding for the Moorhead hazmat ERT, MPCA staff costs for responsibilities related to railroad and pipeline response preparedness, and related operational expenses, including the costs of required DPS legislative reports.

State-sponsored hazmat regional response teams: Funded by state government and coordinated by HSEM, Minnesota's 11 CATs and its four ERTs (co-located with CATs) can assist with incidents involving oil, ethanol, and other hazardous substances transported by rail and pipeline, as well as a much wider range of hazmat incidents. Regular state funding for CATs and ERTs amounts to $1.185 million annually, over and above the funds from the Railroad and Pipeline Safety Account used for the ERT in Moorhead.

MPCA's Emergency Management Unit (EMU): The EMU handles MPCA's preparedness and response efforts for hazardous substance emergencies, only a small portion of which relate to train and pipeline incidents involving oil and ethanol. The unit works on community planning, firefighter training, exercises and drills, response calls, and enforcement. An MPCA official estimated that annual agency costs for all EMU work total roughly $1 million.

Minnesota Board of Firefighter Training and Education: DPS' MBFTE makes funds available to fire departments statewide for training that meets quality criteria and also for reimbursements to fire departments for training-related personnel costs. Eligible training includes hazmat courses, some of which would be applicable to rail and pipeline incidents involving oil and ethanol. Most of the funds for MBFTE come from the state's Fire Safety Account (FSA), but MBFTE also uses federal grants and receives funding from the Railroad and Pipeline Safety Account, as noted above. MBFTE has $8 million available from all sources for disbursement in fiscal 2017, with $4.9 million of that coming from a one-time FSA allocation. A more typical fiscal year amount would be $3 million.

State-administered federal grants: The U.S. Department of Transportation provides Hazardous Materials Emergency Preparedness grants to states mostly for distribution to local and county governments. Funds are used primarily to prepare emergency responders for hazardous materials incidents. Uses may include activities relevant to rail and pipeline incidents involving oil and ethanol. Minnesota received $410,300 in federal HMEP funding in the grants announced October 2016.

Private Sector Funding for Preparedness Activities

Railroad and pipeline operators account for a significant share of the funding and response preparedness activities for rail and pipeline incidents involving oil and hazardous substances. Ethanol producers and oil refiners are involved, too, in broader but relevant efforts. In Minnesota, Class I and II railroads and pipeline operators who transport oil have paid assessments into the state's Railroad and Pipeline Safety Account, as noted previously. For the three fiscal years from 2015 through 2017, railroads will have contributed $3.75 million to the account, and pipeline operators will have contributed $3.75 million. In addition, railroad and pipeline operators spend separate funds on their own first-responder training and preparedness activities, including exercises.

The railroad and pipeline companies also pay to ensure personnel and equipment are available for incident response, including their own resources, resources that they contracted for through outside response companies, and resources cooperatively provided through CAERs. MAD was not able to determine or estimate total private sector spending on preparedness activities for potential incidents involving the transport of oil, ethanol, and other hazardous substances by rail and pipeline. Railroad and pipeline operators reported that the complexity of the expenditures prevented them from accurately tallying the costs. This was true as well for ethanol producers and oil refiners.

Local Funding

Cities and townships commit significant portions of their budgets to public safety, including emergency response and preparedness. However, public safety officials at both the local and state levels reported there is no reasonable way to estimate what share of such expenditures relates to preparedness for incidents involving the transport or hazardous materials, let alone those transported specifically by rail and pipelines. The share is "miniscule," one official said.

Equity Concerns and Considerations

As part of this report, MAD analyzed equity concerns and considerations regarding funding sources for the Railroad and Pipeline Safety Account, which constitutes the state's major public-private financing partnership. In terms of the railroads, the state only assesses the Class I and Class II railroads. Consequently, none of the 17 Class III and private railroads operating in Minnesota pay assessments into the account, whether they carry oil and ethanol or not. Another equity consideration is that the assessment for the safety account is only levied against railroads and pipelines, although oil and other hazardous substances are transported in Minnesota by trucks. Representatives from the railroads in particular cited this as an unfair imbalance, especially given that rail transportation for hazmat substances is considered safer than truck transport. Public sector officials and others, however, argued that the focus on railroad and pipeline operators is justified for the Railroad and Pipeline Safety Account because rail lines and pipeline move high volumes of oil and hazardous substances and thus constitute the biggest risks for large-scale incidents.

Introduction: Purpose and Process for this Report to the Legislature

The Minnesota legislature directed the Department of Public Safety (DPS) to produce two reports on preparedness for rail and pipeline incidents involving oil and ethanol. DPS asked Management Analysis and Development (MAD), a division of Minnesota Management and Budget, to draft the reports and develop recommendations for DPS's consideration. A DPS report on "Minnesota's Preparedness for an Oil Transportation Incident" was presented to the legislature in January 2015.[1] This 2017 DPS study on preparedness for ethanol and oil transportation incidents is the second of the two required by the legislature.

The 2017 ethanol and oil report draws on interviews, survey results, and reference research to present information, evaluate preparedness activities, and offer recommendations. MAD has constructed the different sections of this report to stand alone so readers can read, share, and use parts of this report without needing to review the entire document. This approach risks repetition for those who read the full report, particularly when it comes to the executive summary, but it is designed to increase the practicality of the document.

The Legislature's Requirements for the Study

Based on legislation passed in 2014 and amended in 2015, this report on preparedness for ethanol and oil transportation incidents does the following:

1. Update the 2015 DPS report to the legislature on preparedness for an oil transportation incident.
2. Analyze preparedness and impacts to public safety from ethanol transportation by rail, which must provide the following information:
    a) summarize the preparedness and emergency response framework in the state;
    b) provide an assessment of costs and needs of fire departments and other emergency first responders for training and equipment to respond to incidents involving the transportation of ethanol;
    c) develop a comprehensive public and private response capacity inventory that, to the extent feasible, includes statewide identification of major emergency response equipment, equipment staging locations, mutual aid agreements, and capacities across industries involved in the transportation of ethanol; and
    d) assist in long-range ethanol transportation incident preparedness planning.
3. Evaluate the effectiveness of training and response preparedness activities.
4. Identify current sources of funds, funding levels, and any unfunded needs for preparedness activities.
5. Analyze equity in the distribution of funding sources for preparedness activities, including

[1] Department of Public Safety, "Minnesota's Preparedness for an Oil Transportation Incident," January 15, 2015. https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf.

a. examination of the public-private partnership financing model,
b. review of balance across industries involved in storage and distribution of oil

6. Make recommendations for any programmatic or legislative changes.[2]

Based on guidance from legislators and officials with DPS' Homeland Security and Emergency Management Division, this report focuses on ethanol transported by rail, and oil transported by rail and pipeline.

Research Methods: Interviews, Surveys and Reference Research

For this study, MAD interviewed almost 70 individuals with experience, knowledge, and expertise in response preparedness for rail and pipeline incidents involving oil, ethanol, and other hazardous substances. MAD analysts spoke with railroad and pipeline representatives, emergency responders and managers, state agency officials, ethanol producers, representatives from a citizens group, national experts, trainers, and legislators. (See Appendix A for a list of those interviewed and Appendix B for interview questions.)

In addition, MAD sent an online survey to valid email addresses for 365 local and county fire departments, emergency management offices, sheriff's offices, and police departments for their answers to questions about response preparedness and funding. A total of 127 survey recipients provided useable responses, for a response rate of 35%. The breakdown for respondents is as follows: 29% from fire departments, 27% from police departments, 15% from sheriff's offices or other law enforcement agencies, and 29% from emergency management offices. In total, 55% represented city governments, 41% represented county governments, and 4% represented tribal governments.

For the 2016 survey, MAD used the same contacts selected by DPS for a 2014 survey on response preparedness among counties and municipalities with rail and pipeline routes that transport oil. To this list of recipients, MAD added emergency response and preparedness officials from counties and municipalities with ethanol rail routes because the legislature added ethanol as a focus for this 2017 study through amendments passed in 2015. The sheriff departments, fire departments, police departments, and emergency managers surveyed were selected with the purpose of including those who might have direct knowledge of emergency response plans and overall preparedness in the counties, cities, or tribal areas.

The online survey was set up to direct survey respondents who identified ethanol as a hazardous substance of concern for their jurisdictions to the ethanol questions on the survey, and those who identified oil as a concern to the oil questions. Of the 130 respondents, 69 reported that both ethanol and oil were relevant to their jurisdictions and answered both types of questions. The response rate for the survey was 36%. Because MAD surveyed all of those in the identified targeted population, this

[2] Laws of Minnesota 2015, Chapter 75, https://www.revisor.mn.gov/laws/?year=2015&type=0&doctype=Chapter&id=75&format=pdf. The language here has been adapted to clarify what was requested with regard to ethanol.

survey was not a random sample, and no margins of sampling error are included. No extrapolations to a larger population are made. The questions and full results from the survey are found in Appendix C.

To shape this report, MAD also conducted reference research. The list of sources is found in Bibliography. For sections of this report, MAD also drew upon the 2015 DPS report to the legislature on "Minnesota's Preparedness for an Oil Transportation Incident."[3]

Report Examines Response Preparedness but Prevention and Mitigation Stand Out as Key Issues

Emergency management can be broken into five different phases:

- **Prevention** includes actions taken to stop an incident from occurring.
- **Preparedness** "is focused on the development of plans and capabilities for effective disaster response."
- **Response** "is the immediate reaction to a disaster. It may occur as the disaster is anticipated, as well as soon after it begins."
- **Recovery** focuses on resources and capabilities that help restore communities after a disaster.
- **Mitigation** "consists of those activities designed to prevent or reduce losses from disaster."[4]

In keeping with the request from the legislature, this DPS report focuses on response preparedness and preparedness activities, including training. Training and response preparedness are the purposes of Minnesota's Railroad and Pipeline Safety Account, and the legislature's request for this study stems in part from its interest in that special revenue fund. However, a number of those interviewed for this report emphasized the importance of accident prevention and efforts aimed at mitigating the impacts of accidents in forestalling dangerous rail and pipeline incidents involving the transport of oil, ethanol, and other hazardous substances. While preparedness and response are important, prevention and mitigation reduce the threat of hazmat transportation incidents. "We place too much emphasis on responding to accidents and not enough on preventing them," noted one source from the Twin Cities area. "There are no emergency response resources that could reduce the severity of the initial destruction [from] a post derailment fire in our urban areas to an acceptable level for the community." Many of those interviewed emphasized, too, that hazardous substances other than oil and ethanol are far more dangerous to public safety under most circumstances than ethanol and oil—often mentioning anhydrous ammonia and chlorine.

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[3] Department of Public Safety, "Minnesota's Preparedness for an Oil Transportation Incident," January 15, 2015. https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf.

[4] List adapted from Association of Minnesota Emergency Managers, "Emergency Management Handbook for Government Officials," Section 1. August 2012. Accessed December 15, 2014, http://amemminnesota.org/wp-content/uploads/2013/10/Elected-Officials-Handbook-2012.pdf. Some emergency planning resources describe *four* phases of emergency management, combining prevention and mitigation phases.

Acknowledgements

Both MAD and DPS acknowledge all those who contributed time and insights for this report. Their participation in this research effort drove the findings and recommendations found in the report and allowed for the detailed information presented here about many important topics. Thanks extend to the fire chiefs, law enforcement officials, and emergency managers who responded to the survey about oil and ethanol response preparedness and to those who also spoke to MAD for the research interviews. Thanks go to the many others, too, who participated in interviews for this study, including representatives from the railroad and pipeline companies, contacts at ethanol production plants, experts at state and national associations, safety advocates, and engaged citizens. Significant help with this report also came from state officials and employees, including many within DPS and HSEM but also with the governor's office and other state agencies, including the Minnesota Pollution Control Agency, the Department of Agriculture, the Department of Transportation, and the Department of Health.

Recommendations and Related Findings

Relevant to the following element requested by the legislature:

6. *Make recommendations for any programmatic or legislative changes.*

MAD pulled from survey findings, interviews, and reference research for this study to identify a number of important recommendations for consideration by the Department of Public Safety and its Homeland Security and Emergency Management (HSEM) Division specifically. These recommendations relate to both potential ethanol rail incidents and potential incidents involving oil transported by rail and pipelines. Some of the recommendations presented here relate to priorities for training and response preparedness activities funded through the Railroad and Pipeline Safety Account. Others are broader recommendations not linked to unfunded needs and dollars available from the safety account. No specific legislative recommendations were identified.

Recommendations for Safety Account Funding

The legislature established a State of Minnesota Railroad and Pipeline Safety Account in 2014 as a special revenue fund for training and preparedness relevant to potential rail and pipeline incidents involving oil and other hazardous substances. Funding for the account comes from assessments on railroad and pipeline companies, totaling $2.5 million annually in the three fiscal years from 2015 through 2017, plus $1.574 million committed from the State of Minnesota's general fund. HSEM expects a $6.746 million balance for the account as of July 1, 2017, when fiscal 2018 begins. Much of the $2.324 million that will have been spent from the account by then has been used to support awareness training and advanced training for firefighters, law enforcement officers, emergency managers, and emergency medical staff. MAD offers the following recommendations to DPS for safety account spending priorities going forward.

Exercises and Drills

MAD interviews and survey findings show strong support for increased exercises and drills for potential rail and pipeline incidents involving oil, ethanol, and other hazardous substances. DPS plans to offer funds from the Railroad and Pipeline Safety Account to counties for response preparedness exercises. Funds to counties for exercises most likely should be offered as grants, but HSEM will need to ensure that the grant application process is a simple one, so as not to create obstacles to the funds for the busy and stretched emergency managers in many of Minnesota's counties. Targeting the counties makes sense because Minnesota's public safety structure builds mostly from the county level, and counties throughout the state have emergency managers who could engage in the process.

Funds from the safety account are needed as well to support continued HSEM efforts to assist counties with planning and coordination as they prepare for and execute exercises. In addition, funds from the safety account could be used by HSEM to produce a situational manual with information for county emergency managers on how to plan for exercises, identify funding sources and apply for funds, and connect and coordinate with key response preparedness entities for successful exercises. Such a manual

would be of particular value to emergency managers from less-populated counties in Greater Minnesota, where the emergency manager position may be part-time or part of a full-time job that involves other important and demanding duties.

HSEM estimates that roughly $100,000 per year would be needed to support local exercises. The costs for support efforts by HSEM staff would be over and above this amount. The costs of carrying out exercises vary significantly depending upon length, complexity, and the number of participants. Based on input from county emergency managers and HSEM, MAD estimates the costs of exercises as follows:

- about $1,000 for tabletop exercises
- $1,000 to $3,000 for functional exercises
- $5,000 to $25,000 for full scale exercises.

Sources from the local to the national levels noted the importance of exercises and drills for validating plans and procedures, testing capabilities, identifying strengths and gaps, coordinating response activities among the many entities involved, and increasing familiarity with the operations of incident command structures. Exercises structured around hypothetical hazmat situations allow participants to practice their roles and skills. This type of hands-on training was identified in the DPS 2015 report to the legislature as a recommended way to expand the state's training program after classroom training has been carried out.

Those interviewed for this report specifically mentioned the value of tabletop exercises and full-scale exercises. Discussion-based tabletops vary in length from short ones that cover the basics to complex ones that take hours to work through and generally focus on conceptual understanding, the identification of strengths and gaps, and changing perceptions. Often tabletop exercises are used as starting points to prepare for full-scale exercises. Full-scale exercises are complex, resource-intensive activities involving multiple entities in scenarios that focus on operational activities, typically involving real-time actions carried out in an environment designed to simulate an actual incident. The other main type of exercise is functional, involving staff who direct, command, and control operations, and these exercises often provide experience with incident command structure.[5]

Staff and Participant Support for Exercises at Camp Ripley

MAD heard support from local emergency managers and from state officials for plans to expand a Joint Emergency Response Training Center (JERTC) at the Camp Ripley Training Center near Little Falls to allow better emergency response simulations and exercises involving train derailments and pipeline leaks. HSEM and the Minnesota National Guard have plans for such an enhancement of Camp Ripley's facilities. Camp Ripley would provide a centrally located facility within Minnesota for exercises involving oil, ethanol, and other hazardous substances. An expanded facility would serve firefighters but also other key players in emergency response, including emergency managers and planners, law

[5] U.S. Department of Homeland Security, "Homeland Security Exercise and Evaluation Program," April 2013, pp. 2-4. https://www.fema.gov/media-library-data/20130726-1914-25045-8890/hseep_apr13.pdf.

enforcement, public officials, and public works staff. If developed, the facility should be used to supplement, not replace, county-based exercises, based on local needs and opportunities.

Assuming that some $3.3 million is secured to cover the capital improvement costs of the Camp Ripley expansion, then dollars from the Railroad and Pipeline Safety Account could be used to fund additional training staff at Camp Ripley, scholarships for training participants, and reimbursements to local fire departments for the personnel costs they incur because of participation by their staff in exercises there. HSEM estimates the costs for these expenses at roughly $275,000 annually.

Planning, Including Risk Assessment

The legislation that created the Railroad and Pipeline Safety Account allows the funds to be used for emergency planning and coordination, although to date dollars from the account haven't been used for these purposes. Going forward, DPS plans to use dollars from the safety account for grants in support of community planning, including evacuation planning, and to explore risk assessment needs and other potential planning gaps for counties and cities. This will bolster existing HSEM efforts to offer useful planning guidance and assistance to local governments. In addition, HSEM could establish web-based information resources to help guide city and county personnel with risk assessment, evacuation planning, and other planning efforts.

Evacuation Planning

Research carried out for this study indicates support for planning efforts, especially evacuation planning. Survey respondents identified evacuation planning as a top priority, and the sources interviewed by MAD noted the importance of evacuation planning to a community-focused approach to incident preparedness and response. Evacuation planning provides important guidance for residents, schools, businesses, and others in zones where rail and pipeline incidents could have serious adverse impacts. Safety account funds should be used to support local evacuation planning. HSEM provided a rough estimate of $150,000 annually from the safety account for local evacuation planning grants.

HSEM offers guidance for local evacuation planning efforts but no direct planning assistance unless it is requested by individual counties or communities. For guidance, HSEM could establish a web-based resources page allowing county and local planners to easily access or learn about existing helpful resources for evacuation planning. For example, HSEM currently provides community-specific maps of impact zones for potential incidents upon request but doesn't reference this service on its website. HSEM is currently exploring use in Minnesota of FEMA materials relevant to evacuation and warning efforts.

Risk Assessment

MAD research surfaced interest in risk assessment regarding the transportation of oil, ethanol, and other hazardous substances by rail and pipeline. MAD recommends that HSEM hold a forum or series of meetings with county emergency managers and others involved in local response to explore what needs exist with regard to local risk assessment, determine if statewide risk assessment information is required, and then work to address needs and requirements.

More than one-third (39%) of survey respondents who ranked their funding priorities chose risk assessment as among their top three picks. HSEM officials recognize that risk assessment is absolutely critical to planning and allows for effective targeting of preparedness and response efforts. But HSEM leaders also expressed concerns that a strong focus on risk assessment could waste resources by identifying the standout risks already well known in counties and communities, or by duplicating existing information already included in local and county planning documents. HSEM leaders emphasized that emergency response is local, as is risk, and argued that any risk assessment efforts should be focused on building capacity at the local level.

HSEM officials expressed interest in forums or meetings to explore what local and county planners and leaders need in the way of risk assessment. Several sources interviewed for this report cited a need for a formal statewide risk assessment from rail and pipeline traffic, and HSEM forums or meetings could help determine if a statewide risk assessment would advance response preparedness. HSEM will require funds to support work on risk assessment, but estimating the costs isn't possible until the needs are defined.

Community-focused Communication and Warning Efforts

A number of those interviewed for this study supported concerted efforts to inform and educate people in higher-risk communities about both potential risks and response resources for oil and ethanol incidents involving trains and pipelines. These efforts would involve public awareness but also warning systems that can provide real-time guidance to people in the event of an incident. With this in mind, HSEM plans to use safety account funds for improved local warning systems and for a public awareness campaign aimed at potentially vulnerable communities.

Improvements to local warning systems would advance preparedness for Minnesota communities. In some communities where rail and pipeline incidents are possible, outdoor warning systems need upgrading to ensure that residents and workers will know when an emergency has occurred. In addition and of particular interest, too, is the Integrated Public Alert and Warning System (IPAWS) that can send out emergency information through mass notifications, cell phones, and the existing alert system for radio and television stations. Information can be sent to individuals who are located in targeted geographic areas. Already well more than half of Minnesota's counties use IPAWS, but help and funding could move the remaining counties to this system. According to rough estimates from HSEM, $62,000 is needed to support local alert and warning systems, with additional safety account spending possible going forward.

In addition, HSEM should carry out a targeted public awareness and communications campaign about potential rail and pipeline incidents involving oil, ethanol, and other hazardous substance transported by rail and pipelines. Such a campaign would provide reliable information about the risks of such incidents and about what people in those communities should do if an incident occurs. An HSEM official noted that the state was involved in a similar campaign for communities near nuclear power plants. A public awareness and communications campaign about rail and pipeline incidents would cost about $25,000, according to rough estimates from HSEM, with additional spending possible going forward.

Classroom Training

Since August 2014, HSEM has offered awareness training for potential rail and pipeline incidents involving oil and other hazardous substances, with more advanced training also provided by training vendors on a smaller scale beginning in January 2016. HSEM should continue to use dollars from the safety account for awareness and advanced training going forward but in a targeted manner and at much reduced frequency than was the case in the 2014-16 period.

Specifically, MAD recommends that HSEM offer additional awareness training focused on ethanol in 10 Minnesota counties where ethanol likely moves via rail lines but where participation in HSEM training on oil incident awareness has been limited.[6] Evaluation scores and results from MAD's 2016 survey of fire chiefs, law enforcement officials, and emergency managers indicate success from those training efforts. The oil awareness trainings include information relevant to ethanol rail incidents, so it would be redundant for HSEM to repeat awareness trainings in counties where ethanol is transported but where participation in past HSEM awareness training sessions was high. Additional awareness trainings beyond the 10 targeted counties likely will be needed in future years to inform and prepare first responders who joined their units after HSEM conducted the training in their area.

MAD also recommends that HSEM continue to fund advanced training from outside training vendors, targeted toward communities where oil and ethanol stand out as a risk, but under the assumption that HSEM can ensure and confirm quality training from its vendors. (Evaluation data from a limited number of vendor trainings indicate potential to improve quality.[7]) HSEM should work closely with the railroad and pipeline operators to reduce duplication of training efforts.

MAD assumes that additional trainings offered by or through HSEM would use the same approach taken for the trainings about potential oil incidents involving rail and pipelines. This means funds from the Railroad and Pipeline Safety Account would be used to pay for the training and also for reimbursements by the Minnesota Board of Firefighter Training and Education (MBFTE) to local fire departments for personnel costs. MAD estimates that roughly $110,000 to $130,000 would be needed to offer 30 to 35 training sessions in the 10 ethanol counties where participation in HSEM training has been limited.

The research for this study also identified extensive training opportunities from associations and industry relevant to both potential ethanol rail incidents and incidents involving oil transported by rail

[6] Based on maps of ethanol plant locations and information from the Minnesota Regional Railroads Association, MAD identified the following 10 southern Minnesota counties where ethanol is likely moved by train but where fewer than half the local fire departments have firefighters who have participated in the HSEM awareness training on potential oil incidents involving rail or pipeline: Big Stone, Brown, Freeborn, Jackson, Lincoln, Martin, McLeod, Redwood, Renville, and Waseca. The oil awareness trainings drew participants from fewer than half the local fire departments in another seven counties in the state but those are counties where ethanol by rail is unlikely to be of concern.

[7] For more, see the section of this report entitled "Participation Evaluations of the HSEM Training Sessions" on page 36.

and pipeline. HSEM should tap into existing resources, continue to build from them, and continue to promote them among first responders to avoid duplicating efforts and wasting resources.

Estimated Staff Costs for HSEM Response Preparedness Work

The recommendations presented here for response preparedness activities and initiatives will require significant staff time from HSEM personnel. Each of the funding-related recommendations listed above will need attention and action from HSEM staff. Consequently, HSEM estimates that $250,000 per year from the Railroad and Pipeline Safety Account will be needed to fund staff efforts on training, exercises, and other preparedness activities, with additional dollars from the account going toward necessary administrative support, too.

Other Recommendations

MAD offers additional recommendations not linked to unfunded needs or tied to the Railroad and Pipeline Safety Account. HSEM will consider these recommendations as well, and pursue them as appropriate to advance response preparedness for potential rail and pipeline incidents involving oil, ethanol, and hazardous substances.

Identify Available Response Equipment and Assess Gaps

MAD research for this study found that significant response resources exist statewide and in nearby locations outside the state from the railroad and pipeline operators, private sector contractors, the state's regional hazmat response teams, and partnership cooperatives for Community Awareness Emergency Response (CAER). Importantly, rail and pipeline companies are the responsible parties under federal rules for incidents involving the oil and other hazardous substances they transport. As such, the railroads and pipelines are expected to provide equipment and personnel when responding to an incident. For these reasons, MAD makes no recommendation for spending on response equipment for local fire departments as part of this report.

However, research for this report also revealed a lack of information about the specific types of major response equipment and its availability for use if a rail or pipeline incident occurs. MAD recommends that HSEM explore ways to work with others to compile information about key response equipment, document the availability of the equipment in the event of an incident, and identify gaps, if there are any. HSEM should explore the feasibility of such an inventory.

In this study, MAD presents a capacity inventory that includes information about equipment. (See the section on "The Private and Public Response Inventory Capacity" on page 71.) However, MAD's information about equipment falls short of the detail needed to assess adequacy and identify gaps for specific items, especially the foam used for suppressing vapor and fire. A number of the fire departments officials interviewed for this report called for more information about what specialized response equipment is known to be available and how fast it could reach the site of an incident in their areas. "That's important, figuring out regionally when a big incident does happen, where are those resources, and how quickly are they available?" said one of the fire officials.

Railroads and pipelines must have the equipment needed to respond to incidents, under federal requirements. Nonetheless, additional information about the major equipment available would allow

local emergency officials to plan for rail and pipeline incidents involving oil, ethanol, and other hazardous substances and to act if such incidents occur. By way of example, several sources for this report cited uncertainty about the availability of the alcohol-resistant foam needed to suppress vapor and fire for an ethanol incident, as distinct from other firefighting foam that can be used in oil incidents. Some local sources referenced foam stored at ethanol plants and refineries as potential resources, but the availability of that foam for response to rail incidents is not clear, nor is it clear that it if would be needed. And Minnesota's nine larger airports—the Part 139 facilities, under the Federal Aviation Administration's classifications system—were mentioned as another potential source of equipment, but research for this study surfaced restrictions and issues regarding the availability of airport firefighting equipment for off-site use.

Include Railroad and Pipeline Safety Officials in Minnesota's ARMER Emergency Communications Network

MAD recommends that DPS expand and make permanent a current pilot project that allows access for some railroad safety officials to the state's primary communications tool for first responder agencies and other public safety entities. HSEM should explore the potential benefits of providing similar access to safety and response officials from the operators of pipelines in Minnesota.

The Allied Radio Matrix for Emergency Response (ARMER) system directly connects public safety and response personnel at the state, county, and local levels and allows for fast communication between responders and experts in the event of an emergency. A 14-month pilot project has given some safety and response experts from the railroad companies temporary access to the system so that they can quickly communicate with first responders when an incident occurs. The value of this arrangement became clear during a spring 2016 fire and explosion that happened when a propane truck parked on railroad tracks was hit by a train. MAD interviews with railroad and HSEM officials indicate strong interest and support for making access to the ARMER system permanent for all the railroads. Presumably, it would be beneficial to allow similar access to ARMER for safety and response officials with companies that operate pipelines in Minnesota.

Information about Rail Car Contents

A number of those interviewed for this study called for more information about train car contents so that responders can know and address hazardous substance threats immediately when an incident occurs. MAD recommends that HSEM continue to encourage emergency responders to adopt the relatively new AskRail software application from the Association of American Railroads, and also encourage emergency managers to use commodity flow reports from the railroads about the hazardous substances transported through their communities. HSEM plans to continue to promote use of AskRail and the commodity flow reports at first-responder meetings and during its hazmat trainings.

AskRail as a Resource for Emergency Responders

Beginning in October 2014, the Association of American Railroads (AAR) and the major Class I railroads in North America began offering a cell phone software application that allows access for qualified emergency responders to specific information about the hazmat contents of a rail car in real time. Since then, AAR has upgraded the app several times to improve ease of use and usefulness. The AskRail app will soon be available for computers as well as cell phones, in response to requests from

those fire departments that restrict cell phone use at incident sites. While the railroads have made the app available, relatively limited numbers of emergency responders have applied for access and downloaded it, railroad representatives reported. "There should be a requirement or a push that every first responder has AskRail if they are stationed within five miles of a track," said a railroad official. HSEM helps promote use of the app in Minnesota for emergency responders along rail lines.

AskRail is available from the specific railroads upon request from firefighters, police officers, and emergency managers along their rail routes. The app provides real-time information about train car contents based on the car number, and it allows fire chiefs and other emergency responders in positions of authority to view information about the contents of all the cars in a train based on a rail car number. The rail car content information from the app includes contact listings for the railroad and the hazardous commodity. Information is available for all cars carried by Class I railroads. In many cases, information about the hazardous contents of Class II and III cars are included on AskRail, too, if those cars are slated to be transferred to Class I lines or if they originated from Class I railroads.[8]

Commodity Flow Reports for Hazmat Rail Traffic

Railroads also make information available to emergency response and planning groups about the top hazardous commodities that they ship through specific areas. These commodity flow reports cover at least the top 25 hazardous commodities being transported, listed in rank order, based on past shipments.[9] The information allows local emergency response leaders to assess the risks moving on the rails. According to one county emergency manager interviewed for this study, the commodity flow report helps focus fire and law enforcement leaders on which priorities to plan for. Based on MAD's interviews with county and local emergency response contacts, HSEM could play a bigger role in informing emergency planners and others about the usefulness of commodity flow reports. HSEM should continue to encourage use of these commodity flow reports, perhaps including information about the reports as part of an evacuation planning resource that HSEM compiles for emergency planners.

Considerations and Concerns about Rail Car Information

A number of considerations and concerns shape and complicate how much information about rail cars is shared. The federal government—not state or local governments—is responsible for regulating the nation's railroads. Federal regulators are currently setting out new rules for what information railroads must make available about hazardous train car contents, with updates about these rules expected in mid- to late-2017.

Emergency response officials and representatives of the railroads noted the need for caution in sharing information about train car contents, out of concern that the information could be used by individuals with bad intent to carry out acts that would threaten lives and damage property or the environment. Summing up this tension, one state official said responders need information because that information can help save lives, but at the same time that information shouldn't be widely available to the general public because it is sensitive. In Minnesota, the state's Government Data Practices Act specifies that all

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[8] For more information about AskRail and the application process for access, go to http://www.askrail.us/.

[9] For more information about commodity flow requests, see CP's website at http://www.cpr.ca/en/safety/transporting-dangerous-goods/notification-list-US as an example.

government data not about individuals is public unless exempted from this status by state statute, classification, or federal requirement. This means that information about rail car contents—and other information relevant to incident response—is assumed to be available to the public if it is shared with state government in Minnesota. This causes railroads and others to heavily redact information that is submitted to the state, rendering it far less useful for emergency managers and first responders, several emergency managers said.

MAD did hear from county emergency managers and citizens groups that more information is needed, perhaps including advance information about what will be moving through a community. However, state officials and railroad representatives said too much advance information about trains traveling through communities can lead to information overload, especially because such a small fraction of all trains experience derailments. State officials and railroad representatives argued that extensive advance information about the movement and contents of all trains wouldn't be of significant value because it wouldn't prompt action on the part of local first responders, who need information about the contents of specific train cars when an incident occurs, not in advance for trains that will travel through without incident.

Establish Clear Reporting about How Safety Account Funds Are Spent

HSEM should take the simple but important step of making information publicly available about how the state is spending funds from the Railroad and Pipeline Safety Account in order to demonstrate the usefulness of the fund and keep stakeholders updated. MAD suggests a webpage on the HSEM website that breaks out the major spending categories, including classroom training, local grants for exercises, public information campaign, and the like.

During interviews for this study, sources ranging from emergency response officials to railroad representatives expressed concerns about how DPS is spending funds from the Railroad and Pipeline Safety Account, less because of objections over actual spending and more because no information on use of the funds is readily available. Railroad officials noted that state officials pitched assessments paid by their companies and the pipeline operators into the safety account as a public-private partnership but said the state hasn't shared information with them about spending from the account. "What has been done with the money that the railroads and pipelines have paid via the hazmat fee?" asked one of the railroad representatives. In addition, several public sector sources indicated skepticism about how the money was being used. DPS' best defense against poor perceptions of safety account expenditures is to provide easy access to accurate information about what the funds actually finance. Website information would help address this problem.

Updates to the 2015 Legislative Study

Relevant to the following element requested by the legislature:

1. *Update the 2015 DPS report to the legislature on preparedness for an oil transportation incident.*

Since the release of the 2015 DPS study on "Minnesota's Preparedness for an Oil Transportation Incident," many activities have been implemented to increase Minnesota's preparedness. State government, private sector companies, the federal government, and local governments have taken actions to educate and enhance preparedness for oil incidents involving rail and pipelines.

DPS Strategy and Progress on the 2015 Recommendations and Intended Actions

The 2015 DPS report on oil transportation includes a section entitled "Recommendations and Intended Actions." The following portion of this 2017 DPS report provides updates on the 2015 recommendations and actions that DPS and its Homeland Security Emergency Management Division has taken to increase Minnesota's preparedness for an oil transportation incident. These actions leverage existing organizational structures, programs, and resources to accomplish the goals of the 2014 legislation while also building the state's all-hazard preparedness.

The DPS implementation strategy for the recommendations and intended actions focuses on increasing the awareness of emergency responders and local decision makers about how Bakken crude oil is transported, educating them about train derailment challenges for responders, and clarifying roles and responsibilities for local, state, and federal responders. The purpose of focusing on awareness is to provide insight to a community about its specific needs regarding capacity building. Once communities understand what is needed, they work with others to ensure the appropriate resources are available to effectively respond to an oil transportation incident. As a result, DPS didn't focus on the purchasing and distribution of response equipment but instead provided information about available private and public sector resources so communities could determine what, if any, equipment would be necessary.

Awareness Training for Oil Transportation Incidents

DPS has used training initiatives to address the recommendation for its 2015 report to the legislature that it increase awareness about oil incidents involving railroads and pipelines.

Awareness Training Sessions

Using funds from the Railroad and Pipeline Safety Account, DPS's HSEM Division developed and delivered awareness training throughout Minnesota. In 70 of Minnesota's 87 counties, firefighters from more than half the local fire departments had participated in this training of mid-October 2016, according to HSEM. From mid-August 2014 through mid-October 2016, HSEM held 279 awareness trainings for 5,844 participants, including 4,785 firefighters, 540 law enforcement officers, 368 emergency managers and public officials, and 151 emergency medical service staff. HSEM has conducted additional trainings since then.

HSEM staff developed the course with input from Class I railroads and pipeline operators. They also invited the input and participation of the members of the state's Oil Training Advisory group, consisting of representatives from DPS, the Minnesota Pollution Control Agency, and the Minnesota Board of Firefighter Training and Education and formed to address the topics of cleanup and environmental concerns and firefighter skill development.

The HSEM awareness training on oil incidents involving rail and pipelines is designed to result in the following participant learning outcomes:[10]

- An understanding of how crude oil is transported throughout the State of Minnesota;
- A general awareness of pipeline and railroad infrastructure and hazards;
- Clarifications of the response capabilities, roles, and responsibilities of those who are responding to an incident;
- Familiarity with environmental and cleanup concerns;
- Knowledge of basic planning considerations for local response groups to use in developing or enhancing emergency response plans;
- Next steps to develop exercises, from tabletop exercises up to functional exercises; and
- Knowledge of how to operate safely around the pipeline, railroad equipment, and facilities.

See Appendix D for the awareness training syllabus.

