

SECURING AND PROTECTING AMERICA'S RAILROAD SYSTEM:

U.S. Railroad and Opportunities for Terrorist Threats

**A Report Prepared for
CITIZENS FOR RAIL SAFETY, INC.**



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***Securing and Protecting America's Rail System:
U.S. Railroads and Opportunities for Terrorist Threats***

Executive Summary

On any given day, thousands of trains move across the American landscape. Each one of them presents a potential threat to the safety of individuals and families, to the continued functioning of our communities and our economy, and to the life of our great cities. Whether carrying millions of workers to and from their jobs, or providing the safest means of transporting hazardous materials, or bringing food and agricultural necessities to consumers, railroads pose an inviting target to would-be terrorists. Yet no significant act of terrorism has been directed against U. S. railroads, and we lack hard information on the nature of the terrorist risks involved in rail transport. This report highlights the potential threats, examines the response of government and the rail industry to the post-9/11 security responsibilities, and suggests ways in which public policy and rail operations can be better directed to meet the challenges of security in an age of terrorist activity.

Efforts to secure the nation's rail system have been undertaken by federal, state, and local government agencies and by private rail operators. These activities differ fundamentally between the passenger and freight modes. Driven by events such as the Madrid and London rail attacks, and by the assumption that since the 9/11/01 events all passenger modes of travel in the U.S. constitute potential terrorist targets, passenger rail security has been largely entrusted to the public sector, albeit with less attention and fewer resources granted for passenger rail security than for aviation. Freight rail security has also been driven by events but has been guided by the private sector rail industry.

Resources currently directed to rail security are inadequate, given the potential for catastrophic loss of life or economic disruption from attacks on the rail system. The growing use of rail systems for work-related passenger travel and the critical role played by freight railroads in U.S. and global commerce makes insuring their security a matter of urgent public concern. While the efforts to secure the system led by the Department of Homeland Security represent a good start in tackling the issues, legislation specifically dealing with rail security is needed to identify the threats, clarify the roles of the various public and private actors, and establish a level of funding commensurate with the importance of the rail system and the potential loss of life and economic damage that might result from terrorist attacks.

In addition to prevention, the rail system plays or can play an important role in mitigation and recovery efforts after man-made or natural disasters.

Key Findings

- Across the globe, railroads have been among the most common targets of terrorist attack, leading to significant loss of life, interruption of vital services, and political repercussions.
- The rail sector in the U. S. has not received adequate resources and attention to protect it and the public from terrorist acts directed against rail operations, facilities, and assets.
- Traditional approaches to rail security, focusing on policing and cordoning of rail assets, are inadequate to provide security against post-9/11 terrorist threats. The North American rail network is too vast and diverse to be protected simply through more policing, surveillance, or anti-trespass measures.
- Responsibilities for rail security remain divided among a number of federal agencies; between federal and state agencies; between government and the private sector; and between shippers, users, and providers.
- Rail security encompasses a variety of separate threats, due to the diversity of rail operations and the still emerging nature of terrorist activities and goals.
- The lack of empirical data, drawn either from actual events or conclusive information regarding the goals and operations of terrorist groups, makes risk assessment and the allocation of resources to security measures difficult; nonetheless, a risk-based approach offers the best means of putting scarce resources into the most likely areas of terrorist activity.
- The role played by the rail industry in intermodal shipments, especially those involving movement of cargo from and through port facilities, represents a major area of risk that the railroad industry may find hard to prevent.
- Based upon events in other nations and analysis of terrorist activity in the U. S., the highest risk operations in the rail mode are urban transit and commuter operations in large Northeastern cities.
- Terrorist acts directed against freight railroads have a potential for mass devastation and catastrophic loss of life.
- The private rail industry was quick to respond to the need for enhanced security after 9/11/01, but only in recent months has the government begun to treat rail security in a comprehensive manner. Federal rail security legislation is needed to bring coherence to the joint public-private response to the terrorist threat.

- The Transportation Security Agency (TSA) has been designated the lead federal agency working with the rail industry, but rail security efforts in TSA have suffered from a lack of expertise in rail operations, high turnover of TSA officials assigned to rail matters, and the general priority within TSA of aviation security.
- Rail security policy is a matter of concern to a significant number of key individuals in Congress and is likely to receive serious attention in the next session of Congress.

Guiding Assumptions

- The rail network in the U. S. is crucial to the functioning of society.
- The threat to the rail network from terrorist organizations inside and outside the U. S. must be considered real.
- The public does not understand the role played by railroads in today's economy nor the nature of the rail industry.
- Efforts to insure security of rail operations must recognize the for-profit nature of the freight rail sector and allocate costs and responsibilities between government and the private sector in a manner that allows the private rail entities to remain profitable.
- The rail mode is inherently the most energy-efficient and safe means of transporting hazardous materials and intermodal container shipments.
- Networking approaches to security have the greatest potential to achieve effective, innovative, and cost-efficient programs to identify threats and provide security of rail operations.
- Providing secure intercity rail passenger operations is necessary not only to protect regular services but also to provide a modal alternative to air and highway transportation.
- Rail security should be directed at both preventive measures and ways to use railroads in responding to catastrophic events, either from terrorism or natural disaster.
- Deregulation of the freight rail industry has led to improvements in efficiency and service.
- The size, diversity, and nature of the rail network make it cost-prohibitive and infeasible to provide a high level of policing and surveillance of rail assets.

- Passenger rail operations, including urban transit, urban rail commuter services, and intercity passenger operations, will continue to grow as costs of energy increase, as state and local governments invest in rail operations, and as the public recognizes the advantages of rail travel.
- Policies based on public law are superior to those emanating from broad grants of power to executive-branch agencies.
- Lessons drawn from other nations, and empirical data of terrorist events overseas, are relevant to guide U. S. efforts to thwart terrorism.
- Although terrorist activities directed against the economy are potentially catastrophic, most terrorist acts involving the rails have had the goal of killing large numbers of innocent people.

Summary of Recommendations

- Congress needs to pass comprehensive rail security legislation and allocate adequate financial and administrative resources to enhance current security efforts.
- Resources to enhance security must be adequate to deal with potential problems and be allocated according to a careful assessment of risk, not formulas based on population or political earmarking.
- Passenger and transit operations in major urban areas, in particular those that have been targets of past terrorist acts, should receive increased percentages of all funds expended for rail security, until such time as actual terrorist acts cause a shift in the assessment of risk.
- Congress needs to clarify the roles of the TSA, the Federal Railroad Administration, and the Federal Transit Authority regarding safety and security programs. One agency should be clearly established as the lead federal agency to deal with all safety and security issues involved in rail transport.
- A congressionally established National Commission on Rail Security composed of leaders from government, the rail industry, rail unions, and public representatives should be created and empowered to study the state of rail security and report back to Congress its findings within a reasonable period of time.
- Legislation directed at a specific mode of transportation, such as port operations or railroads, should take into account the intermodal nature of contemporary transportation and insure that logistics chains and intermodal connections are factored in to programs.

- Federally funded research on rail security issues should be expanded. Research should be directed both to areas of product and service delivery and scenarios that examine the consequences of possible terrorist acts against railroads.
- Information sharing within the rail security network should be enhanced through public and private investment in shared and secure information systems.
- The General Accountability Office (GAO) of the federal government should provide regular assessments of the state of rail freight and passenger security for the scrutiny of Congress, concerned government agencies, the rail industry, and the public.
- Efforts to involve the general public and the rail enthusiast, such as the BNSF's Citizens for Rail Security program, should be supported and expanded, with the understanding that such programs do not abrogate rules against unlawful trespass or other security measures imposed by rail operators.
- All anti-terrorism measures utilized in air passenger operations should be examined for their potential to enhance rail passenger security.
- Research should be funded to examine the potential of special rail passenger operations in recovery operations after natural and man-made disasters, such as hurricanes or the release of hazardous materials in large cities. Rail has the potential to move large numbers of people away from disasters more efficiently and with a greater concern for social equity than reliance upon automobiles.
- Enhanced training of rail personnel to deal with both the prevention of terrorism and its aftermath is necessary, and should be a shared public and private responsibility.

Introduction

It is a typical weekday in the United States in the year 2006. Consider these everyday happenings:

- Paul Johnson, an investment banker, boards a Metro North commuter train to head from his home in Westchester County, New York to his job in Manhattan. The train is on time, and Paul arrives at the station just in time to board, along with 20 other passengers. He reads a paper on his way to the office, and forgets to bring his briefcase off the train as he departs Grand Central Station.
- Two visitors to the U. S. are exploring the Mall in Washington, D. C. As they walk along Independence Avenue on their way to the Air & Space Museum, they look to their right and watch a CSX freight train loaded with tank cars pass on its way south through the city.
- In the ironically named location of East Siberia, California, a remote and unpopulated point along the Transcontinental Mainline of the BNSF in the Mojave Desert, a train pulls to a stop and awaits a van to bring a new crew to continue the trip east from the Port of Los Angeles/Long Beach to the Chicago area.
- In a dark rail yard in Chicago, a group of teenagers armed with cans of spray paint climb through a hole in the fencing around the tracks and prepare to vandalize a row of freight cars.

On this normal day, nothing unusual happens. Mr. Johnson informs the railroad of his missing briefcase and picks it up on his way home. The visitors to the Mall barely notice the hazardous cargoes passing through Washington and go to the museum. The crew arrives at East Siberia and takes the waiting train to Winslow, Arizona without incident. The teenagers leave their mark with spray paint on the unattended freight cars and exit the yard without causing any further damage. Another day on America's sprawling rail network goes by without incident.

But consider these alternative endings. In place of Mr. Johnson, think of a terrorist boarding the train and the consequences of a briefcase containing biological weapons or a bomb left in the passenger car – or activated before arrival. Nothing was in place to prevent this from occurring.

Suppose that the visitors to the Mall were not unsuspecting tourists but rather terrorists bent on taking thousands of lives in the capital of the U. S. An explosive device shredding the metal sheathing of a chlorine tank car would create a cloud of poisonous gas that would cause deaths in the tens or even hundreds of thousands.

Instead of spray painting graffiti on the sides of the freight cars, suppose that the teenagers had been paid to implant a canister of some biological agent in an open boxcar

or covered hopper, to contaminate a cargo or be released without notice at some later time.

Given current levels of rail security, it is problematic if any of these threats would have been prevented. Could they be – are preventive measures feasible? What are the resources required to prevent terrorist attacks on the rail system, or the use of the rails as a means to transport weapons of destruction? Are the risks real, or are they fanciful scenarios drawn up without regard to the motives, expertise, and past behavior of terrorist groups and individuals? In this report, we lay out the reasons why rail security is a critical aspect of homeland security and anti-terrorism efforts.

Rail security is a matter of serious concern for a wide variety of reasons. Some of the most important are these:

- Freight railroads are critical to the nation's economy. They move almost all the coal needed for industry and power production; they are essential to the nation's agriculture industry; they move most finished automobiles and automobile parts. The fastest growing segment of their business is the movement of intermodal shipments, vital to global commerce and to the efficient and safe movement of goods within the domestic market. Interruption of these vital services would have major consequences for the global economy.
- Passenger operations move millions of riders every year, and are essential to the functioning of many of the nation's largest metropolitan areas. Interruption of passenger operations in cities such as New York, Philadelphia, Washington, and Boston would produce gridlock on the highways and pose constraints on the normal functioning of business and government. Rail passenger operations are also the most efficient way of providing an alternative to air transport in the event of a recurrence of terrorist attacks on the nation's aviation sector.
- Railroads provide the safest means of moving hazardous materials such as chemicals and nuclear waste products; however, such movements provide opportunities for terrorist incursion as well as natural or man-made obstacles to safe and secure transport of such items.
- Rail transport is the most energy-efficient means of transportation. Terrorist acts that cause the diversion of rail passengers and cargoes to other modes would have consequences for the nation's efforts to become more energy-independent.
- The rail network is vast and diverse. It includes seven major freight railroads, over 500 short line and terminal freight railroads, Amtrak, and a large number of publicly owned and operated commuter and transit systems. Protecting and securing such a large and diversified network of rail operations is not a simple matter, but one that requires significant financial resources, information sharing within a broad network of affected organizations, and careful assessment of risk

to put scarce resources where they promise to have the greatest chance of preventing terrorist incursions.

This report comprehensively frames the issue of securing the rail transportation network to the greatest extent that can be practically achieved. It discusses the nature of terrorism and security; the structure and operations of U. S. railroads; describes and analyzes private and public sector efforts to secure the rail system; and suggests a set of recommendations whereby government and industry can realize an efficient and effective approach that allows the rail network to continue to provide those transportation services so critical to the economic vitality of the nation.

The research was carried out for Citizens for Rail Safety, Inc. by a team of researchers from the schools of Business Administration and Public Affairs at The Pennsylvania State University, Harrisburg. The research represents an effort to meld the public policy and business logistics disciplines as they relate to rail security. At the outset it was realized that the all-encompassing nature of the problem as well as its potential solutions would require input from a range of participants. As a result we endeavored to access industry trade associations, specifically the Association of American Railroads (AAR) and the American Short Line and Regional Railroad Association; information on Federal government agencies including the Transportation Security Administration and the Federal Railway Administration; the major freight (Class I) railroads; short line operators; passenger railroads; and firms from other modes that employ railroad capacity in an intermodal sense. One common theme that did result was that no entity would agree to discuss the issue of terrorism unless promised non-attribution. Even at that we had several refuse our request for interviews.

The result is essentially a comprehensive case study of a network of public and private organizations facing the new reality of security threats after 9/11. The network is composed of the railroad industry and government agencies entrusted with the development and implementation of rail security efforts. Rail security is seen as a new and pressing responsibility that requires cooperation and collaboration between the government and the private sector. It also requires the maintenance of a proper degree of balance between the need for security and its attendant costs and the equally pressing need to maintain an efficient and strong railroad system for both freight and passenger service.

Much case-related research endeavors to use multiple participants to identify key variables in a theory-building process that are later tested, most often by others, in a theory testing effort using surveys and more traditional statistical analysis (Miles, 1994). Conversely, we have used dissimilar firms and organizations to build theory and to leverage the different perspectives of the researchers, the School of Public Affairs and the School of Business Administration.

The balance of this report is divided into several sections. Section I, The Security Problem, introduces the problem of security within the context of terrorism, discusses the need to balance industry viability with security, develops a taxonomy of threats, draws

similarities between safety and security, and considers the experiences of other nations. Section II, The Structure of U.S. Railroads, discusses the different types of firms and organizations engaged in rail transportation; explains the concept of a rail network as well as a transportation network, and addresses the long-standing history of railroad police. Section III, Industry Response to the Terrorist Threat and Section IV, Government Response to the Terrorist Threat, describe and analyze the efforts of the private and public sectors in dealing with the new post-9/11 realities. The final section, Section V, Recommendations, provides a systematic series of actions that recognizes the work that the railroads have already undertaken to establish best practices, but also the need for the Federal government to leverage its influence to see that the well-being of its citizens and the economic health of the nation are protected. Our recommendations are multi-faceted, the same as the problem, and rather than selecting one single approach we make a strong case for cooperation and coordination among what many will deem disparate entities.

