Practice Guide #33

Fall 2013

Communities, Trains, and Trainyards: Exploring Policy Options for Affected Municipalities

by

Ryan Fenwick and Daniel Weinstein
University of Louisville

Center for Environmental Policy and Management
Environmental Finance Center: Serving EPA Region 4
University of Louisville
Department of Sociology
Louisville, KY 40292
502-852-4749
http://louisville.edu/cepm

UNIVERSITY OF LOUISVILLE
CENTER FOR ENVIRONMENTAL POLICY & MANAGEMENT

Contents

Introduction

Rail transport, for many a nostalgic by-gone technology, is for others a serious risk of catastrophe. Neither is accurate. Rail technology, while less commonly used because of the relative cost and flexibility of trucking, is still an exceedingly efficient way to move freight. As fuel prices increase, it is likely rates of rail usage will also increase. The U.S. Department of Transportation predicted in 2009 that due to increasing road congestion demand for rail services will increase by 88 percent in the coming years (Spraggins, 2010). Though there have been incidents of train derailments and cargo leakage, rail transport results in significantly fewer accidents than truck transport with fatality rates 12 percent of the rate for trucking and injury rates only six percent of the trucking injury rate per trillion ton-miles of use (Spraggins, 2010). Rail transit is essential as one of the safest and most energy efficient way to transport hazardous materials in the United States.

Rail carriers have a history of toxic impoundments of hazardous substances on unregulated rail yards, unsafe grade crossings posing risks to residents crossing tracks, and a federal regulatory structure that largely insulates rail carriers from local regulation. In recent years, however, communities have successfully negotiated with train operators who no longer conform to the caricature of the uncaring robber barons. Careful preparation can mitigate health hazards and residents have succeeded in changing federal laws that greatly impede a community's power to self-regulate environmental hazards. This practice guide addresses how communities can work with rail carriers and regulators to improve community well-being and enact appropriate regulations to preemptively protect community health and wellbeing. State and federal regulations, idling, whistles and train noise, chemical leaks, transload facilities, and rail safety are discussed in a problem-solution format.

Background: Historical Overview of State and Federal Regulations

Rail regulation dates back to the earliest charters designed to encourage the development of a national rail network (Ely, 2001). A need to control freight pricing practices set by rail companies commonly perceived as unfair led to inclusion of rate setting provisions in state charters as early as the 1830s. Early rail operators set rates at the maximum possible based on each individual shipping cargo. This occasionally meant transporting freight at a loss from markets with freight carrier competition and making up the loss in markets with no competition. Price discrimination based on length of haul and amount transported was common. The first federal intervention in rail came in the form of the Interstate Commerce Act of 1887 after the Supreme Court ruled state rate regulation interfered with interstate commerce in 1886.

During this time, ambiguity clouded interactions between rail companies and the communities through which rails traveled (Morser, 2005). Early communities were able to exercise extensive control over rail operators, winning significant victories by reducing the length of time trains blocked streets, changing how crossings were managed, forcing railroads to maintain tracks in good repair through cities, and enforcing maximum operating speeds for locomotives traveling through communities. States' rights to regulate rail carriers through safety measures were largely upheld by the U.S. Supreme Court until the early years of the 20th century when the Court began to focus on the increasing interconnection commerce between states and wrestled with issues of when state regulations improperly burdened interstate commerce absent Congressional action (Ely, 2001). Rail carriers lost many cases during this ideological wrestling,

but the Court's interest in allowing for economic activity between states often militated against inconsistent state controls of rail transport.

Federal Courts became less significant in the regulation of rail practices as Congress turned its attention to rail. Congress, which did not frequently legislate on issues of interstate transport in the 19th century, became more active in the 20th century as an interstate economic regulator. Congress enacted comprehensive railroad controls during the first two decades of the 20th century. This legislation was upheld in a series of federal cases, with the Supreme Court stressing that when Congress takes possession of an interstate commerce regulatory field the states are not able to weaken or strengthen these requirements. Some ability to create regulations concerning rail safety remained, but communities lost a great deal of flexibility in their dealings with rail carriers.

States have authority under the 1970 Federal Railroad Safety Act to ensure railroad safety in conjunction with the U.S. Department of Transportation (USDOT) and the Federal Railway Administration (FRA). However, as of 2012, only 30 states adhere to the State Rail Safety Participation Program, a key piece of the 1970 legislation. Even within the participating states, individual states vary significantly in both their bilateral agreements with the FRA and the extent of the state's authority in an investigative context (Nice, 1993). Variations in safety performance across states have led to differing levels of success across these agencies.

Bilateral agreements between the states and FRA represent the most visible part of rail safety regulations. A myriad of agencies are involved in the regulation of railroads, even at just the federal level. USDOT's agencies that regulate aspects of rail transport include FRA, the Federal Highway Administration, Federal Transit Administration, Pipeline and Hazardous Materials Safety Administration, Surface Transportation Board, National Highway Traffic Safety Administration, Research and Innovative Technology Administration, and Federal Motor Carrier Safety Administration. More recently, the Department of Homeland Security has become involved along with the Transportation Security Administration.

Currently, states are largely unable to exercise police power over train operations. Communities may not, for example, ask rail carriers to reroute toxic substances away from schools or state capitals; in fact, dangerous substances regularly travel within miles of the national capital on freight trains (Branscomb, Fagan, Auerswald, Ellis, Barclan, 2010). Communities may no longer regulate the speed of trains through towns and cities, and little can be done to require rail carriers to maintain fences or other safety devices in areas where communities fear for the well-being of people likely to cross tracks away from grade crossings.