The course encourages participants to consider a well-thought-out response tailored to their communities. It includes a 20-minute tabletop exercise and covers response approaches. It emphasizes that if a crude oil fire is on the ground, firefighters shouldn't fight it, but instead put resources where they are needed in protecting the community, its residents, and the responders on the scene. "We give them permission to back up and hold the perimeter, to maintain rather than charge in," said an HSEM course instructor.

The next phase of the awareness training initiative will be to audit awareness training effectiveness and create a refresher course to allow continued training as needed in the next three years. HSEM instructors distribute course evaluation forms to awareness training participants. Collectively, for the 4,478 participants who completed evaluation forms, the training sessions earned a 4.7 score on average for all the evaluation questions taken together across all the trainings, using a rating scale with 1 as the lowest score and 5 as the highest.

Advanced Training

Advanced training is the next level of training beyond awareness. HSEM has tapped private and public training providers to develop and deliver advanced training in Minnesota through the 2017 calendar year. These courses included classroom instruction and hands-on training. The courses cover air monitoring, product characteristics, and when and how to open and close a tank car valve. The courses use discussion and tabletop exercises to training with more depth than the awareness classes. As of mid-October 2016, HSEM sponsored 41 advanced trainings for 871 participants from at least 29 different communities located in 18 different counties. Firefighters accounted for 97% of those trained.

[10] DPS/HSEM, "Oil and Hazardous Substance Transportation Awareness – Syllabus."

Connect Funding for Training and Equipment to Regional Coordination

Local emergency managers are in the best position to assess their area's capabilities and needs, but many need additional information about risks and available resources related to oil transportation incidents. DPS adopted a 2015 recommendation to establish a funding system based on regional coordination. But rather than establish a funding system, DPS has decided to invest in helping local emergency managers identify their capacity and needs. DPS supports emergency management personnel as they plan, conduct, and evaluate exercises for a wide range of emergencies. The next steps for DPS will be to analyze the current funding processes and improve them to better support regional coordination.

Develop a State-level Program Evaluation Approach to Assess Hazardous Materials Preparedness Activities

In response to the 2015 report's recommendation on evaluation, DPS' HSEM Division has been collecting evaluation data from participants about the quality of the awareness and operations training, as noted above. HSEM also collects data on the number of participants, their home communities (in most cases), and the location of the training sessions to better inform DPS about what communities are being served through the training and to identify targets for future trainings. This data collection is the first step in the broader data collection agenda to inform state preparedness. The next step will be to create a framework for data collection and analysis to evaluate all of Minnesota's hazardous materials preparedness activities.

Enhance Existing Databases or Develop New Ones to Provide More Comprehensive Information about Response Resources across the State

The 2015 DPS report included a call for better database information about response resources. DPS has taken the interim step of ensuring that information about response resources is shared across the state using the federal Homeland Security Information Network (HSIN). HSIN is used to securely share information that is sensitive but unclassified—for example, information about the location of emergency response equipment. Rail and pipeline response plans are now posted on HSIN for access by local emergency managers and fire chiefs. Local first responders and emergency response officials apply and receive clearance to access rail and pipeline prevention and response plans. This interim step provides local officials a more complete understanding of the resources that are available in the event of an oil incident.

Establish Standards for Pipeline Preparedness and Response

The 2015 report recommended that the state adopt response standards and timelines for pipeline companies similar in scope and content to state response standards set for railroads. Such action, however, would be up to the legislature, not to DPS.

Additional DPS Actions for Preparedness

In addition to the original recommendations, DPS has taken the following actions to further Minnesota's preparedness.

Reciprocity Arrangement with Neighboring States

DPS has met with North Dakota and Wisconsin state officials to strengthen collaboration on emergency response through the national Emergency Management Assistance Compact (EMAC). The EMAC is a mutual aid system that makes explicit the partnership between the states by formalizing how they will share personnel, equipment, and other resources in response to a disaster. DPS has also spoken with officials in Ontario, Canada, about creating a similar understanding.

Existing State Response Teams

DPS is using the State of Minnesota's Chemical Assessment Teams (CATs), hazmat Emergency Response Teams (ERTs), and existing resources to boost response preparedness for oil incidents involving trains and pipelines, rather than creating a new, specialized responder group. This allows for cost savings in startup and efficiencies in response. To that end, all state CATs and ERTs have received advanced training for response to crude oil incidents. In addition to receiving training, the 55th Civil Support Team, CATs, and ERTs conduct full-scale exercises during each of their quarterly meetings, some of which incorporate elements relevant to an oil incident.

Continued Work with Rail and Pipeline Companies

DPS has partnered with the railroad companies in the development of the HSEM awareness and operations training curriculum. DPS will partner with the pipeline companies in the future as they look for the development of pipeline preparedness and response standards. In addition, DPS has and will continue to facilitate interactions between the rail and pipeline companies and local public safety officials in the areas of safety protocols, information sharing, and collaboration.

Support for Local Governments in Enhancing Warning and Evacuation Systems

DPS has been working with local governments to implement IPAWS (Integrated Public Alert and Warning System) that allows communication to be pushed out by public safety officials to those in danger. Depending on the emergency, IPAWS can utilize several different channels of communication to alert Minnesotans. Those channels include:

- Emergency Alert System (EAS) for TV and radio
- Wireless emergency alerts (WEA) for cell phones
- Emergency telephone notifications for landline phones
- Outdoor warning sirens
- Social media, NOAA weather radios, and digital billboards.[11]

[11] Minnesota Department of Public Safety, "Alerts and Warnings," Accessed December 3, 2016, https://dps.mn.gov/divisions/hsem/emergency-response/Pages/emergency-alert-system.aspx.

DPS offers guidance and resources for evacuation planning. DPS is currently developing a practical planning workshop on community evacuation, which it hopes to offer to local emergency managers within the next two years.

Provide Resources to Help Local Governments Communicate Regarding Oil Transportation Incident Preparedness

DPS has created and continues to update their Minnesota Rail Safety website[12] with timely rail safety information. It includes updates on preparedness activities, rail safety information, and resources.

Minnesota's 2016 Status for Oil Transportation Incident Response

To update the DPS 2015 report to the legislature on "Minnesota's Preparedness for an Oil Transportation Incident," MAD offers this additional information about the current situation in the state when it comes to railroads and pipelines.

Year-Over-Year Survey Comparisons

For the past three years, DPS has sponsored surveys of fire chiefs, law enforcement officials, and emergency managers from across Minnesota with questions about preparedness and response for oil incidents involving railroads and pipelines. Many questions have remained the same, allowing for comparisons of the situation in Minnesota on some key elements of response preparedness. Overall, the survey results over time indicate that the state is more prepared for oil transportation incidents than it was in 2014.

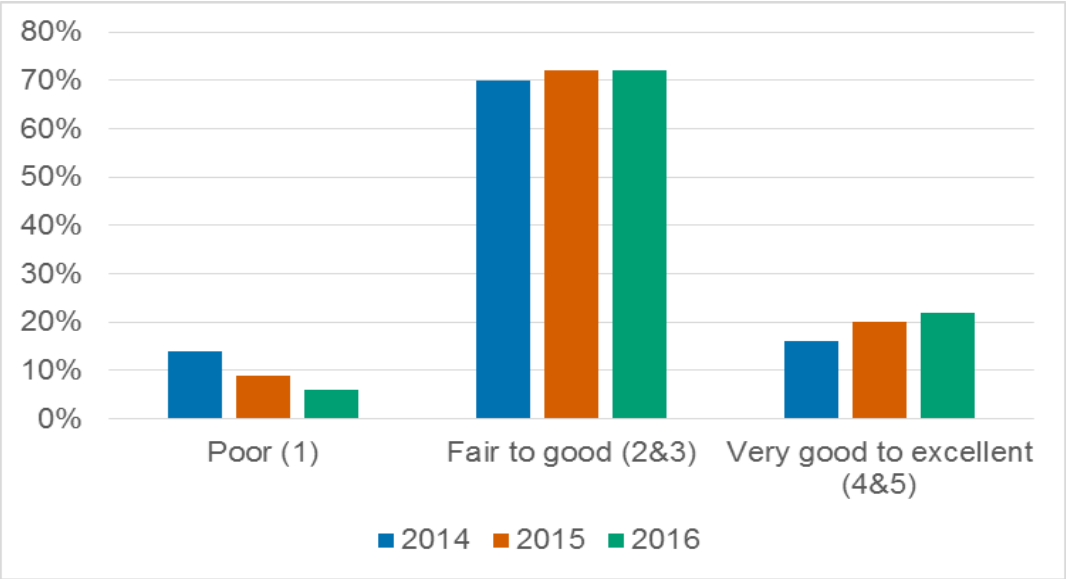
It is worth noting that while the surveys in each year from 2014 through 2016 were sent largely to the same audiences, survey results over time may not come from the same survey respondents in one year compared to the next. Consequently, analysis of the survey results over time cannot provide the level of insight available from a longitudinal study that tracks the same respondents over time. However, the results do provide useful trend data to inform this study.

Increased Ability to Respond to Oil Transportation Incidents

In each of the past three years, survey respondents have been asked how they would rate their ability to respond to an oil transportation incident, considering the public and private resources available. From 2014 to 2016, the share of survey respondents rating their ability to respond as poor dropped from 14% to 6%, while those rating themselves at 4 and 5 on a scale with 5 as excellent rose from 16% to 22%. (See Figure 1.)

[12] Minnesota Department of Public Safety, "Minnesota Rail Safety," Accessed December 3, 2016, https://dps.mn.gov/divisions/hsem/planning-preparedness/Pages/minnesota-rail-safety-regulations.aspx.

Figure 1: Ability to respond to an oil transportation incident



Familiarity with Train and Pipeline Contents Increases

Each of the surveys over the three-year period asked respondents questions about their knowledge of rail car contents. The percentage of respondents indicating a high level of familiarity with the contents of trains passing through their areas has grown from 24% in 2014 to 45% in 2016 (ratings of 4 and 5 on a scale from 1 = not at all familiar to 5 = very familiar). The percentage of those reporting no familiarity with the contents of trains remained at 5% over that same period.

The surveys also asked about familiarity with the contents of pipelines passing through their city, county, or tribal government areas. The percentage of respondents indicating a high level of familiarity with the contents of pipelines in their area rose from 54% in 2014 to 67% in 2016, with 3% reporting in 2014 that they were not familiar, compared with 2% in 2016.

Greater Familiarity with Private and Public Sector Resources

Two survey questions asked about respondents' familiarity with resources available to help in the event of an oil transportation incident. Regarding private sector resources available to respond to an oil transportation incident, the share of respondents indicating a higher level of familiarity increased from 19% in 2014 to 37% in 2016, while the percentage reporting they were "not at all familiar" fell from 22% to 8%. The scale used ranged from 1 = not at all familiar to 5 = very familiar.

For public sector resources, the survey asked about familiarity with the state's Chemical Assessment Teams and hazmat Emergency Response Teams. The percentage of respondents who rated themselves at a higher level of familiarity (4 and 5 on the scale) with these regional response teams went from 32% in 2014 to 59% in 2016. The percentage that reported they were not at all familiar with CATs and ERTs fell from 10% to 1% over the three-year period.

Levels of Improvement since 2014 for Response Preparedness Factors

Respondents to the 2016 DPS survey on response preparedness were asked to rate how preparedness in their areas compares to preparedness in 2014 for eight factors. Table 1 shows the results. Classroom training shows the strongest level of improvement, followed risk assessment and evacuation planning activities. Ratings for equipment showed the least amount of improvement, with 70% of the respondents reporting no change since 2014. (Notably, the 2015 DPS report to the legislature and this 2017 report as well didn't find support for local equipment investment as a priority response preparedness approach, except under certain circumstances.)

Table 1: Rating of improvement in preparedness for oil transportation incidents in survey respondents' areas since early 2014

	Better or a lot better	Somewhat better	No change	Worse
Classroom training	34%	29%	37%	0%
Risk assessment	32%	30%	37%	1%
Evacuation planning	29%	32%	38%	1%
Public communication and awareness	28%	29%	43%	1%
Other preparedness planning	26%	43%	32%	0%
Coordination and mutual aid	23%	31%	45%	1%
Exercises and drills	22%	31%	47%	0%
Equipment	11%	18%	70%	1%

Notable Public Sector Updates

Governor's Council on Freight Rail and State Rail Director

Governor Dayton established a 15-member Council on Freight Rail in July 2016 to elevate coordination and partnership between the State of Minnesota and the railroads. Aims for the council include increased rail traffic safety and reduced risk, as well as economic development and community engagement. The governor's council serves as a way to convene higher-level safety preparedness conversations among state agencies, Class I and III railroads, Amtrak, the League of Cities, and the Association of Minnesota Counties. The council's membership and focus provide an effective approach to improving rail incident preparedness by elevating the conversation to an actionable level.

In addition to the council, the governor also created the new position of state rail director to help ensure appropriate infrastructure improvements, increase the effectiveness of response in the event of a derailment or explosion, and advance work with communities and railroad companies for safety.[13]

[13] Minnesota Department of Public Safety, "Minnesota Rail Safety."

These developments have increased coordination between state agencies and railroads, according to a number of those interviewed for this study. One member of the freight rail council said, "If we can't talk to each other, than we are the problem."

A number of the sources for this report cited improved relations between the railroads and state government. They noted the importance of good relations to emergency preparedness and response efforts. "It's important that we really build and maintain relationships with rail companies," said an emergency manager. A state agency representative said, "The rail companies share resources and coordinate with us very well. The rail companies have helped the first responders get what they need to better understand rail safety and keep it moving along. The rail companies do a good job of working with the state and the governor's office."

Improved Railcar Safety

While related to prevention as well as response preparedness, recent federal action on rail car safety is another important public sector development affecting oil transport by rail. Federal law and regulations from 2015 regarding high-hazard flammable trains (HHFTs) have established new rules about train speeds, risk assessment of rail routes, enhanced braking systems, and notification for hazardous materials being shipped through jurisdictions, and enhanced braking. HHFTs are unit trains made up of 70 or more cars carrying class 3 flammable liquids at speeds greater than 30 mile an hour, including such trains carrying oil and ethanol.

In addition, federal law and regulation now requires that new tank cars for HHFTs be built to meet design and performance criteria for U.S. Department of Transportation Specification 117. DOT-117 tank cars, as they are known, have jacketed shells that are insulated and made of 9/16-inch steel. These cars also have full-height, half-inch-thick head shields; sturdier, re-closeable pressure relief valves; and rollover protection for top fittings.[14] DOT-117 tank cars are significantly safer than the DOT-111 cars commonly in use and safer than CPC-1232 tank cars that those in industry had put forward, according to sources interviewed for this report.

Under the provisions of the federal Fixing America's Surface Transportation (FAST) Act and subsequent federal rules, all types of DOT-111 tank cars must be phased out for oil transport by March 2018, with phase-out for all types of CPC-1232 tank cars for oil by May 2025. These changes affect ethanol shipment, as well. However, the FAST Act allows longer phase-out periods for DOT-111 tank cars and non-jacketed CPC-1232 tank cars used for ethanol: May 1, 2023 for all types of DOT-111 cars carrying ethanol in HHFTs, and July 1, 2023 for non-jacketed CPC-1232 cars carrying ethanol in HHFTs, compared to April 1, 2020 for non-jacketed CPC-1232's used for oil. The railroad companies transport the tank cars, but the cars themselves are owned by leasing companies, petroleum companies, and chemical companies, not the railroads.[15]

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[14] Federal Railroad Administration, "Enhanced Tank Car Standards and Operational Controls for High Hazard Flammable Trains Final Rulemaking," Pipeline Hazardous Materials Safety Administration and Federal Railroad Administration, U.S. Department of Transportation, pp. 1-3. www.fra.dot.gov/Elib/Document/14509.

[15] Ibid.

Notable Private Sector Updates

Increased Access to Information about Train Contents via AskRail

The Association of American Railroads and the Class I railroads released a cell phone app in late 2014 that provides qualified emergency responders with immediate and specific information about the contents of rail cars. Upon request and with clearance, AskRail is available from the Class I railroads for firefighters, police officers, and emergency managers along their rail routes. The app provides real-time information about train car contents based on the car number. For those with appropriate clearance, information is available, too, on all the cars in a train based on one train car's number. The app provides information about the car contents but also offers useful guidance about the substance characteristics and includes contact information for railroad personnel and for the hazardous commodity. [16] The system covers hazardous substances on Class I railroads but according to railroad representatives the app also offers information about many hazmat cars from Class II and III railroads, too, if those cars are slated to be transferred to Class I routes or if they originated with Class I carriers. While AskRail is a national development, it offers the potential in Minnesota for increased access to train car contents for first responders in the state.

Training by Railroads Since 2014

Minnesota has more first responders now than in 2014 who have been trained in how to respond to hazmat incidents involving rail and pipeline. In addition to the HSEM trainings mentioned previously, the Class I railroads have delivered training to increase Minnesota's first responders. In total, 7,058 Minnesota first responders participated in railroad hazmat training here in the state from the start of 2014 through to the end of October 2016—2,763 in 2014, 2,612 in 2015, and 1,683 through the first 10 months of 2016.

Under 2014 changes to Minnesota's Spill Bill, railroads are required to provide training opportunities to the fire departments having jurisdiction along the routes of *unit trains*—trains with more than 25 cars carrying oil or hazardous substances. The state required the railroads to offer training by the end of June 2016, and the law requires that refresher training must be offered to the fire departments at least once every three years going forward.[17] Railroad representatives noted that their companies offered training prior to the 2014 Spill Bill changes.

Railroads also fund training for Minnesota firefighters at out-of-state training centers, including hazmat training applicable to oil rail incidents. The training is developed and conducted by railroad personnel who have significant experience in responding to railroad emergencies. The cost of tuition and travel expenses are covered by the railroad. From 2014 to the end of October 2016, the railroads sent 259 Minnesota firefighters to the three-day crude-by-rail training class at the Security and Emergency Response training Center in Pueblo, Colorado and the Texas A&M Engineering Extension Center in College Station, TX.

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[16] AskRail, "The AskRail® app is a safety tool for first responders," Accessed December 3, 2016. http://www.askrail.us/.

[17] Minnesota Statutes 2016 § 115E.04.

Training by Pipeline Operators

Companies that operate pipelines in Minnesota have also provided training since 2014—as well as earlier—boosting the knowledge base of hazmat responders in Minnesota. Pipeline operators are required to meet with emergency responders and offer training on how to respond to an incident. Minnesota Pipeline Community Awareness Emergency Response (CAER) uses funding from operators of pipelines in the state to support pipeline safety information efforts and training to emergency officials, including local fire, law enforcement, and others, through the enhanced awareness of pipeline emergencies, availability of member resources, and emergency response capabilities.[18] The organization averages 25 to 30 sessions in Minnesota every year, serving 1,100 to 1,200 participants annually, according to a Minnesota Pipeline CAER official.

For its information and training sessions, Minnesota Pipeline CAER schedules meetings to ensure each county in Minnesota with pipelines receives training every three or four years. Because training is offered periodically in every relevant county, it is more accessible than it otherwise would be for volunteer firefighters who may have difficulty attending other trainings that require more travel. Representatives from the pipeline companies and oil companies also participate. The Minnesota Pipeline CAER curriculum uses an all-hazmat approach because pipelines contain various hazardous substances. The three most common hazardous substances covered in the trainings are natural gas, liquids, and highly volatile liquids such as crude oil. Starting in 2017, Minnesota Pipeline CAER will shift the trainings to include tabletop exercises that will allow emergency responders to walk through scenarios with the trainers and experts.

[18] Minnesota Pipeline CAER Association, "Our Mission." Accessed December 3, 2016, http://mncaer.com/home/.

Evaluating Effectiveness of HSEM Training Activities for Oil Transportation Incidents

Relevant to the following element requested by the legislature:

3. *Evaluate the effectiveness of training and response preparedness activities.*

The legislature asked DPS to evaluate the effectiveness of training and response activities funding through the Railroad and Pipeline Safety Account using benchmarks proposed in the 2015 DPS study for the legislature on "Minnesota's Preparedness for an Oil Transportation Incident."[19] The benchmarks from the 2015 study were designed to align with a Results-Based Accountability (RBA) approach, framed around three critical questions for any service or program's performance:[20]

How much did we do?
How well did we do it?
Is anyone better off?

For this current report to the legislature, MAD applied the RBA benchmarks from the 2015 study to training that HSEM has carried out or sponsored in order to improve response preparedness for potential oil incidents involving rail and pipelines. The HSEM awareness and operations training sessions conducted from summer 2014 to the present constitute the preparedness activities funded through the Railroad and Pipeline Safety Account, although funds from that account have been used, too, to support a hazmat Emergency Response Team in Moorhead and to fund MPCA staff involved in reviewing railroad prevention and response plans in keeping with the provisions of state law.

How Much Training?

As noted earlier in this report, thousands of firefighters, law enforcement officers, emergency medical service staff, emergency managers, and public officials throughout Minnesota have participated in HSEM awareness and operations training sessions. HSEM makes the training available but first responders are not required to participate.

Awareness Training

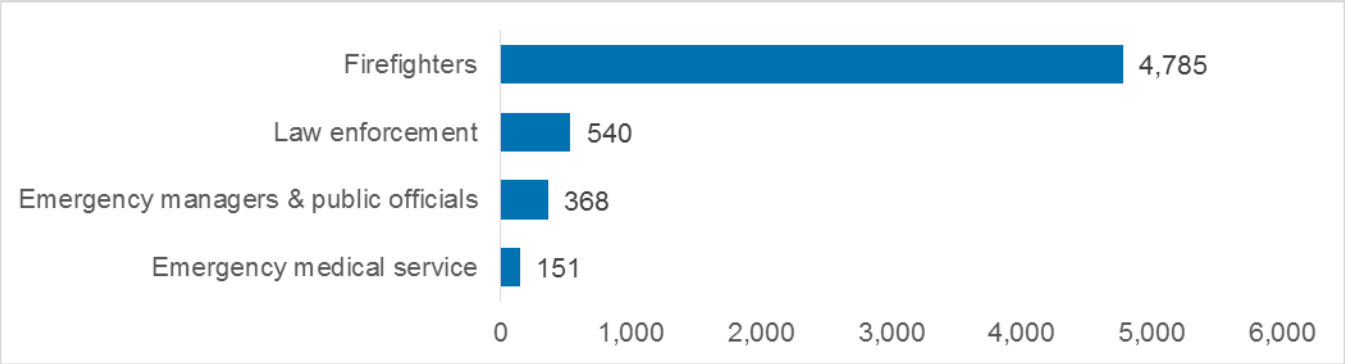
For awareness training on potential rail and pipeline incidents involving oil, HSEM conducted 279 sessions in the 27 months from mid-August 2014 through mid-October 2016, drawing a total of 5,844

[19] For the proposed evaluation benchmarks from the Minnesota Department of Public Safety's January 15, 2015 report, see pages 87-88 at https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf.

[20] Results-Based Accountability is advocated by Mark Friedman, among others. More information about Results-Based accountability can be found in: Friedman, Mark. *Trying Hard Is Not Good Enough: How to Produce Measurable Improvements for Customers and Communities*. Santa Fe, NM: FPSI Publishing, 2005.

participants—4,785 firefighters (82%), 540 law enforcement personnel (9%), 368 emergency managers and public officials (6%), and 151 emergency medical service workers (3%). (See Figure 2.)

Figure 2: Number of participants in HSEM awareness training by type for rail and pipeline incidents involving oil, August 13, 2014, through October 13, 2016



The 279 awareness trainings were conducted throughout Minnesota In the case of 70 of Minnesota's 87 counties, HSEM reports that firefighters from more than half the local fire departments participated in the HSEM awareness training sessions. Participants came from at least 257 different cities and townships,[21] including 246 (53%) of the 463 high-priority communities located near railroad tracks and pipelines carrying oil. Participants from other communities undoubtedly participated in the HSEM awareness trainings as well but were not recorded by home location because HSEM didn't track this type f information at county-wide training sessions or for those who attended training offered during statewide or regional conferences and meetings. The total training time for all participants combined exceeded 17,500 hours, based on three hours of awareness training received by each of the 5,844 participants.

Having conducted so many sessions with so many participants, HSEM has found that requests for the awareness training have declined in recent months.

Advanced Training

Starting in January 2016, outside contractors began offering more detailed operations and technician training for emergency responders, using funds from the Railroad and Pipeline Safety Account. In the 10 months from early January to mid-October 2016, outside trainers worked with HSEM to conduct 41 sessions for 871 participants, including 847 firefighters (97%), 11 law enforcement personnel (1%), 9 emergency managers and public officials (1%), and 4 medical service workers (less than 1%).

The 41 sessions were held in at least 29 different cities and townships, including 28 (6%) of the 463 high priority communities near railroad tracks and pipelines carrying oil. The sessions were conducted in 18

[21] The number of sessions exceeds the number of cities and townships because HSEM offered the training multiple times in some communities with large numbers of first responders.

of Minnesota's 87 counties. The combined hours for the 871 participants in advanced training total to 3,484, based on four hours per training. Operations and technician training continues.

Exercises and Drills

The 2015 DPS report to the legislature also suggested using the number of exercises and drills to evaluate progress by HSEM on oil incident preparedness.[22] Oil transportation incident drills and training offer concrete ways to increase response preparedness. Funds from the Railroad and Pipeline Safety Account weren't used for free-standing exercises and drills during the first two fiscal years that safety account funds were available. HSEM sensibly focused on the types of training that prepares first responders for next-stage training through exercises and drills—awareness training and advanced training. Nonetheless, HSEM in the last two years has been involved in tabletop exercises and has provided staff support and participation in exercises involving a wide range of emergencies, including but not limited to oil incidents involving rail and pipelines.

HSEM trainers note that their awareness and operations trainings include brief tabletop exercises at the end of the sessions, so in this way Railroad and Pipeline Safety Account funds have been used to support limited tabletop exercises for some 320 trainings.

In addition, HSEM staff have led or helped with 12 hands-on trainings at quarterly meetings for the state's Chemical Assessment Teams, hazmat Emergency Response Teams, and the 55th Civil Support Team of the Minnesota National Guard. HSEM staff have also supported emergency management personnel with planning, conducting, and evaluating some eight full-scale, hands-on exercises. And HSEM staff have been involved in eight tabletop exercises, each lasting about three hours, including one carried out by the University of Minnesota and its partners in December 2016.

How Well Was the Training Done?

Simple counts of training sessions or the number of participants trained fails to capture how well the trainers carried out their work. For the "how well" element of training, the DPS 2015 report to the legislature suggested using as benchmarks the participants' evaluations of the training sessions and the geographic and risk-based distribution of the training conducted.[23]

Participant Evaluations of the HSEM Training Sessions

HSEM collects participant feedback for the awareness trainings and the advanced trainings, using different evaluation questions for the two types of trainings. When staff adopted more carefully

[22] In addition, the 2015 DPS report to the legislature proposed that the number of new cooperatives or interjurisdictional groups formed using the state's guidance be used as a benchmark for how much was being done by HSEM in the area of oil incident preparedness, but HSEM focused its efforts on training and did not work on cooperatives and interjurisdictional groups, so no such groups were formed with HSEM's help.

[23] The 2015 DPS report to the legislature also suggested assessing how well the training was conducted through after-action reviews of drills or large-scale exercises and by gauging the quality of applications for funding submitted from local or regional groups. However, the Railroad and Safety Account has yet to be used to fund exercises and drills, and HSEM has not set up a process an application process for safety account funds, so these approaches were not used here in this report. That said, HSEM is reviewing the after-action report from released in November 2016 for the June exercise held in Stevens County.

targeted evaluation approaches in early 2016, it chose to continue using its original evaluation questions for the awareness trainings to allow comparisons over time. This is why two different evaluation approaches are employed.

Awareness Training Evaluation Scores

HSEM tallies evaluation feedback from participants in awareness training in a way that aggregates the scores from all evaluation questions combined. The division tracks average scores for each training session. Of the 5,844 participants in awareness training from mid-August 2014 through mid-October 2016, 4,478 (77%) filled out evaluation forms. Evaluation ratings averaged 4.7 on a scale with 5 as the highest score and 1 as the lowest. Written comments from the participants were overwhelmingly positive. Breakouts for results by evaluation question, rather than aggregate results across all questions, would provide better indications of participant evaluations, but these breakouts aren't available.

Advanced Training Evaluation Scores

HSEM uses funds from the Railroad and Pipeline Safety Account to contract with third-party training providers for the advanced sessions. HSEM staff work with the trainers on content and curriculum. The evaluation forms for these sessions ask participants to rate their satisfaction with the trainings using a number of different factors, but the forms also ask participants to indicate gains in knowledge or abilities from pre-session to post-session. The evaluation scores show reasonably affirmative ratings for satisfaction with the training, but only modest gains in ratings by trainees of their pre- and post-training knowledge and abilities.

To measure satisfaction, the HSEM evaluation form asks participants to rate their level of agreement or disagreement with statements about the training. Table 2 shows the average results from 23 training sessions with 542 participants, although not all the participants necessarily completed evaluation forms.[24] All of these averages fall well above the neutral mid-point (3.0) on the scale but none is within half a point of the "strongly agree" mark.

Table 2: Training participants' satisfaction ratings for advanced training (1 = strongly disagree, 5 = strongly agree)

Response	Rating
This training met my needs and expectations.	4.3
The hands-on training was effective.	4.0
I will be able to apply what I learned.	4.4
The trainer(s) presented the subject matter clearly, explaining topics and terms well.	4.1
The trainer(s) encouraged active participation and questions from participants.	4.4
I would recommend this course to other 1st responders.	4.2

[24] HSEM tallies evaluation data from each of the advanced training sessions separately and so has data totals for each session, but it doesn't retain data on the different individual responses for each training session. For this, it is impossible to determine the number or participants filing evaluations for any training session.

To measure gains in knowledge or abilities, the HSEM evaluation form for the advanced training asks participants at the session to register their status before the training and after on a series of statements, which allows for a useful gauge of impacts from the training. Table 3 shows the average results from nine of the training sessions with 199 participants for their pre- and post-session ratings and the percentage changes. (The pre- and post-session data was not collected from early advanced trainings, and was not collected, either, for most of the sessions conducted in September and October 2016.) The gains are limited, indicating either a mismatch between the evaluation questions and the purpose of the training sessions or underperformance on the part of the trainers. Percentage gains for pre- to post-session levels are generally lower when participants start pre-session with higher knowledge or ability levels. Nonetheless, the small gains in these cases are notable.

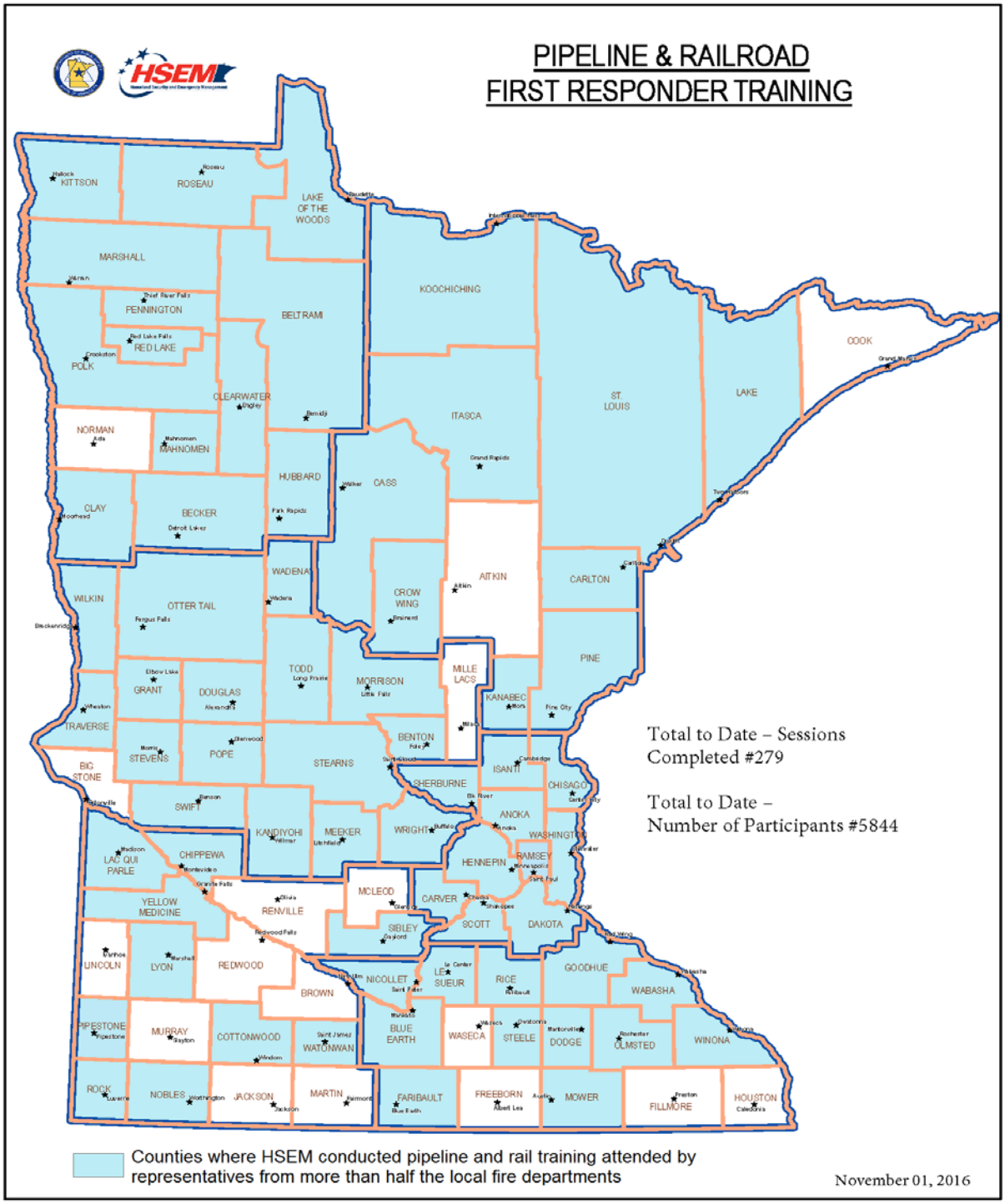
Table 3: Training participants' pre- and post-session ratings for knowledge and ability (1 = disagree, 5 = agree)

Response	Pre-session to post-session % change
I feel my department is prepared for an oil transportation incident.	28%
I feel I am prepared for an oil transportation incident.	30%
I can identify the contents of trains and pipelines moving through my area.	16%
We know how to seek resources and assistance from rail and pipeline companies and regional resource teams.	15%

Geographical and Risk-Based Distribution of Trainings

A county-based view of where the awareness trainings have occurred shows that HSEM has covered much of the state with these sessions, which HSEM has targeted toward cities and townships near oil train routes and oil pipelines. From mid-August 2014 to mid-October 2016, HSEM offered awareness trainings statewide and held them where requested. In the case of 70 of Minnesota's 87 counties, HSEM reports that firefighters from more than half the local fire departments participated in the awareness training sessions. Many of the 17 counties where participation in this HSEM awareness training has been more limited are located in southern Minnesota, probably because that area is less likely to have trains and pipelines carrying crude oil—although they are more likely to have trains carrying denatured ethanol. Figure 3 highlights the 70 counties where firefighters from more than half the local fire departments had participated in HSEM awareness training sessions as of mid-October 2016.

Figure 3: Counties where firefighters from more than half the local fire departments participated in HSEM awareness training for oil incidents involving rail and pipelines



In keeping with risk-based distribution for trainings, HSEM identified 463 high-priority communities near railroad tracks and pipelines carrying oil and targeted these communities for its training efforts. The HSEM awareness trainings drew participants from at least 246 (53%) of those high-priority communities. Only in 11 cases did participants in the awareness trainings come from other communities, at least for those participants from whom HSEM collected location information. (For statewide and regional conferences and meetings, and for county-level sessions, HSEM didn't record the home communities of participants.) For advanced trainings, in only one case through mid-October was a participant from a community other than HSEM's high-priority communities, again among the participants for whom data on home location was available.

Did Training Leave Participants Better Off?