I. The Security Problem

I.1 War and Terrorism

In times of war transportation vehicles and infrastructure have historically been primary targets because they represent the ability of the enemy to not only sustain themselves, but to wage war. Modern war fighting philosophy considers transportation a subset of the broader theme of logistics which has become the movement and storage of goods along with the information necessary to do so. Logistics has become so important in prosecuting war that U.S. Army General George Patton is quoted as saying “Amateurs talk about tactics, professionals deal in logistics.”

As acts of war, strikes against transportation infrastructure and vehicles can be direct or clandestine as in sabotage. In either case, the outcome is the same and that is to deprive the enemy of the ability to move personnel and material, or its populace from moving passengers and goods in the prosecution of economic activity.

Acts of terror by both declared and undeclared enemies have been employed to make political statements concerning the plight of its perpetrator and demoralize those believed to be the oppressors in order to precipitate concessions. In recent times, commercial airlines have been the preferred targets because the destruction of modern aircraft makes for sensational press, kills or maims large numbers of people, and represents significant economic loss given the cost of modern aircraft. With the events of September 2001 terrorist ingenuity used hijacked aircraft to attack the high profile ground targets of the New York World Trade Towers and the Pentagon, causing destruction to those targets as well as to the aircraft, itself.

Other transportation infrastructure has also been targets including the Tokyo subway system, London Underground, and the Madrid commuter rail lines. In the case of London, the threat was thwarted; however, the release of toxic substances in Tokyo in the 1990s and the Madrid commuter train blast were successfully executed terrorist events. Passenger trains have been regular targets in India where a long-running conflict with neighboring Pakistan over the Kashmir has frequently fostered terrorist acts. This is instructive because it moves the terrorist targets away from those associated with aviation.

Whether the issue is acts of terrorism or the clandestine efforts of organized military, the problem is the covert targeting of non-aviation transportation infrastructure that could include pipeline, inland water transportation, trucking, international water transportation and the railroads. Pipelines would be a useful target; however, most of their linear distance is buried meaning that targets of opportunity become their terminals and intermediary pumping stations. Inland water transportation, specifically, barge transportation on canals and rivers may be visible, but it is characterized as movers of bulk commodities and, with the exception of petroleum products and some chemicals, holds comparatively less threat value. Railroads, on the other hand 1) operate a substantially more visible infrastructure, whether freight or passenger, 2) frequently move

through congested urban areas that comprise commercial, industrial and residential districts, and 3) transport passengers as well as goods that may have their own destructive properties.

I.1.2. Defining Terrorism

In this report, we use a definition of terrorism from Jessica Stern (1999):

Two characteristics are critical for distinguishing terrorism from other forms of violence. First, terrorism is aimed at noncombatants. This is what makes it different from fighting in war. Second, terrorists use violence for dramatic purpose: usually to instill fear in the targeted population. This deliberate evocation of dread is what sets terrorism apart from simple murder or assault (p. 11).

In this definition of terrorism, it is the *acts* and the *motivations* of groups, not the nature of the groups involved that is most important to understand. Terrorists can be domestic or foreign, dedicated to religious or ideological goals, organized into cohesive groups or single disaffected individuals.

Transportation targets have historically been favorites of terrorists. Attacks on planes, trains, and buses manifest both characteristics of terrorism noted by Stern: they are aimed at noncombatants and are dramatic in nature, producing fear. Witness the reactions to the bombings of trains in Madrid in 2004 and the London mass transit system in 2005.

I.1.3. Lessons from World War II

On a dark evening in June of 1943, four German-Americans in the employ of the Third Reich came ashore at Amagansett, Long Island (Persico, 2001, pp. 199-205). Half of an eight-man operation named Operation Pastorius, they had been trained to use their language skills and knowledge of America to sabotage major elements of the U. S. infrastructure, including the huge Limeville Bridge of the Chesapeake & Ohio Railway spanning the Ohio River, a heavily traveled route for coal and other vital materials.

The operation turned quickly from a major threat to comic opera. The group was almost immediately apprehended by an alert Coast Guardsman, John C. Cullen; rather than killing Cullen, the group's leader, Georg Dash, a former restaurant waiter, tried to bribe him. Cullen quickly reported the incident; in the meantime, Dash and his colleagues had gone to New York City, lived it up a bit on their expense money, and then soured on the scheme and gave themselves up to the FBI, informing the government of the arrival of the second half of the gang in Florida. All eight saboteurs were arrested, tried in a military tribunal, and sentenced to death. Six were executed; two others, including Dash, had received long prison terms as a consequence of their willingness to inform on the others. None had acted upon their orders to destroy vital elements of the rail system.

Operation Pastorius, as abortive as it was, represents the only serious effort to inflict damage on the U. S. rail system by foreign agents or terrorists. What it shows is how much the stakes have changed in the 63 years since the U-boats dropped the eight men into U. S. territory:

- In an era before weapons of mass destruction, the eight men hoped to cause damage through conventional means, including the use of high explosives and incendiary devices. Eight men in two teams of four could not have expected to do more than cause temporary and partial damage to the rail infrastructure. Contrast that with today, where the potential weapons include nuclear devices, dirty bombs, and biological agents, as well as explosives.
- During a time of declared war, and before the advent of global air transportation, the German agents could reach the shores of the U. S. only with great difficulty, and with the assistance of a sponsor spy service. Once identified as German nationals, their presence in the U. S. immediately triggered arrest. In today's altered situation, entry to the U. S. is much easier, and the murky nature of the War on Terror means it is not necessary for terrorists to have state sponsorship, nor can we assume that all individuals of a particular nation need be apprehended as likely enemy agents.
- Without the ability to communicate with their sponsors, the Pastorius group had to rely upon prior training and plans, which helped to doom the four-man group in Florida betrayed by the group that landed in New York. Today, the use of the Internet, cell phones, and other devices makes it much harder to prevent the flow of information within terrorist networks.
- Even had the Pastorius group proceeded to their planned targets, the deployment of large numbers of uniformed security personnel during World War II might have led to their apprehension and the foiling of their plans. Such a high level of security is not currently present or planned.

Prior to 9/11/01, however, it might be said that thinking about rail security had not progressed much from the era of Operation Pastorius. Rail security was thought of largely in terms of *cordonning* and *policing* approaches: build barriers – physical and/or legal – around the rail system, and police it to keep out unauthorized trespassers and to protect and secure rail assets. In peacetime, threats to the rail system were seen as random and unconnected acts of criminal or negligent behavior. The most serious consequences were interrupting rail service, theft, inflicting damage to rolling stock, civil suits, and deaths and injuries to railroad employees.

The growth of terrorist activity in the last decades of the 20th century, however, began to show the attractiveness of transportation facilities and physical infrastructure as targets of terrorist activity worldwide. As elements of each category, transportation and infrastructure, railroads were increasingly vulnerable to terrorism. A report by the RAND Institute documented 181 attacks on rail targets. These attacks followed a general

pattern: the trains attacked were passenger trains and the goal was to kill as many people as possible by conventional means, such as bombing, shooting, and setting cars on fire.

Although some attention was given to rail security after the Tokyo sarin gas attack in 1995 and threats to the New York City subway system in the first planned World Trade Center attack, it was not until the 9/11/01 attack on the World Trade Center, Pentagon, and United Flight 93 that the threat to domestic rail operations from terrorist activity came to be seen as imminent.

I.2 Potential Threats

The typical threat against railroads, at least from a historical perspective, has involved passengers. Freight rail operations have not been a target of choice for terrorists. However, since 9/11 the press has focused also on the movement of hazardous materials as a significant potential threat. In balancing history with that of potential, the following taxonomy of threats is offered.

I.2.1 Threats Against the Citizenry

As in the cases of India, Tokyo, Madrid, and London, the target was clearly to harm people through various means. Madrid was used to precipitate Spain's withdrawal from the Iraq War, but it also brought about a change in that nation's government. As described in Section IV of this report, the Madrid and London bombings had repercussions in other nations including the U. S.

I.2.2 Threats to Passengers

Threats to passengers have been demonstrated to be brought about by either introducing external harmful substances to passenger trains or by damaging rail infrastructure in order to cause derailment. In the case of Tokyo it was sarin nerve gas; Madrid, carefully timed explosive devices that caused death and carnage on multiple trains; London, explosive devices in underground mass transit facilities. From a strictly publicity standpoint, external substances appear to be a preferred approach. Assuming that rail cars are fully loaded with passengers, use of explosive devices can be expected to produce casualties in the range of dozens to hundreds. In at least one instance, in Mozambique, a terrorist attack by armed rebels led to loss of life in the hundreds.

I.2.3 Threats to Non-Passengers

Threats to non-passengers involve the release of hazardous materials. Here the options are many as the rails are often the preferred mode of transportation for flammable materials such as fuel oil, benzene, toluene, xylene, and a range of alcohols. Exploding a tank car of these or even derailing it can result in a chain reaction with other cars in a single train, or worse in a rail yard. As was demonstrated with the derailment and fire in CSX's Baltimore Tunnel, the threat to persons in neighborhoods adjacent to rail lines can

be considerable. The most extreme of these cargoes may be the liquefied petroleum gas (LPG) and liquid propane.

Toxic materials are also often carried by rail. Items such as chlorine, ammonia, fluorine, and pesticide intermediates pose a substantial hazard even if they are not inherently explosive. Here, derailment is the major threat in that it can result in rupture to the vessel.

Other materials may pose a threat, but are likely secondary to the aforementioned materials. Items such as hydrogen peroxide, mineral acids and sodium hydroxide (caustic soda) are inherently dangerous, but do not explode or cause health problems unless someone is in immediate proximity or the material is allowed to react with other chemicals, which is always a possibility in a derailment.

I.2.4 Threats Against Lading

Cargoes carried by railroads may be threatened because of their use to terrorist organizations, or the deprivation of use to the U.S. military. Tainting human consumable items may have catastrophic effects, but may have more value in destroying confidence in the food supply chain.

I.2.5 Theft

Theft may occur for two reasons: to obtain items for direct use by terrorist groups, or to obtain items to be sold for cash by terrorist groups. In the former case, military cargoes may have the most utility; however, the sale of items for cash provides the necessary capital to support operations in a very fluid way.

I.2.6 Tainted Cargo

The best way to describe the use of tainted cargo is to consider the Tylenol incident of 1982 when only a few capsules within a single bottle were finally deemed to have been tampered with. The cost to Johnson and Johnson and the pharmaceutical industry was extensive with the result being 1) a total recall of all Tylenol from the distribution channel, and 2) the implementation of tamper-proof and tamper-evident packaging for all pharmaceuticals and many food items.

It is believed that in most of the developed world that human consumables are pure and wholesome. From time-to-time there are incidents that are significant because they put that confidence into question. Another example is the impact that e coli and salmonella contaminated foods have had on food producers, supermarkets, and restaurants within recent years. Approximately, three years ago contaminated green onions nearly brought about the demise of Chi Chi's restaurant chain, while the e coli contaminated spinach was major headline news that caused consumption to plummet for several weeks during 2006.

I.2.7 Threats to Infrastructure

Threats against infrastructure occur for two principal reasons: to disrupt rail transportation and to inflict economic damage on a region and an overall economy, and to create a catastrophic event that becomes newsworthy. Infrastructure is defined as the rights-of-way, track structure, stations and depots, terminals, intermodal facilities, repair facilities, bridges and culverts, tunnels, communications and signaling, rail yards, control centers, and office buildings. While each has its own particular attraction as a terrorist target, those generally believed to be the most attractive with regard to freight railroads are the bridges and tunnels. These also are attractive targets with passenger railroads, but stations and terminals need to be added to the list.

There are multiple ways to attack infrastructure, the development of a taxonomy of which is beyond both the scope of this project and the expertise of the researchers. Suffice it to say that there can be direct physical attacks as has been the nature of such actions for thousands of years, or there can be an attack on the information technology that controls the supply chains, the railroads being just one important element of which.

I.2.8 Distribution of Weapons of Mass Destruction

Weapons of mass destruction (WMD) are defined as weapons “capable of inflicting great numbers of human casualties over a large area” (Prelas and Peck, 2005, p. 23). WMDs are usually broken down into three major categories: nuclear, chemical, and biological. Railroads regularly carry chemical cargoes. They also on occasion transport nuclear waste material. In addition to cargoes of potential WMD, there is the opportunity for terrorists to use trains as the means of transporting WMDs clandestinely. The growth of global commerce using standardized containers is noted as one area of great risk for the use of rails to convey WMDs in intermodal shipments. There is also a potential for a terrorist threat that does not have the railroad per se as a target, but rather depends on its purpose for being: the distribution of goods and people. For example, it is entirely possible that following a bio-attack that has yet to be detected, the passenger railroads are the unwitting distributors of disease and/or contamination. Here we specifically mean the commuter railroads that haul the same passengers day after day in distances that can range up to 75 miles. Their nodes, specifically the center city stations, would pose useful centers of exposure.

I.3 Security and Safety

Security and safety issues share significant considerations given that much of the effort to assure the latter can abet the former. Decomposing overall safety issues results in a focus upon infrastructure, rolling stock, freight, passengers, information, and employees.

Since deregulation railroads have invested heavily in improving the integrity of their infrastructure. Thousands of miles of right-of-way have been rehabilitated with new crossties, new or refurbished rail, cleaned ballast, rebuilt bridges and viaducts, and upgraded signaling. Safe railroads are efficient railroads because accidents impede the movement of goods thereby reducing the ability to earn a return on invested capital.

All rolling stock has been upgraded with particular attention to bearings, couplers, brakes and air lines. As noted elsewhere in this report, hazmats are typically transported in shipper-owned equipment that has undergone significant changes in design to both a) protect the public from the deleterious characteristics of the cargo, and b) to protect the quality integrity of the cargo itself.

Although freight shipments are in large measure protected by the integrity of the infrastructure and the rolling stock, loss prevention especially as it pertains to theft remains an issue. Safety of the cargo, whether it is potential for contamination or theft, continues to be an issue where there is vulnerability. Access to rail facilities remains easy; the magnitude of the network and the insignificant penalties for trespassing continue to work hand-in-hand as a major threat. See statements elsewhere in this report on threats and also recommendations.

I.4 Hazardous Materials and the Chemical Industry

For at least the past century, railroads have been regular carriers of hazardous materials. This originally occurred when the rails were the only viable source for transporting anything any significant distance. At first hazmats were petroleum products and other relatively common chemicals important for sustaining both the economy as well as urban populations. Among that list were many of the chemicals listed in Table 1, such as caustic soda and chlorine, which even today represent significant volumes. Chemical manufacturing was originally centered in New Jersey and Delaware, but when the petroleum industry became its principal source of raw material, southeastern Texas and the Gulf Coast gained prominence. With the advent of polymers, such as nylon, polystyrene, polyethylene, polypropylene and PVC, significant volumes were added to the rails as both finished goods and raw materials. The northeast and Texas became sites for the construction of “world scale” plants whereby economies of scale and low unit costs could be achieved.