This historical context highlights the legislative limits of community action. However, these obstacles are not insurmountable. Communities successfully respond to derailment emergencies because of preparation and adherence to national best practices. Negotiation with train companies can result in satisfactory solutions to issues presented by rail operations. While clearly not a convenient solution, Congress can and has been moved to legislate in favor of communities needing additional protection from rail carrier practices. The remainder of this guide focuses on the most frequent causes of concern presented by rail operations to give readers ideas about proactive measures important to safeguard community interests.

Common Causes of Concern

The operation of trains near communities presents numerous issues. Idling trains create air pollution and cause noise pollution for surrounding residents. Crossing whistles may keep residents living close to crossings up at all hours of the night and offer little real protection for travelers at the crossing. Toxic chemical leaks can result in significant health, economic, and environmental impacts for communities unprepared to respond. Rail operated transload facilities may introduce hazardous waste management facilities to communities that have not carefully considered appropriate protections. Injuries at highway grade crossings can result in loss of life and injuries where communities do not actively monitor the conditions of these crossings and make data-based land use decisions that take hazards posed by train tracks into account. These issues addressed here in the guide were selected as the most common sources of conflict between communities and train companies.

Idling

Train engines, especially older trains in a company's fleet, sometimes must remain idling for much longer than when the engine is in motion (U.S. Environmental Protection Agency [EPA], 2008). Operators may need to keep diesel engines, which are less efficient when run with antifreeze than with water, constantly running to prevent engine blocks from freezing and cracking. An engine may need to idle to maintain comfortable conditions for train passengers or crew. Brakes function on some trains only when the large engines are running.

Concerns about health impacts from diesel engine emissions are justified. Diesel emissions can lead to asthma, allergies, and worsened heart and lung disease especially among the young and old (EPA, 2012). Soot, smog and acid-rain-causing nitrogen oxide, hydrocarbons, black carbon, and air toxins are released into the environment; thus contributing to global climate change. Additionally, there are environmental justice implications, since minority neighborhoods may be disproportionately affected by train yard emissions (EPA, 2012).

The U.S. Environmental Protection Agency (EPA) implemented new rules to reduce train emissions in 1998 that took effect in 2000 (EPA, 2008). All new trains must meet stringent guidelines that will greatly decrease fumes from locomotive engines. All currently operational engines are required to be retrofitted with emissions reduction technology when they are remanufactured. These rules should lead to significant reductions in the level of train emissions, especially as new ultra-low emission trains come into use. However, trains commonly remain in operation for 50 years and must be remanufactured only about every 15 years.

Communities experiencing problems with emissions from a rail yard should attempt to negotiate with rail carriers to alter operating practices or more closely monitor worker compliance with requirements (EPA, 2008). While it is not guaranteed, contacting a railroad operator can be an important step in starting a negotiation process. For example, in the Puget Sound region of Washington, complaints from residents about idling trains led Tacoma Rail, which operates a switching service (where trains are transferred from one line to another), to retrofit four of its switchyard locomotives with a system that would not require the locomotives to be idled in cold weather.

Grants designed to reduce levels of diesel emissions may be a possible source of funding for rail yards to reduce emissions (EPA, 2013b). The National Clean Diesel Campaign[1] (NCDC) provides monetary awards in an effort to reduce emissions from existing heavy diesel engines. The program can be used for a number of locomotive improvements, including replacing old, high emissions locomotives with new low-emissions engines (EPA, 2013a). NCDC also partners with regional organizations, such as the Rocky Mountain Clean Diesel Collaborative, to facilitate cooperation between stakeholders including concerned residents, environmental groups, freight carriers, and regulators at the federal and state level (EPA, 2013a). These regional organizations are important links to expertise and regional funding for programs to lessen the impact of diesel emissions. The program funded $200 million annually between 2007 and 2011, and is currently in the process of announcing $9 million in grants under the National Clean Diesel Funding Assistance Program (EPA, 2013b) and $5.6 million under the State Clean Diesel Program (EPA, 2013c).

EPA, along with freight transporters, government and environmental groups, cooperate in the SmartWay Program[2] (EPA, 2013a). This program seeks innovative ways to reduce emissions and costs through technology, regulation, and voluntary emissions abatement agreements. For example, in 2002, EPA partnered with the city of Chicago, two rail carriers, Burlington Northern and Santa Fe Railway Company (BNSF) and Wisconsin Southern Railroad Company (WS), and the private Kim Hotstart Manufacturing Company to conduct a project to reduce emissions and noise pollution in the nation's largest train yard, Chicago's Belt Rail Yard (EPA, 2004). The result of this partnership was installation of a diesel engine heating system that allowed trains to be shut off even when outside temperatures are below freezing, and an automatic shutoff system that eliminated the potential for rail employees to leave trains running because of habit. As a result, EPA found use of this technology on a locomotive switch yard engine (used for transporting cars waiting in a train yard for transport over rails) would reduce idling time by 80 percent, saving 12,738 gallons of diesel over the average working days of the engine. Over the course of the year, this engine emits 2.1 fewer tons of oxides of nitrogen (NO_x) and a 0.6 ton decrease in particulate matter emissions. The project also resulted in significant reductions in noise pollution.

The program has helped partners save millions of dollars and has attracted all Class 1 rail carriers to use SmartWay supply chain accounting tools (SmartWay, 2013). If smaller rail carriers are located in your area, asking these carriers to join the program could help the company find cost effective ways to reduce emissions. The organizations are voluntary and open to freight transportation companies willing to commit to providing data to SmartWay. Since the program has a proven track record for saving money for carriers while reducing emissions through efficiency, this may be an easy request during negotiations with a rail carrier. Carriers who agree to participate in the program will be given technical assistance to assess emissions and adopt strategies to reduce fuel consumption and emissions, and help set and achieve goals by helping carriers overcome barriers and design incentives to successfully implement policies (EPA, 2012b).