As noted in the 2015 DPS report to the legislature on Minnesota's preparedness for a rail or pipeline incident involving crude oil, determining if training leaves participants better off is difficult and problematic. Clearly, no one wants an incident involving oil, ethanol, or other hazardous substance transported by rail or pipeline, and without a serious event, an organization or jurisdiction cannot know with certainty that their preparedness plans and training programs will lead to the intended outcomes. The 2015 legislative report suggested one way to gauge whether or not training and preparedness activities funded through the Railroad and Pipeline Safety Account have left participants better off would be to conduct follow-up, hands-on exercises with organizations who received training to determine if their preparedness has improved. At this point, HSEM has concentrated its efforts on awareness and operations training, with plans to move to exercises going forward using safety account funds. For this reason, assessment of full-scale exercises has yet to be a practical way to assess the impact of awareness and operations training efforts.

Impact Indications from Survey Results

The 2015 DPS report to the legislature also suggested that results from surveys of firefighters, law enforcement personnel, and emergency managers could provide some indication of whether or not training has improved preparedness for the state. There are limitations to this approach. Notably, those surveyed are not necessarily the same people who have participated in the training and they may not be in areas where HSEM training has taken place. In cases where the results from surveys are compared over time, there is a further limitation: The survey respondents from one year are not necessarily the same people who responded in the previous year. So this report presents results on several key questions included in surveys of firefighters, law enforcement personnel, and emergency managers to explore the possibility that HSEM training on oil incidents has moved the needle on preparedness, but with the caveats that the survey results aren't tied directly to HSEM training, and comparisons of survey results over time are difficult to make. (Results from some, but not all, of these survey questions are included in an earlier section of this report, "Minnesota's 2016 Status for Oil Transportation Incident Response," on page 28.)

Classroom Preparedness

The recent survey of fire chiefs, law enforcement officials, and emergency managers asked them to indicate how preparedness in fall 2016 for eight factors compared to preparedness in early 2014, before HSEM began its classroom training initiative. The highest percentage of respondents rating this change over time as a lot better or better did so for classroom training preparedness, as shown in Table 4. More

than three in five respondents (63%) reported that classroom training preparedness was at least somewhat better now than in early 2014. Another 37% of the respondents noted no change in classroom training preparedness, but again it may the case that those responding to the survey weren't from departments or units that participated in the HSEM training.

Table 4: Comparing classroom training preparedness before and after HSEM training initiative

	Better or a lot better	Somewhat better	No change	Worse
Classroom training	34%	29%	37%	0%

Comparing 2016 and 2014 Survey Results for Oil Incident Preparedness Questions

For the past three years, MAD has surveyed fire chiefs, law enforcement officials, and emergency managers in across Minnesota. Many of the questions included in these surveys have remained the same year to year. As noted earlier in this report, the responses over time indicate that the state is reported to be more prepared for oil transportation incidents in 2016 than it was in 2014 across numerous measures.

The 2014, 2015, and 2016 surveys asked respondents to rate their ability to respond to an oil transportation incident, considering the public and private resources available. The percentage of respondents rating their ability as poor dropped to 6% in 2016 from 9% in 2015 and 14% in 2014, while the percentages responding with ratings of excellent or near excellent (4 and 5 on the five-point scale) rose to 22% in 2016 from 20% in 2015 and 16% in 2014.

Table 5: Ability to respond to an oil transportation incident

	2014	2015	2016
Poor (1)	14%	9%	6%
Fair to good (2 & 3)	70%	72%	72%
Very good to excellent (4 & 5)	16%	20%	22%

Another question included in all three surveys asked respondents if they were more or less prepared to handle oil transportation incidents compared to other hazardous materials incidents. In 2014, only 6% of survey respondents viewed themselves are "more prepared" or "much more prepared" to respond to an oil transportation incident as compared to other hazardous materials, whereas in 2016 the percentage of respondents indicating the same levels of preparedness rose to 21%. It is also interesting to note the decline in those survey respondents who indicated that they are "less" or "much less" prepared to respond to an oil transportation incident than to other hazmat transportation incidents—39% in 2014 but 18% in 2016.

Table 6: Ability to respond to an oil transportation incident compared to other hazmat transportation incidents

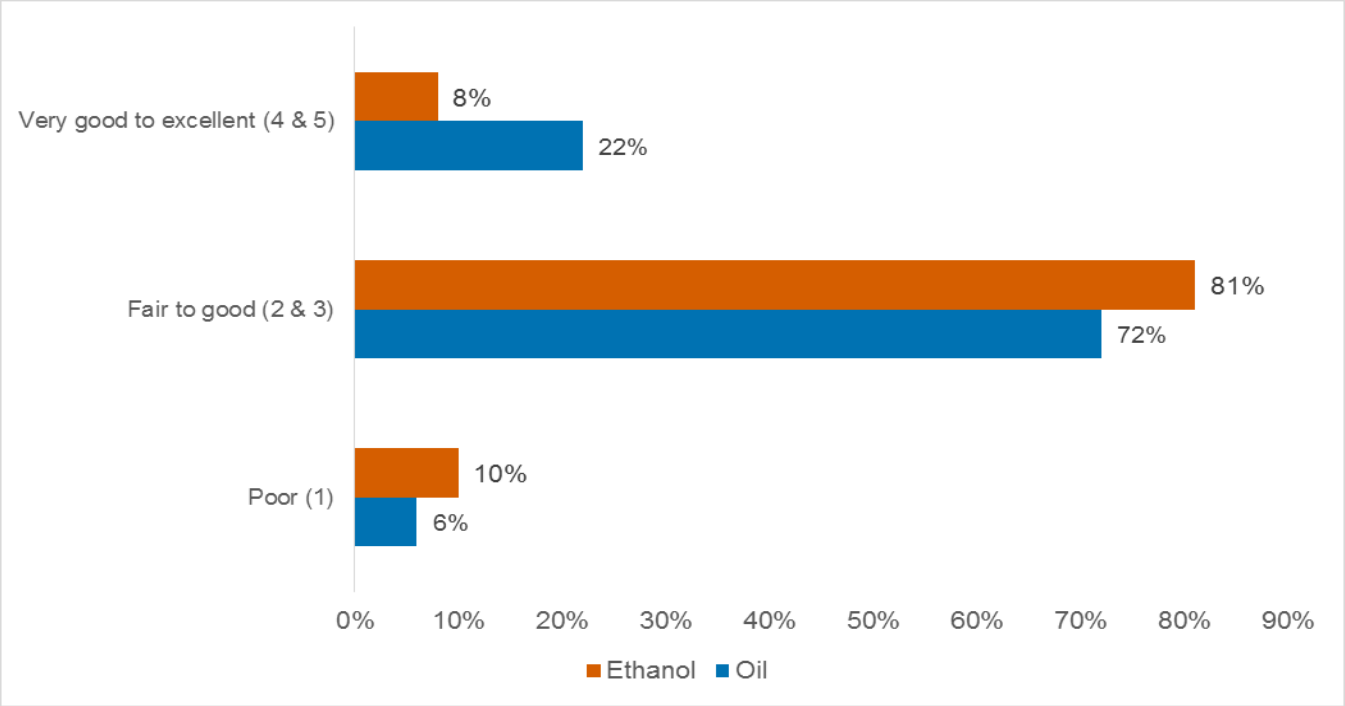
	2014	2015	2016
Less or much less prepared	39%	30%	18%
Prepared about the same	56%	60%	61%
More or much more prepared	6%	11%	21%

Comparing 2016 Survey Results for Oil Incidents and Ethanol Incidents

The 2016 survey asked similar questions of respondents who either have or might have oil trains moving through their area and respondents who either have or might have ethanol trains moving through their area. This allows for comparisons between the situation for oil, which has been the focus of HSEM training efforts, and the situation for ethanol, which has not. (About 60% of the respondents to the 2016 survey reported that trains traveling through their jurisdiction carry ethanol and oil. These respondents answered both the ethanol and oil questions.)

While the results from the 2016 survey relevant to oil transportation incidents cannot be tied directly to HSEM training efforts around oil transportation incident preparedness, the results do show better preparedness for oil incidents than ethanol ones. In rating their ability to respond to a transportation incident, a much higher percentage of respondents used 4 and 5 from the response scale of 1 = poor through 5 = excellent when assessing their preparedness for an oil transportation incident than did respondents assessing their preparedness for an ethanol incident—22% compared to 8%. (See Figure 4.)

Figure 4: Comparing the ability to respond to a transportation incident involving oil to one involving ethanol (95 respondents for oil question and 106 for ethanol)



The 2016 survey also asked similar questions about preparedness for oil transportation incidents but also ethanol transportation incidents compared to other hazardous materials. Among respondents who either have or might have oil trains traveling through their jurisdiction, a higher percentage reported that they are more or much more prepared (21%) than did respondents who have or might have ethanol trains traveling through their jurisdictions (14%). Conversely, a smaller percentage of those who have or might have oil trains moving through their jurisdictions reported that they were less or much less prepared (18%) compared to respondents for whom ethanol was a consideration (26%).

Comments from Interviewees

During its interviews, MAD asked those knowledgeable about the HSEM training for comments about its quality and effectiveness. The opinions varied. Most said that training to date has helped first responders and provided a broader frame than other training efforts focused almost exclusively on firefighter issues. But some also expressed concerns that the awareness training efforts have been too general, and others called for training to assist emergency planners as well as responders.

Several of those interviewed cited the value of awareness training for more than 5,800 participants statewide, as well as advanced training for more than 850. The HSEM training, they said, has left the state better prepared to handle potential rail and pipeline incidents involving oil and other hazardous substances. The training has increased awareness and knowledge of oil issues and how best to handle them. “The training that DPS has done has helped,” said a railroad official. “The more training the better.”

A number of people cited the value of the HSEM training in looking beyond the incident on the tracks to the impacts of incidents on communities, including critical infrastructure such as water treatment plants, schools, and storm sewer systems. MPCA involvement in the HSEM awareness trainings has provided firefighters and other first responders with an opportunity to learn about ways to anticipate the environmental aspects and impacts as they act to protect lives and stabilize the incident. One interviewee, however, suggested that HSEM trainings should do more to include emergency managers and public works staff and to focus more on the planning activities that communities need to carry out as key elements of their response strategies.

The interviews MAD conducted revealed some concerns about the generic nature of HSEM awareness training. While acknowledging the value of the HSEM training efforts, several officials from the private sector said it was their opinion that the awareness training lacked detail and specifics that would make it more valuable. “It’s generic,” said one. “It’s an appetizer,” said another. They said HSEM awareness trainings should offer more information about how to identify the contents of trains and where to find the resources needed to respond to an incident. Another interviewee said that while the HSEM awareness training has been helpful, it hasn’t offered enough guidance about what should be done to deal with incidents that might occur in densely populated urban areas.

A state staff person outside of HSEM but familiar with the awareness training said it confirmed what firefighters know and served as a useful reminder to them about how to approach hazmat incidents. “The training that was offered probably didn’t expand the knowledge base of the firefighters,” he said. “I think it was very valuable in having the state say [to firefighters], ‘What you know is good.’”

HSEM officials said they purposely decided to focus on more general awareness training as a first step when rolling out preparedness activities using Railroad and Pipeline Safety Account funds in order to create a common baseline of information among training participants. HSEM plans to use these trainings as a knowledge base for the advanced training that began in January and for exercises and drills as a next step. With the need for awareness training largely satisfied, HSEM will move to more detailed training. HSEM also said that refresher awareness courses going forward will focus more on the specifics for locations where the trainings are held.

Railroad representatives said that the HSEM trainings have saturated the state and have made it more difficult for the railroads to draw Minnesota participants to the first responder trainings that they offer in the state and to intensive training offered for firefighters at national training centers, particularly the Security and Emergency Response Training Center and Texas A&M Engineering Extension. They also suggested that assessments from the railroads paid into the Railroad and Pipeline Safety Account have left the railroads with fewer dollars available to support their own training efforts in Minnesota, possibly reducing the number of first responders whom they reach with their railroad training.

Several people interviewed expressed some concerns about the advanced training, some stemming from a lack of knowledge about what the trainings cover or unfamiliarity with the vendors offering the trainings.

Ethanol

Relevant to the following element requested by the legislature:

2. *Analyze preparedness and impacts to public safety from ethanol transportation by rail*

In 2015, the Minnesota legislature changed the requirements for this 2017 DPS study to include information about impacts and preparedness for ethanol carried in Minnesota by rail. Ethanol, unlike crude oil, is produced in the state, and it has been for some time. Like crude oil, ethanol is a Class 3 flammable liquid, making it a hazardous substance of interest when it comes to potential rail incidents, preparedness, and response. Nationwide, denatured ethanol is the most common hazardous material, by volume, shipped by rail.[25] Ethanol is also transported by truck and barge, but ethanol isn't transported by pipeline due to its corrosive nature.

Ethanol is most commonly blended with gasoline and used as fuel for cars and other vehicles. Ethanol producers ferment and distill corn, sorghum, and other agricultural products that contain starch in order to produce ethanol, which is primarily used as a renewable fuel source. [26] Ethanol is also used for alcoholic beverages and for industrial products, such as cleaning products, solvents, and

[25] Office of Hazardous Materials Safety, "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains," U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, May 2015, p. 19.

[26] Ethanol Emergency Response Coalition, "Training Guide to Ethanol Emergency Response Module 2: Chemical and Physical Characteristics of Ethanol and Hydrocarbon Fuels," participant guide, no date (downloaded October 2016), pp. 2. http://ethanolresponse.com/wp-content/uploads/2016/01/Participant-Guide-Mod2-1.pdf.

pharmaceuticals.[27] Because corn is very often used to produce ethanol, production is concentrated in the Upper Midwest.

While ethanol has been used as an octane enhancer for gasoline since the late 1970s, federal legislation on renewable fuels and renewable fuels standards has made ethanol a significant component of the motor fuel market in the United States. Ethanol is now blended with almost all the gasoline sold in the country, most often at mixtures of 10% or 15% ethanol, but the mixture can be as high as 85%.[28] Prior to shipping ethanol from the production plant to the facility that will blend it with gasoline, ethanol producers add in 2–5% gasoline to denature the ethanol for shipment, rendering it unfit to drink and thus not subject to liquor taxes imposed by the federal Alcohol and Tobacco Tax and Trade Bureau. [29] Nationally, ethanol production has boomed, increasing from 1.6 billion gallons to 14.3 billion gallons between 2000 and 2014, respectively.[30]

Ethanol Hazards and Rail Transport

Ethanol is a highly flammable hazardous substance and regularly transported by rail. Nationally, in 2013, ethanol constituted 26% of the total number of hazmat rail shipments and 1.1% of total railroad shipments overall.[31] The U.S. Department of Transportation notes that the accident rate for ethanol shipments has declined significantly, dropping by 13% from 2005-2015, but increases in the number and volume of shipments in recent years has resulted in more train accidents, "posing a significant safety and environmental concern."[32]

Public Safety

From a public safety perspective, the characteristics of ethanol pose a number of dangers. For one, ethanol has a very low flash point of 55° Fahrenheit for pure ethanol and lower for denatured ethanol.[33] The flashpoint indicates the lowest temperature at which a substance produces enough vapor to form a flammable mixture with air near its surface, so the lower the flash point, the greater the hazard of fire.

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[27] Iowa Department of Transportation, "Iowa Crude Oil and Biofuels Rail Transportation Study," April 2016, pp. 8-9. http://www.iowadot.gov/iowarail/safety/report/1_0_CBR_Biofuels_Rail.pdf.

[28] Ethanol Emergency Response Coalition, "Training Guide to Ethanol Emergency Response Module 1:,Ethanol and Ethanol Blended Fuels," participant guide, no date (downloaded October 2016), http://ethanolresponse.com/wp-content/uploads/2016/01/Participant-Guide-Mod1-1.pdf.

[29] Ethanol Emergency Response Coalition, "Training Guide to Ethanol Emergency Response Module 2: Chemical and Physical Characteristics of Ethanol and Hydrocarbon Fuels," participant guide, no date (downloaded October 2016), p. 8. http://ethanolresponse.com/wp-content/uploads/2016/01/Participant-Guide-Mod2-1.pdf.

[30] Iowa Department of Transportation, "Crude Oil and Biofuels Rail Transportation Study, Final Study," State of Iowa, p. 27. http://www.iowadot.gov/iowarail/safety/report/full_final_CBR_Biofuels.pdf.

[31] "Renewable Fuels Association, 2013. "Ethanol, Rail Transportation, and Safety." http://www.ethanolrfa.org/wp-content/uploads/2015/10/Ethanol-Rail-Transportation-and-Safety.pdf.

[32] Office of Hazardous Materials Safety, "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains," U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, May 2015, p. 6.

[33] Ibid., p. 20.

Ethanol also burns hot, producing radiant heat flux that can be two to five times greater than heat from a gasoline fire.[34]

From a firefighting perspective, ethanol mixes with water and will still burn even with that mix at a ratio of five parts water to one part ethanol, making it practically impossible to dilute ethanol with water to a point where it no longer supports combustion.[35] Because ethanol mixes with water, it is recommended that firefighters use special alcohol-resistant aqueous film-forming foam (AR-AFFF) to suppress ethanol fires. (For gasoline or oil, the fuel floats to the top, so other foams can be used.)[36] For firefighters, the response to an ethanol fire is different than with crude oil, too, because ethanol "does not produce visible smoke and has a hard to see blue flame" and, in contrast to crude oil and gasoline, ethanol can conduct electricity.[37]

For ethanol, as with crude oil, the difficulties of fighting a fire lead experts to recommend that responders let ethanol fires burn down to a manageable level if possible, and only attempt to suppress the fire if life or safety are at risk.[38] Dangers are higher in densely populated urban areas, especially ones categorized by the federal government as high threat urban areas (HTUAs). In Minnesota, Minneapolis and St. Paul, plus a 10-mile buffer around the borders of those cities, are an HTUA. The first responder approach to an incident involving ethanol or any hazardous substance is to identify the substance, evacuate people in the area, and secure the area. The recommended evacuation zone for oil and ethanol fires is a half mile in all directions.[39]

Denatured ethanol and crude oil are both categorized as Class 3 flammable liquids. Some sources interviewed for this report argued that ethanol is less dangerous than crude oil because the properties of denatured ethanol are known and relatively stable. By contrast, there is significant variability in the make-up and characteristics of Bakken crude and other crude oils. Others, however, cited the flammability of ethanol to argue that it posed a greater threat to public safety.

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[34] Massachusetts Emergency Management Agency, "Large Volume/High Concentration Ethanol Incident Response Quick Reference," June 2016, no page number. http://www.mass.gov/eopss/docs/mema/resources/plans/ethanol/mema-ethanol-pamphlet.pdf.

[35] Ethanol Emergency Response Coalition, "Training Guide to Ethanol Emergency Response Module 2: Chemical and Physical Characteristics of Ethanol and Hydrocarbon Fuels," participant guide, no date (downloaded October 2016), pp. 3. http://ethanolresponse.com/wp-content/uploads/2016/01/Participant-Guide-Mod2-1.pdf.

[36] Ethanol Emergency Response Coalition, "Training Guide to Ethanol Emergency Response Module 1: Ethanol and Ethanol Blended Fuels," participant guide, no date (downloaded October 2016), p. 2. http://ethanolresponse.com/wp-content/uploads/2016/01/Participant-Guide-Mod1-1.pdf.

[37] Ethanol Emergency Response Coalition. "Training Guide to Ethanol Emergency Response." http://ethanolresponse.com/resources.

[38] For an example of this advice to let the ethanol fire burn, see Massachusetts Emergency Management Agency, "Large Volume/High Concentration Ethanol Incident Response Quick Reference," June 2016, no page number. http://www.mass.gov/eopss/docs/mema/resources/plans/ethanol/mema-ethanol-pamphlet.pdf.

[39] Iowa Department of Transportation, "Crude Oil and Biofuels Rail Transportation Study, Final Study," State of Iowa, p. 10. http://www.iowadot.gov/iowarail/safety/report/full_final_CBR_Biofuels.pdf.

Environmental Impacts

Ethanol on its own is not viewed as a major, long-term environmental threat, but the gasoline mixed in to denature ethanol raises concerns.[40] In addition, there are near-term impacts from spills and leaks of ethanol, complicated by the fact that ethanol mixes completely with water and therefore cannot be contained when it contaminates a waterway or body of water. As ethanol biodegrades in water, which it does relatively rapidly, it causes deoxygenation that can lead to fish kills. Ethanol spills may contaminate groundwater, too. In the case of many ethanol incidents, fire burned off the substance and prevented significant environmental impacts.[41]

Train Transport of Ethanol

Sources consulted for this report, both inside the rail industry but outside it as well, identified trains as a safer mode of transport than trucks for ethanol and other hazardous substances, citing the low probability that an incident will occur. A representative from one of the Class I railroads reported that 99.999% of all hazardous car loads are moved by train without any accident-related releases. He also compiled data from the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) for the last 10 years showing rail had 25 times fewer incidents than truck transport. PHMSA, in a May 2015 report, estimated that number of mainline railroad derailments for ethanol and crude oil trains nationwide will drop to 14 and below 14 in 2017 and 2018, respectively.[42]

While the likelihood of a rail incident is low, however, concerns are compounded by the practice of shipping ethanol in unit trains, [43] meaning that many cars on one train carry the same cargo from its origin to its destination. The federal government defines a train as a high-hazard flammable train if it carries Class 3 flammable liquid in 20 or more tank cars that form a continuous block, or 35 or more tank cars spread across an entire train.[44] It is common for ethanol—and crude oil—to be transported in units of 80 to 100 tank cars on the same train.[45]

Ethanol in Minnesota

Minnesota is a major producer of ethanol used for motor fuel. The state's 21 ethanol plants, mostly located in southern Minnesota, have a combined annual production capacity of more than one billion

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[40] Office of Research and Development, "Science Brief: Biofuel Ethanol Transport Risk," U.S. Environmental Protection Agency, 2011, p. 2.

[41] Department of Environmental Protection, "Large Volume Ethanol Spills – Environmental Impacts and Response Options," Commonwealth of Massachusetts. July 2011, pp. E1-E4. http://www.mass.gov/eopss/docs/dfs/emergencyresponse/special-ops/ethanol-spill-impacts-and-response-7-11.pdf.

[42] Office of Hazardous Materials Safety, "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains," U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, May 2015, p. 77.

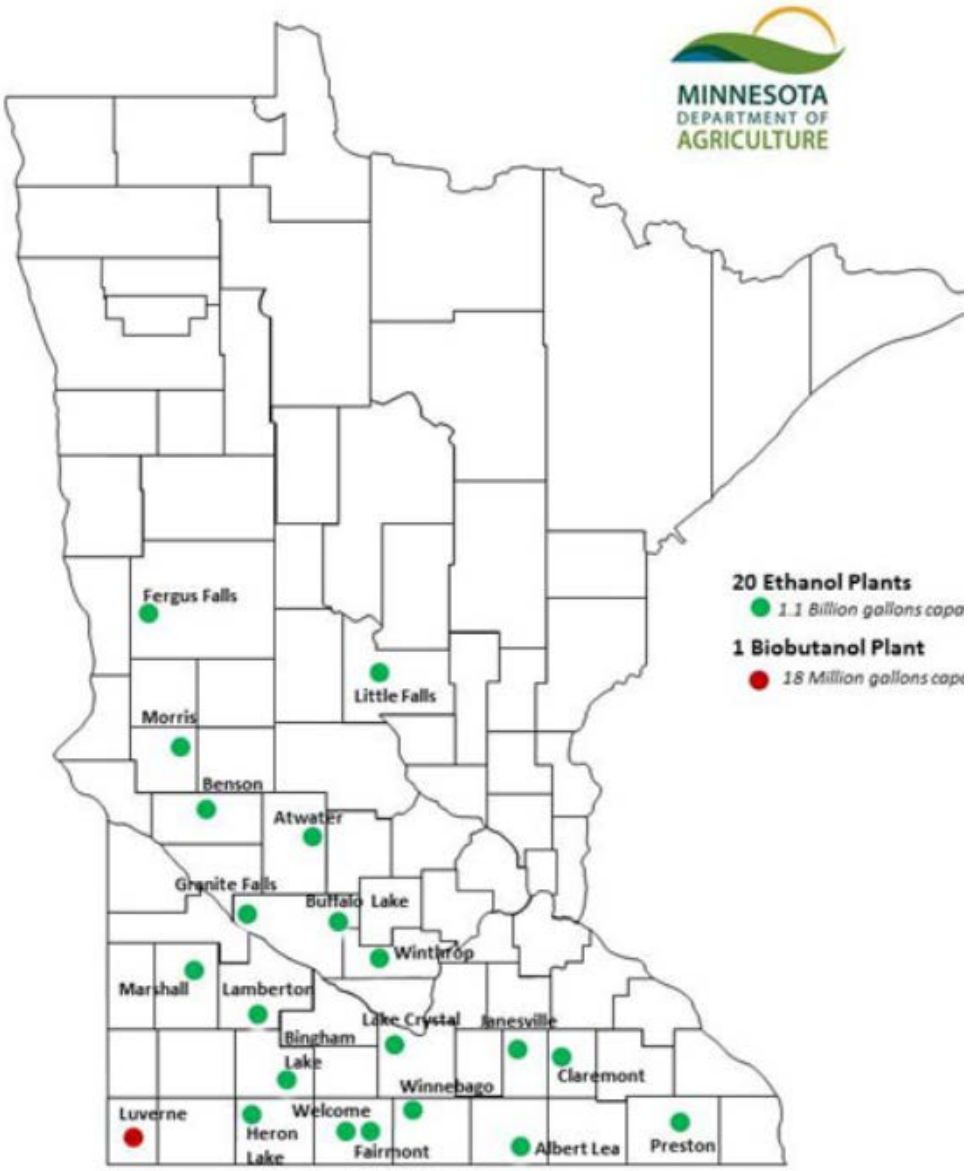
[43] Ibid., p. 6.

[44] Ibid., pp. 6-7.

[45] Ethanol Emergency Response Coalition, "Training Guide to Ethanol Emergency Response Module 3: Transportation and Transfer of Ethanol-Blended Fuels," participant guide, no date (downloaded October 2016), p. 6. http://ethanolresponse.com/wp-content/uploads/2016/01/Participant-Guide-Mod3-1.pdf.

gallons.[46] Minnesota ranks fourth among states for ethanol production, accounting for almost 8% of both the nation's production capacity and its annual production at the start of 2016.[47] The map below, from the Minnesota Department of Agriculture, shows the location of ethanol plants, as well as the location of a plant that produces biobutanol, another, higher energy fuel produced from the fermentation and distillation of corn or other agricultural products.

Figure 5: Ethanol and Biobutanol Plants in Minnesota



[46] Of the plants counted here, 20 produce ethanol and one produces biobutanol, a related, higher energy fuel also produced from the fermentation and distillation of corn or other agricultural products. Another of the 20 plants is in the process of converting to n-butanol production, targeting the chemical market.

[47] Renewable Fuels Association, "U.S. Ethanol Production Capacity by State," January 2016. http://ethanolrfa.org/consumers/where-is-ethanol-made/.

Ethanol plants locate along rail lines so that the product can be loaded directly into rail cars for shipment. Based on information from the Minnesota Regional Railroads Association, ethanol is shipped in Minnesota by three of the four major Class I railroads that operate in the state—Burlington Northern Santa Fe (BNSF), Canadian Pacific (CP), and Union Pacific (UP). Among the short line railroads, four of the state's 17 Class III and private railroads and the state's one Class II railroad carry ethanol as well: Minnesota Prairie Line (MPL), Minnesota Southern Railway (MSWY), Ottertail Valley Railroad (OTVR), Twin Cities & Western (TCW), and Rapid City, Pierre & Eastern (RCPE). (See Appendix E for the complete map of freight railroads operating throughout Minnesota.)

A number of sources interviewed for this report noted that ethanol has been produced and transported in the state for decades. The oldest of Minnesota's ethanol plant now in operation was established in 1991.[48] For this reason, some said, the industry and those responsible for incident response have had more time and are better prepared for an ethanol rail incident. Ethanol has been a part of many local emergency operation plans for some time, resulting in more preparedness activities, including ethanol tabletop and incident exercises, ethanol facility tours by emergency responders, and specific first responder training around ethanol. "We have been moving ethanol for a lot longer than we've been moving crude oil," one interviewee said. A number of those interviewed cited the relationships between private and public sector players and the roles they have taken to engage each other in response preparedness, citing this as a positive for the state when it comes to the capacity to handle a potential ethanol rail incident.

According to a February 2016 study prepared for the Minnesota Bio-Fuels Association, ethanol production, transportation, and consumption is important to Minnesota's economy. The report lists the following estimated annual impacts:

- "Generated $7.4 billion in gross sales for Minnesota business
- Accounted for more than $2.1 billion in state Gross Domestic Product
- Generated $1.6 billion worth of income for Minnesota households
- Supported more than 18,100 fulltime jobs in the state
- Contributed $93 million to state and local government tax rolls"[49]

There are policies in place in Minnesota that encourage ethanol production, including the requirement that biofuels account for 10% of all the gasoline sold in the state.

Ethanol as One of Many Hazards in the State

Ethanol is one of several risks that can lead to an incident requiring preparedness and emergency response. Tornados, flooding, wildfire, nuclear incidents, infectious disease outbreaks, and hazardous material discharges (including ethanol) are all possible in Minnesota.

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[48] Department of Agriculture, "Ethanol," State of Minnesota, http://www.mda.state.mn.us/renewable/ethanol.aspx.

[49] Urbanchuk, J. and S. Norvell, "Contribution of the Ethanol Industry to the Economy of Minnesota," Agriculture and Biofuels Consulting, February 29, 2016, p. 1. http://www.ethanolrfa.org/wp-content/uploads/2016/03/Contribn-of-Ethanol-Industry-to-MN-Economy_ABF-Econ_2016-02-29-1.pdf.

As detailed in the 2015 oil transportation study that Management Analysis and Development conducted for the Department of Public Safety,[50] Minnesota has adopted the Minnesota State Hazard Mitigation Plan as part of its homeland security and emergency management functions. Among other components, the statewide plan presents an analysis of relative risks of major natural and human-caused hazards that Minnesota could face. Experts ranked these hazards qualitatively as an aid to overall prioritization, but the plan emphasizes that detailed risk assessment is still necessary as part of preparedness efforts.

The tables below are adapted from Minnesota's 2014 Hazard Mitigation Plan. Hazardous materials, which include ethanol, are assessed as a medium probability hazard. The plan notes that the probabilities of these hazards have not changed since the 2011 plan.

The plan examines the future perspectives relating to transportation of oil and notes that responses to hazardous materials incidents may be complicated, and threats may be magnified, by a variety of factors unique to this hazard. These may include "restricted access, reduced fire suppression and spill containment, and even complete cut-off of response personnel and equipment … [as well as] the risk of terrorism …"

Table 7: Probability Ranking and Criteria for Hazard Identification[51]

Ranking	Criteria
High	The hazard has impacted the state annually, or more frequently The hazard is widespread, generally affecting regions or multiple counties in each event There is a reliable methodology for identifying events and locations
Medium	The hazard impacts the state occasionally, but not annually The hazard is somewhat localized, affecting only relatively small or isolated areas when it occurs The methodology for identifying events is not well-established, or is not applied across the entire state
Low	The hazard occurs only very infrequently, generally less than every five years on a large scale, although localized events may be more frequent The hazard is generally very localized and on a small scale (i.e. sub-county level) A methodology for identifying event occurrences and/or severities is poorly established in the State, or is available only on a local basis.

[50] Department of Public Safety, "Minnesota's Preparedness for an Oil Transportation Incident," January 15, 2015. https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf.

[51] Adapted from Minnesota State Hazard Mitigation Plan 2014. p. 44.

Table 8: Hazard Identification[52]

Hazard	Probability
Drought	High
Extreme Heat	High
Flooding	High
Hail	High
Lightning	High
Tornadoes	High
Wildfire	High
Wind Storms	High
Winter Storms	High
Dam Failure	Medium
Erosion	Medium
Fire (Structure and Vehicle)	Medium
Ground and Surface Water Supply	Medium
Hazardous Materials	Medium
Land Subsidence	Medium
Earthquakes	Low
Infectious Disease Outbreak	Low
Nuclear Incidents	Low
Transportation	Low

A fall 2016 MAD survey of fire chiefs, law enforcement officials, and emergency managers asked them to rank the importance of 15 hazardous materials as potential transportation incidents in their area. Based on the number of times respondents rated each of the options as very important, ethanol ranked below anhydrous ammonia for importance and just slightly below propane, so it effectively tied for second. Oil ranked sixth, trailing liquefied petroleum gas and gasoline, as well as the top three choices. These results come from a survey specifically targeted to individuals assumed to have concerns about ethanol and oil. (A total of 122 to 127 respondents to the survey answered this question, with the counts varying somewhat depending upon the hazardous substance being rated.)

[52] Adapted from Minnesota State Hazard Mitigation Plan 2014. p. 45.

Table 9: Hazardous materials rated very important as potential transportation incidents for respondents

Substance	Percentage Rating Very Important
Anhydrous ammonia/ammonia	61.4%
Propane	52.4%
Ethanol	52.0%
Liquefied petroleum gas	47.2%
Gasoline	44.4%
Oil	43.3%
Chlorine	40.7%
Hydrochloric acid	27.6%
Sulfuric acid	26.6%
Benzene	26.4%
Radioactive material	23.4%
Molten sulfur	17.9%
Hydrogen fluoride	16.9%
Hydrogen peroxide	17.1%
Phosphorus	16.4%

An All-Hazards Approach to Hazardous Materials

In general, the State of Minnesota and county and local public agencies address concerns about ethanol in the context of an all-hazards approach to potential hazardous materials incidents. All-hazards is the lens emergency management uses in planning for threats to public safety. It requires a risk analysis of the community's vulnerabilities to identify and prioritize the potential of local threats. Once threats are identified, the community develops the capacity to meet the level of risk through functional planning. Functional planning prepares a community for the component parts of almost any hazardous incident, including notification/warning, evacuation, and sheltering.

Communities and first-responder divisions engage in a number of all-hazards planning efforts. Many establish emergency operation plans (EOPs) for all types of potential community-specific emergencies. Community efforts may involve hazard mitigation plans (HMPs) that build on planning guidance in this area from the Federal Emergency Management Agency (FEMA). HMPs focus on hazards in a community, disaster-prone areas, and mitigation actions. Another broader approach is to use the Federal Emergency Management Agency's Threat and Hazard Identification and Risk Assessment (THIRA) procedures to identify community threats and hazards ranging from storms to hazmat and set capability targets based on core capabilities identified in the National Preparedness Goal.

Summary of the Ethanol Preparedness and Emergency Response Framework in the State

Relevant to the following elements requested by the legislature:

2. *Analyze preparedness and impacts to public safety from ethanol transportation by rail, which must provide the following information:*
    e) summarize the preparedness and emergency response framework in the state

The legislature asked the Department of Public Safety to examine the response framework in the state for ethanol rail incidents. The following sections present information about these important elements of the framework:

- The level of preparedness and planning for ethanol rail incidents at the local level
- The roles of the different entities involved in preparedness and response—railroads, state government, local first responders, and the federal government
- The legal framework and requirements regarding ethanol incident preparedness and response

Preparedness response situation for ethanol

At the direction of DPS, Management Analysis and Development surveyed fire chiefs, law enforcement officials, and emergency managers in fall 2016 in part to gather information about local circumstances for ethanol rail incident response preparedness. Results are presented here to indicate the local situation, as part of the overall framework for ethanol preparedness and emergency response in the state. The survey was sent to fire departments, sheriff departments, police departments, and emergency managers along rail lines carrying ethanol, as well as oil for oil incident questions also included in the survey. For the ethanol questions analyzed here, MAD included respondents who reported that they have or might have ethanol trains moving through their jurisdictions.[53]

Most as Prepared for an Ethanol Incident as for Other Hazmat Incidents

Most survey respondents to the ethanol questions rated their preparedness for ethanol transportation incidents as "about the same" as other hazardous materials transportation incident preparedness, with more than three in five (61% or 68 respondents) choosing this option. However, more than one quarter of these respondents (26% or 29 respondents) reported that their city, county, or tribal governments are less prepared to respond to an ethanol transportation incident than they are to other hazardous materials incidents. Three of the 29 rated their jurisdictions as "much less prepared." The remaining

[53] The survey asked questions about ethanol to respondents who reported that ethanol trains move through their jurisdictions, as well as those who indicated that they were unsure if ethanol was traveling by train through their areas.