With increased volumes came concerns for transportation safety. Comprehensive Federal regulation came to govern the permissible quantities shipped by specific modes, the types of equipment that could be employed including their safety appliances, the placarding required to state the nature of specific hazards, and the maintenance of a system of material safety data sheets that told anyone potentially having contact the necessary precautions (see 49 CFR). Most hazmats move in privately-owned railcars—equipment NOT owned by the railroads—because of the specific requirements of individual materials for a) tank linings, b) loading and discharge connections, and c) car size (due to material density). Safety features of railcars improved, first with the addition of dome safety platforms, but later with non-overriding couplers and reinforced tank heads. These features reduced the potential for one car to puncture another in the event of a derailment. Regulations affected railroad operations by stipulating how close to the motive power hazmat cars can be located in the consist. Hazmats are transported in various types of railcars, the predominant type being tanks (see Table 1 for a listing of car types and their respective ownership). Packaged hazmats as drums, bags, and bulk bags may be handled

as boxcar loads, but are generally prohibited from TOFC and COFC service. ISO tanks carrying hazmats, specialized units designed for transport on containerships as well as for some domestic service are generally also not carried TOFC or COFC.

Moving hazmats by rail, despite the routing through populated areas, still provides the lowest potential for unintentional material release. Barge lines do not have sufficient geographic access, while trucks are always maneuvering in traffic. Under the rate structures, chemicals and plastics are prima facie highly remunerative freight. Where the railroads have exposure, and to a greater extent where the movement of hazmats is potentially non-remunerative, is their nearly unlimited liability. One CEO has gone on public record stating “[E]very time we accept a carload of hazmats for transportation, we are in effect betting the entire ranch.” One estimate by an industry official is that insuring hazardous cargoes accounts for roughly 80 percent of the total insurance costs of the freight rail industry, while not accounting for nearly as high a percentage of tonnage or revenue. An industrialized economy requires these materials, which means that they need to be transported in the safest manner possible. Taking them off the rails and putting them on the highways with the rest of the road traffic is, therefore, not a viable alternative.

II. The Structure of U.S. Railroads

The U.S. rail network consists of approximately 171,000 miles of track that traverses an average 100 foot right-of-way. This average accounts for single line routes that are narrower as well as multi-line routes and rail yards. The resulting land mass controlled is the equivalent of 3,200 square miles or an area nearly the size of the state of Delaware (AAR 2005).

The rail network needs to be considered as a system for myriad reasons. First, it is operated by several hundred private firms the majority of which connect with one or more others. Added to the private rail industry are the government-owned passenger carriers that include Amtrak and the commuter lines. Second, because of the use of standard gauge, the rail networks of Canada and Mexico also have multiple connections with the U.S. Third, is the economic realization that railroads are typically most viable in moving large quantities of goods long distances. Large quantities of goods can be characterized by bulk materials, dimensional goods (that the railroads will frequently term “heavy, high and wide”), and containerized traffic where packaged goods are aggregated into containers that are typically 8’ x 8’ x 20’, 8’ x 8’ x 40’, or 8’ x 8’ x 53’.

From an analytical standpoint, various sections of this report will make reference to links and nodes. This is typically a means whereby logisticians evaluate transportation networks with nodes making reference to fixed points of geography such as stations, terminals, and interchange points. With freight transportation this can also make reference to both supplier and customer locations. Links, on the other hand, refers to transportation lines that connect nodes. Obviously, the more links and nodes in a particular transportation system the more complex it will be. It is also worthwhile to note that individual nodes may serve as an origin or destination for a great many links; hence

the more that do so, the greater importance that such a node would have for the system (Coyle 2003, 55).

Not only do railroads need to be viewed in a total transportation perspective, but as enablers in the supply chain as well. Although a term that has now reached common parlance, it is instructive to define the term *supply chain*. Perhaps the most useful explanation can be found in the Supply Chain Operations Reference (or SCOR) Model developed and furthered by the Supply Chain Council whereby 1) a chain is a group of buying and selling members that are dependent upon one another, 2) each entity has the business activities of source, make and deliver with an overarching or coordinating plan activity, and 3) three flows transcend all of the members of the supply chain—namely physical, informational, and financial flows (Supply Chain Council 2006). Transportation is significantly present at the inter-firm connections where one firm's source is the deliver function of another.

The international economy is dependent upon supply chains, but suffice it to say that every economy consists of myriad combinations comprising millions of supply chains. Disruption of an economy is simple: disrupt its supply chains insofar as its physical flows are concerned. In other words, disrupt the physical flow and the financial flow crumbles. Most people think of terrorist attacks on the physical flows because that is what is visible. From a terrorism standpoint, that is where the most newsworthy events may occur, but consider that the physical flow is significantly enabled by the information flow. This is to say that an attack on the information technology capabilities of transportation providers will disable an economy perhaps with greater effect than any attack on the physical flow, specifically infrastructure (Meade 2006; Lee 2004).

For railroads, the information flow is comprised of transactional systems just the same as any business or government agency. However, railroads have extensive communications and signaling systems that control the flow and speed of trains across their respective networks. All entities dealing in goods, whether they are manufacturing, selling, or transporting need to be able to answer one fundamental question: Where is it? The inability of manufacturers to answer this question with regard to raw materials—typically done with inventory and warehouse management systems—ultimately shuts down production. Similarly, should firms, whether producers, wholesalers, or retailers incur such inability, stock-outs or shortages are likely to occur for consumer products. For transporters, the inability to answer the question of “where is it” results in the inability to determine which rail cars to move where. All of these scenarios, however, carry highly damaging consequences including disruption to financial systems as buyers and sellers would not have the ability to engage in commerce.

II.1 Passengers and Freight

In many instances, freight and passenger carriers share significant miles of line. While Amtrak owns rail line between Washington, DC and Boston as well as the Keystone Line between Philadelphia and Harrisburg, portions of those lines also carry commuter rail traffic including Maryland Area Rail Commuter (MARC), Southeast Pennsylvania

Transportation Authority (SEPTA), Metropolitan Transportation Authority (Long Island Railroad and MetroNorth in New York and Connecticut), New Jersey Transit (NJT), and Massachusetts Bay Transportation Authority (MBTA), Chicago's METRA, and California's CALTRANS, are other examples of major commuter operations sharing trackage with freight railroads (Carstens 1985; Walker 1994).

Additionally, Amtrak and regional commuter line may have freight traffic operating over their lines with trackage rights. Conversely, Amtrak runs on trackage rights over freight railroads in areas other than the Northeast Corridor and the Keystone Line. Some commuter operations, such as Maryland DOT's service over CSX to Brunswick, MD and Martinsburg, WV and the Virginia Railway Express in northern Virginia, operated over freight railroads as well. Moreover, there are many occasions where passenger railroads and freight railroads parallel each other in close proximity, even to the extent of having their respective tracks occupy the same rights-of-way in what many land use planning refer to as transportation corridors. An example is the close proximity of CSX's main line between Washington and Pittsburgh and lines of the Washington Metro system in Maryland.

II.2 Passengers Per Day

The volume of passengers handled by Amtrak and the various commuter agencies begins to approach the volume handled by the nation's domestic air carriers. The primary difference; however, is the nature of the network. While average trip distances for rail are significantly shorter than those of commercial aviation, the number of station locations is much greater. Any comparison to air travel is instructive. The smallest regional airports will accept aircraft with as few as 19 passengers (e.g. Beech 1900s) where capacity utilization may require a yield factor of 60%, or 12 passengers, to achieve economic viability. By comparison, many commuter trains will make station stops for as few as one passenger.

A further distinction between passenger rail service and commuter airlines is that the latter typically operate in a hub and spoke environment where an entire flight is both loaded and offloaded en mass. Conversely, a commuter train may have as many as 10-20 stops with extensive loading and offloading of passengers at each location (NJ Transit 2006; MetroNorth 2006). While Amtrak provides daily commuter operations in several major metropolitan areas, the roles played by the regional authorities remains significant and a major consideration within this research. A summary of Amtrak and commuter rail operations is provided in Table 3.

II.3 Amtrak

The National Passenger Rail Corporation, as Amtrak is officially known, was established in 1970 with the specific purpose of relieving the railroad companies of their money-losing passenger operations while still retaining passenger rail service for the nation. It is, therefore, no accident that Amtrak acquired track and other infrastructure that 1)

remains in close proximity to freight rail operations, and 2) still utilizes the track of freight railroads through much of its network.

Amtrak's densest route, the Northeast Corridor, daily moves large volumes of passengers between a limited number of key nodes, namely Washington, DC, Baltimore, Philadelphia, Metropark (Edison, NJ), Newark, New York, New Haven, Providence and Boston. Although not specifically a commuter railroad, many of Amtrak's passengers are, indeed, commuters. This is true of both the Northeast Corridor as well as the Keystone Service. The railroad operates hundreds trains per day and an average of 750,000 passengers (Amtrak 2006). Not unlike the airlines with additional flights, Amtrak will accommodate additional passengers on extra trains during holidays.

II.4 Commuter Railroads

Once part of companies that hauled both freight and long distance passengers, the commuter railroads now operate as regional transportation authorities within and around the major metropolitan areas. They are characterized as moving mostly repeat passengers on a daily basis over relatively short distances (mostly under 50 miles). For the purposes of this research, subway systems, traction (trolleys) and other forms of what the industry terms "light rail" have been excluded.

II.5 Freight

In selling railroad services, the freight carriers work in car units or train units. Most shippers may consign one or several carloads to a customer, there are also situations where railroads sell the services of an entire train to a single customer. This occurs in two principal examples: unit trains and intermodal trains. Unit trains are where an entire train, usually of a single commodity such as coal, is moved from an origin to a destination, such as from a mine to a power plant. Intermodal capacity is sold either as an entire train to a customer such as UPS, or on a wholesale basis to an intermodal agent such as Hub Group or Alliance Shippers. The character of the intermodal relationship is important because in terms of knowing what is being carried the railroad only identifies a loaded or empty container or trailer, hence it has no knowledge of the contents.

From a historical standpoint, freight traffic has been increasing steadily since the railroads were economically deregulated by the passage of the Staggers Act of 1980. Since that time they have been permitted to sell off low volume lines to short line and regional railroad operators, an event that paved the way for the current configuration of the network. Additionally, they were permitted to abandon lines that had such low volume that they could not be sold off or operated economically, plus, they were permitted to rationalize their infrastructure. Many also seized this opportunity to rationalize their networks by single tracking once double-tracked lines, double-tracking triple-tracked lines, and abandoning some rail yards (Coyle 2006, 129-139).

Railcars, also referred to as *rolling stock*, can be either owned or operated by the railroads or by non-railroad companies referred to as private fleet operators. The differentiator is

asset utilization, hence freight requiring specialized equipment has significantly lower utilization factors or annual equipment turns meaning that railroads over time increasingly refuse to make such investments.

II.6 Equipment types

Railroads own or operate a range of equipment. Passenger operations can be bifurcated into short-distance and long-distance activities, but this is also the major equipment differentiator. Longer distance equipment is typified by higher levels of comfort often with dining and sleeping capabilities, while shorter distance equipment is focused on high density seating and coaches intended for rapid boarding and detraining.

Freight railroads operate equipment generally configured for moving large volumes of cargo long distances. Equipment is intended for bulk materials, oversized machinery, and intermodal operations. From an economic standpoint, equipment ownership decisions focus on returns on investment which can be translated into maximizing the number of car trips per year. See Table 5 for a breakdown of car types and ownership.

II.7 Intermodal Traffic

Intermodal traffic has been the fastest growing segment of the rail industry for many years. Recent statistics reported in *Journal of Commerce* (2006) show that it is still growing at near double digit rates and that its share of total railroad carloads in 2005 was 13 million out of an annual 31 million carloads (AAR 2005). The significance to the discussion of terrorism because 1) railroads have little knowledge of the contents of ocean containers or truck trailers being hauled other than that they are either full or empty, and 2) containers and trailers are far more mobile than railroad cars because they ultimately are taken off the rails and moved over roadways.

Decades ago the railroads made a conscious effort to exit the retail marketing of intermodal services with the result being that today the railroads sell container positions or truck positions on flatcars or doublestack cars to the major trucking companies such as J.B. Hunt, Schneider National, and UPS; the ocean container lines like Maersk-Sealand, Evergreen and Yang Ming; and to the intermodal retailers, some of the largest being Hub Group and Alliance Shippers. Often the capacity of entire trains is sold to these firms.

The railroads interviewed for this research stated that they specifically exclude hazardous materials from intermodal service. To succeed at this, they need to rely on the systems and procedures of the truckers, ocean carriers, and intermodal retailers. Ostensibly, the most obvious way to detect hazardous materials is by the presence of the DOT-mandated placards on dry vans. Tank containers, otherwise known as ISO tanks, are bulk vessels suspended in a steel framework and handled the same as 20-foot ocean containers vis-à-vis through third parties. ISO tanks carrying hazardous materials are also prohibited from intermodal service; those seen on freight trains are likely hauling non-hazardous materials including bulk beverages, food items, and numerous industrial products.

The intermodal flatcars and doublestack equipment are not owned by the railroads per se, but may be by the ocean container carriers or most often by TTX Corporation (formerly Trailer Train Corporation), a separate legal entity owned by a consortium of railroads, but acts independently of them (Trailer Train undated; TTX 2006).

II.8 Private Railcar Fleets

Much of the freight car traffic hauled by the railroads is owned privately and not by the railroads themselves. This is especially true when the goods being carried require specialized equipment or where a shipper's industry practice necessitates the use of cars for long-term storage. Both eventualities serve to reduce individual asset utilization to the point where the railroads would find respective ownership uneconomic.

Specialized equipment may mean tanks of specific alloys, unique lining systems or having pressure ratings for compressed gases. Covered hoppers have low asset utilization factors because of their frequent use for product storage by either producers or their customers. The AAR reports that railroads operate 595,000 cars; industry shippers, 717,000 cars—53% are therefore private (AAR 2005).

When the railroads refused to make the necessary investment in specialized equipment, the shipper corporations did, with the result being extensive car fleets owned and/or operated by individual firms. Sizeable fleets of tank cars are operated by such chemical makers as BASF, Dow, DuPont, and Monsanto; and covered hoppers by plastics producers, Shell, BP, Fina, and Huntsman. Agricultural products companies are also operators of tank cars and covered hoppers with such names as A.E. Staley, Corn Products, Cargill, and Archer-Daniels-Midland commonly found (Railway Equipment Register 2003). Reference is again made to Table 2 concerning the ownership of these types of specialized freight railcars.

II.9 Rail Networks

An individual railroad has its own network consisting of terminals, rail yards, junction points, and sidings with customers and consignees all connected with lines representing the links in the system. Moreover, all of the interconnecting railroads in North America represent a network system whereby both rolling stock and locomotives are engaged in extensive interchange in order that shippers and consignees in the wider trading bloc market are served.

To end the consideration of the rail network at the industry level, however, is to short-change discussion of the topic. Three events converged to provide the basis for the current intermodal construct that represents the industry today. First, was in the mid-1800s when the concept of carrying movable wagons on a flatcar was pioneered by the Camden and Amboy, a predecessor of the Pennsylvania Railroad—a development that ultimately evolved into the movement of highway trailers and what was termed *piggyback* (Cunningham 1951). The second event was Malcolm McLean's development of containerized ocean shipping—now ubiquitous. The third was the Stagger's Rail Act

that economically deregulated the industry and moved trailer-on-flatcar and container-on-flatcar traffic from common carriage status to contract carriage status. This all demands that any study of rail freight traffic includes both trucking and ocean shipping, rail's partners in intermodal commerce (Coyle 2006, 209-214).