[1] National Clean Diesel Campaign: http://www.epa.gov/diesel/
[2] SmartWay: http://www.epa.gov/smartway/index.htm

Crossing Whistles

Under certain circumstances, a community may apply to the FRA to create "quiet zones" restraining train whistles from sounding when approaching a crossing that meet FRA requirements (Federal Railroad Association [FRA], n.d.). The regulation requires mitigation efforts, such as better crossing gates, in order to prevent accidents without the familiar train whistle blast to alert drivers (FRA, 2012). The "train horn rule," created by the FRA, both sets train whistles requirements and provides the procedure for opting out of the requirements. If a crossing scores below a threshold on the FRA risk calculator tool, a crossing is automatically approved to become a quiet zone, provided compliance with rules for accident mitigation such as notification of stakeholders and installation of a crossing gate with warning lights and a power outage indicator. If it is greater than the threshold, it is necessary to complete additional improvements, such as grade separations, to reduce the risk score below the threshold.

Eliminating train whistles, however, may increase the risk of accidents. Extensive research conducted by the FRA (2000) and partner organizations of data collected from crossings from 1992 to 1996 determined that the risk of accidents in "quiet zones" is 62 percent greater than at stops where train whistles are used. The study determined crossings without gates but with active warning signals such as flashing lights experience 119 percent more accidents, leading to proliferation of the more stringent Train Horn Rule currently in effect. However, if a community still wishes to ban train whistles at crossings, they should begin with obtaining information from the FRA,[3] which gives a more detailed explanation of the rules and provides links to procedures and forms for applying to create a "quiet zone."

Toxic Chemical Leaks

Successful response to a toxic chemical release requires careful preparation. The rule for communities with an active train route is to prepare for the worst and hope for the best. Emergency responders must be well prepared to deal with train derailment situations because toxic substances, sometimes in gaseous form, spread quickly and can affect a radius of many miles. Rail carriers, because of their common carrier status, are required to transport dangerous substances with far less discretion than may be exercised by truck carriers (Abel, 2011). Congress put this limitation in place with an eye toward encouraging the use of rail, even private rail lines, for transportation of dangerous cargoes. While people seem to fixate on the risks of rail derailment, and major catastrophes are not out of the question, serious consequences from rail incidents are substantially less likely where communities are well prepared.

In addition to risks from trains passing through an area, accidents on railyards can also seriously threaten large populations. As cities expanded, suburban development has gradually encroached upon once remote railyards (FEMA, 1991). Tanker cars can be damaged either while parked on tracks or while being transported to a different location within the yard. The close proximity of rail yards to residential area can pose additional safety concerns.

Several communities have faced serious challenges posed by toxic chemical leaks. Minot, North Dakota experienced one of the worst chemical releases to date. In 2002, a rail tanker car carrying anhydrous ammonia leaked 146,700 gallons of the gaseous compound, affecting a five-mile radius and impacting 11,600 people in the area (Branscomb et al., 2010). In a 2004

[3] FRA Train Horn Rule and Quiet Zones: http://www.fra.dot.gov/Page/P0104

accident, 9,400 gallons of chlorine gas were leaked into the atmosphere in Macedonia, Texas. In Graniteville, South Carolina in 2005, leaking chlorine gas caused nine deaths and approximately 554 people were admitted for treatment at a local hospital. FRA estimated the total cost of this accident, including the fatalities, injuries, evacuation, property damage, environmental cleanup, and damaged track to be $126 million.

Emergency responders do not have access to exact information about what is transported through their communities, but instead receive only general information about what is most frequently transported (Hunter, 2010). Carriers are required to report serious risks to local authorities in the jurisdiction affected by derailments. Ideally, once an accident happens, local emergency responders follow established and practiced emergency procedures. These follow national guidelines proliferated by the Federal Emergency Management Agency (FEMA), such as the National Emergency Management System (NEMS), which is an organizational chart explaining the roles of emergency response organizations individuals and state authorities.

Responders participate in federal and local training, practicing for the full spectrum of emergencies possible in the community (J. Duncan, Public Information Officer Louisville/ Jefferson County Metro Emergency Management Agency, personal communication, May 23, 2013). Most cities should be capable of performing a well-orchestrated response to train accidents; however, prominent failures in the planning process prove not all communities are ready to execute an effective response to a derailment. For example, Minot officials could not warn the residents affected by a HAZMAT spill due to the consolidation of local radio and television with national providers. There were no local radio or television personnel available to give the emergency warning of the threat from released gasses when both the modern Emergency Alert System (EAS) and the Emergency Broadcast System (EBS) failed (Shafer, 2007). The local NBC and CBS affiliates in the area were also both unable to transmit emergency information to residents, meaning those out of ear shot of the warning sirens, but in the area impacted by gaseous leaks from the derailed train, received a warning too late to prevent injury. The EAS malfunctioned when a backup generator was installed and a power surge erased system programming. Additionally, the station designated to receive the communication did not have the right crystals to receive the transmission (Nislow, 2003). When the EBS was tested days after, technicians discovered cleaning and regular maintenance was all that was needed to repair the equipment.

It is important for communities to define, understand and prepare hazard mitigation to adequately respond to potential hazards (U.S. Federal Emergency Management Agency, [FEMA], 2003). Furthermore, communities have incentive to engage in hazard mitigation planning because sources of funding for mitigation activities through FEMA's Flood Mitigation Assistance Program[4] (FEMA, 2013a) and Hazard Mitigation Grant Program[5] (FEMA, 2013c) require mitigation plans. During the process of hazard mitigation planning, stakeholders identify potential risks and develop plans for effective responses. Community officials and residents should ensure existing hazard mitigation plans have been adopted to prepare for manmade as well as natural disasters. Communities with rail yards should include them in the plan in addition to trains carrying cargo along rail tracks. FEMA provides detailed recommendations for

[4] FEMA Flood Mitigation Assistance Program: http://www.fema.gov/flood-mitigation-assistance-program
[5] FEMA Hazard Mitigation Grant Program: http://www.fema.gov/hazard-mitigation-grant-program

local hazard mitigation plan adoption, which substantiate the process whereby such plans become approved by State and Federal agencies (FEMA, 2013b).

