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Crude Oil Railroad Transport: Community Risk Perception and Emergency Preparation in the Hudson River Valley

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Photo Source: Reuters (2014) 'US Taxpayers Help Fund Oil-Train Boom Amid Safety Concerns', retrieved from <http://www.reuters.com/article/2014/12/14/us-railways-crude-insight-idUSKBN0JS0DR20141214>.

Abstract

Crude oil transport by rail has increased dramatically since 2010. There are many communities that are located along the routes that oil trains travel everyday. This report addresses a critical issue that has risen in conjunction with the surge in oil production in the United States: increased risks to communities traversed by crude oil trains. Although train accidents have detrimental environmental, human and economic consequences, prior research that assesses whether communities have adequate emergency preparations is limited. This study aims to address this shortage by providing a framework for analysis of community risk perception and emergency preparation on crude oil transport by rail, using the Hudson River Valley as a case study. By conducting interviews and surveys with local officials and county representatives, we found that while most communities are aware that oil trains pass through their communities and have some form of emergency plans, most communities rely on local volunteer emergency services that may not have the capacity to respond if major accidents happen. We offer possible alternative regulatory measures that can raise more awareness of the issue and help communities better prepare for possible oil train related disasters.

Three Summary Points of Interest

- Recent growth in the railroad transportation of crude oil in North America increases the risks of possible accidents in communities located along rail lines
- Most communities in the Hudson River Valley are aware that trains containing crude oil run through their communities
- Most communities lack professional emergency services and rely on volunteers before county or state wide response arrives on scene of accident

Keywords: Crude oil, railroad transportation, emergency management, disaster preparation, risk perception, risk awareness, train derailment, oil spills, Hudson River Valley

Introduction

There were 9,500 carloads of crude oil transported by rail in 2008, however, this number increased to 435,560 carloads in 2013 (McClatchy DC, 2014a). As a result of the surge, railroad revenues also expanded from \$25 million in 2008 to \$2.15 billion in 2013 (Wall Street Journal, 2014). Despite the economic benefits, the rapid growth in the production of crude oil in North America has increased the risk of derailments and oil spills from train related accidents. This report addresses a critical issue that has surfaced in conjunction with the boom in oil production in the United States since 2010: increased risks to communities where crude oil trains pass directly. A series of recent accidents have left detrimental environmental, human and economic consequences, the most notable incident being the derailment in Lac-Mégantic, Quebec in July 2013 that killed 47 people and destroyed the town center (The Globe and Mail, 2013). Other high-profile accidents in the United States, including Casselton, ND and Lynchburg, VA have also resulted in oil spills and resident evacuations (McClatchy DC, 2014a, ProPublica, 2014). Concerns for safety are heightened if trains derail while running through populated areas and town centers.

A vulnerability analysis of crude oil spills in the mid-western states demonstrated that crude oil spills often occur in inland areas, mostly near or in smaller, rural towns rather than in large urban settings (Brody, et al., 2012). Oil spills tend to affect inland areas because these regions are more likely to be environmentally sensitive (Cronk, et al., 1990; Yoshioka and Carpenter, 2002). These small communities often remain uninformed that dangerous commodities are moving through their neighborhoods, and their local emergency response teams may not have the capacity to respond to major oil accidents or explosions (ProPublica, 2014). It becomes important to assess communities' awareness of the issue and whether adequate emergency preparations are taking place. However, as this issue has emerged relatively recently, no research has been done to examine local perception of risk and emergency management related to crude oil transport in the United States. According to the New York State Division of Homeland Security and Emergency Services, there are about 25 to 44 crude oil trains moving to Albany County weekly, where oil

refineries are located (McClatchy DC, 2014b; Press Republican, 2015). Trains that contain at least 160,000 barrels of crude oil travel through 23 upstate counties along the Hudson River Valley everyday, passing through many populated communities along the way (Christopherson, 2014; Capital New York, 2014). Therefore, through a case study of communities along the Hudson River Valley, this study offers an approach for analysis of risk awareness and emergency preparation in communities affected by transport of crude oil by rail.

In our research, we referred to the theoretical frameworks of multi-scalar emergency preparation and risk governance to help us conceptualize our main research themes. Since the 1990s, the task of handling risk, threat and hazard has become a priority for many government agencies (Rogers, 2011). In the United States, disaster preparedness is largely implemented at the national and state level. Upper-tier government bodies are responsible for disseminating information and for conveying expertise to lower government tiers (Perry and Lindell, 2003). With railroads, the Federal Railroad Administration (FRA) is the primary agency that oversees regulations for railroad safety in the United States, and state inspectors then implement federal legal requirements. In the event of a rail accident, different government actors come together to respond. The National Oil and Hazardous Substances Pollution Contingency Plan specifies that the state, regional and local officials must be the first responders to ensure that proper evacuation of residents take place in a timely manner and must also be responsible in notifying federal government for further assistance if conditions escalate (Frittelli, et al., 2014).