II.10 Infrastructure

Infrastructure consists of right-of-way—those corridors where track can be found, bridges, tunnels, trestles, culverts, classification yards, engine and car repair facilities, intermodal terminals, passenger stations, control towers, data centers, and office buildings. The most visible are the terminals, stations, bridges and tunnels, but from a terrorist standpoint, all represent potential targets depending upon the type of threat that can be considered. Physical protection of all of this capital investment is a difficult task given that the seven Class I railroads plus the aggregate of the short line and regional railroads are estimated to have in excess of 100,000 bridges and culverts.

Protection of intermodal terminals, a considerably smaller number, would also pose a very significant challenge. Table 6 shows the stated number of terminals in the U.S. by railroad or a total of 160. These nodes may or may not be located on the owning railroad and many may be shared with intermodal services firms. Note that the transnational character of several firms requires that terminals located in Canada and Mexico are included.

Passenger operations have stations numbering in the hundreds, some at locations boarding thousands of passengers per day; others, as few as a dozen. What is germane is that the rail system is a network having some characteristics not unlike the airline system—someone entering the system at a small unprotected station is still in the system.

II.11 Urban versus Rural

Economic development and railroad service have been mutually dependent since the founding of the first railroad, the Baltimore and Ohio in 1830. Railroad companies built lines to access markets; however, clusters of communities were created to access “improved transportation” provided by the railroads. This provides a challenging conundrum with regard to security: how to retain railroad service to population centers already challenged by a labyrinth of over-used roadways while lowering any perceived threat that the railroads may pose because they may be attractive targets for terrorist activity or a useful means for executing terrorist missions (TRB 2005, 3).

Urban routes also tend to have freight and passenger either running over the same tracks or running on separate tracks in close proximity to one another. There are many examples of both. In the greater New York area, the Long Island Railroad (MTA) moves passengers over the same trackage as the freight carrier New York and Atlantic; in the Philadelphia area the Southeast Pennsylvania Transportation Authority (SEPTA) share various tracks with the Norfolk Southern. Throughout the northeast Amtrak, PATH (Port Authority Trans-Hudson), NJTransit, Norfolk Southern, Conrail Shared Assets, and

various shortlines including Morristown and Erie, and New York, Susquehanna, and Western operate rails through common transportation corridors (Carstens 1985; Walker 1994) Such corridors are, at least in part, an efficient approach to rationalizing land use and often include other utilities including water lines, petroleum pipelines, electricity transmission, and telecommunications.

In contrast there are thousands of miles of rail line that pass through rural areas, some marked by small towns and villages; others by long miles of open spaces. The common theme shared by both urban and rural areas is how to protect the infrastructure and residents of each. Urban areas with higher densities of rail routes may offer alternative routes should one be taken from services; however, even these have their critical “choke” points. Rural areas may offer fewer alternative routings, but have the advantage of more difficult access, both from a geographic standpoint as well as a social one, where strangers may be more likely noticed.

II.12 Interchange

Most of the U.S. railroad network operates on a standard track gauge of 4’ 8-1/2” that allows the rolling stock of one railroad to operate over the rails of another provided that they have connection points. There are some railroads that do not connect with others and are captive to a particular industry; however, they will remain outside of the scope of our interest.

Interchange represents an inherently defensive capability for one railroad to route traffic around a particular problem or sensitive area. Conversely, it also represents a problem that suggests that protection of the entire system is a difficult and perhaps impossible task.

II.13 NAFTA Connections

Large volumes of freight moves north and south between the U.S., Canada, and Mexico. All three countries use the same standard gauge. Table 7 shows the volume of freight including containers that cross these borders on an annual basis (Bureau Transportation Statistics 2004). The volume involved poses its own challenge as goods must clear U.S. Customs formalities upon entry. Although goods are administratively processed for entry into the U.S., inspections, if any are being performed, occur at rail yards some distance from the borders. Physical inspection of every railcar does not occur as bill of lading information regarding shipper, consignee, cargo description, and cargo quantity are profiled to determine levels of scrutiny.

It is noteworthy that many containers arriving at Halifax, Montreal, and Vancouver may have a U.S. consignee as the final destination. These are unloaded from vessels at Canadian ports and transported under bond (note that these may be marked TIR for *Transport International Routiers*) to a designated U.S. port of entry for clearance. Ports of entry are not necessarily that port closest to the border—note that many containers arriving at Montreal and Halifax clear Customs at Chicago rail yards.

Should the Mexican ports of Ensenada and Los Moches ever be fully developed as an alternative for U.S. west coast ports a similar mechanism can be envisaged. Moreover, with constrained U.S. port capacities, the Canadian port at Prince Rupert, British Columbia is already being developed with the outcome being more ocean containers passing through Canada en route to U.S. customers.

II.14 Current Situation of Constrained Capacity

The existing transportation capacities of all modes are challenged making the economic impact of a terrorist act potentially greater. Specifically, the concern is that other modes may have difficulty in making up for a loss of any specific piece of infrastructure. Where this argument may be effectively countered; however, may be with the demonstrated ability of Norfolk Southern being able to restore the Lake Pontchartrain, LA bridge within just 12 days after its near total destruction by Hurricane Katrina (Norfolk Southern 2005).

Railroad capacity has been near stagnant since the early 1980s when following the passage of the Stagger's Rail Act many miles of triple tracked railroad was double tracked and double tracked lines single tracked. Clearly, a response to the steadily declining traffic of the 1950s, 1960s and 1970s, but it left a situation where 25 years of growth equal only to the growth of gross domestic product at a compounded rate could be expected to double the traffic. Even in the mid 1990s there were parts of the rail network that were suffering traffic congestion during some hours of certain days of the week.

Trucking has suffered as well with ongoing driver shortages forcing many carriers to increase rates, refuse to take loads, and divert longer distance hauls to intermodal service over the rails. The driver shortage has prompted some truckers to seek to make acquisitions, not for added customers or for expanded geographic coverage, but to acquire the drivers. In part the use of intermodal has been to improve driver lifestyles. Long distance travel, difficult for family life and for health habits, was a driving force behind J.B. Hunt's decision to increase purchases of containers, chassis, and non-sleeper power as they sought to keep drivers closer to home.

Using trucks has gotten more expensive as rates have been rising along with fuel surcharges to compensate for higher diesel fuel costs. Shippers, accustomed to 25 years of steadily decreasing rates, have continued to expect more of the same. Most have been disappointed with some even having carriers refuse to do business with them.

Road congestion is now legendary in many regions of the country where former traffic jams only during rush hour have been displaced by nearly round-the-clock congestion. As states and communities build new roads, they are only finding that new traffic patterns result in those capacities quickly filling. Urban areas are clearly worst than rural, but congestion can now be found to be nearly ubiquitous (TRB 2005, 2; Journal of Commerce 2006; FHWA 2002).

Ports, especially west coast load centers such as Los Angeles-Long Beach, San Francisco-Oakland, and Seattle are capacity challenged on several fronts including berth spaces, container yard acreage, and access roadways and rail lines. One example is Wal-Mart, a major importer from Asia. Wal-Mart has made a conscious decision to divert to Houston, a lower utilized port that requires goods to spend more time at sea as well as traversing the Panama Canal (TRB 2005).

II.15 Railroad Police Agencies

Originally established to protect railroad company property as well as the cargo of the rail customers, railroads have long operated their own police agencies. At some times in history these have almost resembled private armies when routes began crossing broad expanses of unsettled territory.

Railroad police agencies typically have unusually active law enforcement roles given that they are units of private sector corporations. Although their power varies from state-to-state, their authority extends beyond the private property of their corporations. Their power derives from Section 1704 of the Crime Control Act of 1990, effective March 14, 1994, provides that:

"A railroad police officer who is certified or commissioned as a police officer under the laws of any state shall, in accordance with the regulations issued by the Secretary of Transportation, be authorized to enforce the laws of any jurisdiction in which the rail carrier owns property." (Crime Control 1990)

Class I railroads operate their own police academies, often performing contract training of officers for smaller railroads and in more than one instance for municipalities. Conversely, legislation finally authorized railroad police officers to attend the Federal Bureau of Investigation's academy at Quantico, VA (Senate S1235). Statistics on the number of officers employed by individual railroads is difficult to obtain; however, there are approximately 2,300 officers for covering all of North America (NSPolice 2007). Class I railroads employ the most officers, but even many of the regional and short line roads have their own forces, such as the New York, Susquehanna and Western with a 14 person force covering a route structure exceeding 200 miles (including trackage rights) passing through just two states, New Jersey and New York (NYSW 2007).

As proficient as these agencies may be, the resources appear relatively miniscule for the task of protecting the miles of routes, bridges, tunnels, stations, rail yards, communications and signaling systems, and administrative facilities. This may be so even without considering the issue of terrorist threats.

III. Industry Responses to Terrorist Threats

As explained in the foregoing chapter, the railroads have a long tradition of possessing the resources to protect their property as well as their shippers' cargos. In the case of the latter it has been strictly loss prevention and the legal obligation to account for the goods. With protecting their own property; however, it has often also been a case of preventing others from death or injury caused by railroad operations and the increasing financial liabilities that this presents.

From a historical perspective, railroads were first established through much of what was considered undeveloped territory. Train crews and cargos running through wilderness were prime targets for criminal activity. Defending property and cargo fell to the special agents, later often called railroad police because the railroads operated 1) on private rights-of-way and 2) through areas with little to non-existent publicly provided law enforcement.

As posited previously, safety and security are related topics and the railroads were lauded after the 9/11 attacks for having the most comprehensive stance on terrorism. Perhaps out of tradition, but the operating rules for most railroads contain a Rule L which states:

In the case of danger to or loss of the company's property, from any cause, employees must unite to protect it. . . Property of the railroad, as well as the freight and articles found in or on cars, or on company premises, must be cared for and property reported (Conrail 1976, 3).

The secure transportation of cargo was and still is a basis for competitive advantage. Shippers and consignees are driven by customer service. Stolen and damaged cargo reduces their ability to serve their markets. Transportation firms that provide the best service and protection of cargo are most likely to be rewarded with additional business, hence a more financially successful railroad.

III.1 Access Control

As difficult as it is to defend 171,000 miles of track and thousands of separate, and in many cases geographically isolated, pieces of infrastructure with only 2,300 police officers, efforts have accelerated to reduce unauthorized access to railroad property. While some facilities may require the wearing of photo identification, several railroads have implemented active programs of encouraging employees to challenge unknown persons.

Most of the Class Is and many of the regional and short line railroads have aggressively pursued Rule O, as found in the Rules for Conducting Transportation, an operating manual provided to most railroad employees within North America. Specifically, this rule states:

Unauthorized persons shall not be permitted upon engines, trains, cars, equipment, or company property (Conrail 1976, 4).

Of special note is the development of the eRailsafe effort established as a joint venture between the Class I railroads. Realizing that they do, in fact, operate a transportation network and with the realization that much of the work formerly handled by the railroads' own employees now may be likely outsourced to specialized contractors, eRailsafe provides access clearances for suppliers and contractors that must enter onto railroad property. Providing access in this case means individual and firm level background checks, the providing of photo identification, and the centralized recordkeeping for security purposes.

III.2 Network Management

One response that is seldom given public recognition is that railroads, while private entities, have long fostered a level of cooperation and mutual aid when faced with adversity. For example, should floods or a derailment block the route of one railroad it is usual for it to use the tracks of others to circumvent the affected area. This "network option" is also an important defense in the face of terrorist threats. From a proactive stance, some railroads are establishing new or even re-establishing formerly removed connections that could be useful for circumventing infrastructure that could pose an important or attractive target. None of the railroads interviewed were willing to discuss specific locations in this regard.

Railroad engineering departments have long maintained extensive files on bridge and tunnel clearances, curve radii, and track weight load limitations. From a commercial standpoint this was useful when contracting to haul dimensional cargos (oversized loads that are also known as "heavy, high and wide") and determining appropriate routings.

Building upon this wealth of information, many railroads have added data on the locations of hazardous materials, high density housing, sports facilities, and other areas where there may be large numbers of people such as concerts. Trains carrying high risk cargos subsequently rerouted to maintain significant distance from such locations.

III.3 Information Sharing

Information sharing with respect to major catastrophic events, such as the case with Hurricane Katrina, has been a longstanding industry tradition that appears to have kept pace with modern technology. Information on weather conditions and other important international events is monitored by the major railroads and shared between them. In part this eases transition should one line require access to the track of another.

Information is a major role of the two principal industry associations, the Association of American Railroads and the American Short Line and Regional Railroad Association, in which participant members are active on a range of committees. Safety and security, having always played a role in these two organizations, has now been elevated to a new and more compelling status.

III.4 Roles of Industry Associations

With the case already made that modern supply chains require an efficient and effective information flow to enable their physical and financial flows, the protection of data integrity has been an ongoing challenge. Railroad information requirements are bifurcated into transactional and communications and signaling (C&S).

Transactional data keeps track of what cargos are being transported, their shippers, their consignees, the value involved, quantities, and what are the special characteristics such as hazard classes. Conversely, C&S controls train operations seeking to optimize track capacity while maintaining safe operation. C&S has become far more effective with the continuing evolution of technology. Dragging equipment detectors and hotbox detectors have improved safety of operations, but perhaps one of the most compelling advancements has come from radio frequency identification (RFID). It began in the early 1990s when AAR mandated that all locomotives and rolling stock intended for interchange had to carry a passive RFID tag that was also known as an Amtech tag after the company that developed it. Electronic trackside readers had the ability to identify each car number in a train passing by at 79 miles per hour. The advantage was that the railroad now had the ability to tell shippers where a specific car was on the North American network. A secondary use was being able to know where each locomotive was in order that locations and use be optimized relative to the demand for motive power. This technology is now useful for identifying the exact locations of those cars carrying hazardous materials.

The Class Is all operate data centers that have all of the usual defensive accoutrements such as fire protection and backup electric generators. They are located in areas least prone to flooding and are given an intentional low profile with minimal signage to indicate their mission. Not unlike the major banks, the Class Is have multiple backup data centers and all continuously back one another up. Data center access is limited to only those authorized employees.

III.5 Insurance and Risk Issues

Insurance and related risk is an ongoing problem for the industry. Its exposure is significant because of 1) the energy contained within the mass of a 10,000 train traveling at 79 miles an hour has great potential for incurring damage, 2) the transportation of hazardous materials, for which there is no viable safer alternative, 3) an increasingly litigious society extracts ever-greater monetary damages for incidents, and 4) the concept of joint and several liability seeks to enjoin any party having any part whatsoever.

Operating as part of a network compounds the risk issue given that other railroads, shippers, ocean container lines, non-vessel operating common carriers (NVOCCs), trucking companies and intermodal agents are all participants. Defending against unwanted tampering with cargos originating outside of the United States has been a top priority for the Department of Homeland Security. For example, the Container Security Initiative (CSI) has sought to provide inspections of cargos at foreign ports before they are ever loaded aboard a U.S.-bound ship.