FEMA recommends a "Whole Community" response preparedness strategy (FEMA, 2012). In this approach community members are consulted to create broader understanding of safety concerns in a community than would come from a top-down process. This process is also designed to leverage existing resources within the community. Community members additionally benefit from directly confronting potential causes of concern within their communities and understanding emergency procedures.

During the hazard mitigation planning process, smaller communities may become aware they are not adequately equipped with the resources to deal with major train accidents. It may be necessary for them to have prearranged agreements with nearby communities for response (FEMA, 2013d). These agreements, known as mutual aid agreements, detail an understanding between political units, agencies, or organizations about how response will be conducted.

These agreements may be particularly useful in communities with rail yards. Railroads and communities generally maintain separate plans for rail yard emergencies. However, cooperation is necessary. Larger railroads depend on resources from the community only for large accidents, while smaller yards may require community assistance for any rail yard emergency. In addition to maintaining an open line of communication between communities and rail companies about safety, entering into mutual aid contracts to ensure equipment needed for emergency response not kept on-site at the rail yard will be immediately available should be considered by communities undertaking a mitigation plan (FEMA, 1991).

Transload Facilities

In recent years, many municipalities found themselves host to rail carrier operated transload facilities where waste is loaded from smaller carriers to larger carriers for large scale transport (Railroad Owned Solid Waste Transload Facilities, 2007). Federal law preempted state regulation, leaving cities powerless to regulate rail-owned facilities in the same way as an identical facility not operated by a rail carrier would be regulated.

Widespread attention to the problem led to enactment of legislation in 2008 that places transload facilities unambiguously under state jurisdiction (Clean Railroads Act of 2008). While the Surface Transportation Board (STB) may issue a land use exemption for regulations that unreasonably burden interstate transportation of waste or discriminates against rail carriers, states and municipalities may now regulate rail carrier operated facilities in the same way as similar facilities not operated by railroad carriers (Hawkins, 2009).

It is important for states and local governments to maintain appropriate regulations to govern facilities that will process toxic waste since these will be the governing regulations for any rail transload facilities built in a jurisdiction. States and municipalities have adopted regulations in addition to federal regulation for waste transfer facilities. For example, in Massachusetts, solid waste transfer facilities must file an environmental impact review with the state secretary of environmental affairs (Richmond and Goldstein, 2006). The Massachusetts Department of Environmental Protection (MA DEP) and the local board of health in the affected municipality must then give approval. Developers are then usually required to obtain local zoning, wetland permits, and site plan approval from municipal authorities. Subsequently, a solid waste

construction and separate facility operation permit must be obtained from the MA DEP. The process generally takes two to four years.

The requirements for transload facility site developers in New Jersey is similar to Massachusetts' requirements, but additionally requires a background investigation of all companies and individuals involved in the development, an application for a certificate of public necessity and convenience, contract with a state solid waste disposal district, incorporation of operations into the district's solid waste disposal plan, and submission of environmental and health impact statements as well as detailed engineering designs to the New Jersey Department of Environmental Protection (Richmond and Goldstein, 2006).

Communities may also regulate waste transfer facilities. Counties, cities, regional solid waste management authorities, health departments, and air pollution control districts may serve as regulatory agencies overseeing transload facilities (EPA, 2012c). The ability of local authorities to tailor regulations to local needs depends on the authority depends on the state regulatory structure, and therefore local authorities will need to work in conjunction with state authorities. In Louisville/ Jefferson County Metro Government, KY, a solid waste transfer facility is required to operate in a structure equipped with a dust control system designed to minimize dust escape and a system to manage odors with three sides and a roof (Louisville, KY Ordinance No. 44, Series 2005). Facilities accepting construction, demolition, or yard waste must operate on a hard surface pad and occur within a screened, fenced area. The facility may not accept materials containing asbestos or hazardous waste. All water draining from a site must either be diverted to the municipal sewer or on-site treatment or collecting facility that will prevent drainage from contaminating waterways. The responsibility for enforcement of these requirements is delegated to the Waste Management District, who in turn may delegate responsibilities to the Department of Health or other metropolitan government agencies. These regulations are in addition to state regulations and municipal zoning requirements.

Rail Safety and Highway Grade Crossings

While the U.S. was second globally in terms of accidents per million train-miles for 2012, the frequency of incidents and fatalities at highway-grade railroad crossings has steadily declined over the last 30 years. The most recent data show that 2012 was the safest year since accident data has been collected (Szabo, 2013). The rate of incidents decreased by 39 percent, with deaths and injuries decreasing by 42 percent and 49 percent respectively from 1994-2011. This occurs despite a 21 percent increase in rail traffic volume (Schartung et al., 2011; Center for Hazards Research and Policy Development [CHR], 2008). This decline occurred in part due to changes in the type and number of warning devices available at crossings. FRA data indicate an increase in gated crossings and active warning devices generally. Most of the new devices have been gated crossings, with such crossings constituting around 60 percent of active devices at highway grade crossings (CHR, 2008). Specifying best practices for active at-grade crossings is not without debate (Schartung et al., 2011; Lerner, 2002). The issue is complex and analysis difficult due to the many interacting and otherwise complex variables involved, such as the volume of trains per day, the number of tracks involved, the angle of the crossing, the degree of urbanization in the surrounding area, and others (ibid). One of the few clear messages from this research is that active crossings are safer than passive crossings, a fact borne out by comparing accident-to-crossing ratios for different groups of crossings.