This type of tier system disaster management is often ineffective due to different costs and benefits of disaster risks across multiple levels of government, placing the highest burden and responsibility for disaster response on local communities (Lyles, et al., 2014; McEntire, 2007). There is currently limited knowledge of how local communities actually respond to national mitigation policies and whether administering federal emergency management projects at the local level is successful at all (Lyles, et al., 2014). Furthermore, Neuman (2007) attributes uncoordinated processes, fragmented finances, lack of comprehensive management and metrics, and overlapping jurisdictions

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and duties as factors that lead to inadequate management systems in regional planning, which can affect processes of disaster planning as well (Neuman, 2007).

In response to these limitations, recent planning literature has emphasized the increasing importance of interoperability, inter-departmental coordination and multi-scalar collaborative planning in exchanging information through networks rather than hierarchies and tiers (Innes, et al., 2007; Neuman, 2007). This highlights a paradigm shift from the concept of 'government' to 'governance', focusing instead on 'rescaling' decision making responsibilities from one scale to another, vertically and horizontally among institutional networks (Neuman, 2007; Berkes and Folke, 1998; Ostrom, et al., 2002). A multi-scalar approach can also provide a collaborative process in linking different units at multiple scales in disaster management (Butler and Goldstein, 2010).

With this framework of multi-scalar network governance in mind, risk governance is defined by the actors and processes that collectively make risk-related decisions and policies that can be helpful in managing disaster related problems (Renn, et al., 2011). The current configuration of risk handling activities also mirrors similar those of network governance, turning away from the hierarchal state-centric model. Instead, there are a diverse set of actors and knowledge that are involved in the risk management process that includes civil society, industries, educational institutions, and NGOs acting at all levels and horizons (Renn and Klinke, 2013; Irwin, 2008).

By taking the framework of multi-scalar emergency management and risk governance into account in our analysis, we hope to raise more awareness of the issue and help create effective regulatory alternatives to supplement future disaster planning research. We would like to provide researchers and policymakers with better understanding of local perception of risk and emergency preparation of crude oil transport among communities.

Results & Discussion

Our results demonstrate communities' level of risk awareness, perception of danger and how these elements are reflected in their disaster preparation.

Studying the different perception of risks and how preparation varies across communities can help us see the complexity of multi-scalar approaches in emergency management.

Awareness of Issue and Risk—The survey results show that all but one community (95% of the respondents) are aware about oil trains that travel through their neighborhoods (Figure 1). Most communities identified 'Media' as the main source of information and how they became aware of the issue initially (Figure 2). Town meetings and newsletters were the second most common way of knowing about the issue, while other sources of information, such as communication from railroad companies, Riverkeeper, or from first hand observations comprised 58% of the responses. Several town officials noticed the increased frequency of oil trains from previous years and looked at placards to identify hazardous materials as trains pass through their communities. Although railcars that contain hazardous materials must display placards indicating the different types of hazardous materials they carry, responders often need more information specific to the commodities that are being transported to plan for effective response measures (Frittelli, et al., 2014).

Answer	Response	%
I know a lot	12	60%
I know a little	7	35%
I don't know about crude oil transport	1	5%
Total	20	100%

Figure 1. How much do you know about the crude oil transport through your community?

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Answer	Response	%
Media	12	63%
Word of mouth from friends and family	4	21%
Town/community meetings	7	37%
Newsletters/Emails	7	37%
Website/search engines	4	21%
Other	11	58%

Figure 2. How did you find out about the crude oil transport through your community? (Check all that apply)

Perception of Danger—In total, 14 communities (70% of respondents) considered parts of their community to be in danger in the event of an oil spill, while 6 communities (30% of respondents) did not consider their community to be in any particular danger (Figure 3). Of the respondents that answered ‘Yes’, residential homes and commercial districts/town centers are considered to be most vulnerable. As oil trains also run directly between parklands, watersheds or rivers in several communities, ecological issues were also raised in addition to the built environment (Figure 4).

While specific spaces within the communities were considered dangerous to the officials, many believe that location of where the accident occurs, and the physical state of tracks and tank cars affect the magnitude of the disaster and their vulnerability. Of the six communities that responded ‘No’ in Figure 3, officials noted that their town centers are far from the train tracks, and any impact from a possible accident would be indirect since trains run inland. As some trains do run across very rural areas, these respondents believe that there would be enough time to evacuate residents if need be.