The much publicized C-TPAT, in which the railroads continue to play an active role, seeks to establish due diligence on the part of the importers, which in exchange for preferential treatment from U.S. Customs agree to certify their supply chains beginning with the foreign supplier of the goods, the foreign carrier to the port of loading, the foreign container facilities, and the foreign intermediaries including the freight forwarder

Over the years individual industry groups have taken various measures to improve security and safety. For example, the Technology Asset Protection Association, a loose consortium of electronics goods manufacturers was founded to improve transportation and storage security standards for their highly theft-prone products. Limitations on access to their documentation and means for securing cargos have been their cornerstones. The American Chemical Council, formerly the Chemical Manufacturers' Association has been active for decades when it first established Chemtrec as a resource center where emergency responders could access expert advice in dealing with transportation incidents.

In recent years AAR established the Freight Railroad Security Plan that has four distinct alert levels and provides initiatives aimed at assisting operating personnel in addressing issues with hazardous materials, threats to infrastructure, and specifics related to moving military materiel. The eRailsafe initiative by the Class I railroads has already been noted as a cooperative and proactive venture by the industry.

One individual railroad initiative is the Strategic Transportation Asset Tracking System (STAT for short) undertaken by the BNSF to provide real time tracking of high value and other sensitive cargo—interpreted to mean that it could apply to hazmats and to military moves. This system endeavors to make real time what the RFID system had been attempting to achieve in a batch mode. Where RFID provided voluminous amounts of data through which the railroads had to sift out that which was important—namely cars off schedule or off itinerary, STAT is used only on exception basis for those cars identified as important.

Table 8 summarizes these various initiatives. While there may be others, it is believed that these are the most significant to which the observation is also made that if there are too many, the risk is that none will be meaningful.

IV. Public Policy Approaches to Rail Security

IV.1. Delegation of authority

Delegation of authority from Congress to the executive branch agencies to implement public policies is a necessity in the modern administrative state. Three distinct approaches have been developed over the years to empower the agencies of government to do their work: the **agency-centered**, **networking**, and **public law** models. Each is described below, after which we explain how each implies a specific approach to dealing with rail security issues.

IV.1.1. Agency-centered approach

In the **agency-centered** approach, general authority to plan and implement public programs is given to a government agency; in transportation security, for example, the Transportation Security Administration of DHS. The key executives of the agency are then “liberated” from supposed constraints – red tape – and allowed to flesh out the programs with a degree of freedom to allow them to be entrepreneurial, performance-driven, and efficient. Accountability is derived largely from their ability to find ways to achieve performance standards either specified in law or developed in the course of implementing the program. The delegation from the legislative branch is broad, and often the time-period in which the program is fleshed out is lengthy. The agency is also able, given the flexibility implicit in the approach, to develop critical relationships with organizations inside and outside government: it is the ends, expressed in performance-based terms that are the basis of accountability much more than the means, which must be flexible to allow the executives to find the most effective way to reach goals. Although there is no single model to serve as a template for this approach, it is the philosophy that has driven the National Performance Review (NPR) project of the Clinton/Gore administration and, with significant variations but some shared philosophical bases, the President’s Management Agenda of the George W. Bush administration.

IV.1.2: Networking approach

The **networking** approach is based upon the assumption that traditional top-down bureaucracies are inadequate to deal with emerging problems, with ill-defined boundaries or characteristics. One of the leading scholars exploring the use of networks in public policy is Laurence J. O’Toole, Jr. O’Toole defines networks as “structures of interdependence involving multiple organizations or parts thereof, *where one unit is not merely the formal subordinate of the others in some larger hierarchical arrangement*” (O’Toole, 1997, p. 45; emphasis added). Lacking a single authority that can or should force compliance on the other actors in the network, the goal of management is to develop trust among the participants, facilitate the sharing of resources and information, and respond intelligently to changing conditions and problems while recognizing that the organizations that make up the network have their own agendas, practices, and culture.

Networks vary greatly depending on the nature of the common problems and the type of interdependence that emerges. It is generally accepted, though, that tasks common to all networks include the building of relationships and trust as well as work related specifically to the achievement of goals. Some networks are stable, with high levels of trust established, while others are characterized by high rates of turnover and instability.

Agencies empowered to create network approaches to problems are tasked with creating opportunities to share information and work with other public and private organizations with which they share some common goal. Rail security policy may require the formation of a complex network, with DHS as lead agency tasked to work with other federal

agencies (e. g., DOT and DOJ) and the railroad industry, which may work through its own networks with representation provided by membership associations that become the specific nodes of the network representing the industry perspective (e. g., the Association of American Railroads for large freight roads, the ASLRRA for short lines, and AASHTO and the American Public Transit Association for urban commuter operators).

IV.1.3. Public Law approach

The **public law** approach is rooted in constitutional structures and practices. It takes as its starting point the separation of powers expressed in the Constitution, and the system of public administration that is derived from it. The essential characteristics have been described by scholars such as Ronald C. Moe and Robert S. Gilmour (1995) and Anthony M. Bertelli and Laurence E. Lynn, Jr. (2006). Both sets of authors agree on a number of points about the public law approach:

- Laws passed by Congress, with “policy and program objectives specifically agreed to and incorporated into enabling legislation, subject to reasonable and articulate standards of measurement and compliance” (Moe and Gilmour, 1995, p. x), are the cornerstone of public policy.
- The president is responsible for insuring that the laws be implemented faithfully and efficiently.
- Executive branch officials “are held legally accountable by reviewing courts for maintaining procedural safeguards in dealing with both citizens and employees and for conforming to legislative deadlines and substantive standards.

Agency managers in the public law approach must act with what Bertelli & Lynn (2006) call a sense of *managerial responsibility*, to insure each of the three branches – the congress, the president, and the courts – trust the agency to act responsibly and effectively according to the specific delegation of power given it in public law. It is a much more formal approach than the agency-centric approach, and based more on constitutional and political theory than the business-based management ideas on which the agency-centric notion rests.

IV.1.4. Balanced approach

As in the case of all ideal types, none of the pure forms of administrative action are likely to describe the way public agencies actually function, nor prescribe a single “best case” around which to design new programs. Each has advantages and disadvantages, and for this reason we propose a balanced approach incorporating elements of each. The implications for rail security policy may be summarized as below:

- Rail security constitutes a major potential threat to the security and prosperity of the U. S. and should be the subject of legislation specific to itself, not implied in general grants of authority to deal with transportation, infrastructure, hazardous materials, or other categories of threats of which rail transport is a subcategory.

- The legislative delegation of authority should be clear, specific, and unambiguous in regard to agency authority, performance expectations, timetable for completion of tasks, and measures of accountability.
- The development of legislation on rail security will allow all interested and affected parties a chance to influence the policy formation.
- Rail security legislation should deal both with the prevention of terrorist attacks and incursions, and the use of the rail network in case of disasters outside the rail system per se in which the railroads may be vital in recovery/mitigation efforts.
- Rail security legislation should specify the desired relationship between public and private action to achieve common goals, recognizing the need for continued interaction and dialogue between the private rail industry, state and local agencies engaged in rail and transit operations, and the federal agency(s) involved.
- Memoranda of understanding between federal agencies engaged in rail security oversight (e. g., DOT and DHS) should clearly spell out in detail the responsibilities of each agency for purposes of accountability and effectiveness.
- Legislation should require the accountable agent of the executive branch to prepare an annual “State of Security in the Nation’s Rail System”, summarizing progress made in achieving statutory performance standards.

Rail security issues pose too grave a threat to the peace and prosperity of the nation to be entrusted without clear goals and standards provided to the private sector or to the discretion of agency administrators. The public law approach is the cornerstone for the recommendations noted above, but it must be made flexible enough that a network of interested parties – the private rail industry and public sector rail authorities – continues to provide needed input and effort to a coordinated and cooperative approach to rail security. Government policy should be crafted to “fill the gap” between the private sector efforts to secure rail assets and desired activities and levels of performance specified in rail security legislation. It should be, as suggested in *Detour Ahead: Critical Vulnerabilities in America’s Rail and Mass Transit Security Programs*, an “overarching strategy that could be used to guide initiatives” (2006, p. 4). Those initiatives should be developed with a constructive dialogue between government and other interested parties in the rail security network.

IV.1.5. Clear delegation of authority

Rail security also needs to be clear in its delegation of authority to the executive branch. A single executive branch agency must be given responsibility to coordinate the efforts of other governmental agencies and the private sector and state and local government rail operators. Congress and the Bush administration have designated the Department of Homeland Security to be that agency. Some would argue that it makes more sense to entrust transportation security to the Department of Transportation; in the case of rail security, to the Federal Railroad Administration and Federal Transit Administration. Arguments can be made on either side of the issue. In arguing for DOT, the advantages are its high level of expertise and experience in rail safety issues, its close historic ties to the rail industry and state and local governments, and its capacity to integrate factors specific to the rail mode to the overall transportation system. In arguing for DHS, the

advantages lie in coordinating rail security and national plans for infrastructure protection, disaster response, and intelligence and planning to thwart terrorist attacks.

Congress needs to be clear about which agency will continue to take the lead in rail security. Assuming it will continue to be DHS, leadership in Congress needs to entrust rail security legislation to committees charged with homeland security policy and appropriations and ensure that committees concerned with other areas of rail policy coordinate their efforts. The list of proposed rail security legislation below points out the duplication of effort in the past.

Rail security policy has been the product of an evolutionary process, however; moving to an overarching approach has to take account of the antecedents of today's rail security policy. It is to a brief history of rail security policy that we next turn.

IV.2. Rail Security Policy before 9/11

Prior to the 9/11/01 attacks on commercial aviation, there was nothing that could be called "rail security policy" directed against potential terrorist threats to the nation's rail network. As described in this report, during World War II German agents were apprehended with plans to sabotage key elements of the U. S. rail system, along with other key infrastructure elements, but the plan was quickly revealed and no damage was inflicted on any alleged target. Policy, if it can be called that, was based upon the enhanced policing of the rail system by employing uniformed members of the U. S. military in addition to rail police and state and local police officers. The rail system emerged unscathed from the conflict, as it did in future wars fought far from the American homeland.

IV.2.1. Rail Safety

With no imminent threats from abroad after World World II, rail safety, not security, was the focus of policy prior to 9/11/01. The Federal Railroad Safety Act of 1970 gave broad jurisdiction to the Federal Railroad Administration (FRA) of the U. S. Department of Transportation.

The FRA remained the major agency player in rail safety up to and to a large extent after 9/11/01. As expressed by FRA Administrator Allan Rutter in testimony before the Subcommittee on Surface Transportation and Merchant Marine of the Committee on Commerce, Science, and Transportation of the U. S. Senate in 2002,

FRA's safety mission can be simply stated: help prevent fatalities, injuries, and property damage related to railroad operations and releases of hazardous materials from rail cars, and enhance the security of railroad operations. Under the Federal Railroad Safety Act of 1970, FRA's jurisdiction extends to all areas of railroad safety. We have issued rules on a wide range of subjects including track, signal and train control, locomotives and other equipment, grade crossing signal devices, and

operating practices, and we enforce those rules as well as rules related to hazardous materials transportation by rail. We conduct inspections of railroad operations to determine the level of compliance with the laws and regulations, and use a variety of enforcement tools when necessary to encourage compliance. We help educate the public about safety at highway-rail grade crossings and the dangers of trespassing on railroad property. FRA has its own accident investigation authority, and works closely with the National Transportation Safety Board (NTSB) on those accidents that NTSB investigates.

Security remained defined as an element in rail safety until the shock of the 9/11 attacks. During the 1990s issues of rail security gained increased attention but were not focused on the threats posed by terrorists, either internal or international groups. Instead, the rail industry defined the security problem as largely the liability they faced from the actions of trespassers on rail property. Accidents, suicides, instances of vandalism, theft of rail property, and the general nuisance caused by unauthorized trespassers on rail property, tended to define the “security” problem. The focus was not just on trains but on other physical assets: bridges, tunnels, access roads, standing rows of freight cars, and the like. Although one incident of terrorism against a moving Amtrak passenger train did take place on American soil, at Hyder, Arizona in October 1995, it did not prove to be a compelling reason to craft either legislation or executive orders to deal with the threat.

IV.2.2. Anti-trespass legislation

One policy goal of this period of rail security interest was the passage of state laws to tighten rules and penalties associated with unlawful trespass on rail property. In response to the growing interest in this problem, Congress passed the Federal Railroad Safety Authorization Act of 1994 (49 U. S. C. 20151), which required the Secretary of Transportation to develop a Model State Trespass Bill in consultation with the rail industry and state governments (Plant, 2004, p. 297). Many states considered such legislation, but the shock of 9/11/01 provided support to the need for such legislation, which was often opposed by property owners adjacent to rail lines, sportsmen, and photographers.

Another area of policy consideration, related to some degree to the trespass issue, was safety concerns associated with railroad grade crossings. The *New York Times* brought attention to the grade crossing problem with a series of compelling articles in 2004. These seemed to indicate a failure of the FRA to regulate the rail industry in the manner prescribed by law. In an article by Walt Bogdanich that appeared on November 7, 2004, the FRA was characterized as lax on enforcement, eager to create “partnerships” with the big freight railroads, and run by officials with too-close ties to the rail industry. An earlier article from July of 2004 indicated that the major railroads had often failed to report accident information from grade crossing incidents or had covered up investigations into the cause of accidents, including malfunctioning safety equipment (Bogdanich, 2004A). Little punitive or corrective action in these cases was pursued by the FRA.

IV.2.3 Summary

In summary, rail safety/security policy before 9/11/01 was:

- Clearly entrusted to a single federal agency, the Federal Railroad Administration of the Department of Transportation;
- Based on clear legislative authority;
- Regulatory in nature, with provision for inspections, fines for noncompliance, and investigatory powers;
- Concerned with traditional safety concerns and not terrorist threats to the rails;
- Unable to generate substantial national interest as a major policy question.

IV.3 Public Policy after 9/11

IV.3.1. Anti-terrorism legislation

The attacks of September 11, 2001 provided the impetus for the government to create policies to deal with the changed world of transportation and homeland security. The **USA PATRIOT Act** (officially titled **Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act of 2001**, but called by its acronym or its abbreviation, **USAPA**), (42 U. S. C. 5195c(e)) was passed shortly after the 9/11 attacks and signed into law by the president on October 26, 2001 after little debate. It was the first of a series of bills designed to safeguard the homeland in the wake of the new War on Terror. Its major provisions included changes to a number of existing statutes to empower the federal government to act aggressively in such areas as wiretapping, surveillance, discovery of computer fraud, money laundering and finance, immigration controls, and the general powers of law enforcement officials to detect and deter terrorism. It did not specifically address transportation security issues but did define **critical infrastructure** in section 1016(e).

Transportation had been the target and the weapon of choice in the 9/11 attacks, so it was not surprising to see legislation address the pressing issue of transportation security shortly after the attacks. The **Aviation and Transportation Security Act of 2001**, Pub. L No. 101-71, 115 Stat. 597 (2001), created the Transportation Security Administration and empowered it to deal generally with transportation security issues. It was mode-specific in regard to the actions of TSA in aviation security, but more general in its charge to deal with transportation security across other modes. It charged the TSA Administrator to deal with a broad range of transportation security issues.