There is significant variability in state regulation of signalization, vegetation clearance, blocked crossings, and the implementation of warning devices and automated enforcement systems (cf. Jennings, 2009). The variability in state regulation and federal-state agreements attached to participation in the State Rail Safety Participation Program may have problematic consequences. While not conclusive, a look at the geographic distribution of accidents occurring at crossings suggests that state policies are related in a nontrivial fashion to safety. Seven states accounted for 40 percent of accidents over the 1994-2005 period, 44 percent of fatalities, and 42 percent of injuries at grade crossings for the entire nation – Texas, Illinois, California, Indiana, Louisiana, Mississippi, and Ohio; with Texas having the lion's share of accidents at a rate that is nearly double or more than double that the rate of accidents in Illinois, Louisiana, and Indiana (CHR, 2008). On the other hand, 82 percent of states have an accident rate less than one accident per 100 miles of railroad tracks; the majority of states have minimal problems with accidents at train-rail grade intersections. While explaining why accidents occur much more frequently in the aforementioned states as they may relate to regulations is outside the scope of this guide, community and/or state stakeholders and regulators are encouraged to compare their local regulatory capacities with those of the best-performing areas.[6] These states' best practices are discussed later.

Changing trends in the kinds of train cars involved in accidents over the last decade add to these concerns. HAZMAT cars are increasingly involved in collisions and accidents (CHR, 2008). In 2005, 670 HAZMAT cars were involved in accidents at crossings, more than doubling the rate of the previous five years. This phenomenon increases the likelihood of communities and cities being exposed to noxious or hazardous chemicals in the aftermath of an accident, and represents a serious risk. In the appendix of this practice guide, procedures invoked during the October 2012 train wreck in Louisville, Kentucky are detailed. The official response involved coordination between over 50 agencies and organizations in two counties.

Considering the frequency of collisions and trends such as increasing HAZMAT train involvement, varying levels of infrastructure integrity, and the safety deficiencies reported – e.g. the heterogeneity of safety legislation and standards – it is clear that, while frequencies of a single event may be decreasing, in the event of an accident, there remains significant potential for catastrophic collisions at highway-rail grade crossings in the U.S. A collision at a highway-rail grade crossing could result in high death tolls when it involves passenger trains, buses, or the release of hazardous materials in areas which are densely populated.

Blocked crossings are potentially a source of frustration and danger for motorists and may provide dangerous incentives for unsafe behaviors at crossings. Violations at active grade crossings should be treated with severity. Motorists engaging in such hazardous behaviors not only put their life at risk, but those of their passengers, the train occupants, and entire neighborhoods in case of a derailment followed by HAZMAT release. Increased penalties and/or community service hours served could be allocated towards improving the infrastructures (the financing of new gate installations) and enhance existing commuter and train operator education programs for commuters and operators alike (Rail Safety Improvement Act of 2008). While not likely given the prevailing policy environment, changing federal grade crossing laws to

[6] This guide is unable to *causally* explain the spatial distribution of accidents as they relate to state regulations; such a report would require in-depth case studies and more data than is provided. The number of intersections, average daily traffic, and other factors such as incomplete data reporting complicate analysis of how state policies may affect accidents (Schartung et al., 2011; CHR, 2008).

implement the state participatory program nationwide and bring more consistency to the states' inspection capabilities would narrow likely narrow the gap between least and most safe states. Furthermore, including an increase in the absolute number of inspections required and the number of inspectors would also amplify a state's capacity to mitigate chances of future accidents.

Improving Crossing Safety thru Data: Sources for Local Planners

Increasingly dense urban and suburban developments pose problems for safety at rail crossings. These problems may be anticipated through assessment of existing crossings in order to efficiently allocate future investment. New developments around railroad tracks should require grade separation or gated crossings (Russell, 2002). Communities should audit their local codes to guarantee resident safety when development is up for review. To assist communities in this effort, the FRA launched GradeDec. The FRA houses an online tool, GradeDec[7], designed to aid planners in analyzing highway-rail grade investment. GradeDec makes available cost-benefit measures for a rail corridor, a region, or an individual grade crossing. The modeling software also makes available "comparative analysis of grade crossing alternatives that are designed to mitigate highway-rail grade crossing accident risk and other components of user costs including highway delay and queuing, air quality, and vehicle operating costs" (FRA, 2013).

While the FRA's Office of Safety Analysis publishes accident data[8], there is no means by which non-expert users may navigate available datasets. In anticipation of what kinds of information communities need to make informed decisions, data should be made available for states, counties, and municipalities in order to raise awareness on the issues at stake, and target key areas, especially data for the number of incidents, fatalities, and kinds of regulations. This should include a means for non-experts to use it, i.e. maps and other visual representations and/or interactive data-mining tools.

Non-governmental Organizations and Crossing Safety

A brief survey of the non-profit organizations concerned with rail safety conducted by the CHR (2008) reveals that, in some cases, local groups such as the now-defunct *Citizens for Rail Safety* are active or have been recently active in the area of safety at grade-crossings. This guide updates their findings. Unfortunately, Citizens for Rail Safety no longer exists – and this guide finds *no* evidence of other regional or local rail safety advocacy groups. There is one major resource which ought to be highlighted. Operation LifeSaver[9], a national organization, provides pedagogical resources of many kinds, including materials such as lesson plans for K-12 environments as well as short courses for first responders, law enforcement, and professional drivers. They provide speakers and, in conjunction with their state-level offices, serve as a clearinghouse for crossing safety training and related information. They are not, strictly speaking, an advocacy group in the sense of promoting or recommending changes to the existing regulatory system. Instead, Operation LifeSaver trains and educates both commuters and operators alike.