Answer	Response	%
Yes	14	70%
No	6	30%
Total	20	100%

Figure 3. Do you consider areas in your community in danger in the event of an accident?

Answer	Response	%
Commercial districts/town center	8	42%
Residential homes	13	68%
Schools	3	16%
Special population centers (care homes, hospitals, child care, prisons)	6	32%
Utility and Energy facilities	7	37%
Transportation infrastructure	5	26%
Government centers (town hall, fire station, police station)	4	21%
Other	8	42%

Figure 4. Which areas in your community do you consider most in danger? (Check all that apply)

Capacity and Capability—Smaller towns and hamlets often rely on volunteers for emergency services. As most communities surveyed were small towns and hamlets, this is reflected in the survey result. 17 out of the 20 towns (85% of respondents) indicated that volunteers provided their emergency services (Figure 5). The three communities that have professional fire and emergency services are all cities. Communities also depend on county and state emergency services, for 16 communities stated that contact with county or state emergency operations services is the first action they would take in an incident (Figure 6).

Answer	Response	%
Volunteers from the community	17	85%
Professional fire and emergency services	3	15%
We do not have fire and/or emergency protection services	0	0%
Total	20	100%

Figure 5. Are the fire/emergency protection services in your community provided by...?

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Answer	Response	%
Contact with county/state emergency operations services	16	80%
Preparation trainings for emergency personnel and/or volunteers	12	60%
Vulnerability analysis/risk assessment of population	2	10%
Emergency water storage tanks/water purification	1	5%
Evacuation routes/zones	9	45%
Creating buffer zones along railroads	1	5%
Other	8	40%

Figure 6. What kind of emergency preparation(s) do you have in your community? (Check all that apply)

Confidence Levels—The survey revealed that most communities (75% of respondents) remained confident of their emergency procedures during a possible rail accident (Figure 7). Communities seemed confident in state response to worst-case disasters from previous experiences as well. Many expressed that state and county responses were great during Hurricane Irene and Superstorm Sandy in their towns, and trust that the same response would be given if the disaster were train related.

Answer	Response	%
Yes	15	75%
No	5	25%
Total	20	100%

Figure 7. Are you confident that emergency procedures, including evacuation, are in place if an oil train accident occurs in your community?

Discussion—The survey results have shown that the majority of the communities surveyed had some sort of emergency preparation guidelines or procedures in place. Interviews with local officials and county representative demonstrated that there is a lot of multi-scalar coordination between different government agencies and organizations that includes local fire unit teams, regional HazMat teams, as well as state and county emergency services. While almost all the

communities are aware that trains containing crude oil travel through their communities, smaller towns and hamlets' emergency services are provided on a volunteer basis. While these towns and hamlets have emergency responders on duty, many of these communities may not have the capacity to respond to a disaster and may need to rely on the county or state to handle larger crises. According to a study done by the National Fire Protection Association in 2009, there are about 1.1 million firefighters across 30,000 departments in the United States, in which 800,000 firefighters are volunteers. The turnout rates for these volunteers remain low nationally, from 20-50% (McClatchy DC, 2014a). A low turnout rate raises many critical issues. For example, as training sessions lead to effective emergency response (Perry and Lindell, 2003), several communities sent volunteers to attend educational and preparation training provided by railroad companies and counties as part of their preparation (Figure 6). However, interviews with local officials indicated that it remains difficult for volunteers to commit even if special training is fully funded, since most volunteers have full time jobs and other responsibilities outside the fire department. In addition, our county interviewees revealed that it takes about 10-20 minutes for professional emergency teams to reach communities on average. Since many of the communities are located in rural areas, getting resources and help on site quickly would be challenging. As reducing response time can significantly reduce crude oil spill threats (Brody, et al., 2014), volunteers may not be able to cope with the widespread impact unless assistance from other towns or counties is made available immediately. If accidents occur in remote areas, the time it takes for response crews and resources to reach the site can greatly complicate response procedures.