Aviation continued to be focus of legislation after passage of the Aviation and Transportation Security Act. The **Transportation Security Enhancement Act of 2001**, H. R. 3110, added a number of specific mandates for the Transportation Security Administration in the aviation mode, but also established the Transportation Security Advisory Council to bring together interested organizations in all modes of

transportation. Several additional pieces of legislation between 2001 and the present have specifically addressed aviation security issues and the authority and duties of the Transportation Security Administration (Sweet, 2006).

The **Homeland Security Act of 2002** (6 U. S. C. 101 (9)) created the Department of Homeland Security, the lead federal agency dealing with anti-terrorism activities. The Act, signed into law on November 26, 2002, created a new cabinet-level department and transferred (through a required reorganization plan) agencies, assets, obligations, and personnel from a variety of pre-existing federal organizations

IV.3.2. Rail Safety and Security Legislation

A number of bills specifically addressing rail security issues have been introduced in Congress since the 9/11 attacks. Six bills in the 107th Congress, 11 in the 108th, and 15 in the 109th were introduced to deal rail safety and security issues. A comprehensive statutory approach to rail security remains, however, to be passed by both houses of Congress and signed into law by the President. A brief summary of proposed legislation follows:

In the 107th Congress, six bills were introduced that included rail security as title or section. These included:

- HR 4545, the Amtrak authorization bill;
- HR 5216, to establish a national rail passenger transportation system;
- S 1550, to provide for rail safety and security assistance;
- S 1726, to require the Secretary of Transportation to study screening of rail passengers;
- S 1871, to require the Secretary of Transportation to conduct a rail transportation security risk assessment;
- S 1991, to reauthorize Amtrak and improve passenger rail security.

The 108th Congress saw 11 bills related to rail security introduced:

- HR 2726, to reauthorize Amtrak and establish a national rail passenger system;
- HR 4476, to provide for safety and security of rail and rail transit systems;
- HR 4896, to deal with security issues in the U. S. rail system;
- HR 5132, to provide increased rail and public transportation security;
- HR 5291, which included rail provisions in a general bill addressing the war on terror;
- S 6, which included provisions on rail security in a bill to enhance homeland security;
- S 104, to reauthorize Amtrak and provide for enhanced rail passenger security;
- S 1599, to provide screening of passengers on Amtrak trains;
- S 1961, a comprehensive bill addressing issues of rail security;
- S 2273, also to provide increased rail security.

The 109th Congress saw 15 bills related to rail security introduced:

- HR 153, to provide increased rail and public transportation security;
- HR 1109, to provide for the security and safety of rail transportation systems;
- HR 2351, to provide for safety and security of railroads and their employees, passengers, and communities, and to create an assistance program for families of passengers involved in rail accidents and incidents;
- HR 3270, to provide rail security upgrades;
- HR 4009, which included a provision for comprehensive examination of intercity passenger rail security by the Secretary of Homeland Security;
- HR 4106, to direct the Secretary of Homeland Security and Secretary of Transportation to develop standards for rail security in cooperation with rail operators and owners;
- HR 5714, to improve security of rail and public transportation in the U. S.;
- HR 5965, to promote energy independence and enhance rail infrastructure to relieve dependence on foreign oil;
- S 140, to provide a homeland defense fund including rail security needs in high-risk urban areas;
- S 1052, to improve rail security;
- S 1516, to reauthorize Amtrak and deal with rail passenger security;
- S 2412, to deal with homeland security issues including rail transportation security risk assessments;
- S 2791, to amend title 46 and 49 of the U. S. Code to improve transportation security;
- S. 3875, which includes rail security in a comprehensive bill to deal with homeland security and the war on terror.

Looking at the array of proposed legislation, several observations seem warranted:

1. There is a noticeable disconnect between legislation dealing specifically with rail passenger security – often coupled with provisions dealing with Amtrak or high-speed rail systems – and those dealing with freight rail transport.
2. The referral of bills to committees of either house is divided between those sent to committees dealing with transportation (i. e., the House Committee on Transportation and Infrastructure and the Senate Committee on Commerce, Science, and Technology) and the committees dealing with homeland security (i.e., the House Committee on Homeland Security and the Senate Committee on Homeland Security and Governmental Affairs).
3. There are sponsors of rail security legislation representing both major parties in each house of Congress. Rail security is not, and need not be, a matter of strong partisan debate.

4. Rail security is seen as a significant issue by a number of members of Congress, as shown by the number of individuals who have introduced or sponsored rail security related bills.
5. The proposed legislation is divided between those bills that contain specific actions and those that give broad authority to executive branch leadership, in either DHS or DOT or both, to study and take action on rail security issues.

Much has been made of the fact that recent congresses, especially the 109th, failed to move forward on most proposed legislation. This appears to have been the case with rail security legislation. The leadership of the 109th Congress did not by all accounts figure in rail security as an item for legislative action, and a number of promising bills died on the vine, as it were. The result has been a continued reliance upon the executive branch agencies concerned with transportation and rail security – the TSA, the FRA, and the FTA – and the private owners and operators of rail systems organized within the rail security network.

Despite the lack of comprehensive rail security legislation to emerge from the 109th Congress, a number of encouraging lessons can be learned from reviewing the efforts of the past few years in Congress:

- A number of policy entrepreneurs or champions exist, in each house and each party, who have developed a good deal of expertise on the issue by supporting legislation over a number of years;
- A sophisticated, comprehensive view of rail security is present in much of the proposed legislation, capturing the need for careful assessment of risks, the role of rail transportation in contemporary commerce and commutation;
- Lessons from programs directed at other transportation modes, such as maritime and ports and aviation, are being redirected to issues of rail security;
- There is growing attention to the need for risk assessment and analysis to guide program development and resource allocation.
- Incidents in other nations (such as the bombings in Madrid, London, and Mumbai) continue to provide stimulus for rail security enhancements in the U. S.

IV.3.3. DHS as Responsible Federal Agency

The creation of the Department of Homeland Security through the Department of Homeland Security Act of 2002 represented a major new step in federal transportation security policy. The new department, unlike its antecedent entity, the Office of Homeland Security, created by Executive Order 13228 on October 8, 2001, was not simply a staff office to coordinate homeland security efforts and advise the president, but a full-blown department inheriting responsibilities for such diverse activities as border patrol, emergency management, airport screening, port security, the activities of the Coast Guard, and citizenship and immigration services, to name some of the most important elements making up the new department.

Two agencies of DHS are most significant in dealing with rail security policy. The Office for Domestic Preparedness (ODP) undertakes risk assessments and provides grants to urban areas under the Urban Area Security Initiative (UASI) program. ODP has provided risk assessments for passenger rail and mass transit systems and has dispensed over \$100 million to urban rail systems and \$7.1 million for Amtrak through 2005. Increased funding was provided in FY 2006.

The Transportation Security Administration (TSA) was transferred from the Department of Transportation to DHS as part of the reorganizations that formed the new department. TSA is empowered by law to deal with the security of all modes of transportation. As noted by GAO in 2006, “ATSA [the Aviation and Transportation Security Act of 2002] does not specify TSA’s roles and responsibilities in securing the maritime and land transportation modes at the level of detail it does for aviation security. Instead, the act broadly identifies that TSA is responsible for ensuring the security of all modes of transportation” (GAO, 2006, p. 10).

Immersed within the large and diffuse new department’s responsibilities, rail security policy remained a lower priority than aviation and port security for several years. With enormous start-up costs in areas that either demanded immediate action, such as airport screening operations, or the integration of existing activities in the context of the new department, such as INS, Border Patrol, and Coast Guard, no compelling incentive existed for DHS to turn its attention to rail security issues, especially since its authority for general safety and security issues seemed to remain shared with DOT’s Federal Railroad and Federal Transit administrations. In addition to the lack of immediate incentive to put rail security on the front burner, the proactive stance of the railroad industry and its leading trade associations, the American Association of Railroads (AAR) and American Shortline and Regional Railroad Association (ASLRRA) toward rail security immediately after 9/11 provided somewhat of a cushion for DHS to move at a measured pace on rail security. Private sector activity is described in Section III of this report.

DHS is also designated the lead agency for transportation infrastructure protection in Homeland Security Presidential Directive 7 (HSPD-7) issued by the White House on December 17, 2003. This authority is delegated within DHS to TSA. HSPD-7 established national policy for Federal departments “to identify and prioritize United States critical infrastructure and key resources and to protect them from terrorist attacks”. This directive established the Secretary of the Department of Homeland Security “to be responsible for coordinating the overall national effort to enhance the protection of the critical infrastructure and key resources of the United States”. Section 15 of the directive specifically included transportation systems among the six sectors of infrastructure, along with information technology, telecommunications, chemical, emergency services, and postal and shipping. Transportation was defined as mass transit, aviation, maritime, ground/surface, and rail and pipeline systems. To implement the program, DHS was charged with producing a National Plan for Critical Infrastructure and

Key Resources Protection within one year, as required in the Homeland Security Act of 2002.

After Michael Chertoff assumed leadership at DHS he stressed two principles to guide the work of the organization: the use of risk assessment to identify the likely targets of terrorism and their impact, and the need to work within networks of concerned organizations, both public and private sector. After the London bombings in July 2005 he reiterated his commitment to the network approach:

We must draw on the strength of our considerable network of assets, functioning as seamlessly as possible with state and local leadership, law enforcement, emergency management personnel, firefighters, the private sector, our international partners, and most certainly, the general public. Building effective partnerships must be core to every mission of DHS.

IV.3.4. Awards to Rail Passenger and Transit Systems

As noted on the DHS website, approximately \$18 billion dollars has been awarded to state and local governments between FY 2003 and 2006. Of this amount, \$375 million has been awarded to 60 mass transit systems in 25 states and the District of Columbia through the Transit Security Grant Program. Although it can be argued that funds received by state and local governments may be of benefit to rail security, by providing better overall capabilities in prevention, recovery, and response efforts, the targeting of mass transit by terrorists in other developed nations, most notably in large urban areas and national capitals such as London and Madrid, raises doubts as to the adequacy of funding specifically targeted at mass transit.

When the funding for mass transit and rail passenger systems is disaggregated, the funding issue becomes even more pronounced. Eight metropolitan areas in the U. S. have significant rail transit and/or commuter rail systems. For FY2006 a total of \$110 million in grants will be awarded. This brings the total of such awards between FY 2003 and FY 2006 to roughly \$335.9 million. Such awards are used for a variety of expenditures, including planning, training, equipment, and security enhancements. The distribution of funds for these major urban rail systems is noted in appendix z.

Major cities have been the most frequent target for terrorist attacks, so it is hard to argue with the logic that all major U. S. cities present likely targets for attacks. By the same token, to say that New York City and Washington, D. C. should receive only 50 per cent of the total awards, given the history of terrorist attacks in national capitals and/or the largest population center in a nation flies in the face of what little empirical evidence there is of risk. It seems self-evident that riders on mass transit and rail commuter systems in New York and Washington face the greatest likelihood of danger from attack. Disruption of these systems would not only create major loss of life and economic disruption, but would also have the greatest symbolic importance to groups using terror against transportation systems for political purposes.

In addition to urban mass transit systems, \$13.6 million has been awarded to Amtrak, the nation's intercity rail passenger system, in the same period, FY 2003-FY 2006. Of this amount, over half, \$7.2 million, came in FY 2006 funding for security enhancements in Amtrak's Northeast Corridor, Chicago, and West Coast Service. As in the case of funding for urban rail systems, the targeting of funds for urban areas is appropriate, especially given the role that rail transportation plays in the Northeast Corridor, providing the best alternative to air travel and in many cases providing long-distance commuting as well as true intercity transportation. The total funding, however, is paltry compared to aviation and the protection of other types of infrastructure and should be significantly increased.

IV.3.5. Alternative Funding Estimates

By almost any standards to be employed, rail security has been under-funded by the federal government. Either in comparison to other modes of transport, other types of infrastructure, other programs of the DHS, or to reasonable risk assessments of the likelihood of attack, rail passenger/urban mass transit and rail freight has been neglected by federal policy makers. Much of the burden of securing the rail systems has fallen on their owner/operators and state and local governments.

A comparison of the actual funds spent on rail security and those proposed in legislation highlights the problem. S. 1052, the Transportation Security Improvement Act of 2005, would authorize \$671 million between 2007-2011, compared to \$15.8 billion for aviation security, of which the Congressional Budget Office estimated that roughly half would be raised from user fees. Much of the proposed \$671 million would go to upgrading security on Amtrak's heavily traveled Northeast Corridor route, to protect bridges and tunnels in the Washington, Baltimore, and New York urban areas.

The Rail Security Act of 2006 proposed an even higher level of funding, \$642 million for fiscal years 2007-09 for DHS and \$671 million for that time frame for DOT. The bulk of the funds would go to Amtrak for system-wide security upgrades, for fire and safety improvements to tunnels in the Northeast, for freight and passenger rail security improvement grants, and for rail security research and development.

It is clear from the disparity of the estimates in rail security legislation and the amounts allocated to DHS and DOT in the president's budget and 2007 DHS appropriations bill that Congressional advocates of heightened rail security hold a much higher estimate of the danger, and the cost of preventing terrorist attacks or accidental catastrophes, than does the administration. The difference was evident also in the remarks made by the President in signing the bill. The signing ceremony was held in Scottsdale, Arizona, and the President, calling the \$33.8 billion dollar appropriations "a good bill", treated it largely as a means of dealing with illegal immigration, with no mention of rail security or many other significant items included in the spending bill.

IV.4. Transportation Security Administration and Rail Freight Security

Despite the charge to TSA to consider transportation security issues broadly, without restriction as to mode, the year 2006 marked the beginning of the agency's full-scale attention to security issues in surface modes. As one interviewee in this project termed it, "2006 was the year of surface transportation for TSA". The problem of hazardous materials shipped over the rails was a major cause for TSA's redirection away from an almost exclusive focus on aviation to issues of surface transportation security. Another factor was the appointment of Kip Hawley as Director of TSA. Mr. Hawley has had extensive experience in surface transportation, having served as Vice President of the Union Pacific Railroad and in the intermodal software industry. Earlier in his career he served in the U. S. Department of Transportation and is familiar with that organization, which is charged to work closely with TSA.

IV.4.1. TSA and the Threat of Hazmat Incidents

Much of the attention to surface transportation has been related to the increased importance given to the safety and security of shipment of hazardous cargoes by rail. It is not much of an exaggeration to say that, without the hazardous materials factor, security of the nation's freight rail systems would have gathered less attention from TSA or DHS, given the limited statutory authority granted to deal with rail freight safety compared to the clear authority of DOT. However, between 2005 and the summer of 2006 the safety of rail shipments of hazardous materials became an issue of great concern after a disastrous wreck unrelated to terrorism led to the release of toxic chlorine gas from a derailed tank car in Graniteville, South Carolina in January 2005, causing nine deaths and hundreds of injuries; this focused attention on the dangers involved in the shipment of TIH materials and their possible release.