13% (14 respondents) indicated that they are more or much more prepared to respond to an ethanol related than to other hazardous materials incidents.

Respondents Largely Better Prepared to Respond to Ethanol Transportation Incident than in 2014

Of the 112 survey respondents who responded that the trains that travel through their jurisdictions carry ethanol or might carry ethanol, well more than half (59% or 65 respondents) reported that they were better prepared for an ethanol transportation incident in their areas than they were in 2014. This is the sum of those who responded that they are somewhat better, better, or a lot better prepared. Another 41% of respondents (46) reported no change preparedness for ethanol transportation incidents.

Players and Roles in Ethanol Rail Incident Preparedness and Response

Preparedness efforts and response to an ethanol rail incident involve key players from the private and public sectors. This section looks at roles for the different entities—railroads, state government, local first responders, and the federal government. It is worth noting that while this section of the report focuses on ethanol, many of those interviewed for this study and for the 2015 DPS report to the legislature pointed out that Minnesota has an all-hazard approach to preparedness, in keeping with well-accepted best practices, not one focused on just one or several substance, such as ethanol and oil. Many emphasized, too, that the private sector company responsible for a discharge or spill is ultimately responsible for responding to an incident.

The Critical Role of Railroads in Incident Response

Railroads are ultimately responsible for responding to an emergency involving the substances they transport. They must have plans in place to prevent and respond to all discharges, and they must pay any costs associated with responding to a discharge. Consequently, unlike with many other emergencies, response to an ethanol rail incident or other hazmat rail incident falls heavily on the railroad as the responsible party.

Representatives from the railroads said their companies are responsible for maintaining and providing the capacity for responding to an oil, ethanol, or other hazardous substance incident, including cleanup and mitigation. Both federal laws and state statutes, as well as other regulations, specify that the railroads are responsible for responding to railroad incidents.

Class I railroads own or contract for emergency response equipment that they employ in the event of an incident, and they have personnel both in-house and under contract who would respond as well. With an ethanol rail fire or explosion, railroad emergency responders would be charged with controlling and suppressing the blaze on the tracks, while local firefighters would likely concentrate their efforts on fighting structural fires that result from the incident, although they may play a role in helping bring the situation under control.

Rail companies are required by law to produce and maintain up-to-date emergency response plans, including specifically defined “worst case scenario” plans that would guide their actions in all aspects

of an incident. Companies may be required to provide state and federal officials with their plans for responding to an incident. Minnesota established additional provisions for preparedness by railroads through 2014 changes to Minnesota's Spill Bill (Minnesota Statute § 115E). A key difference between these recent Minnesota standards for railroads and the current federal requirements for rail and pipeline companies is that the Minnesota statute establishes set timelines for rail companies to respond to any discharge, not only worst case discharges.

As for federal regulations of railroads regarding spills, railroad response plans are required in 49 CFR part 130, "Oil Spill Prevention and Response Plans."[54] Ethanol is routinely denatured with gasoline, which classifies it as oil under U.S. EPA definitions for hazardous substances. In summary, spill prevention and response plans must address the following:

- Range of response scenarios that foreseeably could occur;
- Qualified individual, the alternate qualified individual, and all other personnel with a role in spill response;
- Training, including drills, required for each of these persons;
- Equipment necessary for response to the maximum extent practicable in each of the identified scenarios;
- Means by which the availability of personnel and equipment will be ensured to respond to a spill to the maximum extent practicable;
- Governmental officials and others to be notified in the event of a spill, and the notification procedure to be followed;
- Means for communicating among responsible personnel and between personnel and officials during a response; and
- Procedures to be followed during a response.

Local Governments and Local First Responders

Local governments are responsible for ensuring public safety in their communities. The commander of the local firefighting unit is the overall incident commander in all but the most catastrophic incidents. Local governments develop plans to respond to emergencies that may affect their communities, and they are empowered to develop mutual aid and interjurisdictional organizations.

Local governments in Minnesota have "the primary responsibility for meeting the immediate health and safety needs of its citizens in the event of a major emergency/disaster," though state resources can supplement local governments in certain circumstances.[55, 56] In a response to a rail incident, local first responders most often are the first to arrive on the scene, and the local fire department chief serves as the incident commander, focusing on public safety, taking action to evacuate areas as needed, and

[54] 49 CFR 130.

[55] DPS, HSEM. "State of Minnesota Emergency Operations Plan (Official)," September 1, 2013. Accessed December 12, 2014, https://dps.mn.gov/divisions/hsem/all-hazards-planning/Documents/2013-official-meop-public.pdf. p. O-1.

[56] Circumstances include when "the needs generated by a major incident exceed the capability of local government to respond, the state has a specialized resource needed by local government, or the scope of the event is widespread and there is a need to utilize a centralized incident management system." Ibid, p. O-1.

providing direct firefighting when called for, particularly when a rail car fire spreads to structures in a community. Some cities have hazmat teams as part of their first responder units.

A significant ethanol transportation incident would likely exceed the capabilities of most fire departments, particularly those outside of urban areas. Many of the subject matter experts MAD consulted for this report indicated that in a significant incident involving an ethanol discharge—particularly if there is a fire—the primary public safety response from local first responders is to evacuate residents and workers and secure the area.

In terms of preparedness for an ethanol rail incident—or other hazardous substance transportation incidents—counties and cities are responsible for developing emergency preparedness and response plans that would apply to an oil transportation incident. Most local governments have these types of plans, according to first responder and local government associations interviewed by MAD for the 2015 and 2017 DPS reports to the legislature. Currently, all counties, cities of the first class, and HSEM regions in Minnesota[57] are engaged in planning and capacity identification aimed at identifying and prioritizing risks and determining what resources may be needed. This effort is part of a national process known as Threat and Hazard Identification and Risk Assessment (THIRA). The THIRA process has four main steps: 1) identify threats and hazards, 2) put those hazards in context by describing how they may affect the community, 3) establish capability targets, and 4) apply the results of the analysis to estimate the resources needed to achieve the targets.[58]

The U.S. DOT's Pipeline and Hazardous Materials Safety Administration in 2014 released an updated safety and preparedness advisory for emergency response organizations, called the "Commodity Preparedness and Incident Management Reference Sheet."[59] The advisory, applicable to ethanol incidents, summarizes important hazard awareness and rail safety precautions, as well as recommending a framework for "pre-incident planning and preparedness."

The recommendations are, in summary, that local emergency responder departments should do the following:

- Identify the rail carriers of hazardous materials moving through their communities and determine whether crude oil is one of the products being transported.
- Identify specific points of contact for each rail carrier, including specific personnel responsible for hazardous materials transportation.
- Make sure that their emergency response and operations plans include 24-hour contact information for the appropriate rail personnel.

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[57] Tribal governments are encouraged to participate.

[58] Minnesota Department of Public Safety, Division of Homeland Security and Emergency Management, "Threat and Hazard Identification and Risk Assessment (THIRA)," 2014. Accessed December 12, 2014, https://dps.mn.gov/divisions/hsem/homeland-security/Pages/threat-hazard-risk-assess.aspx.

[59] PHMSA, "Commodity Preparedness and Incident Management Reference Sheet." Accessed December 12, 2014, http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_157A75A27FDC85D2FDCF0A8A6A02D50487BE0200/filename/Petroleum_Crude_Oil_Reference_Sheet.pdf.

- Identify state and local environmental protection agency representatives to identify potential air monitoring and spill containment resource capabilities, and include this information in their emergency response plans.
- Determine from the U.S. Coast Guard (USCG) and other relevant agencies the assistance they would be able to provide in the event of a spill or other hazardous materials release.
- Include an annex in their emergency response plans that are specific to oil transportation response, including:
    - hazard analysis that identifies the potential risks to people and property
    - emergency contact lists
    - resource listings
    - equipment inventories
    - foam and water supply requirements for operations at remote sites

State Government Resources and Assistance

The State of Minnesota participates in emergency hazmat response through its locally based statewide regional hazmat response teams. In addition, state agencies and agency personnel play roles in planning, preparedness, and response.

Chemical Assessment Teams and Hazmat Emergency Response Teams

The state funds regional hazardous materials response teams that can assist with rail incidents involving ethanol, as well as the much broader range of hazmat emergencies. Regional Chemical Assessment Teams (CATs) and Emergency Response Teams (ERTs) were established in the early 1990s to provide capabilities and expertise that local responders may lack when faced with incidents involving hazardous materials. CATs and ERTs are closely related, with both responding to incidents involving hazardous substances. ERTs are larger and may take broader actions than CATs generally do to prevent the release of hazardous materials, mitigate the effects of the release, and stabilize the emergency situation, under the direction of the local incident commander.[60]

Both CATs and ERTs focus their attention, advice, and assistance on the hazardous materials involved in an incident, not on the fires that may result from a release, spill, or accident. CATs and ERTs aren't involved in firefighting and fire suppression. Their roles in an ethanol rail incident could include taking limited actions to mitigate problem situations, monitoring the air or water for dangerous pollutants, tracking movement of the pollutants, and providing information useful to the local commander in making decisions to protect the public, including decisions about methods to reduce vapor and about evacuations. CATs and ERTS are often involved at the incident scene in identifying the hazardous substance, but in the case of an ethanol rail incident, the substance is known already.

Initial response and assessment for emergencies still rests with the first responders in all the communities and counties throughout Minnesota, but those first responders can call upon the statewide response teams for assistance. Fire chiefs in local communities contact the state's Duty Officer Program and DPS's Bureau of Criminal Apprehension, which provides a single point of contact

[60] Minnesota Administrative Rules, 7514.0900 Responsibilities of Teams, https://www.revisor.leg.state.mn.us/rules/?id=7514.0900; and Department Public Safety, Division of Homeland Security and Emergency Management, "FY 2015 Annual Report," pp. 5-6.

for state-level emergency assistance requests. If the call fails to meet criteria laid out in five specific screening questions,[61] then the duty officer refers the call for a decision by one of three expert staff at HSEM. Permission must be granted by either the duty officer or the HSEM expert for a response from one of the teams. Once permission is granted, the State of Minnesota covers liability that might arise for the statewide response teams from the incidents.

CATs and ERTs are located Minnesota within fire or public safety departments in the following locations:

- Duluth (CAT and ERT)
- Grand Rapids (CAT)
- Hopkins (CAT)
- International Falls (CAT)
- Mankato (CAT)
- Marshall (CAT)
- Moorhead (CAT and ERT)
- The North Metro area (Blaine, Coon Rapids, Fridley, and Anoka County) (CAT)
- Rochester (CAT)
- St. Cloud (CAT and ERT)
- St. Paul (CAT and ERT)

Based on a recent study of funding challenges and equipment needs for Minnesota's statewide response teams, DPS is considering recommendations about the number of ERTs and the use CATs to offer ERT services that are more regionally dispersed throughout the state.[62]

State Agency Roles

State agencies are also engaged in preparedness and response activities relevant to an ethanol rail incident. Although it is true, as well, that state government regulators and agency staff are often primarily focused on preventing transportation incidents involving oil, ethanol, and other hazardous substances.

Homeland Security and Emergency Management Division: HSEM provides guidance and advice to local governments to assist them in developing emergency response plans. Emergency response plans should take an all-hazards approach, which may include planning for specific hazards. The MNWALK

[61] The five questions are drawn from criteria for authorizing emergency response, found in Minnesota Administrative Rules, 7514.1600 Emergency Response Criteria and Dispatching, Subp. 2, https://www.revisor.mn.gov/rules/?id=7514.1600. The five are as follows: 1) Is there a release or potential release from a transportation incident or a fixed facility? 2) Does the release present an actual or potential threat to public safety or the environment? 3) Are local emergency response personnel on the scene and have they made an initial assessment of the incident? 4) Do the response needs of the incident exceed your local response capabilities? 5) Are you requesting a team response to the scene?

[62] Kane, M., Collins, J., and Van Amber, K, "Minnesota's Statewide Response Teams: Funding Challenges, Equipment Needs, and Other Issues and Opportunities," Department of Public Safety, September 2016, pp. 26-31.

tool, [63] for example, includes planning requirements relating to oil and other hazardous materials transported by rail and pipeline.

HSEM coordinates regular meetings of response entities, including regional response teams and other state agencies, to discuss preparedness and response. Active groups focused on hazardous materials incidents, such as ethanol incidents, include the Technical Advisory Committee made up of regional hazmat response teams, and State Agency Responders Committee of state agency response experts. HSEM also coordinates the state's Emergency Preparedness and Response Committee, involving state agency leaders for the Minnesota's emergency operations plan. This committee is focused on all-hazards planning and response.

Minnesota Pollution Control Agency: MPCA focuses on the environmental response preparedness for private sector entities that are transporting or storing hazardous materials and petroleum. One of MPCA's current areas of focus—consistent with legislative changes in 2014—is on evaluating the preparedness of railroads, including through the review of preparedness plans and involvement in exercises and drills.

State Agencies Broadly and Agency Coordination: State agencies have specific memoranda of understanding as part of the state's emergency operations planning, which could be relied on in case of a significant incident, including an ethanol transportation incident.

In the context of response to an ethanol rail transportation incident, hazardous materials experts from HSEM, the Minnesota Pollution Control Agency, and the Minnesota Department of Transportation can offer advice to local responders on scene or by phone. The immediate response to an emergency involving hazardous materials would be focused on protecting public safety, public health, and the environment. After a situation is under control from an emergency management standpoint, MPCA's Emergency Response Team provides on-scene coordination of spill cleanup. Minnesota Department of Health (MDH) coordinates Mobile Medical Teams, which can provide medical services during significant incidents. There are two teams in Minnesota—one in central Minnesota and one in the Twin Cities.

Other agencies may play roles as well. Through Executive Order 15-13, Governor Mark Dayton established the roles and responsibilities of state agencies for the general emergency preparedness, planning, response, recovery, and hazard mitigation activities.[64] According to an HSEM official, the agencies roles and responsibilities for incident response are as follows:

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[63] HSEM does not provide templates for local governments for response plans; instead, governments are encouraged to develop locally specific plans that are consistent with federal and state planning guidance. MNWALK is a resource to allow local governments and plan reviewers to evaluate a preparedness plan. The tool is available at https://dps.mn.gov/divisions/hsem/all-hazards-planning/Pages/mnwalk.aspx.

[64] Executive Order 15-13. "Assigning Emergency Responsibilities to State Agencies; Rescinding Executive Order 13-13," July 2015, https://mn.gov/governor/assets/2015_07_13_EO_15_13.pdf_tcm1055-93230.pdf.

Department of Public Safety

- Lead role in state public safety response to a terrorist event involving chemical, biological, and radiological substances
- Deploy Chemical Assessment Teams and hazmat Emergency Response Teams, as noted above
- Facilitate an appropriate state and local response when requested by local authorities
- Coordinate requests for federal assistance
- Coordinates planning and response efforts through its HSEM regions

Pollution Control Agency

- Lead role when non-agricultural, non-radiological materials are involved and the incident is not a terrorist event involving chemical, biological, or radiological substances

Department of Military Affairs

- Responds to and supports state and local authorities responding to suspected terrorist incidents involving chemical, biological, or radiological substances

Department of Agriculture

- Lead role when agricultural chemicals are involved

Department of Health

- Coordinates the provision of short-term behavioral health services
- Reviews cleanup of accident/incident site to ensure the protection of public health
- Provides public health laboratory staff and testing facilities for biological, chemical, or radiological contaminants

Department of Transportation

- Ensures that hazardous materials transportation regulations are enforced

Department of Natural Resources

- Participates in response when fish and wildlife, waterfowl, waterways, or public lands are involved

The Federal Government's Roles

The federal government's primary role in the context of preparedness and response to an ethanol transportation incident in Minnesota is in regulating the rail industry in ways that impact all phases of emergency management—prevention, preparedness, response, recovery, and mitigation. Federal standards and laws establish requirements for certain levels of safety, training of personnel, labeling of rail containers, and adherence to environmental protection standards that companies must meet. The federal government may be involved in response to an incident, particularly if the incident occurs on or near water, or if the incident requires federal disaster assistance. Federal involvement with a state's incident preparedness and response framework may also include providing training and guidance.

Additionally, federal guidelines and best practice recommendations underpin most state and local regulations and requirements, and to some extent their response frameworks and preparedness efforts.

Many federal agencies are involved in aspects of oil and ethanol transportation from the emergency management perspective, including the Environmental Protection Agency,[65] the United States Coast Guard,[66] and the Federal Emergency Management Agency. In general, the U.S. Coast Guard is the lead federal agency for spills and releases for the Great Lakes and Great Lakes shoreline, and the U.S. EPA is the lead federal agency for spills and releases affecting land and surface waters outside of the Great Lakes. The federal agencies have a management and oversight function, focused on ensuring that the responsible party secures the source as part of the response effort and cleans up the spill or release. EPA has the ability to take control of the incident situation if necessary but usually works with incident command structure set up for the local team and the railroads.

Railroad oversight crosses many federal agencies because of the interstate nature of their operations, their role in national energy, transportation, commerce, defense, and other areas. These include the U.S. Departments of Transportation, Defense, Homeland Security, Commerce, and Energy, as well as the Nuclear Regulatory Commission. For the focus of this report, the most applicable federal entities for oversight are the Federal Rail Administration (FRA), the Pipeline and Hazardous Materials Safety Administration, and the National Transportation Safety Board (NTSB), both of which are part of the U.S. Department of Transportation (DOT).[67]

Federal Government Response

Federal action after an ethanol incident would typically be during the recovery phase. For example, the Federal Emergency Management Agency (FEMA) may be called on to provide recovery assistance in an area affected by a significant incident.

Direct involvement of a federal government entity in a response effort would coincide with an incident response area that includes a waterway. For example, in many areas of Minnesota bordering Lake Superior, the Mississippi River, or another major waterway, the U.S. Coast Guard is often part of the area's response plan. In some areas, the National Parks Service or the Army Corps of Engineers may be involved in response or recovery efforts.

Detailed guidance for the federal response to an actual oil or ethanol rail incident are largely focused on dealing with the discharge or release of a hazardous substance from such an incident, and not as much with responding to any resultant fire, explosion, injuries, or other physical damage. Information for that type of response exists, but primarily as guidance for local and state responders, and for coordination, if necessary, with federal-level personnel. Further, most federal-level overlap with an

[65] The EPA is the lead federal agency for inland oil spill incidents. Among other duties, EPA also plays a role in the implementation of Emergency Planning and Community Right-to-Know Act (also known as SARA Title III), which primarily deals with facilities that store hazardous materials.

[66] USCG is the lead for coastal zone incidents.

[67] The Minnesota Pollution Control and Homeland Security and Emergency Management Agencies play significant roles in rail and pipeline oversight, safety, preparedness, and response, but the roles of their federal counterparts, the U.S. EPA and Department of Homeland Security are much more removed in comparison.

ethanol-related transportation incident relates to responding to and mitigating the environmental effects of the aftermath of a hazard spill or release.[68]

Response to Incidents:[69] Federal Guidance on Incident Management and Command Systems

As part of its role in response and preparedness, the federal government has developed the National Incident Management System (NIMS) to help guide responses to all types of incidents in a systematic way. As defined by FEMA:

> The National Incident Management System (NIMS) is a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work together seamlessly and manage incidents involving all threats and hazards—regardless of cause, size, location, or complexity—in order to reduce loss of life, property and harm to the environment.[70]

NIMS is a broad, over-arching guide for all aspects of responding to an emergency that, when utilized at all levels of government and by other involved parties, can help streamline emergency response actions and reduce, to the extent possible, confusion and delays.

FEMA, as part of the emergency response planning and execution process outlined with NIMS, also suggests a command structure for purposes of organizing the various public and private entities and their personnel that are expected to be involved in responding to an incident. This structure is known as the Incident Command System (ICS).[71]

The ICS is a top-down system designed to be flexible so it can be adapted to an incident of any scope or size, and involve as few as a single person, up to multiple federal, state, local, and private sector organizations. One key is that no matter the size of the incident, there is one single person overseeing the entire response—the Incident Commander (IC). Along with IC staff, determinations may be made as to response needs for a given incident. For example, a large-scale rail accident may require local or regional experts, company personnel, someone to talk with the press and be a liaison to other organizations, officials, and the public, as well as potentially the need for hazmat professionals with experience in a certain type of substance, such as ethanol. The ICS structure includes a framework for organizing response to an incident of such magnitude.[72]

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[68] Guidance in this area is outlined in the Oil Pollution Act of 1990 (OPA 90). Subsequent modifications, particularly regarding Oil Spill Response Organizations (OSROs), have been added since OPA 90, but, again, those are almost entirely within the realm of spill response and recovery under the auspices of the EPA and USCG.

[69] In the emergency planning context, an incident is defined as, "An occurrence, natural or manmade, that requires a response to protect life or property." FEMA, "National Incident Management System," December 2008. Accessed December 15, 2014, https://www.fema.gov/national-incident-management-system, p. 138.

[70] Ibid, p. 1.

[71] FEMA, "National Incident Management System Handbook," December 2008. Accessed December 15, 2014, http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf, p. 91.

[72] Additional information and more detail, including potentially needed personnel and their roles and a command structure template, can be found in Appendix B of the FEMA-NIMS handbook.

Federal Government Involvement in Preparedness

The following section relates to federal activity regarding incident preparedness, including but certainly not limited to an ethanol rail incident.

National Response Framework: The federal government organizes its response responsibilities and plans under a framework known as the National Response Framework and its Emergency Support Functions (ESF), which many local and state agencies have adopted and tailored for their own use.[73]

National Preparedness Policy Directive 8: The federal government has in recent years developed a more evolved framework to guide preparedness at all levels. A recent such promulgation was Presidential Policy Directive 8: National Preparedness (PPD-8), issued by President Barack Obama on March 30, 2011. According to the Congressional Research Service:

> PPD-8 provides a guide as to how the nation, from the federal level to private citizens, can prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation including acts of terrorism and other human caused incidents (such as oil spills) and natural disasters.[74]

This and related emergency response frameworks contain a number of components and concepts that many interviewees cited in their responses to MAD. These include:

- All-hazards emergency response model, which is an approach to preparedness and training that avoids focusing on a single type of incident, such as a train fire, pipeline explosion, or a waterway spill, or on a single hazmat type, such as ethanol
- National Incident Management System
- Incident Command System
- National Oil and Hazardous Substances Pollution Contingency Plan, which establishes the procedures for the federal response to an ethanol or hazardous material spill

State Legal Framework for Emergency Preparedness and Response

The State of Minnesota has a comprehensive legal framework for emergency preparedness and response. Though it is not necessarily specific to ethanol transportation incidents, the legal framework defines the roles and responsibilities of public and private entities that may respond to an incident.

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[73] U.S. Department of Homeland Security, "National Response Framework." Second Edition, May 2013. Accessed December 9, 2014, http://www.fema.gov/media-library-data/20130726-1914-25045-1246/final_national_response_framework_20130501.pdf.

[74] Congressional Research Service. "Federal Emergency Management: A Brief Introduction." R42845. November 30, 2012. Accessed December 12, 2014, https://training.fema.gov/hiedu/highref/federal%20em-a%20brief%20introduction-r42845%20-%20lindsay.pdf, p.4. For a more detailed look at PPD-8 and a description of the overall federal response to national disasters and emergencies see the Department of Homeland Security's May 2013 *National Response Framework*, available at http://www.fema.gov/media-library-data/20130726-1914-25045-1246/final_national_response_framework_20130501.pdf.

This section provides a brief overview of the executive order, statutes, and rules related to emergency preparedness and public safety response to incidents, and it identifies other related state laws.

Minnesota's Emergency Management Framework

State agency responsibilities (Executive Order 13-13)

In November 2013, Governor Mark Dayton signed the current executive order assigning emergency responsibilities to state agencies.[75] Executive Order 13-13 requires that identified departments and agencies designate points of contact, engage in planning and preparedness activities, respond in times of emergency, and provide recovery and hazard mitigation support as directed.[76]

Several aspects of the executive order are particularly relevant to ethanol transportation safety preparedness:

- DPS/HSEM is the responsible agency for coordinating and maintaining the state's all-hazard emergency operations plan.
- State agencies will carry out their responsibilities as outlined in the Minnesota Emergency Operations Plan and the Minnesota State Hazard Mitigation Plan, or as directed by HSEM.
- When state agencies respond to a disaster or emergency, they will use the National Incident Management System Incident Command System.[77]

Minnesota Emergency Management Act (Minnesota Statutes § 12)

Minnesota's Emergency Management Act is the primary statute relating to emergency preparedness and response. Among other provisions, the act establishes what is now the Homeland Security and Emergency Management Division, defines the powers and duties of the governor and local organizations, and defines emergency powers and duties.

The act sets out the policy of the state:

> It is further declared to be the purpose of this chapter and the policy of the state that all emergency management functions of this state be coordinated to the maximum extent with the comparable functions of the federal government, including its various departments and agencies, of other states and localities, and of private agencies of every type, to the end that the most effective preparations and use may be made of the nation's labor supply, resources, and facilities for dealing with any disaster that may occur.[78]

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[75] Though the specific content and detailed responsibilities are different, Executive Order 11-03 follows the general framework used by previous governors. The current order—as with the orders of previous governors'—follows the general format initiated by Governor Wendell Anderson in 1975 (Executive Order 75-102, available at http://www.leg.mn/archive/execorders/75-102.pdf).

[76] Governor Dayton's Executive Order 13-13 can be found at http://www.leg.mn/archive/execorders/13-13.pdf.

[77] This system is described on page 24.

[78] Minnesota Statutes 2014 § 12.02, subd. 2.

Of particular relevance to oil transportation public safety preparedness, the act:

Establishes duties of HSEM: Among other duties, HSEM is charged with coordinating state agency preparedness and emergency response, developing the state's emergency operation and hazard mitigation plans, coordinating the development and maintenance of local emergency operations plans and emergency management programs, coordinating emergency preparedness drills involving multiple state agencies, maintaining and administering an emergency management training curriculum, and establishing a single state answering point system for reporting emergency incidents (including those involving hazardous substances or oil).[79, 80]

Defines roles and responsibilities for local governments: Political subdivisions are required to establish local emergency management programs. Directors are appointed by the mayor (for cities) or governing boards or bodies (for counties and other political subdivisions). County organizations are responsible for coordinating the activities of local emergency management organizations throughout the county and may assist in training these emergency management organizations.[81] Additionally, political subdivisions are authorized to levy property taxes to pay for emergency management expenses.[82]

Encourages coordination, mutual aid, and emergency assistance: Several sections of the statute describe ways that local and state government entities can coordinate their efforts for emergency management and response.

> § 12.25, subd. 5 allows two or more political subdivisions to determine the geographic boundaries of their emergency management responsibilities or to develop a common emergency management organizatio**n.** The act later refers to these as interjurisdictional agencies.
>
> § 12.27 allows local organizations for emergency management to develop mutual aid agreements in collaboration with other public and private agencies in Minnesota or with organizations in other states (with approval of the governor). These agreements would allow for reciprocal emergency management aid and assistance "in an emergency or disaster too great to be dealt with unassisted."
>
> § 12.331 allows a political subdivision to request assistance of another political subdivision "[w]hen the public interest requires it because of an emergency," and it provides a method for reimbursement of expenses for use of personnel, equipment, and supplies (damage to equipment is not reimbursable).[83]

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[79] Minnesota Statutes 2014 § 115E.09 contains a more expansive description of a required single answering point system.

[80] Minnesota Statutes 2014 § 12.09.

[81] Minnesota Statutes 2014 § 12.25.

[82] Minnesota Statutes 2014 § 12.26.

[83] § 12.33 contains similar provisions but deals with situations where the governor *directs* a political subdivision to send police, firefighting, health, or other forces to another political subdivision.

§ 12.351 allows the director of HSEM to activate a special emergency response team and deploy the team to a political subdivision if the director determines that this response to an emergency or disaster is in the public interest.

Preparedness: State Legal Framework

Oil and Hazardous Substance Discharge Preparedness (Minnesota Statutes § 115E)

Minnesota's Oil and Hazardous Substance Discharge Preparedness statute, often referred to as the "Spill Bill," requires owners and operators of facilities and vessels to prevent and respond to discharges of hazardous materials or oil. This provision applies to denatured ethanol, which the U.S. EPA classifies as oil. The statute also provides authority to agencies responsible for enforcing aspects of the law, including DPS, MPCA, and the Department of Agriculture.

Duties to prevent and prepare for spills

As relevant to this report, the statute covers structures, equipment, motor vehicles, rolling stock, and pipelines that are involved in transporting oil. Any person who owns or operates one of these facilities has a duty to prevent the discharge of hazardous substances and oil.[84] These persons are also required to be **"**prepared at all times **to rapidly and thoroughly recover discharged hazardous substances or oil that were under that person's control and** to take all other actions necessary to minimize or abate pollution of land, waters, and air **of the state and** to protect the public's safety and health.**"**[85]

Preparedness requirements for railroad and pipeline owners and operators

The statute sets out specific preparedness requirements for persons who "own or operate railroad car rolling stock transporting an aggregate total of more than 100,000 gallons of oil or hazardous substance as cargo in Minnesota in any calendar month" or who "own or operate hazardous liquid pipeline facilities through which more than 100,000 gallons of oil or hazardous substance is transported in any calendar month."[86]

These persons, among others, are required to maintain preparedness to respond effectively to worst case discharges,[87] and they are required to demonstrate preparedness to the Pollution Control Agency (or Department of Agriculture, in the case of agricultural chemicals). Preparedness can include directly employing personnel and equipment or maintaining agreements with for-hire cleanup contractors, with a Community Awareness Emergency Response organization (CAER), or with public sector response organizations (local, state, or federal). Preparedness plans must meet requirements regarding prevention, communication, and incident command, descriptions of response resources, and description of actions in the event of a worst-case discharge. Plans must be provided to the

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[84] Minnesota Statutes 2014 § 115E.02.

[85] Minnesota Statutes 2014 § 115E.03, subd. 1, emphasis added.

[86] Minnesota Statutes 2014 § 115E.03, subd. 2–4, and § 115E.04.

[87] "Worst case discharges" are defined in Minnesota Statutes 2014 § 115E.01, subd. 13 as including incidents such as "in the case of a pipeline facility, sudden loss of the contents of the pipeline which would be expected from complete failure of the pipeline onto land or into water in weather conditions that impede cleanup," and "in the case of railroad rolling stock facilities, sudden loss of the contents of the maximum expected number of the railcars containing oil or hazardous substance of a train onto land or into water in weather conditions that impede cleanup."

commissioners identified in statute or official of a political subdivision "with appropriate jurisdiction" on request.[88]

Powers of commissioners to ensure preparedness

For those entities required to have worst case discharge plans, one or more of the commissioners identified in statute can call for announced or unannounced drills, contact persons or organizations identified in the plan to confirm their roles and capabilities, or use other means to verify that a facility is prepared for a worst-case discharge.[89]

Additionally, for all covered facilities, if one or more of the commissioners finds that the prevention and response plans do not meet requirements, the commissioner can order the facility to make amendments to their plan or take additional measures to ensure timely prevention and preparedness.[90]

Coordination and assistance

Several sections of the statute describe ways that local and state government entities can and should coordinate their efforts.

- The statute provides liability protection to persons who offer assistance in response to a discharge, including members of cooperatives or CAER groups, employees or officials of political subdivisions, members of designated response teams, and others.[91]
- As noted above, the statute allows persons to demonstrate preparedness through a number of different collaborative means.
- The statute appoints the commissioner of DPS as the coordinator of state agency preparedness for response to a discharge and directs DPS to assess preparedness of state agencies and chair regular meetings to prepare for a coordinated response, among other duties. State agency responsibilities and jurisdictions are defined by subject matter.[92]
- DPS is also charged with establishing a single answering point system for persons to report emergencies involving hazardous substances and oil; the system is designed to support communication among the state agencies responsible for state response to an incident.[93]

2014 Changes to the Minnesota Spill Bill

Several aspects of § 115E were changed with the railroad and pipeline safety provisions passed by the legislature and signed by the governor in 2014.[94] Particularly relevant to response to an oil transportation incident, § 115E now includes several specific provisions related to rail transportation safety:[95]

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[88] Minnesota Statutes 2014 § 115E.04, subd. 4(a).
[89] Minnesota Statutes 2014 § 115E.04, subd. 4(b).
[90] Minnesota Statutes 2014 § 115E.05.
[91] Minnesota Statutes 2014 § 115E.06 and § 115E.061.
[92] Minnesota Statutes 2014 § 115E.08.
[93] Minnesota Statutes 2014 § 115E.09. Minnesota Rules 7514 implements this part of the statute through the Minnesota Duty Officer system.
[94] Laws of Minnesota 2014, chapter 312, article 10.
[95] Pipeline companies are not covered by the specific provisions described below.

- Defines an "incident commander" according to National Incident Management System Guidelines.
- Requires railroads to offer training to each fire department along the routes of unit trains.
- Requires railroads to communicate annually with emergency managers, fire officers, and others to ensure that response activities are coordinated.
- For railroads that transport unit trains of oil or hazardous substances, requires railroads to "deliver and deploy sufficient equipment and trained personnel to contain and recover discharged oil or hazardous substances and to protect the environment and public safety."[96]
- Establishes timelines for response activities for railroads if there is confirmation of an oil or hazardous material discharge.
- Requires railroads to conduct oil containment, recovery, and sensitive area protection drills every three years, as directed by MPCA.
- Requires railroads to have submitted prevention and response plans to MPCA by June 30, 2015 and to submit again every three years thereafter.
- Directs MPCA to engage in environmental protection activities related to rail transportation incidents, including working with local governments and railroads, facilitating cooperation and mutual aid, and evaluating railroad preparedness efforts.
- Directs DPS to engage in public safety protection activities related to rail transportation incidents, including assisting local emergency managers and fire officials with understanding the hazards of oil and other hazardous substances and including response information in preparedness plans, assisting with development of protocols for first responders, and facilitating cooperation among private and public sector organizations.

Response: State legal framework

Hazardous Materials and Incident Response Act (Minnesota Statutes § 299A.48–299A.55)

The Minnesota Hazardous Materials Incident Response Act established what are now referred to as regional response teams. Important provisions of the statute include:

- Defines chemical assessment teams. They are: 1) "trained, equipped, and authorized to evaluate and, when possible, provide simple mitigation to a hazardous materials incident and 2) required to recommend to the local incident manager the best means of control the hazard …"[97]
- Defines regional hazardous materials response teams. These teams are "trained and equipped to respond to and mitigate a hazardous materials release." Regional response teams may include chemical assessment teams.[98]
- Required DPS to develop an implementation plan and rules in consultation with identified agencies, appropriate technical response representatives, and affected parties.[99]

[96] Minnesota Statutes 2014 § 115E.042, subd. 4, emphasis added.
[97] Minnesota Statutes 2014 § 299A.49, subd. 2.
[98] Minnesota Statutes 2014 § 299A.49, subd 7.
[99] Minnesota Statutes 2014 § 299A.50.

- Requires a "responsible person" to pay for all costs of response to a hazardous materials incident.[100]

Responsibilities, training, and equipment standards for the response teams are outlined in Minnesota Rules 7514.0100 through 7514.2000.

Changes in 2014

In 2014, sections were added to § 299A related to transportation safety preparedness. In particular, a Railroad and Pipeline Safety Account was established to provide for additional training and preparedness activities. This account is explored in greater detail in the sections of this report about funding sources and levels.