[7] GradeDec: http://www.fra.dot.gov/Page/P0337
[8] Office of Safety Analysis: http://safetydata.fra.dot.gov/OfficeofSafety/default.aspx
[9] Operation LifeSaver: http://oli.org/

Conclusion

This guide outlines options for communities with rail lines, rail yards, and related transportation issues. Communities that wish to regulate or affect change regarding rail lines in their area face complex decisions that often involve trade-offs. For example, while crossing whistles may be an annoyance to some community members, they are associated with higher levels of safety. As with many other aspects of planning, much of the *agency* in terms of whom and what may alter regulations involved occurs at the state and federal levels through state agreements with the FRA.

The reality is that the moments in which communities can impact how rail transportation affects their neighborhoods occur during the planning stages, during which it is possible to incorporate tools available from the FRA and other entities in conjunction with local preferences. Safety and traffic congestion concerns should also be handled during planning stages; the *growth* of traffic volume should, ideally, be a factor in planning new developments.

Affected communities need to proactively develop and maintain emergency plans in the event of an accident that involves train cars carrying noxious or toxic substances. The case study of the response in Louisville, KY provides an example which other communities may find useful: nearly 60 government and emergency response organizations coordinated in preconceived steps to mitigate potentially dangerous consequences and were successful. The salient lesson is preparedness and training, and this practice guide identifies places and organizations which can assist communities in both ways.

Key Points

- Many regulations at the state and federal level have preemptive effects limiting the potential for communities to directly enact local regulations of trains.
- Idling trains cause noise and air pollution problems for communities. The community's first step should be to work directly with the owner of the train yard to try to find compromises that will limit the impact of rail yards.
- Sounding whistles at train crossings can cause annoyance to surrounding residents, and but are associated with significantly fewer accidents than at crossings where whistles are not sounded. Communities may apply to the Federal Railroad Association.
- Toxic chemical leaks can pose serious health risks to communities with train yards or tracks running through their communities. Careful hazard mitigation planning is necessary to make sure the community's response to such an accident effectively minimizes the damage from such an accident.
- Transload facilities where waste is sorted and transferred from truck to train or between trains, may be operated by rail carriers. Communities should make sure regulations are in place that protect from adverse consequences.
- Rail highway grade crossings can also result in injury and property damage. Communities should make sure their local codes and regulations provide for review of new developments slated for areas with train activity and use FRA models designed to simplify the cost benefit analysis of grade crossing safety improvements. Educational efforts may decrease the number of accidents resulting from people unsafely crossing train tracks.

Appendix:

Responding to the October 2012 Louisville, KY HAZMAT Accident[10]

Louisville Metro, like many metropolitan regions, receives daily rail shipments of dangerous substances. In Louisville, a daily train arrives from Paducah, KY at a DuPont factory in an industrial West End neighborhood of Louisville known as Rubbertown (so named because of its history of chemical manufacturing processes). A specific inventory of these trains is not known in advance, but Louisville/ Jefferson County Emergency Management Services (EMS) and other teams tasked with responding to an accident know generally what is likely to be on these daily trains and stay prepared to respond to accidents.

A train consisting of five locomotives pulling 57 cars derailed adjacent to Dixie Highway (Route 31) on October 29, 2012. Of the cars, 13 came off the tracks. Hazardous chemicals were present in nine cars. Butadiene[11] was in three of the derailed cars, one of which was leaking. Another leaking car carried styrene.[12] Two cars were carrying sodium hydroxide, and a third was carrying residual levels of ketone.[13] Hydrogen fluoride residue, which can affect a large number of people quickly, was left in two cars, posing a threat similar to chlorine gas.

The accident in the southwest area of Metro Louisville was reported minutes after the accident by passing motorists who called 911 operators complaining about a chemical smell in the air. Two calls followed reporting a train derailment. The train company called minutes later to report the accident. MetroSafe (a central hub that receives all local 911 calls in the county) dispatched responders three minutes after the initial call. In five minutes, police and emergency medical services were on-scene. Responders arrived at the scene wearing heavy suits complete with protection from skin exposure and inhalation. Responders routinely wear the highest grade of protective gear until they know the severity of the accident and what levels of toxic chemicals have been potentially released.

The Dixie Highway Derailment activated 58 agencies. Louisville/ Jefferson County EMS is primarily responsible for coordinating emergency response and public outreach in the case of a major threat such a toxic inhalation hazard. They quickly implemented response procedures. Initially, chemical leakage required an evacuation of 12 houses in the area and a "shelter in place"[14] warning for residents in a two-mile radius of the accident. The site was stabilized and contractors were called in on October 31, 2012 to clean up the scene.

MetroSafe Public Information Officer Jody Duncan described the challenge of cleaning up the area as "like playing pick-up sticks, with rail cars scattered in random directions by the accident" (J. Duncan, Louisville/ Jefferson County EMS, personal communication, May 23, 2013). Air quality monitors and stand-by fire responders remained on the scene as contractors were working to monitor the continued threat. While contractors were working to separate cars,

[10] Case study compiled from personal communication with Jody Duncan, MetroSafe Public Information Officer (May 23, 2012), PowerPoint presentation prepared by Duncan for professional conferences, and press releases published in local media after the accident.
[11] For information about butadiene see http://www.epa.gov/ttnatw01/hlthef/butadien.html
[12] For information about styrene http://www.epa.gov/chemfact/styre-sd.pdf
[13] For information about keytone see http://www.epa.gov/oppsrrd1/REDs/factsheets/3094fact.pdf
[14] Shelter in place warnings advise residents to remain in their homes until advised otherwise.

vapors were ignited. A fire continued for days as a stabilizing agent in the butadiene car was allowed to burn butadiene vapors in a controlled way.