Policy Implications

Since responsibility for emergency management is felt most at the local level in post-disaster situations (McEntire, 2007), there are policy implications that can help reduce the uneven burdens of response to a potential crude oil disaster. As emergency management of rail involves different actors from multiple scales, it becomes important to provide a system of safety protocols and liability schemes to fund cleanup costs among shippers, railroads, government agencies and

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the community in the event of a disaster. Most railroad companies do not have adequate insurance coverage for damages. The average third party liability insurance for railways in North America is about \$32 million, which is significantly below the amount needed to deal with a disaster similar to Lac-Mégantic in Quebec, in which environmental cleanup cost is expected to be \$1.2 billion or more (The Globe and Mail, 2013; The Independent, 2015). Although New York State has a fund that finances the cleanup and removal of oil spills called the State Spill Fund, the funds available amount to \$20.4 million, which is not sufficient in paying for the cost of the actual clean up (Capital New York, 2014). In the current system, railroads are liable for all the transport of dangerous goods. Making railroad companies bear the entire cost of insurance is hard to achieve due to the high cost and the low probability of this type of accident occurring (Insurance Journal, 2014; Christopherson and Dave, 2014). Railroads should not be the sole party held accountable for the transportation of hazardous materials; responsibility should be shared across shippers, carriers and producers of these commodities as well. If more parties contribute to part of the insurance coverage for damages, it can reduce the burden placed on the public sector and taxpayers in the cleanup process. Possible ways to address this issue would be for both smaller counterparts that cannot afford the same insurance coverage as their bigger counterparts to pool money into a separate oil fund (CTV News, 2014). Another way to collect sources of funding would be to place a levy on cargoes carrying hazardous materials. This can separate smaller railroads that carry safer products from the burden of joining expensive insurance plans (Insurance Journal, 2014).

What remains unchanged in these debates, however, is that first responders are important in responding effectively immediately after a train accident in any situation. A county representative who we interviewed stated that newer equipment and capacity to run additional training opportunities can be improved through more funding, which can help local first responders better prepare for HazMat disasters. Since these first responders in the communities are mostly volunteers, the key remains in identifying the best practices of these volunteers and maximizing their emergency service capacity. More emphasis on

networking can perhaps help address this issue more effectively at various scales. This can include constant communication and better intergovernmental collaborations, as the success of effective emergency management is largely determined by the involvement of different departments, planning committees and other regional and local networks. Therefore, it becomes important to integrate all disaster activities across different levels of government and other essential stakeholders in the process (McEntire, 2007). Involving more parties can play a very important role in shaping local emergency management practices and policies for a potential crude oil accident.

In addition, analyzing local hazard mitigation plans and their quality can also be valuable in framing policies of risk reduction and emergency response capacity. All six counties have a multi-jurisdictional hazard mitigation plan with a list of identified hazards that could affect the county. These hazards are divided mainly into atmospheric, hydrologic, geologic and other hazards. Some counties have separated natural hazards from human caused hazards that include hazardous material, infrastructure failure or transportation incident. However a mitigation plan that is specific to crude oil rail transportation has not been established yet, though it is in the development stages in a few counties. There is currently no analysis of the quality of local disaster plans that are developed as a result of national regulations (Lyles, et al., 2014), it would be helpful to see how larger scale approaches and policies actually influence local disaster planning. This may also help build local capacity while identifying limitations in preparation.

Studies concerning the risk perceptions of crude oil transport remain limited, and further research can be conducted to assess the public perception of risk in the future. Although most local officials believe that the public is somewhat aware of the issue, they could not speak on behalf of the public about their level of awareness, as public surveys have not been implemented yet. Since creating democratic participation and coordination can be effective in the local decision making process during disasters (Drabek, 2003), officials believe that creating public awareness of the dangers of crude oil and rail transport is an important next step.

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Methods

While research on the issues related to the crude oil transport in the Hudson River Valley has been an ongoing project in Cornell, the outreach process for this particular research on community risk perception took place between August and December 2014. The research focuses on communities in six counties: Rockland, Orange, Ulster, Greene, Albany and Saratoga. Prior to contacting local and county officials, communities located along the valley were identified. Based on the list, surveys and interviews were conducted.

A combination of a short online survey and semi-structured interviews was used. An initial email was sent to local officials, asking them to participate in the research with a web link to an online survey. Respondents were also given the option to complete the questionnaire by phone or by word document (Appendix 1). The survey also included a question about their willingness to participate in follow-up interviews, and for those that agreed, in-depth interviews were scheduled. Interviews with county officials were arranged via phone calls or email, and they were sent a copy of the interview schedule prior to our interview (Appendix 2). Before each survey and interview, we sought consent to use the information provided by the respondents, under the condition that their names, affiliations and community information remained anonymous and be used for research purposes only.

We received survey responses from 20 communities out of the 35 that were identified. We also interviewed county emergency services officials from three different counties. Responses from the online survey were arranged into charts and tables with percentage figures, while interview transcripts were coded to organize sections into themes.

Outreach Comments

This report is a collaborative effort between community leaders, including emergency services managers, town supervisors, mayors, local fire department representatives and county representatives. In addition, we have received support and assistance from Cornell Cooperative Extension officers in identifying potential interviewees and respondents from communities.

Student Training

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Appendices

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