Environmental Response and Liability Act (Minnesota Statutes § 115B)

Among many other provisions related to pollution and cleanup, the Environmental Response and Liability Act establishes that facilities (including rolling stock and pipeline) are "responsible persons," liable for the costs of responding to releases of pollutants, contaminants, or hazardous substances, for removal of the material, and for any damages to natural resources.[101] The statute also authorizes MPCA to take any removal or remediation actions to respond to release of hazardous substances, pollutants, or contaminants. Before taking action, MPCA must request the responsible party to take action, notify the owner of the property, and determine that the responsible party will not take action within the time requested—in emergencies, MPCA may respond immediately.[102]

Related Statutes

A number of other state laws are connected to oil and hazardous materials transportation or preparedness and response, but do not directly apply to public safety response to ethanol transportation incidents. These include:

- Minnesota Statutes 2014 § 299K: Hazardous Chemical Emergency; Planning and Response. The state law is the companion to the federal Emergency Planning and Community Right-to-Know Act (EPCRA) (also known as SARA Title III). The law covers stationary facilities that store hazardous materials. Among other provisions, it requires facilities to provide inventory and release reports, establishes regional review committees, and encourages local governments to develop response plans. The statute requires facilities to pay fees**,** which are used to support administration of the EPCRA program and hazardous materials response. Minnesota Rules 7507.0100 – 7507.0700 implement the provisions of the statute related to fees.
- Minnesota Statutes 2014 § 219: Railroad Safety and Employment. Establishes standards for rail traffic and safety (primarily adopting federal standards). Requires companies to take action to prevent fires on or near tracks, including employing patrollers to discover and extinguish fires during dry seasons in areas potentially overrun by fire. Requires railroads to reimburse local fire departments for expenses of extinguishing a fire when the emergency is caused by the locomotive, rolling stock, or employee**.** If the railroad is subject to property taxes in a

[100] Minnesota Statutes 2014 § 299A.52.
[101] Minnesota Statutes 2014 § 115B.03.
[102] Minnesota Statutes 2014 § 115B.17.

jurisdiction, the company is required to pay fees and assessments related to firefighting and protection expenses in the same way as other property owners. In 2014, § 219 was expanded to authorize rail safety inspectors to participate in federal rail safety program disciplines, including hazardous materials programs.

- Minnesota Statutes 2014 § 115C. Petroleum Tank Release Cleanup. Covers petroleum storage tanks, requires responsible persons to take corrective action in response to leaks or discharges, establishes liability for response costs, and establishes a fund and administrative board to fund corrective actions for petroleum tank releases.

The Private and Public Response Capacity Inventory for Ethanol Incidents

Relevant to the following elements requested by the legislature:

2. *Analyze preparedness and impacts to public safety from ethanol transportation by rail, which must provide the following information:*
    - *d) develop a comprehensive public and private response capacity inventory that, to the extent feasible, includes statewide identification of major emergency response equipment, equipment staging locations, mutual aid agreements, and capacities across industries involved in the transportation of ethanol*

The legislature asked DPS to assess training and equipment needs for ethanol rail incidents among fire departments and other emergency responders for this report. Before considering what additional resources may be needed to enhance Minnesota's public safety preparedness for an ethanol rail incident, however, it is necessary to address another request of the legislature and consider current response capacity inventory. This capacity inventory section of the report builds upon information included in the 2015 DPS report to the legislature on "Minnesota's Preparedness for an Oil Transportation Incident,"[103] with updates and added information included here. While denatured ethanol differs from crude oil in some important ways, both substances are Class 3 flammable liquids when in transit along Minnesota's rail routes. Consequently, the response resources of use for an ethanol incident are mostly the same as those employed for an incident involving oil transported by rail or pipeline. (The ethanol that producers denature at the plant prior to shipment is classified as oil under U.S. EPA definitions for hazardous substances, so MAD assumes requirements regarding oil transport by rail apply to ethanol transport by rail.) The information included in this section is as comprehensive as feasible.

Locations of Resources

Figure 6 on page 73 presents a map showing key private sector resources and Minnesota's public sector regional hazardous materials response teams to indicate the types and locations of resources available to respond to a potential ethanol rail incident. The private sector resources denoted include response resources from railroads, contractors, pipelines, and cooperatives such as Community Awareness Emergency Response (CAER) groups. As the map indicates, there are significant private sector

[103] Department of Public Safety, "Minnesota's Preparedness for an Oil Transportation Incident," January 15, 2015. https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf.

resources available both in the state, with clusters in the Twin Cities, along key rail routes, and along the Mississippi River. Additional private sector resources are available in border states.[104]

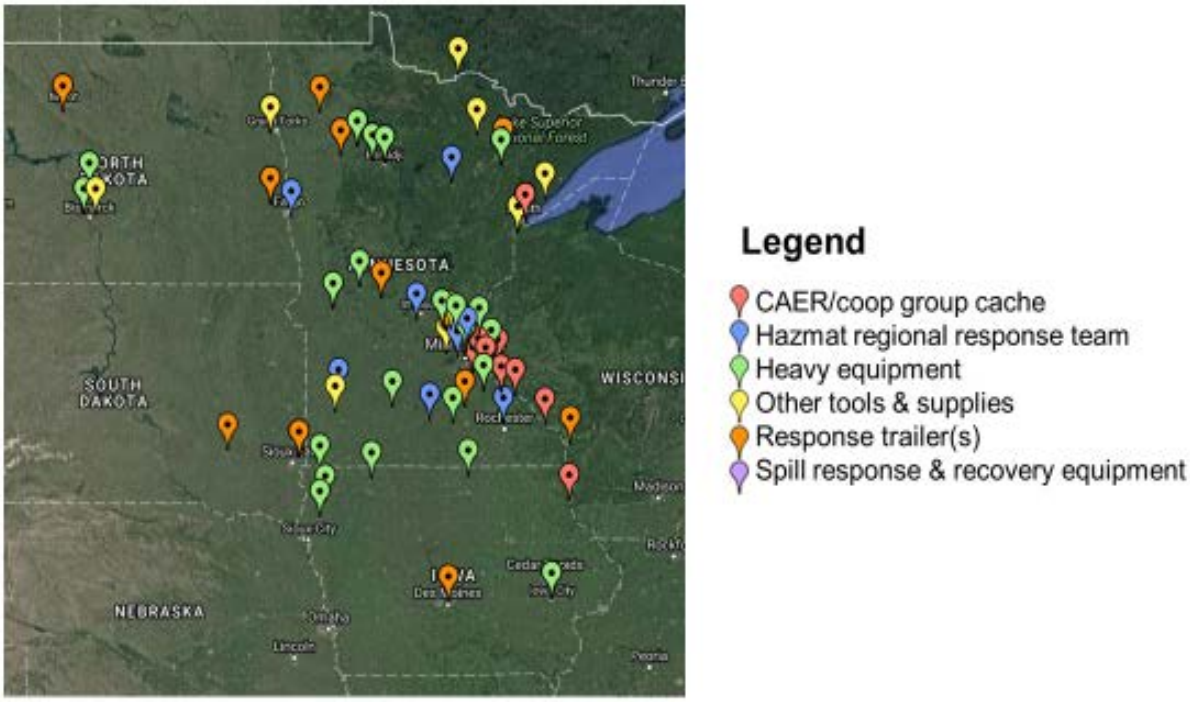
Most of the information captured in the map was collected and analyzed by MAD for the 2015 DPS report to the legislature on oil incident preparedness. The map shows response resources statewide, although ethanol rail traffic occurs primarily in southern Minnesota. Response equipment located in other parts of Minnesota could be used for ethanol incidents if needed in many but certainly not all cases. (Notably, different types of equipment are needed for ethanol compared to oil when it comes to booms and other containment equipment for leaks into waterways and bodies of water.) MAD had a number of sources review the listings used for the map to identify necessary updates, all of which were added. It is still possible, however, that some resources may be missing.

For this mapping effort, MAD analysts grouped findings about private sector equipment held by railroads, pipeline companies, and contractors into broad categories: response trailers, heavy equipment, spill response and recovery equipment, and other tools and supplies. In addition, the map shows locations for equipment caches held by cooperative Community Awareness Emergency Response (CAER) groups. The State of Minnesota's regional Chemical Assessment Teams and the larger hazmat Emergency Response Teams are included because they offer equipment as well as personnel relevant for response to ethanol rail incidents.

The resource classifications and locations used here are based on MAD's interpretation of available information from rail and pipeline companies – information that was not designed for aggregation or categorization. In some cases, the information about locations and types of equipment was imprecise and duplicative. MAD attempted to classify and aggregate information without duplication as best as possible. (See Appendix F for more detail about the information used and the equipment categories, as well as for a county-by-county listing of the resources.)

[104] Additional resources in Manitoba, Canada, are within 300 miles of the Minnesota border but don't appear on the map.

Figure 6: Private Sector Response Resources from Railroads, Contractors, Pipelines, Cooperative Groups, and State of Minnesota Regional Hazmat Response Teams



The map denotes equipment and resources within Minnesota but also within 300 miles of the Minnesota border because companies identified resources outside of Minnesota as ones they would employ in the event of an incident in this state. (The companies also identified other important resources outside of this 300-mile range but within their response zones as relevant to incidents in Minnesota.) The private sector resources include those owned or used by pipeline companies in Minnesota, even though ethanol is not moved by pipeline, because the railroads report that they have interacted with the pipelines about sharing emergency response resources as needed between the two industries.

Equipment at Ethanol Plants and Larger Airports

While the map above identifies major equipment staging locations in Minnesota or within 300 miles of the Minnesota border, additional equipment at Minnesota's ethanol and biobutanol production plants might be of use in responding to an ethanol rail incident. These equipment locations aren't included in the map, however, because of uncertainty about how mobile this equipment is, how accessible it is for off-site use along rail lines, and what arrangements exist for sharing it. Based on MAD interviews for this study, it is known that at least in some cases, the ethanol plants have arrangements that allow for use of equipment by fire departments for off-site incidents.

Table 10 shows the 21 ethanol and biobutanol plant locations in Minnesota, all of which are reported to be along rail lines. For the ethanol plants, MAD was unable to secure specific information about the response equipment stored on site, but ethanol industry representatives note that all the plants have alcohol-resistant foam used in fighting ethanol fires and suppressing vapor. Some plants have arrangements to make that foam available to local fire departments for off-site incidents.

Table 10: Ethanol and biobutanol plant locations in Minnesota

Albert Lea	Fergus Falls	Luverne
Atwater	Granite Falls	Marshall
Benson	Heron Lake	Morris
Bingham Lake	Janesville	Preston
Buffalo Lake	Lake Crystal	Welcome
Claremont	Lamberton	Winnebago
Fairmont	Little Falls	Winthrop

Firefighting Foam at Minnesota's Larger Airports

A number of local emergency responders suggested that firefighting foam might also be available for off-site use from the nine Minnesota airports that are large enough and busy enough to fall under Part 139 of the federal aviation requirements for airport rescue and firefighting services. Based on the size of the aircraft using these airports and the frequency of takeoffs and landings, the airports are required to have certain types of equipment, including foam for suppressing fuel vapor and fire.[105] However, research for this study surfaced restrictions regarding the availability of airport firefighting vehicles for off-site use. In terms of foam, the two airports that responded to MAD's request for information reported they would most likely be able to provide foam in the case of an emergency, but only one of the two airports had the alcohol-resistant foam needed for use in the case of an ethanol incident.

Personnel and Equipment

The private and public sectors both have personnel and equipment available for response to hazmat incidents, including ones involving the transport of ethanol by rail. As responsible parties for any hazmat incidents involving railcars, the railroads own or control significant response resources that they bring to bear when emergencies arise. The public side—local first responders, regional response teams, and state agencies—also provide personnel and equipment. In the best of circumstances, the coordination of private and public resources occurs as a partnership effort in response to an incident.

Private Sector Personnel and Equipment Resources

Overwhelmingly, the private sector is responsible for major emergency response equipment and equipment staging locations for potential ethanol rail incidents in Minnesota and nationwide, and the private sector also secures or provides qualified personnel to handle the particulars of ethanol-by-rail situations. Minnesota's public sector, however, has a critical part to play. Local fire departments handle immediate response to ethanol rail incidents in their areas and lead efforts to protect people and property around incident sites, with support from regional response teams and state agencies.

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[105] For more on the Federal Aviation Administration's Part 139 airport certification requirements, see https://www.faa.gov/airports/airport_safety/part139_cert/ and https://www.gpo.gov/fdsys/granule/CFR-2011-title14-vol3/CFR-2011-title14-vol3-sec139-315.

Railroads and Private Sector Resources

The major railroads that operate in Minnesota report that they have the equipment and personnel needed to respond to an ethanol incident. As the responsible parties for ethanol rail incidents—as well as other rail incidents involving oil and hazardous substance issues—the railroads are required to respond under federal law and regulations administered by the U.S. Department of Transportation, the Environmental Protection Agency, the Department of Homeland Security, and other federal agencies. Railroads are responsible for incidents involving tank cars, even though leasing companies and chemical companies, not the railroads, own those cars. The State of Minnesota also places requirements on the railroads, including that railroads provide advice to the local incident commanders (within one hour), provide on-site personnel to assist and direct the railroad response (within three hours), and provide air-monitoring equipment and a qualified operator of that equipment (within three hours).[106]

The railroads rely on their own personnel or private contractors as their preferred responders to a hazmat rail incident, although they work in conjunction with local, state, and federal emergency responders. Railroad representatives noted that while local responders are very good at what they do, they don't necessarily have sufficient training or equipment to cope with a significant ethanol or hazmat incident. The railroads have trained and knowledgeable staff who respond to railroad hazmat incidents, but the railroads also contract with local, regional, and national hazmat contractors and consultants. The major Class I railroads and the Class III and II short lines contract for response assistance with the same hazmat specialist teams, according to railroad representatives.

Similarly, the major railroads own response equipment and also tap resources from private sector cooperative groups and contractors, again in keeping with federal rules and regulations. The Class I railroads report that they organize these resources regionally to allow adequate response to incidents nationwide. Available equipment includes air-monitoring equipment, firefighting trailers, spill response equipment and trailers, and command vehicles. In Minnesota, BNSF Railway owns heavy response equipment, including industrial firefighting foam trailers, staged in the Twin Cities and in the Fargo-Moorhead area. Each of the Class I railroads reported that they share equipment with other railroads, including the Class III and II "short lines" that generally do not have the internal resources to own and maintain their own heavy response equipment. In southeastern area of Minnesota along the Mississippi, the cooperative Wakota and Redwing Community Awareness Emergency Response (CAER) organizations, made up of private companies and some public sector entities, have shared caches of spill response equipment, some of which would be of use in the case of an ethanol rail incident that could affect area waterways.

Local responders are familiar with private sector resources, for the most part. Respondents to MAD's fall 2016 survey of fire chiefs, law enforcement officials, and emergency managers were asked about familiarity with private resources—including those from railroad companies—available for response to an ethanol transportation incident. Looking at the respondents who either have or might have ethanol trains coming through their area, about nine in 10 (89% of the 111 responding) said they are at least aware of available private sector resources in case of an ethanol transportation incident. Of that 89% percent, 57% (63) reported that they are familiar with the private sector resources to respond to an

[106] Minnesota Statute § 115E.042.

ethanol transportation incident, including those from the railroads, including 28% (31%) who rated themselves as "somewhat familiar." Another 32% (36) reported that they were aware of private sector resources but not familiar with them. Only 12 respondents (11%) were not at all familiar with private sector resources available in case of an ethanol transportation incident. (Notably, a similar question asked in a 2014 survey about familiarity with private sector resources available to respond to an oil transportation incident found that fully one-fifth (21%) of respondents were "not at all familiar.") That said, only about a quarter of the respondents rated their level of awareness with private sector resources as very familiar or familiar.

In the case of ethanol, the ethanol producers constitute another important private sector player involved in emergency response. Minnesota has 21 ethanol plants, mostly located in southern Minnesota, although the northernmost plant is in Fergus Falls. The plants are located along rail routes. In keeping with national codes and standards as well as insurance requirements, production facilities incorporate safety features and keep safety equipment on hand, such as booms, other spill containment equipment, and the all-important alcohol-resistant foam concentrates that are used to fight ethanol fires and control vapor in the event of spills or leaks. Much of the foam-application equipment is built into the plant structure and therefore isn't mobile.[107] According to ethanol industry officials in Minnesota, production facilities work closely with their local fire departments on response preparedness to ethanol incidents. While the focus for resources at Minnesota's ethanol plants is potential incidents at those plants, some ethanol producers make alcohol-resistant foam available if needed for use in fire suppression elsewhere in surrounding communities, industry representatives reported.

State Government Sponsored Resources

The state duty officer contacts state agencies with responsibilities under the state's hazardous materials laws when there is a hazardous materials or oil incident. DPS's Homeland Security and Emergency Management Agency and the Minnesota Pollution Control Agency would be the primary responders in an ethanol rail transportation incident. (The state's Departments of Agriculture, Health, and Transportation, as well as the State Patrol, may also be involved.) State agency responders—on call 24/7—can provide expert advice to first responders on the scene by phone or in person in some cases, and they can deploy state or regional resources if needed.

Chemical Assessment Teams and Hazmat Emergency Response Teams

As noted earlier in this report, the state-funded regional hazardous materials response teams can assist with rail incidents involving ethanol, as well as the much broader range of hazmat emergencies. HSEM coordinates this regional response resource. Both CATs and ERTs focus their attention, advice, and assistance on the hazardous materials involved in an incident, not on fires that may result from a release, spill, or accident. The teams' role in an ethanol rail incident could include taking limited actions to mitigate problem situations, monitoring the air or water for dangerous pollutants, tracking movement of the pollutants, and providing information useful to the local commander in making decisions to protect the public, including decisions about methods to reduce vapor and about evacuations.

[107] International Association of Fire Chiefs, "Ethanol Fixed Facilities: Assessment and Guide," June 2008, p. 10. Available at http://www.ncdoi.com/OSFM/RPD/PT/Documents/Coursework/Ethanol/FixedFacilitiesGuide.pdf.

The state's 11 CATs and its four ERTs (co-located with CATS) have the following equipment available in a response, with ERTs having a more robust inventory in the categories of spill mitigation supplies, spill control supplies, and moving tools:

- Chemical reference and emergency reference materials
- Personal protective equipment
- Spill and leak control supplies and equipment, including shut-off valves
- Spill mitigation supplies and equipment
- Decontamination equipment
- Radio and other communication equipment
- Computer equipment
- Monitor and detection equipment, and calibration equipment
- Basic suppression equipment
- Assorted non-sparking hand and other tools
- Incident management and administration tools and supplies
- Moving tools
- Vehicles and trailers
- First aid supplies and equipment
- Other supplies and tools (such as traffic cones, tents, cameras, binoculars)[108]

MAD roughly estimated possible response times by CATs and ERTs to incidents in southern Minnesota in order to analyze the availability of team resources in the case an ethanol rail incident.[109] The findings show that the region is relatively well served by these statewide response teams. Most counties in southern Minnesota completely fall within a one hour response time of a CAT or ERT, but five counties in the west do not, including Stevens and Swift, where ethanol plants are located, and Traverse, Grant, and Big Stone. All can be reached by more than one team in two and a half hours' time.

It appears that first responders are aware of and familiar with the capabilities and resources of regional response teams. MAD's fall 2016 survey of fire department chiefs, law enforcement officials, and emergency managers asked respondents about their familiarity with the Chemical Assessment Teams and the hazmat Emergency Response Teams in the context of responses to ethanol transportation

[108] List compiled from information supplied by HSEM and Minnesota Rules 7514.1400. Notably, CAT teams currently have equipment capacities that are beyond the minimum set by Rule.

[109] For rough estimates of CAT and ERT response times to locations in southern Minnesota, MAD used data and procedures from its September 2016 report to DPS on statewide response teams, including online mapping functionality at www.freemaptools.com. The analysis was carried out for the following CATs and ERTs in or near the regions: Blaine, Hopkins, Mankato, Marshall, Moorhead, Rochester, St. Cloud, and St. Paul. MAD used the overly simplified assumption that teams can travel at constant speeds of 65 miles per hour on all roads to reach any location. For more on the methodology, see "Minnesota's Statewide Response Teams: Funding Challenges, Equipment Needs, and Other Issues and Opportunities," Department of Public Safety, September 2016, p. 28.

incidents. Among the 111 respondents who either have or might have ethanol trains in their area[110] and responded to this question, 98% percent (109) have at least a basic awareness of regional response team capabilities in regards to ethanol. Of that 98%, more than half (55% or 61 respondents) are familiar or very familiar with the regional response teams. About one-fourth (28% or 31 respondents) were aware of CATs and ERTs but not familiar with them. Only two percent (2 respondents) were not at all familiar with regional response team resources and capabilities in regards to ethanol transportation incident response.

Minnesota Pollution Control Agency

Personnel with MPCA's Emergency Management Unit are on call 24 hours a day throughout the year to respond to environmental releases, including potential ethanol rail incidents. The unit has eight full-time staff equivalents who carry out response work, as part of their larger roles in outreach, prevention, preparedness, response, and cleanup for oil and hazardous material emergencies. Expert staff are involved in calls throughout the state—and would handle calls for an ethanol rail incident.

Local First Responder Resources

Local fire departments are an obvious and important resource for response to ethanol rail incidents, as too are law enforcement agencies, emergency management offices, and emergency medical services. In Minnesota, fire departments generally have jurisdiction in cases of hazardous substance, and of course any ethanol-related fire would be of concern to the fire departments as well. The Minnesota Board of Firefighter Training and Education counts 20,600 firefighters statewide in 780 different fire departments.

In the case of local fire departments, equipment concerns are less about owning and maintaining specialized equipment for an ethanol rail incident and more about knowing what is available, who will bring it to the scene, and how fast. In terms of personnel, the local fire personnel take charge of the incident scene, and trained local staff play an important role in response.

Local Equipment

In terms of equipment, local departments as a rule have firefighting and rescue vehicles, gear, and tools to address situations they would most often encounter, such as traditional structural fires and roadway accidents. In most cases, the specialized equipment needed to handle a rail-related ethanol spill or fire isn't available from local departments. According to public safety and industry experts, this is unsurprising and sensible. As with rail incidents involving the transport of oil, the railroads have primary responsibility under federal regulations for responding to ethanol rail incidents and own or contract for the equipment and personnel to do so. One state official said, "Railroads have a lot of assets…. We do not need to compete on safety. We should complement each other on safety."

Most often, according to DPS officials, local first responders in the case of an ethanol rail incident need to focus less on the rail cars, railroad tracks, and ethanol and more on protecting life and property in

[110] The survey asked questions about ethanol or oil of respondents who reported that ethanol trains or oil trains and pipelines move through their areas, as well as those who indicated that they were unsure if ethanol and oil was traveling through their jurisdictions. Respondents were not asked about ethanol or oil if they reported that these hazardous substances didn't travel through their areas.

their communities through evacuation measures or fighting structural fires that might result from a rail incident. In general, they said, local fire departments need to concentrate their limited resources on securing the types of equipment they need for their most common fire incidents: those involving structures and vehicles. Even the responders from the railroads, who are focused on the rail cars and their potential impact on public safety, often choose to let a fire on the tracks burn down as the preferred way to deal with ethanol and other hazardous substance, as long as the situation is contained and controlled.

However, in some communities near ethanol plants or major rail hubs, where the risk is higher for rail incidents involving hazardous substances, fire departments have purchased specialized equipment, particularly alcohol-resistant foam for use in vapor and fire suppression. For example, a fire department in a west central Minnesota city with very heavy rail traffic keeps 100 gallons of the alcohol-resistant foam concentrate in stock in case of an accident—not enough to handle a large ethanol rail incident but enough to be useful, particularly in the event of a spill for which they need to suppress flammable vapor. By contrast, most local fire departments that do stock foam concentrate likely keep some 5 to 15 gallons on hand for minor spills and incidents at gas stations, according to public safety officials.

Local Personnel

When a hazmat rail incident occurs—involving oil, ethanol, or other hazardous substances—the local fire chief takes command of the situation and works with railroad experts and response personnel, as well as state agency officials, local law enforcement officers, emergency managers, and first responders from the state's Chemical Assessment Team or hazmat Emergency Response Team. This puts local personnel in the key role for protecting public safety, with assistance and advice from others. Adequately trained personnel at the local level—at fire departments, local law enforcement agencies, and emergency management offices—are a critical response resource when it comes to ethanol rail incidents.

MAD's fall 2016 survey asked leaders of local fire, law enforcement, and emergency management entities about available staff or volunteers who have received training specifically for ethanol transportation incidents. A majority of the respondents who either have or might have ethanol trains coming through their area said yes. Of this group, 53% (58 respondents) have available staff or volunteers that have received training for ethanol transportation incidents, but 31% (34 respondents) report that their city/county/tribal governments do not have available staff or volunteers that have received such ethanol-specific training. The rest (18 respondents) do not know or are not sure if they have staff or volunteers trained specifically for ethanol response.

As noted in the next section, the railroads, the State of Minnesota, and the ethanol industry have offered significant training to first responders and emergency managers in the last several years. Railroad training takes an all-hazards approach, rather than an ethanol-specific one, given the wide range of hazardous substances carried in rail tank cars. Training from Minnesota's HSEM division has focused on oil transport incidents involving rail and pipeline, although the trainings also include information applicable to incidents involving ethanol and other hazardous substances. Training from the ethanol industry focuses on ethanol. To the extent that more ethanol-relevant training is provided

to first responders and emergency managers, it might work best if framed as an important part of an all-hazards approach.

Mutual Aid

Mutual aid agreements between jurisdictions can increase the capacity of local fire departments and other emergency response units. These agreements establish that first responders from the cities and townships involved will aid emergency response efforts across municipal borders as needed. Formal mutual aid agreements address potential liability issues for cases of damage or injury. Results from MAD's fall 2016 survey show that four in five (81%) of the respondents from communities where ethanol is or might be a concern report mutual aid agreements that would apply to ethanol transportation incidents.

Even in the absence of a formal mutual aid agreement, state law allows a designated local official to dispatch personnel and equipment beyond a jurisdiction's borders in response to an emergency.[111] In these cases, potential liability issues aren't resolved in advance. In addition, the Minnesota State Fire Chiefs Association (MSFCA) offers a statewide mutual aid plan that communities can participate in, with the aim of providing "easy access to large quantities of fire service resources that may be needed" in cases of major emergencies. For the MSFC plan, participation is voluntary, as is actual response. The community in need is expected to first commit its own resources and local mutual aid resources before requesting statewide mutual aid.[112]

Plans for Ethanol, Oil, and Hazardous Substance Incidents

A number of the experts and officials MAD interviewed for this study noted that emergency plans are an important element of the capacity inventory for responding to an ethanol rail incident, or any type of hazmat emergency. Plans provide baseline understanding about important aspects of the response, including leadership, roles for the different actors involved, response resources, and environmentally sensitive areas in the community. A recent publication from the Renewable Fuels Association notes that a lack of emergency response operations plans was a noticeable gap in a number of train recent derailment incidents.[113]

Railroad Planning

Rail companies are required by both the state and federal governments to have emergency response plans, which they structure to apply to all types of potential hazards, not just ethanol or oil. Minnesota's Spill Bill requires railroads that transport more than 100,000 gallons of oil or hazardous substances in the state in a month to have prevention and response plans for a worst case scenario

[111] Minnesota Statutes 2016 § 12.27, subd. 3.

[112] For more on the Intrastate Mutual Aid Plan of the Minnesota State Fire Chiefs Association, see http://www.msfca.org/?page=mutual_aid.

[113] International Association of Fire Chiefs, "Unit Train Derailment Case Study: Emergency Response Tactics," executive summary, Renewable Fuels Association, March 2015, p. 7.

discharge and update it every three years.[114] To meet these planning provisions, railroads may use the plans they file with the federal government, provided those plans meet the provisions of Minnesota's law.

Local and Regional Planning

Communities and first-responder divisions engage in a number of planning efforts. Many establish emergency operation plans (EOPs) for all types of potential community-specific emergencies. Community efforts may involve hazard mitigation plans (HMPs) that build on planning guidance from the Federal Emergency Management Agency. HMPs focus on hazards in a community, disaster-prone areas, and mitigation actions. Another broader approach is to use the FEMA's Threat and Hazard Identification and Risk Assessment (THIRA) procedures to identify community threats and hazards ranging from storms to hazmat. THIRA planning also sets capability targets based on core capabilities identified in the National Preparedness Goal.

MAD's fall 2016 survey of fire chiefs, law enforcement officials, and emergency managers asked if ethanol incident response is part of their local government's EOPs, THIRAs, or HMPs. Of the 112 survey respondents who either have or might have ethanol trains in their area, 61% (68) reported that ethanol incident response is a part of their plans. As for the other respondents, 21% (23) indicated ethanol wasn't part of their jurisdiction's emergency planning documents, and 19% (21) didn't know. It is possible that in some cases respondents reported a lack of attention to ethanol incidents in their plans because their plans cover all hazardous substances, including ethanol, but do not single ethanol out. As one respondent wrote, "We respond to hazardous material incidents in very similar ways, regardless of the product."

Broadly and for all types of chemicals in all settings, the federal Emergency Planning and Community Right-to-Know Act (EPCRA) requires Local Emergency Planning Committees (known as Regional Review Committees in Minnesota) to plan for each emergency planning district in the state. Requirements include the development of an emergency response plan regarding chemicals in the district and a review of the plan annually. In Minnesota, these Regional Review Committees go through the emergency operation plans (EOPs) for the political jurisdictions in their region, in keeping with Minnesota's four-year planning cycle.

Training Resources that Build Response Capacity for Potential Ethanol Rail Incidents

As noted above, trained personnel are a critical component of Minnesota's capacity to respond to an ethanol rail incident. Consequently, while training resources aren't directly a part of the state's capacity to respond, they play an important role in expanding the response capacity and keeping it up to date. Training equips first responders with the knowledge base needed to handle potential rail incidents involving ethanol, oil, and other hazardous substances. First responders in Minnesota have access to a variety of ethanol training, available through state and federal agencies, the railroads, ethanol producers and their national groups, national training centers, and other national groups and

[114] Minnesota Statute § 115E.04.

associations. This section provides background information on some notable training resources. Much of what's noted below is relevant to, but broader than, ethanol incidents by rail.

Training by the Railroads

The major railroads in Minnesota offer community responder hazmat training, relevant to potential rail incidents involving oil and hazardous substances, including ethanol. While the railroads offered community hazmat training regularly in Minnesota as well as other states prior to 2014, the 2014 changes to Minnesota's Spill Bill[115] required each railroad that operates unit trains of more than 25 cars caring oil or hazardous substances to offer training to fire departments along unit train routes by June 30, 2016, and then offer refresher trainings at least once every three years going forward. From January 2014 through October 2016, the Class I railroads trained 7,058 emergency responders, mostly firefighters.[116] Minnesota has approximately 20,600 firefighters total statewide. The Class II and III railroads also offer limited hazmat trainings.

In addition, the railroads also participate in tabletop and full-scale exercises in Minnesota, with the four Class I railroads and one of the Class III railroads now required to conduct oil containment and recovery exercises at least once every three years under 2014 Spill Bill provisions. The Class I railroads also helped create national training programs for incidents involving crude oil transported by rail and have paid tuition and travel expenses for 259 Minnesota firefighters to participate from January 2014 through October 2016. While the crude-by-rail training does not address the particulars of incidents involving ethanol, many elements of the training are relevant. And the major railroads also offer online hazmat training on a range of issues, including crude oil training for first responders and ethanol considerations.[117]

Training by Ethanol Producers and the Ethanol Industry

The Ethanol Emergency Response Coalition (EERC), made up of organizations representing the ethanol industry and emergency responders, has developed training programs, educational materials, and supporting products aimed at improving the preparedness of emergency responders for potential spills, fires, and other situations involving ethanol and ethanol-blended fuels. While not all related directly to rail transport, the EERC trainings address the challenges of ethanol emergencies and a range of risk factors.[118] The International Association of Fire Chiefs, a key coalition member, developed the training. EERC has eight modules for its training program and makes these training materials—as well as videos and manuals—available via its website. The national Renewable Fuels Association, a founding organization for EERC, has conducted several training sessions in Minnesota, including a May 2016 seminar in Rochester aimed at training trainers.

In addition, representatives of the ethanol industry in Minnesota note that the ethanol producers in Minnesota offer training for first responders in their immediate areas, although not along the rail lines

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[115] Minnesota Statute § 115E.042.

[116] Data compiled and provided Nov. 4, 2016, by BNSF Railway.

[117] For an example of online offerings, see the BNSF website at https://www.bnsfhazmat.com/community-responders/training/online/.

[118] For more about EERC training, see http://ethanolresponse.com/resources/.

that carry the product from the plant to the processor. The training from ethanol producers involves sessions at the plants for local fire departments and, in some cases, nearby mutual aid departments. The trainings focus on the ethanol facility, the loading of ethanol for transport, and spills. "Ethanol plants have worked well with small towns and they've conducted quite a bit of training in those towns," said a DPS official. An ethanol plant official noted that having firefighters involved and more prepared is important to the industry and affected communities.

State of Minnesota Training Initiatives

The Department of Public Safety makes training possible for first responders, including training relevant for ethanol incidents by rail.

Homeland Security and Emergency Management

Qualified and experienced staff from HSEM have conducted awareness-level training in oil and hazardous substance transportation, with a strong focus on the movement of crude oil by rail and pipelines. While ethanol-by-rail incidents aren't central to these trainings, the HSEM sessions do reference ethanol and other hazardous materials, and much of what's covered for oil incidents closely relates to ethanol situations because both oil and ethanol are Class 3 flammable liquids. From August 2014 through mid-October 2016, HSEM trained more than 5,800 firefighters, law enforcement personnel, emergency medical service workers, emergency managers, and public officials in at least 260 communities on awareness of potential oil incidents. HSEM concentrated on locations with oil trains and oil pipelines, and participation in the training has been lower in some southern Minnesota counties where ethanol transport by rail is common. HSEM is also involved in tabletop and full-scale hazmat exercises. And the division has contracted for advanced training on oil incidents involving rail and pipeline, again with some of that information being relevant to ethanol incidents as well.

Minnesota Board of Firefighter Training and Education

The MBFTE provides funds to fire departments statewide for firefighter training and education, with the dollars available to each fire department based on the funds available for training and the number of firefighters in that department.[119] Most of the MBFTE training funds come from the state's Fire Safety Account, which receives the surcharges assessed on the insurance fees paid for homeowners', commercial fire, and commercial non-liability coverage. MBFTE funds may be used to support any training that is provided by a qualified instructor and that also meets an established standard, such as standards from the National Fire Protection Association. Hazardous substance training is available, including training relevant to ethanol rail incidents. DPS officials noted, however, that it would be hard for fire departments to invest significantly in ethanol rail incident training with existing MBBFTE funds because those funds are needed to support the types of ongoing training that firefighters must participate in to remain licensed and certified.

Notable National Training Resources

While not specific to Minnesota, national training centers and training programs are accessible to Minnesota's emergency responders. These include the following training opportunities.

[119] For more about MBFTE, see http://www.mbfte.org/.

Federal Pipeline and Hazardous Materials Safety Administration

The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) offers relevant trainings, including its course on Transportation Rail Incident Preparedness and Response (TRIPR). That course provides information and best practices guidance for rail incidents involving flammable liquids such as ethanol and crude oil.[120] TRIPR training draws upon expertise from public safety agencies, industry, and rail carriers, with training modules that cover a range of topics from incident management to response approaches to personal protective equipment. The materials also offer animated, interactive scenarios to help instructors with tabletop discussions. The PowerPoint slides, instructor lesson plans, and workbooks are available online. An eight-hour TRIPR training was offered in Moorhead in October 2016.

Security and Emergency Response Training Center (SERTC)

SERTC is operated by a subsidiary of the Association of American Railroads to train railroad personnel and public sector emergency responders in incidents involving tank cars carrying hazardous materials, both on rail routes and highways.[121] The center offers residential courses, web-based trainings, and remote courses, many at no charge to emergency responders. Many of the offerings relate to incidents involving the transport of ethanol by rail, including a new remote course that delivers eight hours of training on "Responding to Incidents Involving Flammable Liquids Transported by Rail." Located in Pueblo, CO, the training center is supported by the railroads and FEMA. The federal funds and railroad contributions underwrite the tuition and travel costs for the public sector emergency responders who participate in on-site training.