Terrorism is seen as only one of several possible causes of such incidents, and response and recovery as well as prevention efforts needs to be given added attention by government and private rail carriers. According to the AAR, hazardous materials account for only about 5 percent of total U. S. freight shipments, 5 percent of tonnage, and 6 percent of ton-miles. About two-thirds of the total of hazardous materials shipments utilizes tank cars, with most of the remainder moving in intermodal flat cars. As AAR notes "the most potentially hazardous materials, termed toxic inhalation hazards (TIH), are nearly all transported in tank cars" (AAR, *Hazmat Transport: Mandatory Rerouting and Pre-Notification*, January 2006, p. 1).

A recent report to Citizens for Rail Safety entitled *Training in Hazmat and Rail Security: Current Status and Future Needs of Rail Workers and Community Members* (2006) highlights the importance of better training for rail workers and first responders to deal with release of TIH and other hazardous materials. As the report notes,

Just one 90-ton car of chlorine, whether involved in an accident or act of terrorism, could create a toxic cloud 40 miles long and 10 miles wide and could kill as many as 100,000 people in 30 minutes.

As further noted in the report, it is not only acts of terrorism or accidents involving moving trains, as was the case in Graniteville, which causes concern. Sitting cars in rail yards and sidings are often unprotected and lack adequate surveillance. First responders and railroad employees often lack required knowledge of TIH materials to take appropriate action.

Triggered by the Graniteville wreck and the awareness that hazardous material shipments constitute an ongoing threat to public safety, the issue of hazmat shipments, especially the movement of chlorine, reached center stage in the spring of 2005. The routing of chlorine cars in the city of Washington, D. C. – within sight of the Capitol Building and the Mall – prompted the City Council of Washington to ban the transportation of hazardous materials including chlorine within the city. Other cities, including Baltimore, Cleveland, Boston, and Chicago, also raised the issue and considered similar prohibitions.

Both the federal government and the freight rail industry considered the growing interest among local governments in banning hazardous cargoes as a serious threat. For the federal government, it raised the issue of which level of government could effectively work with the rail industry to develop a comprehensive and integrated approach to rail security. For the industry, it raised once again the historic problem of piecemeal, state and local government regulation of interstate commerce that was a major problem before the passage of the Interstate Commerce Act. The issue quickly found its way into the federal court system, with the CSX Transportation Corporation, the rail carrier identified in the Washington ban, challenging the power of a local government to regulate freight movements.

TSA's involvement in rail freight security since 2006 has been focused largely on the issues raised by the shipment of hazardous materials on the rails. The agency has worked in collaboration with the rail freight industry to develop a set of recommended security action items for the transport of hazardous materials. The approach taken has been a network approach, in part due to uncertain statutory authority to impose regulations on the freight operators and in part a reflection of a strategy of collaboration and partnership with the private operators.

As is endemic to issues of rail security, authority to create a comprehensive policy to deal with the movement of hazardous materials by rail is divided. Security plans for such shipments are required by the Pipeline and Hazardous Material Safety Administration of DOT. DOT regulations require each transporter of hazardous materials to develop and implement security plans and train employees in security procedures. Hazardous materials safety is identified as one of the five disciplines that the 415 federal safety inspectors at the Federal Railroad Administration specialize in, and projects related to hazmat transport are included in DOT's National Rail Safety Action Plan.

TSA lacks clear and specific statutory authority to regulate the freight railroads or impose security plans. TSA has shown initiative in converting its general authority to deal with all issues of transportation security to specific programs, but by necessity if not design

these remain in the realm of voluntary and not required actions. It has partnered with the Office of Infrastructure Protection of DHS to create the National Capital Region Rail Security Corridor Pilot Project and a pilot project for a Rail Protective Measures Study Zone for the seven-mile stretch of greatest vulnerability through the District of Columbia. It has also worked with other units of DHS and DOT to conduct High Threat Urban Areas Corridor Assessments in 10 major urban areas where considerable movements of TIH materials occur.

TSA followed up its initial studies with the circulation of draft Security Action Items to the freight rail industry. During the spring and summer of 2006 TSA and FRA representatives worked with industry to identify specific security items. In a memorandum titled *Recommended Security Action Items for the Rail Transportation of Toxic Inhalation Hazard Materials* dated June 23, 2006, DHS and DOT jointly identified a set of 24 security action items related to TIH materials movement. These were divided into three categories: *system security*; *access control*; and *enroute security*. This useful document is found in Appendix X of this report.

What is striking about this document is its stress on voluntary compliance:

DHS and DOT recognize that no one solution fits all locations and circumstances. These security action items allow for flexibility in implementation based upon the assessed vulnerability of a particular process or operation. Where applicable, implementation of these action items to their fullest extent should be the goal of the affected property owner and operator...Adoption of these measures is voluntary.

During the summer of 2006 TSA and DOT continued the dialogue with the freight rail industry to refine an approach to the transportation of TIH materials by rail through High Threat Urban Areas as identified in DHS's Urban Area Security Initiative. Four specific areas were identified and a methodology for risk assessment developed. The four areas identified by DHS and DOT are:

- Establishment of secure storage areas for rail cars carrying TIH materials;
- Expedited movement of trains transporting TIH materials;
- Positive and secure handoff of TIH cars at interchange points and points of origin and delivery;
- Minimization of unattended loaded cars carrying TIH materials, with "unattended" defined as cars in a train or railroad-controlled tracks with no crew on board, no personnel active in the area, or no electronic monitoring.

Risk is to be reduced by 25 percent in the first year. Risk is defined as a function of population density, number of TIH shipments, and the length of time TIH cars are unattended and unsecured.

At the time this report was being prepared, the development of the policy regarding TIH shipments was still ongoing.

IV.5. Private Sector Action as De Facto Public Policy

It was the rail industry and not government which acted swiftly after 9/11 to create a coordinated response to the threat to the rail system posed by terrorism. This was especially noteworthy in regard to the freight rail industry, which operated through its two national trade associations, the American Association of Railroads (AAR) and American Short Line and Regional Railroad Association (ASLRRA) to create, shortly after the 9/11 attacks, a comprehensive industry approach to anti-terrorism activities. This approach focused on the AAR as the central point at which information on threats would be collected, with a 24/7 operations control center to coordinate information sharing among the rail companies and with federal agencies such as the FBI and state and local police organizations. The AAR also hired an executive director of rail security and conducted some initial risk assessments and training activities. There was no specific legislation enacted dealing with rail security and no significant governmental resources directed immediately to the issues of rail security, so the industry was relatively free to begin an approach of its own volition.

On October 7, 2001, the U. S. began military action against the Taliban regime in Afghanistan. Although there was no reported terrorist threat to the rail system, the government and the rail industry agreed to halt shipment of hazardous materials over the rails for 72 hours to protect against the potential threat in the wake of the Afghan invasion. Without a clear assessment of risk, there was nonetheless stepped-up security at key points in the rail system: bridges and tunnels and congested rail choke-points (Plant, 2004, p. 299).

A little over a year later, on October 24, 2002, while the Congress was debating the creation of the Department of Homeland Security, the FBI issues a warning, based on interviews with prisoners at Guantanamo Bay, that terrorists were gathering information on the U. S. rail system with an eye to either bombing of facilities and trains or the destruction of hazardous cargoes. Again, the lack of clear statutory guidance to either the rail industry or the executive branch agencies led to preventive action based on rumor and supposition rather than clear assessment of risk. Nothing untoward happened, and the system returned to normalcy.

Since its creation in the wake of the 9/11/01 attacks, the AAR's Information Sharing and Analysis Center (ISAC) has emerged as a central coordinating hub for information on threats to the nation's rail system. Predating the formation of DHS it has become the hub in the network of organizations involved in rail security. TSA personnel have been deployed to the Center and ISAC personnel have been granted access to TSA's Transportation Security Coordination Center (DHS Fact Sheet, 3/22/04).

The actions of the rail freight industry immediately after 9/11 had both immediate and longer-term effects on rail security policy. They effectively filled a policy vacuum in the months immediately after the attacks, making it imperative that the government, once it turned its attention to rail security, recognize the industry as the hub in a network that

includes federal government agencies and other interested parties. Motivated by the recognition that terrorism posed a grave threat to the economic viability of the rail industry, the leaders of the industry also pre-empted the government from moving to re-regulate a sector that had been transformed after deregulation and that wished to work with government as a partner, not a closely regulated and controlled client.

As noted by the AAR in its *Freight Rail Security Briefing* document, after 9/11 freight railroads immediately tightened security and inspections on rail property, restricted access to facilities, and restored full service quickly to affected areas. Working through AAR, the industry prioritized critical assets and initiated a security plan. Agreement was reached within the industry on over 50 changes to procedures and operations.

As no significant legislation or executive branch action emerged in the years after 9/11, the industry, working through the American Association of Railroads, established a system of Alert Levels that came to be recognized by all the major railroads, most short line railroads, shippers and customers of the industry, and the government. Four alert levels were established:

- Level 1: New normal day-to-day operations
- Level 2: Heightened security awareness
- Level 3: A credible threat of attack on the U. S. or rail industry
- Level 4: Confirmed threat or actual attack on rail industry or U. S.

Each Alert Level contains from eight to 18 specific actions to that level, plus the accumulated actions at each of the lower levels (e. g., all Level 1 and 2 actions for Level 3). However, none require the railroads to cease all movements (the most dire action in Level 4 is to stop the movement of passenger trains through tunnels).

Due to the long history of private rail companies operating in-house policing and security operations, the industry was able to identify personnel to work closely with agencies at all levels of government involved with homeland security issues, including the FBI's National Joint Terrorism Task Force and state homeland security agencies. At the center of this effort is the AAR Operations Center, which monitors and evaluates intelligence on potential threats and communicates to rail operators through the Railway Alert Network (RAN).

The issue of hazardous material shipments has proven to be unsettling to the freight rail industry. As discussed above, it has triggered public attention on issues of freight rail safety and security and motivated political leaders at the state and local level to assure their constituents that adequate steps are being taken to insure their safety. This, in turn, has led the freight rail industry to defend its record of safety regarding hazardous materials shipment and fend off efforts to force the industry to route such traffic away from HTUA's, which it sees as a movement toward re-regulation of rail operations. It has also brought TSA into the picture in a way the agency was not involved in the past, and has complicated the relationship of the freight rail industry with the federal

government by introducing a new agency player in an area formerly occupied by the FRA.

Beyond its opposition to forced rerouting of chemical traffic away from customary patterns, the rail industry sees rail as the safest mode of moving such materials, an assertion based on empirical data; sees the rail carrier as assuming all the risk (and its associated insurance costs) in case of hazmat accidents; and points to recent improvements in computerized tracking of hazmat shipments as reducing the likelihood of exposing the public to release of toxic materials. It prefers voluntary compliance with standards reached through consultation with the federal agencies to standards required by statute or regulation.

IV.5.1. Assessment of Private Sector Efforts to Insure Rail Security

What has evolved since 9/11 is a de facto comprehensive public policy regarding freight rail security initiated, funded, and led by the rail industry with coordination provided by its trade associations, the American Association of Railroads and the American Short Line and Regional Rail Association. This effort has earned the praise of such observers as the *Washington Post*, the deputy secretary of DHS, and top military officers in the Department of Defense. It is quite remarkable in the continuity of effort represented since the shock of 9/11 and has become apparently a long-term concern of the freight rail industry.

The effort of the private rail industry is laudable. Gaps remain, however. No matter how coordinated private sector anti-terrorism measures are they must be wedded to governmental policies and procedures to ensure their success. In addition, freight and passenger rail operations require different measures to guard in prevention and disaster response. The key to a comprehensive approach to rail security is federal legislation that clearly empowers TSA to work in specific ways with the rail industry, labor, and state and local governments; that recognizes the need to fund adequately a comprehensive approach to rail security; that builds on existing efforts of government and the private sector; that insures that rail is given consideration in legislation dealing with modes such as trucking and ports that interact continuously with the freight rail industry; and that takes an expansive view of the importance of rail transport in the life of the nation. This comprehensive approach leads to the following specific recommendations noted below.

V. Recommendations

V.1. Rail security legislation

Congress should pass legislation to identify rail security as a major public policy question worthy of specific attention and oversight. Legislation should fund adequately programs to provide research and development on rail security issues, conduct vulnerability and risk assessments, model potential disaster scenarios and test recovery plans, train front-line employees on security issues, and provide for needed improvements in infrastructure, especially along the Northeast Corridor line of Amtrak. The estimate of funding in the

range of \$1.2 billion over a three-year period as identified in the 2006 Rail Security Act is a realistic estimate of the cost required to reach desired levels of security, taking into account significant private sector and state and local government expenditures as well as the federal funds.

V.2 Clear delegation of authority

The Transportation Security Administration (TSA) of DHS be clearly understood to be the lead federal agency to deal with all aspects of rail security (freight and passenger). TSA should be staffed with personnel possessing expertise in rail operations and procedures. Congress and the executive branch should ensure that TSA personnel working with rail security remain assigned to such tasks so that they develop strong relationships with other elements of the rail security network (e. g., personnel of the AAR and ASLRRRA, rail unions);

V.3 Maintain and Enhance a Risk-Based Approach

Resources to enhance security must be adequate to deal with potential problems and be allocated according to a careful assessment of risk, not formulas based on population or political earmarking. The emphasis on risk assessment used by DHS is the most realistic approach to secure the nation's rail system. Risk assessment activities already undertaken have received high marks from GAO, rail operators, and the media. The methodology employed by DHS, including threat assessment, criticality assessment, and vulnerability assessment, is a sound one. Obviously, not all infrastructure make for likely targets. Those where large number of people congregate, represent major junction points for multiple railroads, or may be system bottlenecks because of geography are most vulnerable from a military standpoint. Trains may be targets if they are carrying passengers or hazmats, but otherwise have little target value unless as a means of conveying a weapon to a target site.

Using a risk assessment approach that embraces a) a realistic understanding of the potential value of a specific target, b) the type of threat involved (e.g. killing people, inflicting damage to the economy in general, or using a railroad as a distribution system for weapons), and c) the ability of the rail network to quickly adapt and circumvent any destroyed infrastructure. On this last point we suggest that coordinated attacks that destroy multiple infrastructure components can be achieved, their coordination is difficult to execute unless the target is a physical attack on a railroad's single data center (assuming it has no backups) or a cyber attack on its information systems (whether or not it has backup data centers).

In conducting risk assessments, it is critical that input be provided from rail operators and other stakeholders, and take into account relevant data from international examples of acts of terror directed at the rail system.

V.4. Enhance funding

To the extent possible, develop a protocol that establishes equity in funding between rail and other modes, for example, the amount spent per passenger on air security and the amount spent on rail and urban mass transit passengers, or between port security and the security of rail freight. It is outside the bounds of this research to suggest specific funding levels. Using past legislative projections, however, it appears reasonable to suggest that rail security is significantly under-funded relative to other transportation modes and infrastructure categories.