The major threat was that brush burning under the train would increase the pressure in other rail cars and cause a release or structural failure in other cars. These threats caused the "shelter in place" warning to be extended to a larger five-mile radius. Residents were notified through the local Code Red emergency warning system, receiving phone calls, texts, or emails per individual resident preferences. Firefighters also went to houses in the affected area to make sure residents were aware of the situation and whether they should shelter in place or evacuate.

During this time, EPA federal and state coordinators and the Paducah and Louisville Railroad (P&L) owner stayed near the scene of the accident to assist. Federal and state EPA, and Louisville Metro Public Health and Wellness monitored toxic release from the derailed cars, ultimately determining that residents were not exposed to pollutants from the derailment and there was no off-site soil or water contamination detected. The P&L owner worked to set up compensation centers where residents were reimbursed for their inconvenience. Residents were compensated for increased commute time, lost wages for shifts canceled due to the accident, and additional child-care costs incurred.

The Louisville/ Jefferson County EMS maintained candid communication with media sources. Sharing all the facts associated with the accident with the local media resulted in a positive interaction between the press, the Louisville/ Jefferson County EMS, and community members (J. Duncan, Louisville/ Jefferson County EMS, personal communication, May 23, 2012). This was easy to achieve through a mailing list kept by the agency including all local news sources.

Ultimately, the fire was extinguished without leading the release of more dangerous chemicals. The response in Louisville to the accident has been a frequently requested case study of best practices in response by organizations including the Chemical Stockpile Emergency Preparedness Program of Kentucky, the National Association of Government Webmasters, Rubbertown Mutual Aid Society, and the National Association of Government Web Professionals. The careful preparation of closely coordinated units made this response possible. While most communities would respond in a similar way, the response comes from diligent study and thorough knowledge of best practices likely to result in effective hazard management.

Training for emergency response happens well in advance of an actual accident. Emergency responders in Kentucky are required to receive certification from the state for various response scenarios. In addition, responders travel to federal government facilities where they live for a week in barracks-like conditions and prepare for emergency situations with the Department of Homeland Security. Teams are responsible for knowing up-to-date FEMA protocols. They are trained to use the National Incident Management System to make sure each team knows their role in emergency situations.

Teams also frequently meet and work through scenarios in what are called "table exercises." A table exercise is a hypothetical worst case scenario that requires a large percentage of total response capacity. These scenarios hone team members' abilities to think quickly about how to respond. After table exercises or actual responses, members have a "hot wash," or after-event discussion of what went well and what should be improved for future emergency response.

MetroSafe and as well as various non-emergency calls and dispatches appropriate responders, is organized under Louisville/ Jefferson County EMS. The organization maintains state-of-the-art equipment such as a communications van with a 75-foot antennae, emergency vehicles for transporting equipment to the scene of accidents and a cache of 125 radios compatible with those used by Louisville emergency responders. The high-tech equipment is frequently tested in table exercises to ensure functionality. The group has the ability to link with organizations located outside of the Louisville area for instances such as a police pursuit across county lines or a mass casualty event.

Collaboration between agencies within a community is crucial for responding to potentially hazardous chemicals. For the Louisville derailment, the 58 teams that responded included organizations such as Louisville/ Jefferson County EMS, Louisville Metro Police, Jefferson County Fire Service HAZMAT Team, local and regional EPA, and the Kentucky Department of Transportation. Relationship building is a large part of emergency management; agencies respond to emergencies within the region and are quick to share resources and expertise with surrounding areas to ensure the best possible response (J. Duncan, Louisville/ Jefferson County EMS, personal communication, May 23, 2012).

Cross-team collaboration is part of the reason why Jody Duncan, public information officer for Louisville/ Jefferson County EMS, believes the response to the emergency would have been the same if it happened on the other side of the county lines or in a more rural section of the state (J. Duncan, Louisville/ Jefferson County EMS, personal communication, May 23, 2012). During the Dixie Highway incident, the response from West Point, KY, a neighboring downwind community, was similar to the Louisville response; throughout, West Point's mayor stayed in close contact with Louisville Metro EMS. If this accident had actually occurred in a community outside of the Louisville area, Louisville Metro EMS would have collaborated with surrounding communities and even mobilized units to assist in a response. There is already a strong precedent for this in the region: neighboring Bullitt County responded to the Dixie Highway accident, and Louisville responders traveled to Bullitt County in 2007 to respond to a similar accident.

Response to the Dixie Highway derailment was successful because careful plans were executed by well-organized agencies. Louisville/ Jefferson County EMS was prepared for toxic chemical releases because planning processes revealed the potential for such an accident posed by daily shipments of hazardous chemicals through the rail corridor. The agency not only knew what to do when the accident happened, but had practiced with their response and communication equipment so they were confident before and during the accident that they would be able to carry out their plans. Smaller communities may not be able to bring the same resources to an emergency response situation, but with the use of agreements across jurisdictional lines and a realistic appraisal of potential risks communities can guarantee a response that effectively mitigates risk.

Sources

Abel, Z.T. (2011). Getting hazmat transportation back on track: the need for hazmat liability reform for rail carriers. William and Mary Environmental Law & Policy Review. 35(3): 972-1011. Retrieved from http://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1528&context=wmelpr.

Branscomb, L.M., Fagan, M., Auerswald, P., Ellis, R.N., Barcham, R. (2010). Rail Transportation of Toxic Inhalation Hazards: Policy Responses to the Safety and Security Externality. Retrieved from http://belfercenter.ksg.harvard.edu/files/Rail-Transportation-of-Toxic-Inhalation-Hazards-Final.pdf.