Texas A&M Engineering Extension Service (TEEX)

TEEX in College Station, TX, offers Fire and Emergency Services training for a wide range of fire and emergencies, including ones relevant to ethanol incidents involving rail. As with SERTC, TEEX training is supported in part by funds from the Federal Emergency Management Administration of the U.S. Department of Homeland Security and the railroads.[122]

Transportation Community Awareness Emergency Response (TRANSCAER)

TRANSCAER offers classroom training, hands-on training nationally, as well as support for community drills and exercises, all designed to help communities prepare for potential hazardous materials transportation incidents and respond to them.[123] Founded by Union Pacific Railroad and Dow Chemical in the mid-1980s, TRANSCAER has evolved into a national outreach effort with involvement from hazardous materials manufacturers, distributors, and transporters, as well as government. CAERs are organized, too, at the local level. (Wakota CAER, serving Washington and Dakota Counties in Minnesota, and Red Wing CAER, along the Mississippi River, both offer training but the training is

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[120] For more on PHMSA TRIPR training resources, go to http://www.phmsa.dot.gov/hazmat/osd/emergencyresponse/TRIPR. To access the training materials, go to http://dothazmat.vividlms.com/default.asp.

[121] For more on SERTC training, go to http://sertc.org/.

[122] For more on TEEX offerings for Fire and Emergency Services, go to https://teex.org/Pages/fire-and-emergency-services.aspx.

[123] For more about TransCaer, go to https://www.transcaer.com/.

focused on oil spills affecting waterways—and ethanol differs from oil when it comes to incidents involving its release into water.)

National Associations

National associations also offer hazmat training, some of which is relevant to ethanol. In particular, online, classroom, and hands-on training is available from the International Association of Fire Chiefs, the International Association of Firefighters, and the National Fire Protection Association.[124] In addition to training programs, the associations also hold conferences with educational sessions.

[124] See the following websites for more about association training programs: IAFC at http://www.iafc.org/education/?navItemNumber=539, IAFF at http://client.prod.iaff.org/#page=hazmat2 for hazmat, and NFPA at http://www.nfpa.org/training-and-events.

Assessing Needs and Costs for Ethanol Incident Training and Equipment

Relevant to the following elements requested by the legislature:

2. *Analyze preparedness and impacts to public safety from ethanol transportation by rail, which must provide the following information:*
    b) *provide an assessment of costs and needs of fire departments and other emergency first responders for training and equipment to respond to incidents involving the transportation of ethanol*

MAD looked at training and equipment needs for ethanol rail incidents primarily using interviews and a survey of first responders and emergency managers. Survey respondents identified potential gaps in the adequacy of training for potential ethanol rail incidents and registered opinions about priority training types, including exercises and drills. MAD interviews provide additional information about training needs. With regard to equipment, the expert sources that MAD interviewed for this report indicated in the case of potential ethanol rail incidents that equipment issues for fire departments is more about knowing what equipment is available from where than ensuring local fire departments along rail lines have specialized response equipment. For this section of the report, MAD estimated costs for training and equipment, when possible.

Training

2016 Survey Findings on Ethanol Training Needs

The MAD survey of fire chiefs, law enforcement officials, and emergency managers in fall 2016 included a number of questions about the adequacy of training and training needs for potential rail incidents involving ethanol. Responses indicate gaps for and interest in training. The survey asked respondents who either have or might have ethanol trains in their area to rate the adequacy of six types of ethanol response and preparedness training on a scale from 1 (inadequate) to 5 (adequate). Among the respondents who offered ratings—100 to 108 total depending on the training type—the adequacy ratings on average clustered near the mid-point (3) between inadequate and adequate, with the averages ranging from a low of 2.7 to a high of 3.1. Equipment training (2.7), drills and exercises (2.8), and classroom training (2.9) all garnered average ratings below the mid-point, while coordination (3.0), assessment and planning (3.0) and communication (3.1) landed at or above the mid-point.

The survey asked the same group of respondents to rate their need for types of training, using different categories. Survey respondents indicated the strongest need for hands-on or field awareness-level training. (This survey question did not include exercises and drills, although the hands-on focus for this type of awareness-level training links it somewhat to the hands-on approach used in exercises and drills.) It is interesting to note that the lowest indicated need was for hazmat technician-level or

specialist-level training. This is perhaps because this survey did not include those first responders. Table 11 shows the results from this question on types of training for ethanol transportation incidents, with the number of respondents for each training type ranging from 107 to 108.

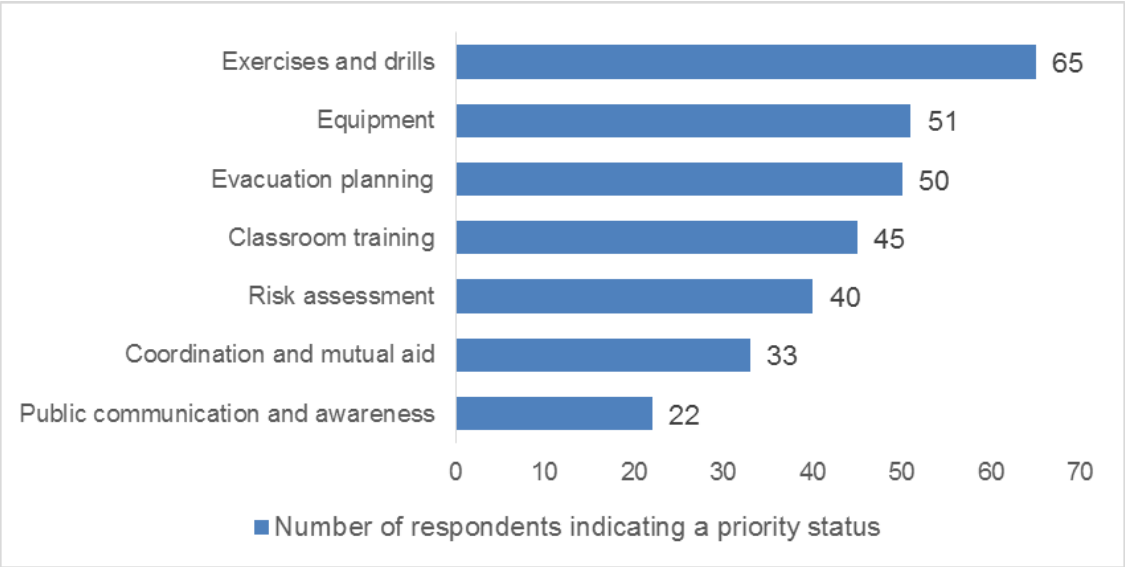
Table 11: Needs ratings among first responders and emergency preparedness staff for types of training related to ethanol transportation incidents

	Needed or Needed a lot	Somewhat Needed	Not Needed	I Don't Know
Awareness-level (hands-on or field)	69%	19%	11%	1%
Evacuation planning and preparedness	57%	34%	34%	0%
Awareness level (classroom)	56%	29%	15%	1%
Hazmat first responder operations-level	56%	30%	11%	4%
Public information, alert, and warning	56%	28%	15%	1%
Hazmat technician-level or specialist-level	43%	28%	22%	7%

A third survey question also provides useful information for assessing training needs among the respondents who either have or might have ethanol trains in their area. MAD asked these respondents to rank their top priorities for funding among preparedness and response activities for ethanol transportation incidents. MAD tallied the total number of times respondents ranked each of the six options as among their top three priorities. Exercises and drills—an important form of training—rose to the top for these aggregated priority rankings, with classroom training registering as fourth. [Using only the first priority rankings from respondents for this question on funding, the top choices are as follows: equipment (26), exercises and drills (23), risk assessment (20), and evacuation planning. Classroom training (10) ranked fifth.]

Survey results, illustrated in Figure 7, show priority status among respondents for the following preparedness and response activities, listed in order by number of respondents ranking each option as their first, second, or third priority:

Figure 7: Priority ratings for preparedness and response activities regarding ethanol transportation incidents



Interestingly, evacuation planning ranked ahead of classroom training, and risk assessment ranked right below it. While evacuation planning is not listed here as a training concern, it stands out for many survey respondents a priority need, and it was identified as a training need in the earlier survey question.

The survey results show room for improvement in the adequacy of training for potential ethanol rail incidents. In addition, respondents used survey questions on training needs and funding priorities to register interest in training types—including exercises and drills. This provides DPS with useful information about training needs.

Comments on Training Needs from Interviews

MAD asked about training needs during many of the interviews for this report. Some of those who talked to MAD said no training was needed, notably the railroad and pipeline representatives. But among those who cited a need for training, their comments indicated a clear interest in exercises and drills, as was true for survey respondents, too, as noted above. Those who talked about training needs said exercises can bring together emergency response personnel from a range of stakeholder entities to work through emergency scenarios, role clarification, resource identification and gaps, and other elements of response. "We really need drills and exercises," said one emergency manager. Depending upon the scope of an exercise, the personnel involved may include first responders, emergency managers, emergency medical workers, community leaders, state agency staff, railroad personnel, and others. Sources called for both tabletop exercises and full-scale ones.

With regard to classroom training, interviews surfaced interest in more targeted efforts than broad ones. The MAD interviews for this study came at the tail end of a big push by the state's Homeland Security and Emergency Management Division to offer awareness training on oil train and pipeline

incidents to targeted communities, and about nine months after HSEM began sponsoring advanced training with that same focus. A number of those interviewed said that the HSEM trainings and trainings offered by the railroads have met the demand for broad scale training. "We're saturated right now," said one official. While the HSEM trainings have focused on incidents involving the transport of oil by rail and pipeline, much of what those sessions cover is applicable as well to ethanol and other flammable liquids. Some noted the value of awareness training and suggested that HSEM continue to offer this type of training in areas of the state where the awareness sessions haven't been held yet. Some also said that HSEM awareness training will need to be offered again going forward because of turnover among firefighters and other responders.

Estimated Costs for Training and Exercises

As part of this study, the legislature requested cost estimates for training needs related to potential ethanol rail incidents. MAD worked with HSEM officials and county emergency managers to compile rough estimates for different types of training emphasized in the previous sections.

Exercises and Drills for Potential Ethanol Rail Incidents

Estimating the costs for exercises and drills is difficult because these types of trainings may vary widely and because the costs usually are shared among several—or even many—public sector entities and private companies. Trainings of this type fit into the following categories:

- **Tabletop exercises:** Discussion-based exercises built around hypothetical emergencies and generally targeted toward conceptual understanding, identification of strengths and gaps, and changing perceptions. Tabletop exercises can vary from short ones that cover the basics of a situation to complex ones that take hours to work through.
- **Drills:** Operations-based activities usually carried out to test or validate "a specific function or capability in a single agency or organization." Often drills are used for training on new equipment, validate procedures, or practice current skills.
- **Functional exercises:** Operations-based activities based on exercise scenarios and often focused on managers and staff involved in directing, commanding, and controlling operations. They typically concentrate on plans, polices, and procedures and don't involve actual movements of equipment and personnel. These exercises may involve training in the use of an incident command structure (ICS) or unified command.
- **Full-scale exercises:** Large, complex, resource-intensive operations-based activities involving multiple entities, such as state and federal agencies, county and city governments, and private sector stakeholders. These use scenarios that focus on operational activities and typically involve real-time actions carried out in an environment designed to simulate an actual incident. Equipment and personnel may be deployed to simulate activities as part of the scenario. Full-scale exercises test roles and coordination under simulated emergency circumstances. [125]

[125] U.S. Department of Homeland Security, "Homeland Security Exercise and Evaluation Program," April 2013, pp. 2-4. https://www.fema.gov/media-library-data/20130726-1914-25045-8890/hseep_apr13.pdf.

The costs for exercises differ significantly across these different types and even within the types depending on the scale and complexity. A county emergency manager identified the following factors as affecting costs for full-scale exercises:

- Number of personnel involved and whether funds are needed to pay for their participation and for backfill in the case of career firefighters and law enforcement officers to cover their regular shifts on duty away from the exercise
- Level of need for meals, lodging, and other life-support arrangements
- Equipment involved, including its transport to and from the exercise, fuel costs, and maintenance
- Duration of the exercise

Based on input from HSEM and from county emergency managers, MAD offers the following as very rough estimates of costs for exercises:

- $1,000 per tabletop exercise
- $1,000 to $3,000 per functional exercise
- $5,000 to $25,000 per full-scale exercise

Stevens County coordinated and organized a half day exercise in June 2016 involving 480 participants and very roughly estimated the costs for the event and the planning efforts ahead of time at $10,000, without factoring in personnel costs.

Awareness and Advanced Training for Potential Ethanol Rail Incidents

As noted above, most of those interviewed for this report who cited training needs suggested that HSEM trainings for potential ethanol rail incidents, if offered, be targeted to areas where the risks are higher and participation by firefighters has been relatively low for HSEM awareness trainings on potential incidents involving oil transported by rail or pipeline. As of October 2016, HSEM oil awareness trainings had drawn firefighters from fewer than half the local fire departments in 10 southern Minnesota counties where ethanol is likely moved via rail lines. As a rule, HSEM has sponsored advanced training sessions in locations where it previously held awareness training, so it is possible and probable that few advanced training sessions have been held in these same counties. The following 10 Minnesota counties are the counties where ethanol likely is transported by rail but where participation in HSEM training on oil incident awareness has been limited:

- Big Stone
- Brown
- Freeborn
- Jackson
- Lincoln
- Martin
- McLeod
- Redwood
- Renville
- Waseca

This leaves aside additional counties in southern Minnesota where ethanol is likely carried by rail but where HSEM oil awareness training sessions through October 2016 drew firefighters from more than half the local fire departments. The HSEM oil awareness training presents information relevant to ethanol incidents, also. The oil awareness trainings drew participants from fewer than half the local fire departments in another eight counties in the state but these are counties where ethanol by rail is unlikely to be of concern.

MAD estimates that $110,000 to $130,000 would be needed to provide HSEM training sessions in the southern Minnesota counties listed above. MAD assumes that HSEM would offer some 30 to 35 training sessions in the 10 counties, sessions that would cover awareness and advanced training similar to what has been offered for oil incidents but adjusted to cover more about ethanol rail incidents. As with the oil training sessions, HSEM would bear the costs for the training itself, either in terms of staff time or as payments to training providers, and the Minnesota Board of Firefighter Training and Education would pay out reimbursements to fire departments for personnel costs incurred as a result of staff participating in the trainings. The MAD estimate of $110,000 to $130,000 is based on HSEM and MBFTE estimates for oil training costs and reimbursements in fiscal 2016. It is a rough estimate only because it doesn't factor in curriculum development costs that will be incurred as HSEM alters the awareness training to focus more on ethanol, nor does it factor in HSEM staff time working with contractors on advanced training. In addition, MBFTE reimbursements will vary dramatically based on the status of the participating fire fighters. The reimbursements paid out to fire departments vary significantly for career, paid-on-call, and volunteer firefighters.

Training Challenges

Any training efforts regarding potential ethanol rail incidents and aimed at first responders will face challenges—as any first responder efforts do. Interviews for this study indicate a number of concerns inherent in any push to train first responders, particularly firefighters. Notable issues include attracting participation, the potential for overwhelming first responders with more training options, potentially duplicating existing training opportunities, and securing community or county funding for exercises. That said, HSEM trainings for potential incidents involving oil transported by rail and pipeline successfully drew more than 6,700 participants, including more than 5,600 firefighters, over a two-year period.[126]

In terms of challenges, several sources involved in first responder training in Minnesota noted that securing participation for training sessions can be difficult. Training competes with time spent at regular jobs or with their family for volunteer firefighters and those who are paid hourly on an on-call basis for the time they spend as firefighters. "Both parents are working, and it's hard to be as committed as they used to be," said one chief. "You can't expect them to be down there attending training."

While career firefighters from larger Minnesota cities are paid their regular firefighter salaries when they spend time training, almost 90% of the state's firefighters aren't career firefighters. Volunteers

[126] This is a count of persons in attendance at the HSEM awareness trainings and at the advanced trainings. Many of those who attended the advanced trainings likely participated previously in the awareness trainings, so the totals here likely double count some participants.

receive no pay for training. In the case of firefighters who are paid for time spent on call for firefighting work, the paid-on-call amounts generally do not make up for wages lost from their regular jobs when they are away for those jobs for firefighter training—and using vacation time from their regular jobs for firefighter training eats into valuable family and relaxation time, said sources interviewed for this report.

To renew their licenses with the State of Minnesota, firefighters are required to participate in 72 hours of training over three years, for an average of 24 hours annually, and a significant portion of the training they receive must address specific categories of skills and knowledge. Consequently, additional training opportunities can be useful, but they also add to a crowded training agenda for these first responders, several sources said. This is particularly true if the training is focused on one type of incident, such as rail, or, in the case of hazmat, if the training is narrowly focused on one or several types of substances, as is the case with oil and ethanol training. "Fire fighters can only do so much. They are maxed out on training," said an assistant chief from a volunteer fire department.

Another challenge with training is the potential for duplication. As noted earlier in the report, many different organizations offer training for a range of first-responder skills and emergency scenarios, including potential ethanol rail incidents. Any training efforts should tap into existing resources and ensure that what is offered fills a niche or reaches first responders in a way that existing resources cannot. Railroad representatives who met with MAD stressed the need to coordinate training efforts, and expressed concern that Minnesota firefighters may participate less in hazmat training that the railroads provide because of HSEM's oil incident training sessions. Another industry representative suggested that Minnesota engage the Ethanol Emergency Response Coalition as a training resource to avoid "duplicating preparedness efforts and wasting financial and other resources." A railroad safety official suggested that the state and the railroads coordinate to offer a limited number of regional training sessions together annually.

A number of sources—and county emergency managers in particular—also noted challenges in securing funds to offer valuable training exercises. The exercises provide important hands-on learning for first responders and others involved in emergency situations. But exercises can be expensive. And while funding may be available through small grants from the state or other sources, the time required to apply for the funds is more time than many county emergency managers have available, particularly in the case of counties in Greater Minnesota where the emergency manager might be part-time or have other county roles and responsibilities as well. A number of people interviewed said they would like to see more funds available to support exercises, with those funds easily available. "It is becoming tougher to get grants and more difficult cobbling together of grants," said one source. "The effort to secure grant funding is time consuming and frustrating," said another.

Equipment

In 2014, when legislators spelled out specifics for the DPS 2015 report on response preparedness oil transportation incidents, some lawmakers and others assumed that preparedness for incident response would necessitate equipment purchases by local fire departments. The parameters for that 2015 study were used to frame this 2017 study, and consequently DPS was asked to explore needs and costs for equipment used for ethanol rail incidents. However, as the 2015 DPS study reported, a key finding

with regard to incident response is that rail and pipeline companies are the responsible parties in the case of an incident involving oil or other hazardous substances. As such, the railroads and pipelines are expected to provide equipment and personnel when responding to an incident. Consequently, while the 2015 report left open the possibility that regional groups might request funds for equipment purchases from the Railroad and Pipeline Safety Account, it identified training as well as planning, and coordination as priorities for funding from the Railroad and Pipeline Safety Account, with equipment as a third option.

Focus Less on Local Equipment, More on Availability

Similarly, research for this 2017 study into potential ethanol rail incidents offered little support for the significant equipment purchases by fire departments and other first responders. The research pointed instead to the need among leaders of first responder units for more detailed information about nearby specialized incident response equipment, including types, locations, how fast equipment might arrive, and documented information about its availability for use. In particular, experts and local fire department officials noted a need for information about the availability of alcohol-resistant foam, which works to suppress vapor and fire from ethanol.

HSEM officials and other fire officials said that in most cases local fire departments don't need to stock specialized equipment, pointing out that while local departments take a lead role in overseeing incident response to ensure public safety, they don't have primary responsibility for putting out tank car fires on rail tracks (railroads do) and wouldn't necessarily have the resources and training needed to do so. Local incident commanders bring in the resources needed to fight tank car fires, generally from the railroad companies. And fire departments focus their efforts on public safety, notably evacuating people from the area, closing roads, and fighting structural fires that might result from an explosion on the railroad tracks. In the case of an ethanol rail fire, "[t]hat is a huge fire that they can't put out," said a state official. As noted previously, the preferred strategy in the case of tank car fire on railroad tracks often is to let it burn down in a controlled manner, whether it is an incident involving ethanol, oil, or other hazardous substances, experts said.

Railroad officials reported that after action reports on oil and ethanol incidents nationwide show that foam at local fire departments wouldn't have changed outcomes. "If they had had 10,000 gallons of foam, the outcome wouldn't have been different," said a railroad official. "In fact, the environmental outcome might have been worse" because of the toxic nature of the foam. Railroad safety experts said that foam often isn't useful for rail incidents until several hours into the response. This is because with an ethanol fire on railroad tracks, for example, "it's simply not practical to fight it," one of the officials said. If buildings adjacent to such an incident are threatened with fire or begin to burn, then local firefighters focus on extinguishing those fires using conventional firefighting equipment.

According to several local fire department sources, the assumption is that very few communities along the rail line would have specialized equipment to handle an ethanol incident and instead would tap into the railroads, other fire departments through mutual aid agreements, and the regional response teams to access what is needed. Still, some communities likely need to stock alcohol-resistant foam and other items of use in case of an ethanol fire or incident, depending upon the hazards in their area and the location and availability of specialized equipment from other sources.

The costs of equipping local departments on rail routes with specialized equipment for a potential ethanol incident would be exorbitant, said an assistant chief. "We just don't know where an incident will occur, and it is just impossible from a financial standpoint to provide every fire department with these assets." He noted, too, that potential incidents from rail traffic might involve a wide range of hazardous substances, including but certainly not limited to ethanol or crude oil, and the equipment needs would vary depending upon the substance in some cases.

However, information about specialized equipment stands out as important. A report on case studies of train derailments written by staff at the International Association Fire Chiefs and published by the ethanol industry's Renewable Fuels Association noted that "railroad emergency response resources are extensive" but local fire department emergency response teams are often unaware of the resources and their availability.[127] With regard to alcohol-resistant foam in particular, an official with a national firefighting organization said about local first responders: "The stockpile of alcohol-resistant foam is one of those things that you have to have identified and have access to. It's not so much that they have to have it themselves but rather them knowing where it is and how fast can you get it…. Do they know the assets they can bring in from the rail lines?"

MAD interviews indicated room for improvement when it comes to information about the specialized equipment that may be deployed in the event of an ethanol rail incident. Several local firefighting officials and emergency managers said they were unsure about sources and availability of alcohol-resistant foam should an ethanol incident require it.

Equipment Needs from Survey Results

While research for this report argues against the purchase of local equipment for potential ethanol rail incidents, results for several questions on MAD's fall 2016 survey of fire chiefs, law enforcement officials, and emergency managers show interest in equipment among those respondents who either have or might have ethanol trains in their area.

MAD asked respondents to rank funding priorities for preparedness and response activities from a list of seven options that included equipment. Equipment was selected 51 times as one of the top three funding priorities for respondents who have or might have ethanol trains traveling through their jurisdictions. This tally puts equipment behind the top ranked priority of exercises and drills (selected as a top priority 65 times) and just above evacuation planning (selected 50 times). Another survey question asked these same respondents to rate the adequacy of equipment for response preparedness involving the transport of ethanol by rail. For this question, 47% of the 100 who offered responses rated the adequacy of equipment below the mid-point on a scale from inadequate to adequate, compared to 24% who rated it above the midpoint. However, MAD interviews collected little in the way of clear calls for local equipment needed to respond to ethanol rail incidents.

With regard to these results about equipment—and the results regarding needs overall—it is important to consider that the MAD survey was not a formal needs assessment, where current training and training levels are measured against a set standard to determine gaps. Instead, the survey results rest

[127] International Association of Fire Chiefs, "Unit Train Derailment Case Study: Emergency Response Tactics," executive summary, Renewable Fuels Association, March 2015, p. 7.

on opinions, albeit the opinions from fire chiefs, law enforcement officials, and emergency managers who constitute a critical collection of stakeholders involved in hazmat emergency response. A number of officials from both the private and public sectors cautioned that asking front-line emergency response organizations about equipment and training will almost always prompt requests for more.

Relevant Equipment Needs among Statewide Response Teams

Separately, MAD examined priority equipment needs among the State of Minnesota's Chemical Assessment Teams and its hazmat Emergency Response Teams, using data from another MAD report to DPS.[128] These regional response teams can assist with rail incidents involving ethanol, as well as the much broader range of hazmat emergencies, focusing their attention, advice, and assistance on the hazardous materials involved in an incident, not on the fires that may result from a release, spill, or accident. In terms of equipment needs, MAD looked at equipment that each of the team leaders identified as necessary to team operations and necessary equipment that would be useful in an ethanol incident, based on advice from HSEM staff. Table 12 shows the results, as well as MAD's cost estimates based on HSEM input and additional research, listing out items that team leaders ranked as among their top three priorities.

Table 12 is useful as an indicator of equipment needs among CATs and ERTs that might bolster team capabilities in responding to an ethanol rail incident. However, it is important to note that team leaders weren't asked specifically about ethanol rail incidents when MAD made these equipment inquiries in spring 2016. In addition, HSEM reports that it has either made purchases or plans to make purchases to address some of the reported team equipment needs. Furthermore, the railroads, too, have responsibility in the case of a rail incident for monitoring air and water, tracking the movement of hazardous pollutants, and providing information to local commanders.

Table 12: Top priority equipment identified by CAT and ERT leaders as necessary for team operations *and* potentially useful in responding to an ethanol rail incident

	Equipment	Price estimate per unit
Duluth CAT/ERT	MultiRAE Pro equipment with mesh link wireless capabilities (chemical and radiation detection and monitoring)	Approx. $5,000
Mankato CAT	AreaRAE replacement (gas and vapor detection and monitoring)	Approximately $10,000
Marshall CAT	Personal protective equipment, including self-contained breathing apparatus (SCBA)	State to purchase SCBA for all teams by June 30, 2017
Marshall CAT	Upgraded monitors, including additional AreaRAE monitors and mesh link wireless capabilities (gas detection and monitoring)	Approximately $10,000
North Metro	Self-contained breathing apparatus	State to purchase SCBA for all teams by June 30, 2017

[128] Kane, M., Collins, J., and Van Amber, K, "Minnesota's Statewide Response Teams: Funding Challenges, Equipment Needs, and Other Issues and Opportunities," Department of Public Safety, September 2016, pp. 88-93.

Unfunded Needs for Incidents Involving Oil, Ethanol, and Other Hazardous Substances

Relevant to the following element requested by the legislature:

4. *Identify current sources of funds, funding levels, and any unfunded needs for preparedness activities*

MAD used interviews and a survey to gather opinions about unfunded needs for response preparedness, looking at incidents involving oil and other hazardous substances transported by rail and pipeline, and those involving ethanol by rail. While some reported no unfunded needs, most said there are needs that haven't been addressed. The survey results and interview comments presented here offer useful guidance on how funds from the Railroad and Pipeline Safety Account might be spent. DPS projects a $6.746 million expected balance on that account at the end of fiscal 2017, when assessments on the railroads and pipelines will cease, barring legislative action in early 2017. Standout ideas for funding include exercises and drills, with support for a central, in-state facility for exercises; community-focused initiatives such as evacuation planning, planning assistance, and public awareness efforts; training; and coordination.

Survey Findings Point to Unfunded Needs

MAD's 2016 survey asked fire chiefs, law enforcement officials, and emergency managers if their governments have unfunded needs related to preparedness and response for an ethanol incident and then separately for an oil incident. Of the 112 survey respondents who have or might have ethanol trains traveling through their jurisdictions, 65% (73) reported unfunded needs, 14% (16) reported no unfunded needs. The remaining 21% (23) said they did not know. Among the 94 survey respondents who have or might have oil moving through their area via train, 69% (65) indicated unfunded needs for preparedness response, while 12% (11) reported no unfunded needs. The other 19% (18) did not know.

Interviews for this study found that sources generally cited unfunded needs for preparedness response at the local and state levels, but a number of those interviewed said no needs existed, including a state official, a local fire chief, a pipeline company official, and representatives of the railroads.

Notable Funding Needs from Survey Findings

Survey respondents weighed in on funding needs. The fall 2016 survey of fire chiefs, law enforcement officials, and emergency managers asked respondents to rate priority funding needs for ethanol preparedness response in one question and then rate priority needs for oil preparedness response in another question. The ethanol preparedness question was asked of respondents who have or might have ethanol trains traveling through their jurisdictions, and the oil preparedness question was asked of those with oil as a concern. For analysis, MAD counted the number of times that each of seven options was selected as one of the top three funding priority for any respondent. MAD then calculated these totals as a percentage of the number of respondents (197), yielding information about what share

of the respondents included each of the eight options as one of their top three choices. Table 13 shows the results.

Table 13: Share of survey respondents selecting each option as among their top three priorities for funding

Preparedness and Response Activities	Percentage of Respondents Ranking the Option as a Priority
Exercises and drills	64%
Equipment	50%
Evacuation planning	46%
Classroom training	41%
Risk assessment	39%
Coordination and mutual aid	30%
Public communication and awareness	20%
Other preparedness planning	9%

Percentages sum to more than 100% because each respondent (197 total) could pick three of the options to include among his or her top priorities, resulting in 591 possible rankings by 197 respondents.

Exercises and Drills

Exercises and drills emerged as the option most favored by survey respondents for both ethanol and oil incident preparedness when they ranked their priorities for funding. The tally of responses for both ethanol and oil combined shows exercises and drills was among the three top priorities selected by almost two-thirds (64%) of the 197 respondents who rated the eight options. And the need for exercises and drills was a common theme from MAD interviews. Sources interviewed for this report urged HSEM to provide funding for exercises, including tabletop ones, and provide staff support, too, to help local entities plan for them. Importantly, exercises can help fire chiefs and firefighters integrate an array of responders into an emergency situation, where many entities and players are involved in the response.

Several people interviewed noted the importance of tabletop exercises. Tabletop exercises often are used as a starting point to prepare for full-scale exercises, allowing participants to uncover issues, knowledge gaps, and potential glitches before engaging in a more realistic and resource-intensive exercise scenario. They are a useful step in the training path from classroom efforts through to full-scale exercises. Exercises overall are an important next step for HSEM to pursue, after awareness training and advanced training.

Exercises can help address another important consideration identified as a funding priority by some survey respondents: coordination. About one-third (30%) of the respondents who rated funding priorities included coordination and mutual aid among their picks. Exercises allow participants and participating entities to communicate, build relations, and make the connections that contribute to successful incident response, according to several of those interviewed.

With regard to exercises and drills, other suggestions from the interviews, not tied to funding, included the suggestion that HSEM compile information and clear steps that county emergency managers can

use to plan for exercises, identify funding sources, and connect with key response preparedness entities and contacts to ensure coordination and success. This information resource would be particularly useful for emergency managers from less-populated counties in Greater Minnesota where the emergency manager position is part-time or part of a full-time job that involves other important duties, said one local official. As another idea, a state official noted that Minnesota law currently requires railroads to engage in exercises once every three years and suggested that an additional requirement be added that railroads participate in tabletop exercises more frequently than that. Railroad representatives noted that they respond to requests from emergency managers for drills and exercises regardless of the legal requirements.

Camp Ripley Improvements for Response Exercises

The Minnesota National Guard, HSEM, and others are exploring the possibility of expanding a Joint Emergency Response Training Center (JERTC) at Camp Ripley Training Center near Little Falls for train derailment and pipeline safety. A number of people interviewed cited plans for the JERTC expansion and enhancement as relevant and useful to an increased emphasis on exercises for response preparedness involving rail and pipeline transport of oil, ethanol, and other hazardous substances. In terms of funding needs, several suggested that the Railroad and Pipeline Safety Account could be tapped to support training staff at the facility, scholarships for training participants, and reimbursements to local fire departments for personnel costs incurred because of the training.

Right now, Camp Ripley serves as a training center for the Minnesota National Guard and already offers basic emergency response training for firefighters, state agency personnel, and others using on-site facilities that include an Emergency Management Training Center, 50 feet of rail track, and a tank car. A proposed $3.3 million enhancement of the JERTC would include, among other improvements, water supply and pipeline equipment for replicating leaks and spills, and one mile of track rail with the potential to simulate emergencies involving multiple train cars.[129]

Sources for this report said that the JERTC improvements would provide a centrally located facility within Minnesota, allowing for exercises that involve not only firefighters but other key players in emergency response, including emergency planners, law enforcement, public officials, and public works staff. They argued that the national training centers—SERTC in Pueblo, CO, for example, and TEEX in Austin, TX—lack this cross-functional focus. "I can't take all my firefighters out of the state of Minnesota and take them to Colorado," said one state official. "And Colorado is for firefighters. We're talking about firefighters, police, emergency managers, local officials, pollution control officials all in one location to allow us to have that whole community discussion at the same time, at the same exercise." However some—notably officials from the railroads—expressed concerns that improvements at Camp Ripley would duplicate existing national training center capabilities.

Several of those interviewed noted that cold weather significantly alters the environmental challenges from a leak or spill of oil or other hazardous substances, and that the Camp Ripley facility would allow

[129] Sanganoo, J., "White Paper – Information: Joint Emergency Response Training Centers," Camp Ripley Training Center, December 8, 2014.

Minnesotans to train for such cold-weather emergencies. “We could train in two feet of snow and find out how our equipment works at 20 below zero,” said one state official.

Community Preparedness

A number of the needs identified in the survey and the interviews broadened the focus for response preparedness efforts beyond firefighters, who have been the primary emphasis of HSEM trainings to date, to initiatives that better position the larger community for an effective response. Overall community preparedness has been missing from the State of Minnesota preparedness efforts, said a member of a citizens group, so funds are needed to expand the scope. While firefighters are critical to any response effort, fire departments can’t fight oil and ethanol fires, so a community focus for preparedness efforts makes sense, she said. “What do we do when something happens?”

Evacuation planning

Survey results show interest among fire chiefs, law enforcement officials, and emergency planners in community efforts, notably evacuation planning and risk assessment. Evacuation planning was listed among the top three funding priorities by 46 percent of the respondents who answered funding questions for ethanol incidents and oil incidents, with the responses to those two questions combined together. Evacuation planning and awareness would inform community residents about how to get to safe areas in the event of an incident.

Warning systems

Several of those interviewed also talked about more effective warning systems and real-time information for community residents and workers in the area around an incident, something that many of Minnesota’s counties are equipped to do now through the Integrated Public Alert and Warning System (IPAWS). IPAWS works much like the Amber Alert system to quickly spreading news about an emergency event or incident through text messages to cell phones and other media. Members of a citizens group cited examples where real-time information might have helped prevented instances when rail car fires prompted the employees of nearby business to evacuate out of their buildings and into the path of fire and smoke from the rail incidents.

Risk assessment

In terms of other community-focused efforts, more than a third (39%) of the 197 who responded to survey questions about funding ranked risk assessment as a first, second, or third priority. Neither the survey nor MAD interviews yielded information about the types or level of risk assessment needed, but such assessments are an important baseline step for planning efforts. With a better sense for the risk assessment needs, HSEM could tie this interest to planning and help support useful progress in communities where oil, ethanol, and other hazardous substance are transported by rail and pipeline. Several sources interviewed for this report cited a need for a formal statewide assessment of risks from rail traffic, citing a recent Iowa Department of Transportation study on rail transportation of crude oil

and biofuels.[130] HSEM officials suggested forums or meetings with planners and leader of local communities and counties to explore risk assessment needs.

Public communications and awareness

Additionally, 20 percent of the survey respondents who ranked funding priorities for ethanol and oil incidents identified public communication and awareness as among their top three picks. Several state officials talked about this need during the MAD interviews, as well. HSEM officials expressed strong support for a public awareness campaign that could inform people across the state about potential rail and pipeline incidents, much like what has already been done to inform communities near nuclear power plants about potential dangers of radiation and the emergency response protocols.

Classroom Training

More than a third of those responding to the survey questions about funding included classroom training among their top three priorities. The percentage choosing this option was slightly higher for those answering the funding priority question about ethanol incidents (42%) than for those answering the same question about oil incidents (38%). Aside from exercises and drills, training came up as an unfunded need in only a few of the interviews conducted for this study. In two cases, the interviewees talked about the need for training about incident command structure (ICS). One state official cited this need as an important one to address because emergency response involves fire chiefs working with multiple entities that all must operate under a unified command. A national fire safety expert noted that ICS was a critical challenge in four of five case studies that his organization conducted of unit train derailments and emergency response, with the responders in those situations unable to define a truly unified command.[131]

Equipment Needs

Fully half of those responding to MAD's survey questions about funding included equipment among their top three priorities. Interestingly, however, interviews and other research carried out for this study and for the 2015 DPS study on preparedness and response for oil transportation incidents found little support for investments in equipment, particularly in the absence of more detailed information about existing equipment caches and stores of supplies. As discussed earlier in this report, an emphasis on sharing information about what critical equipment is available, from where, and how fast is more important that the purchase of specialized equipment for local fire departments that may be called upon to respond to an incident. (See previous section, "Focus Less on Local Equipment, More on Availability," on page 93.)