Center for Hazards Research and Policy Development. (2008). Safety at Grade Crossings. University of Louisville: Center for Hazards Research and Policy Development.

Ely, J.W. (2001). Railroads & American Law. Lawrence, KS: University Press of Kansas.

EPA (2004). Case study: Chicago locomotive idle reduction project. Retrieved from http://www.epa.gov/smartway/documents/publications/420r04003.pdf.

EPA (2012). National Clean Diesel Campaign (NCDC): Basic Information Retrieved June 14, 2013 from http://epa.gov/cleandiesel/basicinfo.htm.

EPA (2013a). National Clean Diesel Campaign (NCDC). Retrieved June 14, 2013 from http://epa.gov/cleandiesel/projects/ .

EPA (2013b). SmartWay Finance Program. Retrieved June 14, 2013 from http://www.epa.gov/smartway/financing/govt-funding.htm .

Federal Emergency Management Agency (FEMA). (1991). Preparedness for Hazardous Materials Emergencies in Railyards: Guidance for Railroads and Adjacent Communities. Washington, DC.: Federal Emergency Planning Agency.

— (2003). Integrating manmade hazards into mitigation planning. Retrieved from http://www.fema.gov/library/viewRecord.do?action=back&id=1915.

— (2012). Whole community. Retrieved July 9, 2013 from http://www.fema.gov/whole-community.

— (2013). Local Mitigation Planning Handbook. Retrieved August, 2013, from http://www.fema.gov/media-library/assets/documents/31598?id=7209.

Federal Railroad Administration (FRA) (n.d.) The train horn rule and quiet zones. Retrieved July 10, 2013 from http://www.fra.dot.gov/Page/P0104.

—(2013). GradeDec Crossing Evaluation Tool. Retrieved August, 2013 from http://www.fra.dot.gov/Page/P0337.

—(2012). How to create a quiet zone. Retrieved July 10, 2013 from http://www.fra.dot.gov/eLib/details/L03055.

Hawkins, C. (2009). How states and municipalities can retain the power to regulate rail carrier-owned solid waste transfer facilities in the context of the Metro Enviro Transfer, LLC. v. Village of Croton-on-Hudson and Buffalo Southern Railroad, Inc. v. Village of Croton-on-Hudson Decisions. Pace Environmental Law Review. 26(1)

Hunter, J. (2010, August 14). Railroads' guarded secret: not even HAZMAT teams are told what's on train. The Star Gazette. Retrieved May 10, 2013 from http://www.stargazette.com/article/20100814/NEWS01/8140340/Railroads-guarded-secret-Not-even-HAZMAT-teams-told-what-s-train?nclick_check=1.

Jennings, L. Stephen. (2009). Compilation of State Laws and Regulations affecting Highway-Rail Grade Crossings, 5th edition, Washington: Federal Rail Administration.

Lerner, Neil, Robert Llaneras, Hugh McGee, and Donald Stephens. (2002). Traffic-control devices for passive railroad-highway grade crossings. *National Research Council Report* 470. Transportation Research Board. Washington, D.C.: National Academic Press.

Morser, E. (2005). Grassroots rebels: municipal power and railroad regulation in La Crosse, Wisconsin, 1883-1900. Retrieved from http://digitalcommons.pace.edu/cgi/viewcontent.cgi?article=1020&context=pelrhttp://www.thebhc.org/publications/BEHonline/2005/morser.pdf.

Nice, David. (1993). The State Safety Participation Program. *The American Review of Public Administration* 23(1) 43-56.

Nislow, J. (2003, March 15 / 31). The wrong time to find out the emergency alert system doesn't work. *Law Enforcement News.* 29 (595, 592). Retrieved July 5, 2013 from: http://www.slate.com/sidebars/2007/01/sidebar_17.html.

Railroad owned solid waste transload facilities: Hearing before the Subcommittee on Railroads, Pipelines, and Hazardous Materials of the Committee on Transportation and Infrastructure, House of Representatives. 110th Cong. (2007).

Richmond, S.M. and Goldstein M.J. (2006). Collision course: rail transportation and the regulation of solid waste. Natural Resources and Environment. 21(2). Retrieved from http://www.bdlaw.com/assets/attachments/2006-09_Collision_Course_-_Rail_Transportation__Regulation_of_Solid_Waste_(S_Richmond__M_Goldstein)(ABA_Nat_Res__Env).pdf.

Russell E. (2002). A review of studies to improve safety at passive Rail-Highway Crossings at grade (HRI). Proceedings from Seventh International Symposium on Railroad-Highway Grade Crossing Research and Safety: Getting Active at Passive Crossings. Melbourne, Australia: Monash University. 20-21 February 2002.

Schartung, Charles T.; Lesales, Thierry; Human, R. Josh; and Simpson, David M. (2011). "Crossing Paths: Trend Analysis and Policy Review of Highway-Rail Grade Crossing Safety." Journal of Homeland Security and Emergency Management 8(1): 1-17.

Shafer, J. (2007, January 10). What really happened in Minot, N.D. Slate Magazine. Retrieved from July 17, 2013 from http://www.slate.com/articles/news_and_politics/press_box/2007/01/what_really_happened_in_minot_nd.html.

SmartWay. (2013). SmartWay Program Overview. Retrieved from http://www.epa.gov/smartway/documents/publications/overview-docs/420f13011.pdf.

Spraggins, H. B. (2010). The case for rail transportation of hazardous materials. *Journal of Management and Marketing*. Retrieved from http://www.aabri.com/manuscripts/09224.pdf.

Szabo, Joseph C. (2013). Testimony of the Federal Rail Administration. U.S. House of Representatives Subcommittee on Railroads, Pipelines, and Hazardous Materials, Committee on Transportation and Infrastructure. Washington: Federal Rail Administration.