That said, the purchase of fire and vapor suppressing alcohol-resistant foam might be called for if an inventory of existing supplies shows gaps in places at high risk of fires from incidents involving hazardous substances, said a national fire safety expert. Several members of citizens groups also

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[130] Iowa Department of Transportation, "Iowa Crude Oil and Biofuels Rail Transportation Study," April 2016. http://www.iowadot.gov/iowarail/safety/report/1_0_CBR_Biofuels_Rail.pdf.

[131] The case studies are found in "Unit Train Derailment Case Study: Emergency Response Tactics," written by the International Association of Fire Chiefs and published by the Renewable Fuels Association in March 2015. The publication is not available online.

suggested fire departments need infrared cameras to detect ethanol fires in the daytime, when the flame isn't visible. They also said it is unclear if the state has enough special booms for use when an ethanol spill threatens to contaminate water. Another national contact—someone involved in pipeline safety training in Minnesota—suggested smaller, isolated communities near pipelines could use help purchasing basic and inexpensive equipment for initial spill containment, such as dam and dike tools and orange mesh to create an initial boom. He also mentioned that pipeline operators sometimes help communities with limited resources secure such equipment.

Sources of Funding and Funding Levels for Preparedness Activities in Minnesota

Relevant to the following element requested by the legislature:

4. *Identify current sources of funds, funding levels, and any unfunded needs for preparedness activities.*

The legislature asked the Department of Public Safety to report on the current sources of funds and funding levels for training and other response preparedness activities for potential incidents involving oil, ethanol, and other hazardous substances, with a focus on transport by rail and pipeline. Both the private sector and the public sector fund preparedness activities in Minnesota, sometimes in partnership or in coordination but also separately. This section looks at notable sources from the public and private sectors.

State Funding for Preparedness Activities

The State of Minnesota commits funds to training and preparedness activities regarding potential incidents involving oil and other hazardous substances transported by rail and pipelines. Some of the funding is aimed specifically at rail and pipeline risks, while other state hazmat preparedness efforts are broader but include potential rail and pipeline situations.

Railroad and Pipeline Safety Account

In 2014, the legislature established the Railroad and Pipeline Safety Account to fund training and response preparedness activities for train or pipeline incidents involving oil or other hazardous substances. DPS projections show that of the $9.074 million that will flow into the account through the end of fiscal 2017, $2.328 million will have been spent in fiscal years 2015 through 2017, with $6.746 million remaining to be spent in later fiscal years. This special revenue fund is targeted specifically toward the types of incidents explored in this study and a previous 2015 study from DPS to the legislature.[132]

The funds in the account come from an initial appropriation of State of Minnesota revenues, annual assessments in state fiscal years 2015 through 2017 paid by the four Class I railroads and the one Class II railroad operating in Minnesota, and annual assessments on pipeline operators who move oil and other hazardous substances in Minnesota. The breakdown for funds to the account is shown in Table 14.

[132] The January 15, 2015 report from Minnesota Department of Public Safety on "Minnesota's Preparedness for an Oil Transportation Incident" is available at https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf.

Table 14: Sources of funding for the Railroad and Pipeline Safety Account, fiscal years 2015 to 2017

		Category 1
State of Minnesota	Initial appropriation by the legislature	$1,574,000
Class I and Class II railroads	Annual assessments totaling $1.25M	$3,750,000
Pipeline operators	Annual assessments totaling $1.25M	$3,750,000
Total		**$9,074,000**

The assessments that provide most of the funding for the safety account end as of July 1, 2017. Interviewees from the railroads and some from the public sector noted that the sunset makes sense given the level of funds that have accumulated in the account, while others from the public sector viewed the end to the assessments as problematic given that preparedness needs will continue even after the assessments ends. A pipeline official called for a training partnership between industry and government rather than a separate fund for training activities.

The state set the assessments for each railroad and pipeline operator based on factors that reflect shares of oil and hazardous materials transported in Minnesota by these carriers. State law specifies the following allocations for the special revenues in the account[133]:

- $104,000 annually for the Minnesota Pollution Control Agency for railroad discharge preparedness activities under Minnesota's Spill Bill (Minnesota Statute § 115E)
- $100,000 annually for the state's hazmat Emergency Response Teams (used to fund the ERT in Moorhead)
- Remaining funds provided to two units within the Department of Public Safety: the Minnesota Board of Firefighter Training and Education and the Division of Homeland Security and Emergency Management

The sunset for the assessments, unless reversed by the state legislature, will leave MPCA without dedicated funds to support its railroad discharge preparedness activities under the Spill Bill, and it will leave HSEM without an identified funding source to use to support Moorhead's ERT. The legislation establishing the Railroad and Pipeline Safety Account says the DPS commissioner may retain funds in the account past the end date for the assessments and use it in subsequent fiscal years.[134]

The legislation allows funds from the account to be used for the following:

- Training costs
- Equipment and gear for hazardous materials readiness, response, and management
- Relevant supplies
- Emergency preparedness planning and coordination

[133] Minnesota Statute § 299A.55.

[134] Ibid.

The legislation specifies priorities for use of the funds: firefighter training, community risk, geographic balance, and recommendations from the Fire Service Advisory Committee, which determines funding allocations from the state's Fire Safety Account.

HSEM officials emphasize that the large balance of funds in the Railroad and Pipeline Safety Account expected as of July 1, 2017 ($6.746 million) reflects the division's purposeful stewardship of the available dollars. Several of the HSEM officials interviewed for this report cited decisions made to first identify priority needs, rather than spending the account down quickly on, say, equipment or other options that might not significantly boost preparedness for potential incidents involving oil and other hazardous substances transported by rail and pipeline. HSEM used findings from a 2015 study on preparedness for an oil transportation incident to focus its efforts in 2015 and 2016 on awareness and operations training. While that report cited other, lower priority needs as well, HSEM staff members were only able to execute the training initiative, involving 320 training sessions with 6,715 total participants in the 27 months from mid-August 2014 through mid-October 2016. HSEM will use the findings of this study to set priorities going forward. Some of those interviewed for this study criticized HSEM for not spending the available funds faster and not making funds available to communities and counties for preparedness activities.

HSEM and the MBFTE indicated the following spending and planned spending from the account for fiscal 2015 through fiscal 2017:

- $312,000 for MPCA
- $300,000 for the Moorhead hazmat ERT
- $213,500 through to October 2016 for MBFTE reimbursements to fire departments for personnel costs incurred from awareness and operations training for oil and pipeline incidents, with up to $286,500 more remaining to be spent from $500,000 set aside for this purpose
- Approximately $900,000 in staff time, costs, and trainer fees for HSEM awareness and operations training for oil train and pipeline incidents throughout the state
- Approximately $300,000 for other related operational expenses, including two DPS studies for the legislature on oil and ethanol preparedness and preparedness activities

State-Sponsored Hazmat Regional Response Teams

Minnesota's regional hazardous materials response teams, funded by the state government and coordinated by HSEM, can assist with incidents involving oil, ethanol, and other hazardous substances transported by rail and pipeline. These regionally dispersed Chemical Assessment Teams and hazmat Emergency Response Teams are called upon for a much wider range of hazmat incidents, as well. Both CATs and ERTs focus their attention, advice, and assistance regarding the hazardous materials involved in an incident, not on fires that may result from a release, spill, or accident.

While only a small fraction of CAT and ERT incident responses relate to rail and pipeline problems, state funding for the teams is relevant. Total state funding for CATs and ERTs amounts to $1.185 million annually, over and above the $100,000 in Railroad and Pipeline Safety Account dollars used to support the ERT in Moorhead. The total funding includes $60,000 to each of the 11 teams for CAT services. The following amounts from state funds support ERT services: $75,000 for the St. Paul ERT, $225,000 for the Duluth ERT, and $225,000 for the St. Cloud ERT. Funding for the Duluth and St. Cloud

ERTs expires at the end of fiscal 2017, and the safety account funding for the Moorhead ERT beyond June 30, 2017 is uncertain. DPS is considering recommendations to reduce the number of ERTs and use CATs in combination to offer ERT services that are both less expensive and more regionally dispersed throughout the state.

State funding for the CATs and CAT services from the ERTs comes from the state's Fire Safety Account (FSA), which is funded through a surcharge on the insurance fees paid for homeowners', commercial fire, and commercial non-liability coverage. Funds for the ERTs come from the state general funds, aside from the $100,000 for the Moorhead ERT. In addition to these funds, the state bills responsible parties for incident costs and then uses these fees to reimburse CATs and ERTs. FSA funds are sometimes used to equipment purchases by the teams.

The Pollution Control Agency's Emergency Management Unit

The Emergency Management Unit (EMU) of MPCA handles the agency's efforts in oil and hazardous substance emergencies. As is true with HSEM's CATs and ERTs, only a small portion of EMU's preparedness and response activities in any year relate to incidents involving trains and pipelines. The unit is involved in community planning, firefighter training, exercises and drills, response calls, and enforcement. An MPCA official roughly estimated that annual agency costs for all EMU work total about $1 million, including the amounts needed to fund eight full-time staff equivalents and a supervisor.

In addition as noted above, MPCA has received $104,000 per year for three years from the Railroad and Pipeline Safety Account (for work it carries out under the 2014 provisions of Minnesota's Spill Bill (Minnesota Statute § 115E) relating to railroads and the transportation of oil and other hazardous substances. Notably, this work includes review of the railroad prevention and response plans, but it also includes attending exercises, and providing guidance and assistance to railroads on compliance as needed.

Minnesota Board of Firefighter Training and Education

The MBFTE, which runs out of DPS, makes funds available to fire departments statewide based on the number of firefighters in each department and the funds it has available each year to reimburse fire departments for training costs. Most of the state funds to MBFTE come from the state's Fire Safety Account, but MBFTE also receives funding from the Railroad and Pipeline Safety Account as noted above and uses federal grant monies, as well. MBFTE reimburses fire departments for the costs incurred when their firefighters train, including the costs of training, wages for the trainees, trainee overtime salaries if relevant, and backfill personnel costs to cover the shift of firefighters who are away. (Those full costs apply for career firefighters but only some of the costs apply for volunteer firefighters and firefighters who are paid at an hourly rate on an on-call basis.) MBFTE disperses funds for firefighter training offered by a qualified instructor and offered in Minnesota, provided it meets an established standard—and eligible training includes hazmat training that would be applicable to rail and pipeline incidents involving oil and other hazardous substances.

As noted previously, MBFTE dispersed $213,500 from the Railroad and Pipeline Safety Account from July 1, 2014 to October 2016 for HSEM's awareness and operations training for oil and pipeline

incidents. Overall, for all types of training and from the Fire Safety Account funds and all other sources, MBFTE had $3.1 million available for disbursement in fiscal 2016 and has $8 million available for disbursement in fiscal 2017, with $4.9 million of that fiscal 2016 total coming from a one-time Fire Safety Account allocation.

DPS Office of Pipeline Safety

The Office of Pipeline Safety (OPS) conducts a wide range of work to protect people, property, and the environment from pipeline risks, a significant portion of which focuses on inspections, regulation enforcement, and accident and incident investigations for liquid and gas pipelines. But the office also carries out education and training, including some that relates to preparedness for potential pipeline incidents involving oil and other hazardous substances. An OPS official estimated that training and education costs totaled about $70,000 in calendar year 2015 and about $47,000 in calendar year 2016 through mid-November. That training included all types of pipelines, not just those carrying oil, and covered issues beyond response preparedness, including education and training to help excavators avoid rupturing pipelines. Funding for the office comes from assessments paid by pipeline companies and from federal grants.

Other State Agencies and Entities

Minnesota Department of Health

MDH's Office of Emergency Preparedness handles a wide range of emergency scenarios, including infectious diseases, infectious disease outbreaks, floods, tornados, fires, and anthrax threats. Some of this emergency preparedness work would be applicable to a potential incident involving the transportation of hazardous materials by rail or pipeline and affecting public health. MDH also coordinates two Mobile Medical Teams—one in the Twin Cities and one in Central Minnesota—that can be employed to provide service during significant incidents. Both the Office of Emergency Preparedness and the Mobile Medical Teams could help in the case of train or pipeline incidents involving oil or other hazardous substances. However, MDH officials were unable to estimate what share of the costs for these programs would be relevant to those types of incidents.

Fire Safety Account

The State of Minnesota collects a surcharge on the insurance fees paid for homeowners', commercial fire, and commercial non-liability coverage to fund its Fire Safety Account (FSA), which supports fire-safety initiatives recommended by a Fire Service Advisory Committee that advises the DPS commissioner. The advisory committee may recommend FSA funds for the Minnesota Board of Firefighter Training and Education to support firefighting training efforts, for Fire Marshall programs and staffing, and for fire-related regional hazmat response teams and other fire service programs with potential statewide impacts.

FSA spending isn't targeted toward rail and pipeline incidents involving oil, ethanol, and other hazardous substances, and the vast majority of the account is commited for programs and initiatives unrelated to these types of hazmat situations. However, FSA funds are expended in ways that may relate to oil and ethanol hazmat incidents situations involving rail and pipelines. FSA dollars have supported hazmat training for firefighters, as well as operational support and also sometimes equipment for the state's Chemical Assessment Teams and hazmat Emergency Response Teams. Funds

from the FSA to support a wide variety of programs and training generally amount to about $13 million per year.

Minnesota Department of Transportation

MnDOT focuses efforts on the prevention of rail incidents, through its rail inspection program. MnDOT officials noted that training for its inspectors could be considered a preparedness activity, and they estimated the training costs to be roughly $10,000 per year, with the Federal Railroad Administration covering about 70% of that total.

Private Funding for Preparedness Activities

Not surprisingly, railroads and pipeline operators account for a significant share of the private sector funding and involvement in response preparedness related to rail and pipeline transportation, although ethanol producers and oil refiners are involved as well in broader but relevant preparedness efforts. MAD was not able to determine or estimate total private sector spending on preparedness activities for potential incidents involving the transport of oil, ethanol, and other hazardous substances by rail and pipeline. What follows includes information about private sector spending and dollar levels or estimates when possible.

Response Preparedness Expenditures by Railroads

For the three years through to the end of state fiscal 2017, four Class I railroads and one Class II railroad operating in Minnesota have paid assessments that together total $1.25 million per year to the state government to fund the Railroad and Pipeline Safety Account. The contributing railroads are Burlington Northern Sante Fe, Canadian National, Canadian Pacific, and Union Pacific, all of which are Class I railroads, as well as Rapid City, Pierre and Eastern, which is the one Class II railroad operating in the state. As noted previously, these assessments from the railroads are combined with an equal total in assessments on pipeline operators and have been combined with more $1.574 million in state funds to finance the safety account. The account may be used to fund training and response preparedness for train or pipeline incidents involving oil or other hazardous substances.

In addition to the assessment, railroads spend funds on their own training and preparedness activities regarding oil and other hazardous substances transported by rail. Representatives of major railroads operating in Minnesota reported that it is impossible to estimate their spending on response preparedness activities in the state for all potential hazmat incidents, let alone those relevant only to oil and ethanol given their all-hazards approach. Railroads don't track and break down such spending at either the national or state levels. In fact, railroad representatives interviewed for this study noted that they were unable to provide estimates to the White House Office of Management and Budget when asked in 2016 for estimated railroad spending on preparedness and response efforts.

In declining to estimate spending on response preparedness activities in Minnesota, the railroad representatives explained that the complexity of the different types of activities and their costs ruled out reasonable estimates. They also argued that if estimates were possible, estimates would likely have the unintended consequence of making it difficult for railroad safety officials to justify preparedness activities along important but sparsely populated miles of track. Training and other efforts in these rural areas of Minnesota and throughout the country are important because so much railroad freight

moves through these rural areas. But the railroad officials said the cost per participant for preparedness activities in those regions is high because the number of first responders participating there is low, so breakdowns of costs might lead to cutbacks in rural regions. Others interviewed for this report, however, criticized the railroads for refusing to estimate their spending on response preparedness, arguing that total funding nationally and by state likely falls short of what is needed but can't be analyzed if cost figures are unavailable.

Even without hard estimates for overall spending, however, it is clear that the railroads are committing significant funds to response preparedness. One state official noted that the railroads have spent a lot of money on preparedness and that it is in their interest to do so both to ensure that trains are moving on the rail lines and reduce the potential for adverse public safety impacts. As noted elsewhere in the report, the Class I railroads operating in Minnesota trained more than 7,000 emergency responders in Minnesota from January 2014 through October 2016. During the same period, the railroads covered tuition and travel expenses for more than 250 Minnesota firefighters who attended rail incident training at the either the Security and Emergency Response Training Center in Pueblo, CO or the Texas A&M Engineering Extension Service in College Station, TX. The railroads have helped fund the three-day training in crude-by-rail offered by those institutions.

Railroads provide staff and equipment for tabletop and full-scale exercises in Minnesota, including the Stevens County exercise in June 2016 and the Vigilant Guard exercise held simultaneously at Camp Ripley and in Duluth in August 2015, involving the 55th Civil Support Team of Minnesota's National Guard, the state's Chemical Assessment Teams and hazmat Emergency Response Teams, state agencies, and local fire departments. Part of the Vigilant Guard exercise involved determining the ability of the railroads to meet the requirements added to Minnesota's Spill Bill in 2014 that they provide equipment on site within three hours. Railroads also own response equipment, they contract with private companies in Minnesota and nearby states for hazmat response services, and they have safety experts on staff in the state and nearby with expertise in hazmat incident response.

Response Preparedness Efforts by Pipeline Operators, Others

As with the railroads, pipeline operators who move oil and other hazardous substances in Minnesota have paid $1.25 million combined into Minnesota's Railroad and Pipeline Safety Account for each of the three years through to the end of state fiscal 2017. These funds, along with dollars from the railroads and the State of Minnesota, may be used to fund training and response preparedness for train or pipeline incidents involving oil or other hazardous substances.

As with railroads, pipeline operators spend additional funds on their own training and preparedness activities. But no reasonable estimates are available for overall spending by pipeline operators on training and response preparedness activities in Minnesota. MAD heard from several sources connected with the pipeline industry that spending on these activities isn't tracked, nor are reasonable estimates available. But as with the railroads, pipeline operators pay for a range of preparedness resource, including equipment, training, and exercises. Noting the difficulties in estimating expenditures, one pipeline official included the following list of training and preparedness activities and expenditures for his company: training and exercise hours for company personnel, annual equipment deployment exercises and tabletop exercises in each of the companies response areas,

education provided to first responders, training offered cooperatively in Minnesota through Minnesota Pipeline CAER, safe community grants offered to first responders along the company's pipelines, mailings to landowners and affected public with emergency contact information, and awareness activities that are part of the company's public awareness plan and its stakeholder engagement plan.

In terms of training for emergency responders and local officials in Minnesota, the operators of pipelines in the state participate in a joint Community Awareness Emergency Response organization called Minnesota Pipeline CAER. Funding from the pipeline companies to this CAER have averaged about $200,000 per year total to cover the costs of 25 to 30 sessions in Minnesota that serve 1,100 to 1,200 participants annually, according to a Minnesota Pipeline CAER official.

The federal government promulgates regulations for pipeline operators nationwide, ones that the State of Minnesota adopts, according to an official at DPS' Office of Pipeline Safety. Pipeline rules require that the companies meet with and educate responders, public officials, and land owners. Because of recent media and public attention to pipelines and proposed pipeline developments, some of the larger pipeline operators have increased their outreach, an OPS official said. Smaller operators with limited resources have at least carried out what they are required to do by law.

Additional response preparedness activities are financed by ethanol producers, with the focus on potential incidents at their facilities and rail spurs there, and by petroleum refineries, again with a focus on the facilities. Some refineries are owned and operated by companies that also own and operate pipelines.

Federal Grants for Hazardous Materials Emergency Preparedness

The U.S. Department of Transportation provides Hazardous Materials Emergency Preparedness (HMEP) grants to states through its Pipeline and Hazardous Materials Administration mostly for distribution to local and county governments to prepare emergency responders for hazardous materials incidents. Grant funding passed along by the state can be used for such activities as planning, exercises, hazmat training, and conferences. The Minnesota Board of Firefighter Training and Education uses some HMEP funding to reimburse local fire departments for qualified training expenses. HMEP grants also support the planning efforts by Minnesota's Regional Review Committees, which serve as the Local Emergency Planning Committees required under the federal Emergency Planning and Community Right-to-Know Act. The Regional Review Committees plan for emergencies in the state's HSEM regions and examine the emergency operation plans for the political jurisdictions in their region.

Minnesota received $410,300 in HMEP grants announced October 2016. Again, only a portion of these funds will be spent in a way that relates to train and pipeline incidents involving oil, ethanol, and hazardous substances.

The federal government also issues Emergency Management Performance Grants and grants under the State Homeland Security Grant program, which aim to support core capabilities essential to national

preparedness goals, including prevention, protection, mitigation, response, and recovery. However, these grants are not used for hazmat rail and pipeline preparedness.

Local Funding

Cities and townships commit significant portions of their budgets to public safety, including emergency response and preparedness. However, public safety officials consulted for this study—experts at both the local and state levels—reported there is no reasonable way to estimate what share of such expenditures relates to preparedness for incidents involving the transport of hazardous materials, let alone those transported specifically by rail and pipeline. Sources consulted suggested that the share would be very small, or "miniscule," with some local governments spending more than others depending upon their high-priority risks. Based on its 2013 Annual Surveys of State and Local Government Finances, the U.S. Census Bureau estimates that direct expenditures by local governments in Minnesota on all fire protection efforts amounted to $371.607 million. (Results from the 2015 annual surveys were not available at the time this study was written.)

Equity Concerns and Considerations

Relevant to the following elements requested by the legislature:

5. *Analyze equity in the distribution of funding sources for preparedness activities, including*
    a. *examination of the public-private partnership financing model,*
    b. *review of balance across industries involved in storage and distribution of oil*

MAD analyzed equity concerns and considerations regarding the distribution of funding sources for preparedness activities, with the focus on the Railroad and Pipeline Safety Account that constitutes the state's major public-private financing partnership.[135] Of the $9.074 million that will be deposited into the Railroad and Pipeline Safety Account as of June 30, 2016, the State of Minnesota will have committed 17.3% of the total from its general funds, with pipeline companies that operate in Minnesota paying assessments into the account that amount to 41.3% of the total, and the Class I and Class II railroads that operate in Minnesota also paying assessments that amount to 41.3% of the account's total.[136]

Railroad Assessments

One equity consideration relates to how the assessments for the Railroad and Pipeline Safety Account are levied on the railroads. In terms of the railroads, the state only assesses the four Class I and one Class II railroads, linking the assessments to Minnesota's law about state rail safety inspections. So as with the state rail safety inspections, the safety account assessments apply only to BNSF, Canadian National, Canadian Pacific, Union Pacific, and the Class II railroad, Rapid City, Pierre & Eastern.[137] For this reason, none of the 17 Class III and private railroads operating in Minnesota pay assessments into the account, whether they carry oil and other hazardous substances or not. (A number of the Class III lines haul denatured ethanol, which is classified as oil under U.S. EPA definitions.) State law specifies that the total assessments for the railroads be divided among the Class I and Class II operators according to route miles in Minnesota. By contrast, the law calls for assessments on pipeline operators based on gallons of oil and hazardous substances transported annually. (Pipeline operators in Minnesota are subject to the assessment if they transport more than 100,000 gallons of oil or hazardous substance in any month of the year.[138])

Assessments on Railroads and Pipelines Only

Another equity consideration is that the assessment for the Railroad and Pipeline Safety Account is only levied against railroads and pipelines, although oil and other hazardous substances are transported in Minnesota by other means, notably trucks. Representatives from the railroads in particular cited this focus on rail and pipeline as an unfair imbalance. Interviewees argued that railroads and pipelines have significantly better safety records for transporting oil and other hazardous

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[135] The specifics about the Railroad and Pipeline Safety Account are found in Minnesota Statute § 299A.55, "Railroad and Pipeline Safety; Oil and Other Hazardous Materials."

[136] Amounts are rounded, with the actual percentages totaling to 100%.

[137] Minnesota Statute § 219.015, subd. 2.

[138] Minnesota Statute § 115E.03, subd. 2.

substances than does the trucking industry and therefore shouldn't be singled out to pay into the state's safety account. "Trucks present a greater hazmat risk, but they pay nothing," said one railroad representative. This "gives trucking companies a competitive advantage." He acknowledged that trucking firms pay gas taxes but pointed out that those taxes are used to help fund the roads that the trucks drive upon, not for hazmat safety preparedness and response. (Under federal rules for common carriers, railroads and most major trucking firms are required to accept hazardous materials for shipment.)

MAD interviews with public sector officials and others revealed a counter argument to this idea that railroads and pipelines are unfairly penalized through the assessments they pay into the safety account. Many of the public sector interviewees argued that the biggest risks for large-scale incidents involving oil and other hazardous substances come from railroads and pipeline because of the volumes of these substances that they carry at one time. The railroads and pipelines are the source of the lot of the risk, said one public official. "They're the big players," said another. Private companies should help fund the public actions needed for response preparedness, some said. Several interviewees from the public sector said that unit trains posed high risks for incidents because these trains have many tank cars rolling through together, with the potential that an incident with one of the cars—a fire or explosion, for example—could lead to incidents involving many of the other cars on the train.

Fixed Facilities

A final equity consideration explored by MAD was that of the state's assessment only of railroads and pipeline companies transporting oil and hazardous substances in Minnesota, with no assessments on other industries involved in storage and distribution. However, the railroad representatives who spoke with MAD didn't express concerns or complaints about this. Nor did the limited number of people MAD talked to who were connected to the pipeline industry. Several officials with the State of Minnesota noted that producers and others who store oil and hazardous materials in Minnesota pay fees under other state laws, perhaps making it less likely that these businesses would be seen as appropriate ones for the safety account assessments. Fixed facilities, such as ethanol plants and oil refineries, are subject to two fees under Minnesota law, both related to toxic release although neither funds response preparedness per say.[139] Under the Minnesota Toxic Pollution Prevention Act, fixed facilities pay pollution prevention fees to MPCA to support the prevention activities, including Minnesota Technical Assistance Program, grants, loans, educational materials, online resources, workshops, and conferences. In addition, facilities that generate large quantities of toxic chemicals that are included in the federal toxic chemical release inventory pay fees annually to MPCA, either based on releases that they report under the federal Emergency Planning and Community Right-to-Know Act or set at a baseline amount of $500 if no releases occur.

[139] For more on these pollution prevention fees, see the Minnesota Pollution Control Agency website at https://www.pca.state.mn.us/quick-links/pollution-prevention-fees.

Closing Comments

The findings and recommendations from this report to the legislature are detailed in the report's main sections and noted in the executive summary. This brief section reiterates several key points by way of review.

Regarding DPS and HSEM work on and Railroad and Pipeline Safety Account funding for response preparedness for rail and pipeline incidents involving oil and ethanol, research conducted for this report found interest in the following:

- Exercises and drills at the county and local level, including discussion-based tabletop exercises and full-scale, operational exercises;
- Community preparedness, including evacuation planning, warning systems, risk assessment, and public communications and awareness efforts to better inform and prepare citizens for potential incidents; and
- Classroom training, particularly for emergency responders in 10 Minnesota counties where ethanol is a concern but where participation in HSEM training on oil incidents involving rail and pipelines has been limited.

This report includes other recommendations that DPS and HSEM plan to pursue, including the following: HSEM should compile information about key response equipment, document the availability of the equipment in the event of an incident, and identify gaps, if there are any—especially for the alcohol-resistant foam needed to suppress vapor and fire from an ethanol incident. DPS should provide railroad safety officials with permanent access to the state's primary communications system tool for first responders units and public sector safety experts, known as ARMER. HSEM should encourage widespread adoption by Minnesota's first responders of the AskRail app that offers real-time information about the contents of hazmat rail cars. And HSEM should make information publicly available about how funds from the Railroad and Pipeline Safety Account are being spent.

The report finds progress in the state when it comes to preparedness for rail and pipeline incidents involving oil, ethanol, and other hazardous substances. Of note are the following:

- Survey results and interviews indicate improvements in Minnesota's preparedness for rail and pipeline incidents involving oil and other hazardous substances. The situation in Minnesota has improved because of efforts by DPS and HSEM, railroad and pipeline operators, new state government initiatives such as the Governor's Freight Rail Council, recent federal action on rail safety, and efforts at the local level.
- Both the public and private sectors are engaged in training that has improved preparedness. HSEM's training efforts around rail and pipeline incidents involving oil and other hazardous substances have reached about 6,000 emergency responders in the state and have had an impact on their preparedness for potential incidents. Training by railroads and pipeline operators has also reached thousands of Minnesotans involved in emergency response and has prepared them better for potential incidents.

Finally, this report makes a number of important points that should and do shape training and preparedness activities for rail and pipeline incidents involving oil, ethanol, and other hazardous substances. These include the following:

- Railroads are responsible for emergencies involving the substances they transport, including oil and ethanol, and consequently they make equipment and personnel available when incidents occur.
- Local fire departments and other first responder units are responsible for meeting citizens' immediate health and safety needs when a major emergency occurs, taking action to evacuate areas as needed and providing direct firefighting when called for, particularly if a rail car fire spreads to structures in the community. They aren't responsible for fires from rail cars on railroad tracks.
- A significant capacity inventory for incident response exists in Minnesota, much of it from the private sector but some from the public sector as well. What the state lacks, however, is clear information for local leaders of public sector emergency response about specific major response equipment and its availability for use if a rail or pipeline incident occurs.
- While ethanol differs from crude oil, the denatured ethanol that Minnesota's ethanol producers ship is classified by the U.S. EPA as oil. Both oil and ethanol are Class 3 flammable liquids. And much but not all of the response capacity relevant for potential oil incidents is relevant for potential ethanol ones. The fact that ethanol mixes completely with water, however, makes it difficult to contain in the case of spills and leaks and makes its fires hard to fight.
- The State of Minnesota and county and local public agencies must address concerns about oil and ethanol in the context of all the hazards, hazardous materials, and potential incidents that could threaten life and property in the state's communities. Incidents involving oil and ethanol transported by rail and pipeline are among the threats, of course, but are not necessarily the most dangerous nor the most common.
- Preparedness and response are important elements of emergency management. However, prevention and mitigation, too, are critical. Prevention and mitigation reduce the threat that hazmat transportation incidents will occur at all and that their impacts will be significant if they do happen. This is particularly important in densely populated urban areas, where an ethanol or oil explosion or fire, for example, would likely have devastating impacts even if preparedness is high and response rapid.

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Appendix A: Persons Interviewed for the DPS 2017 Report to the Legislature

DPS and MAD developed a list of interviewees for this project, which is included below. MAD interviewed almost 70 representatives of more than 35 organizations, including rail and pipeline companies, state agencies, local government units, a concerned citizens group, associations, the Minnesota legislature, and others. In developing the interviewee list, DPS and MAD attempted to capture as much information as possible from experts in rail and pipeline safety preparedness. MAD conducted most interviews in September, October, and November 2016, although some were conducted earlier as part of a separate DPS study of Minnesota's regional hazmat response teams. Almost all interviews were conducted in person or by phone, but a few interviewees provided written comments by email. In several cases, interviewees from the same organization or similar organizations participated in group interview sessions. MAD used a semi-structured approach to the interviews: interviewers used the same base set of questions for interviews but allowed the conversation to flow organically, with follow-up questions based on the specific interviewee's expertise and organization. MAD designed the interview questionnaire to answer the specific research questions posed by the legislation while still allowing interviewees to identify other relevant areas of concern. Interview questions are found in Appendix B.

- John Apitz, Legislative Counsel, Minnesota Regional Railroads Association
- Bob Berg, State Teams Planner, Homeland Security and Emergency Management, Minnesota Department of Public Safety
- Patrick Brady, General Director, Hazardous Materials Safety, BNSF Railway
- Jane Braun, Section Manager, Emergency Response Program, Minnesota Pollution Control Agency
- Sarai Brenner, Policy Team Member, Citizens Acting for Rail Safety - Twin Cities
- Dale Buckholtz, System Manager Emergency Response, CP Railway
- Cathy Clark, Organizational Development Director, Homeland Security and Emergency Management, Minnesota Department of Public Safety
- Kenneth Collins, IC-Officer Dangerous Goods, Canadian National
- Andrew Cummings, Manager Media Relations, CP Railway
- Ed Dankbar, Hazmat Field Specialist, CP Railway
- Scott Dibble, Member, Transportation and Public Safety Committee, Minnesota Senate
- Joe Eichten, Manager Hazmat - Field Safety, Union Pacific
- Sarah Erickson, Principal, United Strategies
- Dorene Fier-Tucker, Supervisor, Emergency Management and Remediation, Minnesota Pollution Control Agency
- Anne Finn, Assistant Intergovernmental Relations Director, League of Minnesota Cities
- Steve Flaherty, Executive Director, Minnesota Board of Fire Training and Education, Minnesota Department of Public Safety

- Jim Fox, Program Specialist - Hazard Materials Enforcement, Minnesota Department of Transportation
- Tim Friesen, Vice President of Liaison Services, Minnesota Pipeline CAER
- Bill Gardner, Freight Project Manager, Minnesota Department of Transportation
- Michael Goldstein, Police Chief and Director of Public Safety, City of Plymouth
- Dona Greiner, Emergency Management Director, Stevens County
- Kevin Hennessy, Biofuels Specialist, Minnesota Department of Agriculture
- Frank Hornstein, Member, Transportation Policy and Finance Committee, Minnesota House of Representatives
- Mike Jerke, General Manager, Corn Plus
- Herb Jones, U.S. Director of State and Local Government, CP Railway
- Joe Kelly, Director, Homeland Security and Emergency Management, Minnesota Department of Public Safety
- Jim Kvedaras, Director of U.S. Government Affairs, Canadian National
- Nancy Lageson, Emergency Management Director, City of Waseca
- Rick Larkin, Emergency Management Director, City of Saint Paul
- Scott LeBraun, Lieutenant, Mankato Fire Department
- Rick Luth, State Emergency Response Teams Coordinator, Homeland Security and Emergency Management, Minnesota Department of Public Safety
- Roger Mackedanz, Pesticide & Fertilizer Manager, Minnesota Department of Agriculture
- Amy McBeth, Public Affairs Director, BNSF Railway
- Victor Meyers, Vice President Operations, Twin Cities & Western Railroad Company
- Fred Millar, Policy Consultant: Chemical Risks, Hazmat Transportation, and Emergency Response
- Richard Miller, Program Manager for Safety, Health and Survival, International Association of Fire Chiefs
- Ryan Muchow, Captain, Moorhead Fire Department
- Joe Neuberger, Operations Branch Director, Homeland Security and Emergency Management, Minnesota Department of Public Safety
- Scott Newman, Member, Transportation and Public Safety Committee, Minnesota Senate
- Mark Nichols, Research Team Member, Citizens Acting for Rail Safety - Twin Cities
- Mike Peterson, Emergency Management Director, City of Winona / Winona County
- Kevin Reed, Deputy Director, Homeland Security and Emergency Management, Minnesota Department of Public Safety
- Mark Rosenblum, President, Minnesota State Fire Departments Association
- Tim Rudnicki, Executive Director, Minnesota Bio-Fuels Association
- Claire Ruebeck, Policy Team Member, Citizens Acting for Rail Safety - Twin Cities
- Liisa Stark, Assistant Vice President - Public Affairs for Illinois, Minnesota, and Wisconsin, Union Pacific
- Jim Stockinger, Emergency Response Specialist, Emergency Response Program, Minnesota Pollution Control Agency
- David Stafford, Manager of U.S. Pipeline Compliance, Enbridge
- Terry Stoltzman, Emergency Management Director, Anoka County

- Brian Sweeney, Assistant Vice President Government Affairs, BNSF Railway
- Alene Tchourumoff, State Rail Director, Governor's Council on Freight Rail
- Mark Uglem, Member, Transportation Policy and Finance Committee, Minnesota House of Representatives
- Eric Waage, Emergency Management Director, Hennepin County
- Kate Weeks, Director of Legislative Affairs, Minnesota Department of Public Safety
- Mark Wegner, President, Twin Cities & Western Railroad Company
- Rick Wellman, Materials Manager, Poet Bio-Refining
- Bruce West, State Fire Marshal, Director of the Minnesota Office of Pipeline Safety, Gopher State One Call Board of Directors Member, Minnesota Department of Public Safety
- Jonathan Wolfgram, Chief Engineer, Office of Pipeline Safety, Minnesota Department of Public Safety

In addition, there were other interviews of:

- Ethanol plant officials
- A volunteer fire chief
- Representatives from:
    - League of Minnesota Cities
    - Local volunteer fire chief
    - Minnesota Professional Fire Fighters Association
    - Minnesota Bureau of Criminal Apprehension
    - Minnesota Department of Health
    - Grand Rapids Fire Department
    - Marshall Department of Public Safety
    - St. Paul Fire Department
    - St. Cloud Fire Department
    - Hopkins Fire Department

Appendix B: Interview Questions

The following lists out all the interview questions that MAD used for this study. Note that only subsets of this full list were used with each person interviewed, based on their expertise, their position, and their agency, organization, or company.

1. How is your organization involved in preparedness and response to rail and pipeline transportation incidents involving crude oil, ethanol, or other hazardous materials?
2. Are there major strengths or concerns worth noting when it comes to response preparedness and funding in Minnesota for potential oil incidents by rail and pipelines and potential ethanol incidents by rail?
3. What's your assessment of the current state of preparedness for potential ethanol incidents involving train transportation here in Minnesota? What would increase preparedness?
4. Who do see as the other key private- and public-sector players and what are their roles and resources when it comes to training and response preparedness activities for potential ethanol train incidents?
5. Are you aware of training needs among fire departments and other emergency first responders, again with regard to potential ethanol rail incidents?
6. Does your organization—or the ethanol industry more broadly—have resources it makes available to help with preparedness and response when it comes to potential railroad ethanol incidents, including equipment?
7. Are there best practices or standout examples that you are aware of, either in your area or elsewhere, for preparedness when it comes to potential ethanol rail incidents?
8. Are there differences in how preparedness and response is handled by different railroad classes?
9. What actions would your railroad take to respond in the event that an ethanol train incident were to occur on your rail line?
10. What resources are you aware of that railroads in Minnesota draw upon in the event of an ethanol incident, things like staffing, equipment, emergency responders, mutual aid agreements, communications capabilities, and coordination?
11. Are you able to estimate approximately how much railroad/pipeline companies spend annually on preparedness and response activities in Minnesota related to potential pipeline incidents involving oil, ethanol, and other hazardous materials?
12. How do the railroads communicate with public sector emergency managers, 1st responders, or others about the types of hazardous materials moving through their communities on rail lines?

13. Do the pipeline companies that operate in Minnesota offer trainings and preparedness response activities to 1st responders in the state? If yes, is there information available about the number of trainings and the number of participants?
14. What funding streams, if any, does your state agency tap into to support preparedness activities?
15. Do you feel Minnesota is more prepared now to handle an oil transportation incident involving train or pipeline transportation than in 2014?
16. What notable changes, if any, would you cite from the private and public sectors since 2015 when it comes Minnesota's preparedness and capacity to respond to an oil transportation incident?
17. How would you assess the effectiveness of training and response preparedness activities for oil, ethanol, and other hazardous materials?
18. Are you aware of unfunded needs for training and preparedness activities, related to the transport of oil, ethanol, or other hazardous materials in Minnesota by rail or pipeline?
19. What funding sources support training and preparedness activities?
20. Funding for training and preparedness activities in Minnesota comes from both public and private sources. This is true for the state's Railroad and Pipeline Safety Account. What's your sense of the equity or fairness of the current public-private partnership financing model, and what's your sense, too, of the balance across industries involved in the storage and distribution of oil and other hazardous substances?
21. What legislative, programmatic or regulatory changes, if any, would you recommend to improve preparedness for potential incidents involving ethanol transportation by rail or oil transport by rail and pipeline?

Appendix C: 2016 Preparedness and Response Survey Results

On Nov. 3, 2016, Management Analysis and Development sent a link for an electronic survey about response preparedness to 404 email addresses of fire chiefs, law enforcement officials, and emergency manages, many of whom received a similar survey in 2014. In 40 cases, the email addresses were no longer valid, leaving 364 recipients. When the survey closed on Nov. 18, 130 recipients had provided useable responses, for a response rate of 36%. The questionnaire included general preparedness questions asked of all respondents, questions about preparedness for oil incidents involving rail and pipelines, and questions about preparedness for ethanol incidents involving rail. The oil questions were asked of respondents who reported either that they knew they had oil moving their jurisdictions or weren't certain. Similarly, the ethanol questions were asked for respondents who reported either that they knew they had ethanol moving through their jurisdictions or weren't certain.

The full results of the survey are listed on the next page.

Hazardous Materials Transportation Safety Survey

Please take 10-15 minutes to complete this important survey about preparedness and response for hazardous materials incidents. The Minnesota Department of Public Safety (DPS) needs input and guidance from you as a local leader on preparedness and response issues for an important updated report to the Minnesota Legislature.

The Minnesota Legislature has requested an evaluation and analysis of response preparedness and funding, with a focus on oil and ethanol. Please answer the questions in a way that best represents your organization as a whole and answer only for your organization, not partner organizations. Any potentially identifying information that you provide is considered private data under the Minnesota Data Practices Act (Minnesota Statutes §13.64); all responses will be kept on a secure server.

This survey is voluntary but your response is crucial to this effort. For a text-based version of this survey, please click the "text only" link at the top of the page. If you cannot complete the survey uninterrupted, your responses will be saved automatically and you can return later to complete the survey. If you have any questions about or problems with the survey, please contact James Collins with Management Analysis & Development at 651.259.3823 or James.Collins@state.mn.us. Thank you for your time.

What level of government do you represent?

72 City

53 County

5 Tribal Nation

What type of organization do you represent?

37 Fire department

35 Police department

19 Sheriff or other law enforcement

38 Emergency management office

On a scale of 1 (very ineffective) to 5 (very effective), rate the effectiveness of training and preparedness activities for incidents involving the transportation of oil and other hazardous materials by rail and pipeline.

	1 (very ineffective) to 5 (very effective)					
Activity	1	2	3	4	5	No opinion
Assessment and planning	5	14	51	37	12	7
Classroom training	3	16	48	37	12	9
Drills and exercises	9	19	39	28	21	10
Coordination	6	19	41	40	14	7
Communication	5	14	45	38	18	7

On a scale of 1 (not at all familiar) to 5 (very familiar), how familiar are you with the hazardous contents of ***trains*** in your area?

7	1 (Not at all familiar)
16	2
40	3
40	4
18	5 (Very familiar)
9	Not applicable

On a scale of 1 (not at all familiar) to 5 (very familiar), how familiar are you with the contents of ***pipelines*** in your area?

3	1 (Not at all familiar)
9	2
28	3
50	4
37	5 (Very familiar)
3	Not applicable

Does your city/county/tribal government have available staff or volunteers that have received training for ***hazardous materials*** transportation incidents in general?

113	Yes
8	No
9	I don't know

Do trains that travel through your jurisdiction transport:

20	Ethanol but NOT oil
5	Oil but NOT ethanol
69	Both oil AND ethanol
23	I don't know
13	Neither oil NOR ethanol

On a scale of 1 (inadequate) to 5 (adequate), rate the adequacy of each of the following in terms of response preparedness for incidents involving the transportation of ***ethanol*** by rail.

	1 (inadequate)	2	3	4	5 (adequate)	No opinion
Assessment and planning	9	25	32	37	5	4
Classroom training	10	29	34	29	4	5
Drills and exercises	16	27	28	26	8	5
Equipment	18	29	29	17	7	10

Coordination	12	25	32	28	10	4
Communication	13	14	35	34	11	4

Is ***ethanol*** incident response a part of your city/county/tribal government's Emergency Operations Plan (EOP), Threat Hazard Identification Risk Assessment (THIRA), or Hazard Mitigation Plan (HMP)?

68 Yes

23 No

21 I don't know

Considering public and private resources available, please rate your city/county/tribal government's ability to respond to an ***ethanol*** transportation incident.

11 1 (Poor)

48 2 (Fair)

38 3 (Good)

13 4 (Very good)

2 5 (Excellent)

On a scale of 1 (not at all familiar) to 5 (very familiar), how familiar are you with available private sector resources (including from rail companies) to respond to an ***ethanol*** transportation incident?

12 1 (Not at all familiar)

36 2 (Aware of but not familiar)

31 3 (Somewhat familiar)

27 4 (Familiar)

5 5 (Very familiar)

On a scale of 1 (not at all familiar) to 5 (very familiar), how familiar are you with available resources from regional response teams (Chemical Assessment Teams and Emergency Response Teams) to respond to an ***ethanol*** transportation incident?

2 1 (Not at all familiar)

17 2 (Aware of but not familiar)

31 3 (Somewhat familiar)

43 4 (Familiar)

18 5 (Very familiar)

Compared to other hazardous materials transportation incidents, please rate your city/county/tribal government's ability to respond to an ***ethanol*** transportation incident.

3 Much less prepared

26 Less prepared

68 Prepared about the same

12 More prepared

2 Much more prepared

Select the appropriate label below to indicate how preparedness for an ***ethanol*** transportation incident in your area now compares to preparedness in early 2014.

0 1 (Worse)

46 2 (No change)

44 3 (Somewhat better)

18 4 (Better)

3 5 (A lot better)

Does your city/county/tribal government have unfunded needs related to preparedness and response to an ***ethanol*** incident in your area?

73 Yes

16 No

23 I don't know

For ***ethanol*** preparedness and response, please rank your top four priorities for funding using 1st for your top priority through to 4th for your last priority. You may rank up to four priorities.

	1st Priority	2nd Priority	3rd Priority	4th Priority
Risk assessment	20	11	9	14
Evacuation planning	17	16	17	11
Other preparedness planning	1	2	8	11
Classroom training	10	16	19	8
Exercises and drills	23	25	17	16
Equipment	26	19	6	13
Coordination and mutual aid	4	13	16	13
Public communication and awareness	5	4	13	17
Other (please specify below)	0	0	1	1

2

Does you city/county/tribal government have available staff or volunteers that have received training for ***ethanol*** transportation incidents, specifically?

58 Yes

34 No

18 I don't know

Please rate the level of need among first responders and emergency preparedness staff in your area for the following types of training related to ***ethanol*** transportation incidents.

	Needed a lot	Needed	Needed somewhat	Not needed	I don't know
Awareness-level (classroom)	17	43	31	16	1
Awareness-level (hands-on or field)	22	52	21	12	1
HAZMAT first responder operations-level	16	44	32	12	4
HAZMAT technician-level or specialist-level	16	30	30	24	7
Public information, alert, and warning	18	42	30	16	1
Evacuation planning and preparedness	24	38	37	9	0
Other (please specify below)	2	7	4	4	11

2

Does your city/county/tribal government have mutual aid agreements in place that would apply to ***ethanol*** transportation incidents?

87 Yes

10 No

11 I don't know

Is ***oil*** incident response a part of your city/county/tribal government's Emergency Operations Plan (EOP), Threat Hazard Identification Risk Assessment (THIRA), or Hazard Mitigation Plan (HMP)?

65 Yes

17 No

13 I don't know

Considering public and private resources available, please rate your city/county/tribal government's ability to respond to an ***oil*** transportation incident.

6 1 (Poor)

23 2

45 3

20 4

1 5 (Excellent)

On a scale of 1 (not at all familiar) to 5 (very familiar), how familiar are you with available private sector resources (including from rail and pipeline companies) to respond to an ***oil*** transportation incident?

8 1 (Not at all familiar)

17 2

35 3

28 4

7 5 (Very familiar)

On a scale of 1 (not at all familiar) to 5 (very familiar), how familiar are you with available resources from regional response teams (Chemical Assessment Teams and Emergency Response Teams) to respond to an ***oil*** transportation incident?

1 1 (Not at all familiar)

19 2

19 3

39 4

17 5 (Very familiar)

Compared to other hazardous materials transportation incidents, please rate your city/county/tribal government's ability to respond to an ***oil*** transportation incident.

5 Much less prepared

12 Less prepared

58 Prepared about the same

19 More prepared

1 Much more prepared

Select the appropriate label below to indicate how preparedness for an ***oil*** transportation incident in your area now compares to preparedness in early 2014.

	A lot better	Better	Somewhat better	No change	Worse
Risk assessment	4	26	28	35	1
Evacuation planning	7	13	33	40	1
Other preparedness planning	3	21	40	30	0
Classroom training	5	27	27	35	0

Exercises and drills	5	16	29	44	0
Equipment	2	8	17	66	1
Coordination and mutual aid	7	15	29	42	1
Public communication and awareness	8	18	27	40	1
Other (please specify below)	1	1	5	13	1

4

Does your city/county/tribal government have unfunded needs related to preparedness and response to an ***oil*** incident in your area?

65 Yes

11 No

18 I don't know

For ***oil*** preparedness and response, please rank your top four priorities for funding using 1st for your top priority through to 4th for your last priority. You may rank up to four priorities.

	1st Priority	2nd Priority	3rd Priority	4th Priority
Risk assessment	25	7	4	8
Evacuation planning	9	16	16	11
Other preparedness planning	1	1	7	11
Classroom training	7	13	15	13
Exercises and drills	23	22	16	11
Equipment	20	16	11	9
Coordination and mutual aid	2	13	12	15
Public communication and awareness	4	3	11	13
Other (please specify below)	0	0	0	0

0

Does your city/county/tribal government have available staff or volunteers that have received training for ***oil*** transportations incidents, specifically?

60 Yes

21 No

11 I don't know

Please rate your level of need for the following types of training related to ***oil*** transportation incidents.

	Needed a lot	Needed	Needed somewhat	Not needed	I don't know
Awareness-level (classroom)	11	37	29	16	0
Awareness-level (hands-on or field)	13	47	23	9	1
HAZMAT first responder operations-level	12	37	32	10	3
HAZMAT technician-level or specialist-level	12	25	34	13	8
Public information, alert, and warning	16	28	34	15	1
Evacuation planning and preparedness	19	35	33	6	1
Other (please specify below)	1	2	5	3	1

0

Indicate the importance of the following ***hazardous materials*** as potential transportation incidents for your area.

	Very important	Important	Somewhat important	Not important	I don't know
Anhydrous ammonia/ammonia	78	30	13	3	3
Benzene	32	29	27	6	27
Chlorine	50	41	14	4	14
Ethanol	65	43	8	6	3
Gasoline	56	49	15	4	2
Hydrochloric acid	34	37	23	6	23
Hydrogen flouride	21	40	25	9	29
Hydrogen peroxide	21	35	25	10	32
Liquified petroleum gas	59	39	14	5	8
Molten Sulfur	22	30	25	11	35
Oil	55	38	19	9	6
Phosphorus	20	46	22	9	25
Propane	66	45	8	4	3
Radioactive material	29	25	22	15	33
Sulfuric acid	33	32	23	7	29

What state-level or legislative changes would improve preparedness and funding related to potential transportation incidents?

46

If there is anything you would like to comment on about preparedness to respond to an incident involving hazardous materials transported by rail or pipeline, please do so in the space below.

28

Thank you for taking the time to answer the questions in this survey. Your input is critical to the success of this study. Please click submit to finalize your answers.

Appendix D: HSEM Awareness Training Syllabus

**This syllabus represents the current plans and objectives. As we go through the instruction process, those plans may need to change to enhance the class learning opportunity.

Oil and Hazardous Substance Transportation Awareness – Syllabus

Instructor Name: Homeland Security and Emergency Management Staff will coordinate
Training location: Local jurisdiction
Training time(s): As requested by the local jurisdiction

Contact: Bob Berg
Office: 445 Minnesota Street Suite 223, St. Paul MN 55101
Telephone: 651-201-7444
Email: Robert.m.berg@state.mn.us

Course Description

The oil and hazardous substance transportation awareness level course will provide the attendee with the general information on how oil is transported through the state of Minnesota. Introductory sections will discuss the modes of transportation, railroad and pipelines, and the infrastructure that is unique to each. Additional sections will discuss the properties of Bakken or Tar sands crude oil, hazards associated with crude oil, other commodities transported, major transportation routes and challenges within Minnesota. The class will culminate with the discussion of response to an incident including oil. Roles and responsibility of emergency responders, emergency management, pipeline or rail companies, elected officials, environmental and pollution control and regulators will be discussed using local critical infrastructure information.

Course Requirements

The attendee must attend the entire session. The involvement of multi-discipline training groups is encouraged

Prerequisites

The attendee must be a responder of a local fire department, police department, emergency management agency, sheriff's office, emergency medical provider.

Priority will be given to those departments that have a pipeline or rail within their jurisdiction. Second priority will be to those jurisdictions that would have mutual aid agreements to assist jurisdictions that have pipeline or rail. Third level priority will be those who do not have a pipeline or rail and not initial mutual aid response

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Learning Outcomes

- Understand how crude oil is transported throughout the state of Minnesota
- General awareness of pipeline and rail road infrastructure and hazards
- Response capabilities, roles and responsibilities of those who are responding to an incident
- What are the environmental and clean up concerns
- Basic planning considerations for the local response group to use to develop or enhance the local emergency response plan
- What are the next steps to develop a table top exercise up to a functional exercise
- How to operate safely around the pipeline, railroad equipment and facilities

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Instructional Methods

The awareness program will be presented by instructors with experience in the areas of rail road and pipeline operations, hazardous materials response, large incident response. This will be a 3-4 hour session broken into 4 separate modules: pipeline, rail road, response to an incident and open discussion.

Course Outline

1. **Pipeline Infrastructure Overview**
    a. Line Markers
    b. Valves
    c. Pump/compressors
    d. How they work in your area
    e. Pipelines in your area
2. **General Pipeline Awareness**
    a. Know the facilities in your area
    b. Excavation Damage prevention
    c. Be on the lookout for...
        i. Excavation without locates
        ii. Odors/sheens
        iii. Vandalism/terrorism
3. **Pipeline Safety Hazard Overview**
    a. Nature of products
    b. Hazard Identification
    c. Spills
    d. Vapors/Vapor Clouds
4. **Rail 101- Basics**
    a. Types of Rail Cars
    b. Rail Car/rail track safety
    c. How to read rail car/rail road markings
    d. Hazards
5. **Commodities transported**
    a. Bakken Oil

b. Tar Sands Oil

c. Other Hazardous substances

d. Non-Hazardous substances

e. Identification process

6. Major Routes with in Minnesota

a. Rail routes and operators

b. Who is your rail company

c. Who is your rail contact

7. Challenges for Minnesota

a. Weather

b. Locations

c. Training

d. Equipment

8. Response to an Incident (Rail or Pipe)

a. Review of Roles

i. Emergency Responders

ii. Emergency Managers

iii. Pipeline or Rail Companies

iv. Elected Officials

v. Regulators

b. Protect

i. Life

ii. Property

iii. Environment

c. Utilization of tools, equipment and resources

i. Who

ii. What

iii. Where

iv. When

9. Clean up/Environmental Concerns

10. Discussion

    a. Possible table top exercise

    b. Question and answer period

    c. Steps forward for local jurisdiction

    d. Planning considerations

Learning Possibilities Beyond Awareness

- Minnesota State Colleges and Universities (MNSCU)
- The Texas A&M University Extension System (TEEX)
- Center for Domestic Preparedness (CDP) Anniston, AL
- Emergency Management Institute/ National Fire Academy, Emmittsburg MD
- Other Public or private providers

Resources for Students

- Minnesota Homeland Security and Emergency Management: https://dps.mn.gov/divisions/hsem/Pages/default.aspx
- Minnesota State Fire Marshal: https://dps.mn.gov/divisions/sfm/Pages/default.aspx
- Minnesota Office of Pipeline Safety: https://dps.mn.gov/divisions/ops/Pages/default.aspx
- Minnesota Pollution Control Agency: http://www.pca.state.mn.us/

- Burlington Northern Santa Fe Railroad Company: www.bnsf.com
- Union Pacific Railroad Company: www.up.com
- Canadian Pacific Railroad Company: www.cpr.ca
- Canadian National Railroad Company: www.cn.ca

Course Schedule

Day	Date	Location	Time	Instructor

Mission

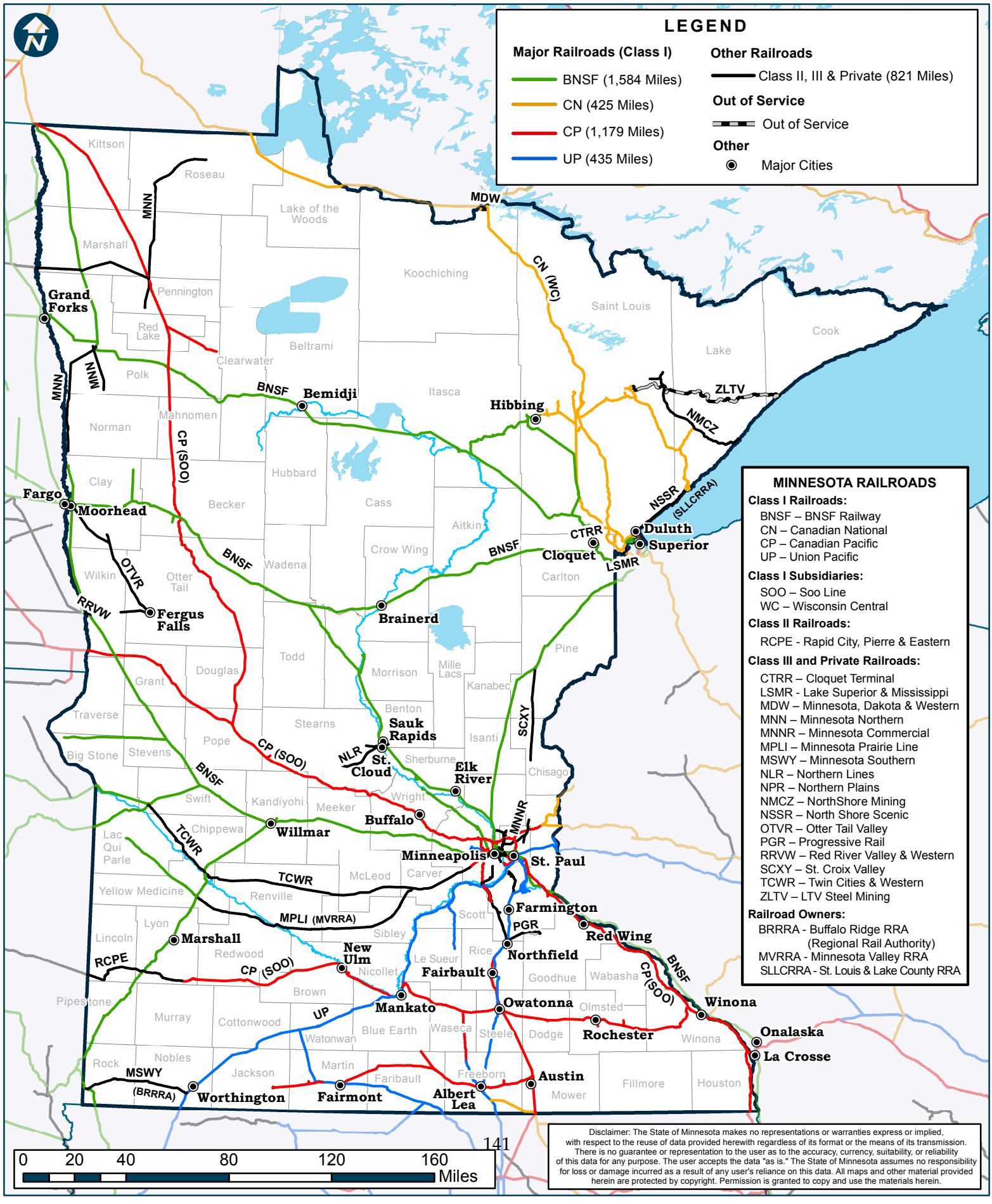
To educate individuals to think and act safely during a hazardous materials emergency response situation that involves crude oil or other hazardous substances within the state of Minnesota.

Appendix E: Freight Railroads in Minnesota

MINNESOTA FREIGHT RAILROAD MAP

Office of Freight and Commercial Vehicle Operations

September 2015



Appendix F: Resource List for Potential Ethanol Rail Incidents

The list below includes the incident response resources used to create the map in Figure 6 on page 73 of this report. Resource classifications and locations are based on interpretation of available information by the State of Minnesota's Management Analysis and Development unit. The information provided by rail and pipeline companies was not designed for aggregation or categorization. A description of MAD categories for equipment is found below the list. The listing uses counties for location because of the sensitivity, in some cases, of listing specific locations for response equipment that is classified as "critical infrastructure sensitive" for homeland security reasons.

The list includes key private sector resources and Minnesota's public sector regional hazardous materials response teams, as an indicator of the types and locations of resources available to respond to a potential ethanol rail incident. On the list are resources within Minnesota but also within 300 miles of the Minnesota border because companies identified resources outside of Minnesota as ones they would employ in the event of an incident in the state. Minnesota's Chemical Assessment Teams and its larger hazmat Emergency Response Teams are designated as "hazmat regional response" teams in the list. The list shows response resources statewide and beyond, although ethanol rail traffic occurs primarily in Southern Minnesota with some, too, in the central region of the state. Response equipment located in other parts of Minnesota could be used for ethanol incidents if needed in many but certainly not all cases. (Notably, different types of equipment are needed for ethanol compared to oil when it comes to booms and other containment equipment for leaks into waterways and bodies of water.)

Additional equipment may be available from ethanol plants and Minnesota's larger airports, but these potential resources are not included because of uncertainty regarding their availability for off-site incidents.

Private Sector Resources and Public Sector Hazmat Regional Response Teams in Minnesota and Nearby

State	County (may be approximate)	Private Sector Resource or Hazmat Regional Response Team	Category
MN	Anoka	Chemical Assessment Team	Hazmat regional response team
MN	Anoka	Private Sector Resource	Heavy equipment
MN	Anoka	Private Sector Resource	Heavy equipment
MN	Anoka	Private Sector Resource	Heavy equipment
MN	Anoka	Private Sector Resource	Spill response and recovery equipment
MN	Beltrami	Private Sector Resource	Heavy equipment
MN	Beltrami	Private Sector Resource	Spill response and recovery equipment
MN	Beltrami	Private Sector Resource	Response trailer(s)
MN	Beltrami	Private Sector Resource	Heavy equipment
MN	Beltrami	Private Sector Resource	Spill response and recovery equipment
MN	Beltrami	Private Sector Resource	Response trailer(s)
MN	Beltrami	Private Sector Resource	Other tools and supplies
MN	Blue Earth	Chemical Assessment Team	Hazmat regional response team

State	County (may be approximate)	Private Sector Resource or Hazmat Regional Response Team	Category
MN	Brown	Private Sector Resource	Heavy equipment
MN	Clay	Emergency Response Team	Hazmat regional response team
MN	Clearwater	Private Sector Resource	Heavy equipment
MN	Clearwater	Private Sector Resource	Spill response and recovery equipment
MN	Clearwater	Private Sector Resource	Response trailer(s)
MN	Dakota	Private Sector Resource	Heavy equipment
MN	Dakota	Private Sector Resource	CAER/coop group cache
MN	Dakota	Private Sector Resource	Spill response and recovery equipment
MN	Dakota	Private Sector Resource	CAER/coop group cache
MN	Dakota	Private Sector Resource	Other tools and supplies
MN	Dakota	Private Sector Resource	Response trailer(s)
MN	Douglas	Private Sector Resource	Heavy equipment
MN	Goodhue	Private Sector Resource	Heavy equipment
MN	Goodhue	Private Sector Resource	Spill response and recovery equipment
MN	Goodhue	Private Sector Resource	Response trailer(s)
MN	Goodhue	Private Sector Resource	Other tools and supplies
MN	Goodhue	Private Sector Resource	Heavy equipment
MN	Goodhue	Private Sector Resource	CAER/coop group cache
MN	Hennepin	Chemical Assessment Team	Hazmat regional response team
MN	Hennepin	Private Sector Resource	Response trailer(s)
MN	Hennepin	Private Sector Resource	Spill response and recovery equipment
MN	Hennepin	Private Sector Resource	Other tools and supplies
MN	Hennepin	Private Sector Resource	Response trailer(s)
MN	Hennepin	Private Sector Resource	Heavy equipment
MN	Hennepin	Private Sector Resource	Spill response and recovery equipment
MN	Hennepin	Private Sector Resource	Other tools and supplies
MN	Itasca	Chemical Assessment Team	Hazmat regional response team
MN	Koochiching	Chemical Assessment Team	Hazmat regional response team
MN	Koochiching	Private Sector Resource	Other tools and supplies
MN	Lake County	Private Sector Resource	Other tools and supplies
MN	Lyon	Private Sector Resource	Other tools and supplies
MN	Lyon	Chemical Assessment Team	Hazmat regional response team
MN	Martin	Private Sector Resource	Response trailer(s)
MN	Olmsted	Chemical Assessment Team	Hazmat regional response team
MN	Pennington	Private Sector Resource	Response trailer(s)
MN	Polk	Private Sector Resource	Spill response and recovery equipment
MN	Polk	Private Sector Resource	Response trailer(s)
MN	Ramsey	Private Sector Resource	Heavy equipment
MN	Ramsey	Private Sector Resource	CAER/coop group cache
MN	Ramsey	Private Sector Resource	Response trailer(s)
MN	Ramsey	Private Sector Resource	Spill response and recovery equipment
MN	Ramsey	Emergency Response Team	Hazmat regional response team
MN	Sherburne	Private Sector Resource	Heavy equipment
MN	Sherburne	Private Sector Resource	Response trailer(s)
MN	Sherburne	Private Sector Resource	Spill response and recovery equipment

State	County (may be approximate)	Private Sector Resource or Hazmat Regional Response Team	Category
MN	St. Louis	Private Sector Resource	Other tools and supplies
MN	St. Louis	Private Sector Resource	CAER/coop group cache
MN	St. Louis	Private Sector Resource	Heavy equipment
MN	St. Louis	Private Sector Resource	Spill response and recovery equipment
MN	St. Louis	Private Sector Resource	Other tools and supplies
MN	St. Louis	Private Sector Resource	Response trailer(s)
MN	St. Louis	Emergency Response Team	Hazmat regional response team
MN	St. Louis	Private Sector Resource	Heavy equipment
MN	St. Louis	Private Sector Resource	Spill response and recovery equipment
MN	St. Louis	Private Sector Resource	Response trailer(s)
MN	Stearns	Private Sector Resource	Response trailer(s)
MN	Stearns	Private Sector Resource	Spill response and recovery equipment
MN	Stearns	Emergency Response Team	Hazmat regional response team
MN	Stevens	Private Sector Resource	Spill response and recovery equipment
MN	Stevens	Private Sector Resource	Heavy equipment
MN	Wabasha	Private Sector Resource	CAER/coop group cache
MN	Waseca	Private Sector Resource	Heavy equipment
MN	Washington	Private Sector Resource	Heavy equipment
MN	Washington	Private Sector Resource	CAER/coop group cache
MN	Washington	Private Sector Resource	Response trailer(s)
MN	Washington	Private Sector Resource	Heavy equipment
MN	Winona	Private Sector Resource	CAER/coop group cache
IA	Clayton	Private Sector Resource	CAER/coop group cache
IA	Dickinson	Private Sector Resource	Heavy equipment
IA	Johnson	Private Sector Resource	Heavy equipment
IA	Johnson	Private Sector Resource	Response trailer(s)
IA	Johnson	Private Sector Resource	Spill response and recovery equipment
IA	Lyon	Private Sector Resource	Heavy equipment
IA	Plymouth	Private Sector Resource	Heavy equipment
IA	Polk	Private Sector Resource	Response trailer(s)
IA	Sioux	Private Sector Resource	Heavy equipment
IA	Worth	Private Sector Resource	Heavy equipment
MB	Selkirk (city of)	Private Sector Resource	Response trailer(s)
ND	Burleigh	Private Sector Resource	Other tools and supplies
ND	Burleigh	Private Sector Resource	Response trailer(s)
ND	Cass	Private Sector Resource	Response trailer(s)
ND	Cass	Private Sector Resource	Response trailer(s)
ND	Cass	Private Sector Resource	Spill response and recovery equipment
ND	Grand Forks	Private Sector Resource	Other tools and supplies
ND	Grand Forks	Private Sector Resource	Spill response and recovery equipment
ND	Grand Forks	Private Sector Resource	Heavy equipment
ND	Grand Forks	Private Sector Resource	Response trailer(s)
ND	McLean	Private Sector Resource	Heavy equipment
ND	McLean	Private Sector Resource	Response trailer(s)
ND	Morton	Private Sector Resource	Heavy equipment

State	County (may be approximate)	Private Sector Resource or Hazmat Regional Response Team	Category
ND	Morton	Private Sector Resource	Spill response and recovery equipment
ND	Morton	Private Sector Resource	Other tools and supplies
ND	Morton	Private Sector Resource	Response trailer(s)
ND	Ward	Private Sector Resource	Response trailer(s)
ND	Ward	Private Sector Resource	Other tools and supplies
SD	Davison	Private Sector Resource	Response trailer(s)
SD	Minnehaha	Private Sector Resource	Response trailer(s)
SD	Minnehaha	Private Sector Resource	Heavy equipment
SD	Minnehaha	Private Sector Resource	Spill response and recovery equipment
WI	Douglas	Private Sector Resource	Other tools and supplies
WI	Douglas	Private Sector Resource	Spill response and recovery equipment
WI	Douglas	Private Sector Resource	Heavy equipment
WI	Douglas	Private Sector Resource	Response trailer(s)
WI	La Crosse	Private Sector Resource	Response trailer(s)
WI	Pierce	Private Sector Resource	CAER/coop group cache
WI	Pierce	Private Sector Resource	CAER/coop group cache
WI	St. Croix	Private Sector Resource	Heavy equipment

Categories for Private Sector Equipment

Category	Description
Response trailer(s)	Used in cases where a company specifically described that they have a response, fire, or a decontamination trailer at a site; in one case this also includes a personnel living-quarters trailer.
Heavy equipment	Does not include response trailers or skimmers. Examples include where some companies specifically listed owning or having access to “heavy equipment,” and others where they identified using one or more contractors that are, for example, excavating companies or vehicle transport companies; category also includes instances where a company lists a specific type of equipment, such as a backhoe, bulldozer or dump truck.
Spill response and recovery equipment	Tools and other equipment listed separately and that are obviously spill response oriented, but are not included in a list of response trailer items in the company’s inventory. Examples include boom, skimmers, absorbent pads, etc.
Other tools and supplies	Other miscellaneous tools and supplies, including some smaller spill-related items not listed in spill response and recovery equipment category. Examples of miscellaneous tools and supplies include tools and hardware, buoys, tape, tarps, shovels, ladders, traffic cones, office equipment, etc.

The MAD categories described above are based on the best information available. The classification of equipment proved difficult. There was not always an obvious way to standardize the information provided, as was the case, for example, for the contents of a “fire trailer” versus a “response trailer.” In some cases, a detailed inventory of trailer contents was not available. Further, in the case of some companies the information was too vague to allow for precise categorization. In many cases the equipment reports provided were duplicative or overlapping, as was often the case, for example, with CAER groups and the private companies affiliated with them. MAD tried to avoid duplication when aggregating the information. In most cases, the equipment described was obviously primarily for use in

spill mitigation and recovery, and not necessarily related to fire response. Some larger companies and affiliated CAER groups included in their inventories "heavy equipment," or sometimes more specifically, a ladder truck, a foam nozzle, and a fire trailer, for example.