V.5. TSA as rail security network leader

- Working with the rail industry, unions, and other affected groups, TSA to complete a strategic plan specific to rail security, including connections with other modes of transportation or of logistics chains in which rail is a factor;
- TSA, working with the Federal Railroad Administration, be empowered to require rail operators to develop security plans and engage in unplanned inspections on the property of rail operators

V.6. Disaster Mitigation and Relief

The rail system should be considered a potential asset in relief efforts after natural and man-made catastrophic events. Consideration to be given to the creation of dedicated trains for deployment to areas impacted by major disasters (e. g., Hurricanes Katrina and Rita). Such trains would be used to move large numbers of families out of impacted areas and should include basic survival items such as food, water, medicine, and medical staff. A typical train would include locomotives on either end of the train to avoid the need for turning or switching; be staffed by crews trained in emergency response; and be included in the security plans of rail operators and TSA's strategic rail plan. We recommend that three such trains be provided, positioned at northern New Jersey, New Orleans, and Los Angeles. The deployment of the New Orleans-based train might be considered seasonal and redeployed to another High Threat Urban Area outside of hurricane season (June-November).

V.7. Maintain and Strengthen Public-Private Partnerships

Information sharing within the rail security network should be enhanced through public and private investment in shared and secure information systems.

V.8. Research and Development

Federally funded research on rail security issues should be expanded. Research should be directed both to areas of product and service delivery and scenarios that examine the consequences of possible terrorist acts against railroads or other situations in which rail operations and facilities are affected (e. g., port security).

V.9. National Commission on Rail Security

A National Commission on Rail Security should be created by Congress, to elevate awareness of rail security issues, point out the potential threats and their impacts on the population and the economy, and identify ways in which railroads can be utilized in case of attacks and natural disasters. The Commission should develop a better understanding of the balance needed between the requirements of security, civil liberties, and economic health in issues related to rail security. The Commission should be broadly representative and include individuals knowledgeable about rail safety issues from a wide variety of perspectives.

V.10. Institute a Process for Identifying Best Practices

The topic of terrorism is a complex one with clear differences in threats as well as solutions between industry segments. We recommend that a multi-echeloned benchmarking endeavor be implemented to share best practices. These echelons need to be considered among the following:

Freight railroads: No single organization has a monopoly on best practices. During the course of this research it was apparent that firm size is not a prerequisite; nor is region of the country. AAR does have a terrorism committee that fulfills this role and we recommend that it be further emphasized.

All railroads: Freight railroads can learn from passenger railroads and vice versa. Any planning by freight railroads should endeavor to include their passenger counterparts. This is especially true when respective passenger railroads and freight railroads either share infrastructure or operate in close proximity to one another.

The transportation industry: The trucking industry has gone substantially unregulated with regard to security—sporadic truck stops conducted by state police agencies and public utilities commissions notwithstanding. However, many of the larger trucking firms have established extensive loss and damage capabilities. Container lines, clearly since 9/11 and the advent of C-TPAT and CSI have been significantly more active with regard to security threats. A forum needs to be established whereby trucking, ocean container lines, and railroads will have the ability to share best practices and to even collaborate on practices that can be shared across modes.

Transportation industry and shippers of sensitive materials: Major firms that have historically produced sensitive materials—hazmats, high value goods, and those with theft potential—have both internal and industry-wide initiatives. The pharmaceutical industry has a state-of-the-practice ability to track shipments while the chemical industry has become increasingly vigilant with regard to integrity of railcars and trucks to be loaded with product. Moreover, the leading firms in the chemical industry have become far more watchful of the security of their facilities as well as the origins and destinations of their products. On the latter issue, the Chemical Manufacturers Association, the predecessor of the American Chemical Council, instituted a subcommittee to address

potential illicit use of members' materials. Engaging these firms in a best practice exchange whereby transportation firms may come out of their "comfort zones" is further recommended.

Aviation lessons: All anti-terrorism measures utilized in air passenger operations should be examined for their potential to enhance rail passenger security.

V.11. Recognize modal linkages

Legislation directed at a specific mode of transportation, such as port operations or railroads, should take into account the intermodal nature of contemporary transportation and insure that logistics chains and intermodal connections are factored into programs.

V.12. Restricted Access

While access cannot be 100% physically restricted because of the extensive nature of the network, it is recommended that legislative action be taken to:

1. Increase the penalties for trespassing from the equivalent of a minor traffic infraction to the equivalent penalty of entry onto airport property having commercial service (currently Federal law stipulates a \$10,000 fine and/or 20 years imprisonment; however, where loss of life is concerned, 50 years imprisonment). Railroads should have no lesser status than other modes of transportation and are generally governed by the Commerce Clause of the U.S. Constitution.
2. Establish fence perimeters for major railroad installations such as rail yards, intermodal terminals, repair facilities and stations. Rights-of-way shall be marked as per existing convention, but in a more consistent manner. Fencing of the entire rights-of-way needs to be recognized as being neither practical nor effective.
3. Increase the use of motion detectors and lighting near major installations. Cut back on brush and weeds that would allow intruders hiding opportunities.
4. Railroads should be relieved of any personal injury liability incurred by individuals while trespassing on railroad property.
5. All railroad employees as well as those applying for employment as railroad workers shall have their backgrounds investigated prior to beginning work. All employees shall be issued picture identification which they shall be required to have on their persons whenever on railroad property. Railroads will provide reciprocity for those employees of other railroads while engaged

in utilizing trackage rights.

6. All contractors engaged by railroads shall have their backgrounds investigated and be issued contractor picture identification for the period that they are performing services.
7. Employees and contractors entering onto railroad property where there are major installations shall have their personal vehicles subject to search under circumstances similar to those entering the property of commercial airports.

V.13 Coordinated Law Enforcement

Enforcement of trespassing regulations shall be enforced by all law enforcement personnel operating in a given jurisdiction. Several specific recommendations are made in this regard:

1. States should provide consistent police powers to railroad police Officers, which should result in consistent authority across all jurisdictions where a railroad owns or operates property.
2. All police officers, whether Federal, state, county or local, inclusive of park police, ports authority police, fish and game officers, Customs and Border Protection agents and Coast Guard personnel, should have the protection of transportation infrastructure within their purview.

V.14. Recommendations for Rail Industry Action

There are several recommendations that railroads can proceed to adopt now. As one rail executive noted during our interview, “There is no single magic bullet that is going to make the railroads secure from terrorist attack, but there are many practical, common sense things we can do, and are doing, today.” The following is a compilation of such recommendations.

V.14.1 Consistent Vigilance Across All Modes of Transportation

Given the complexities as well as the scope of the network, efforts are required to increase the vigilance of all individuals in the employ of the railroads as well as their intermodal partners. Therefore we recommend the following:

1. Each railroad should embrace a total security culture (TSC) whereby a primary objective will always be protection of transportation infrastructure. A total security culture for this millennium will mirror the efforts of the 1980s to establish

total quality management (TQM), which now has been woven into the fabric of most corporations. TSC will:

- a. Need to achieve the unanimous support of senior management and the board of directors. Publicize TSC in the company's annual report, but also in its print and electronic media.
 - b. Develop an awareness of trespassing and how to challenge/educate those encountered. Moreover, making every employee one more set of eyes and ears with a commitment to protect railroad property.
 - c. Provide the identification of items and situations that may be potential threats to the network and whom to contact for further action.
 - d. Establish improved communications between railroad operations and railroad police.
 - e. Establish improved communications capabilities between railroad police and other modes of law enforcement.
2. Consider utilizing railfans as additional eyes and ears for the railroads. While in the past there have been contentious issues, their interest is obvious and their knowledge of railroad operations often goes far beyond that of the casual observer. BNSF has a program to register railfans and the AAR has an embryonic concept on its website. A useful metaphor is that this becomes the railroads' equivalent of the *neighborhood watch*.

V.14.2. Proximity of Rail and Non-rail Activities

While issues such as limiting chemical shipments through urban areas has become political rhetoric and sensationalized news, plans need to be developed to reroute hazardous materials moving on rail lines close to large public events such as concerts, sporting events, and parades. Appropriate distance between the rail line and such locations would need to be established by those technically trained to make such determinations.

V.15. Land Use

Encourage communities to include proximity uses when their planning boards and zoning boards are making decisions with regard to land use. Locating stadiums immediately next to an active rail line might increase tax revenue, but it may add complexity to a

railroad's ability to continue to serve customers demanding materials of a hazardous nature.

V.16. Interconnections

The ability to reroute train traffic may be one of the most significant defensive characteristics of the U.S. rail network. While its complexity makes it difficult to protect, that same complexity, especially with regard to the myriad connections between lines, can make it especially challenging to those wishing to put it out of service. Where connections between railroads do not exist, or may have been removed immediately following economic deregulation, consideration for re-establishing such interconnections should be revisited.

V.17. GAO Review

Within a reasonable timeframe the General Accountability Office (GAO) should be asked to conduct a review of freight rail safety and security policies and procedures, including an analysis of the roles of TSA and FRA and their ability to coordinate their respective security and safety roles; to examine ways in which safety and security needs intersect to avoid duplication of effort; and to give a general assessment of the effectiveness of freight rail security efforts to complement the study of passenger rail security done previously.

V.18. Training

Enhanced training of rail personnel to deal with both the prevention of terrorism and its aftermath is necessary, and should be a shared public and private responsibility.

VI. Summary and Conclusions

Securing and protecting a transportation system as complex, vital, and far-flung as the U. S. rail system is a daunting challenge for government and the rail industry. Railroads have been frequent targets of terrorism in the past, and nothing suggests that they will be less enticing to terrorists in the future. The role that freight railroads play in global commerce and their applicability to move weapons of mass destruction to major urban areas is a new and highly dangerous factor. The three major types of WMDs – radiological, chemical, and biological – all pose threats to freight rail operations. Given the enormity and geographical spread of the U. S. rail network, traditional approaches to security – policing, cordoning, restricted access – are not feasible to defend the system. Instead, a risk-based approach must be employed under conditions of high uncertainty given the lack of empirical evidence upon which to draw conclusions.

Passenger railroads operate in densely populated urban corridors and have been shown to be vulnerable to attack in other nations. By their nature, passenger rail operations can not be made secure by checking all passengers and carry-on materials. Passenger rail, in particular commuter rail, requires easy and quick access and multiple points of entry and

egress. Compared to freight operations, rail passenger threats can be more readily inferred, given the frequency and nature of attacks outside the U. S. The most likely scenario for a rail attack appears to be the use of explosives on trains or rail facilities in the Northeast, either on Amtrak or one of the urban mass transit systems in the region. Given the symbolic importance and proven targeting on 9/11/01 of Washington, DC and New York City, it is logical to assume that these are the most likely targets.

Freight and passenger rail security needs differ in many ways and overlap in others. The network of organizations involved in each rail mode differs, both as to the actors involved and the costs and benefits attached to security investment. Rail passenger security needs include additional funding for infrastructure improvements, better information systems, security personnel and equipment, and other cost items. Rail freight needs include enhanced training of rail personnel, stable and collegial relationships with federal agencies and state transportation agencies, and support for anti-trespass and insurance liability concerns. Rail freight operations need also to be considered as policy is developed for other transportation modes and related industries.

Both freight and passenger rail systems have the potential for catastrophic events, either caused by terrorism or natural disaster. They also have the potential to assist in disaster mitigation and relief efforts. The freight railroads did an outstanding job in recovering from the damage to their infrastructure in the Gulf Coast hurricanes of 2005. Congress should consider ways in which railroads can be factored into effective emergency management plans as well as plans to deal with the prevention of catastrophic events.

Rail security since 9/11/01 has taken a different path than security enhancement in other modes of transportation and other categories of critical infrastructure. Strong private sector action has filled part of the vacuum that existed for several years as the federal executive put higher priorities on other aspects of homeland security and the war on terror. This imbalance between public policy and private sector action is now being partially redressed as stronger network collaboration is emerging between TSA and the rail industry. This is an encouraging development, but more needs to be done. Additional resources, clear directives from Congress regarding TSA performance standards for risk assessment, deadlines for completing and updating strategies and plans, and above all, additional funding to conduct more risk assessments and research into rail security issues, is needed. As the final draft of this report is being prepared, legislation in Congress is being introduced to address many of these needs. H. R. 1, *To Provide for the Implementation of the Recommendations of the National Commission on Terrorist Attacks Upon the United States*, includes many of the recommendations endorsed by this report, including the need for modal strategies and a report by TSA on personnel turnover by mode. This is a good beginning, and we hope that it will be followed by legislation specifically providing for programs to enhance the safety of the nation's rail system. Safe, secure, and efficient rail transport remains vital to the health of the nation.

Tables

Table 1: Top Chemical Commodities Transported by Rail (2002)

Rank	Chemical	Carloads	Tons*	%	Uses
1	Potassium chloride	131,888	13.41	7.1	ice melt, potash
2	Polyethylene	153,380	13.27	7.0	plastic molding
3	Sodium carbonate (1)	121,672	12.43	6.6	glass, water treatment
4	Plastic resins (other)(2)	115,720	9.61	5.1	plastic molding
5	Polypropylene	90,412	8.74	4.5	plastic molding
6	Diammonium phosphate	81,720	7.12	3.8	fertilizer
7	Sodium hydroxide (3)(c)	73,116	7.11	3.8	processing
8	Sulfuric acid (c)	68,420	6.64	3.5	processing
9	Polyvinyl chloride	63,888	5.89	3.1	plastic molding
10	Ammonium nitrate	42,584	4.14	2.2	fertilizer
11	Ethyl alcohol (f)	41,508	3.90	2.1	beverages, fuels
12	Urea (solid)	39,120	3.78	2.0	fertilizer
14	Liquified chlorine gas (p)	34,380	3.05	1.6	multiple
16	Vinyl chloride (f)	32,820	2.89	1.5	PVC (see above)
17	Polystyrene	32,388	2.84	1.5	plastic molding
21	Methyl alcohol (f)	24,120	2.25	1.2	fuel, acetate
22	Hydrochloric acid (c)	21,280	2.02	1.1	multiple
23	Styrene monomer (f)	21,000	1.93	1.0	polystyrene (see above)
26	Liquified carbon dioxide	19,676	1.58	0.8	multiple
27	Ethylene glycol	14,620	1.46	0.8	antifreeze, Polyester

Notes: (1) commonly known as soda ash
 (2) includes a range of polymers including polyesters, polyacetate, polyacetyl, polycarbonate, polytetrafluorethylene, polybutylene, polyacrylate, ABS, and nylon
 (3) commonly known as caustic soda

Hazards: (c) corrosives
 (f) flammables
 (p) poisons

Source: Adapted from *Trains*, November 2004

Table 2: Private Ownership of Railcars by Type (in thousands)

Type	Private Ownership	Percent of Private Fleet
Boxcars	7.1	1.0
Flatcars*	129.8	18.1
Gondolas	51.6	7.2
Hopper cars, covered	271.0	37.8
Hopper cars, open	25.1	3.5
Refrigerated cars	1.4	0.2
Tank cars	229.4	32.0
Maintenance of Way	1.6	0.2
Total	717.0	100.0%

Source: North American Railroad Equipment Register, 2003

Table 3: Commuter Rail Agencies and Ridership

Agency	States Served	Riders/Day*	Riders/Month**
Metrolink	California (greater Los Angeles)	31	
Long Island	New York		6.2
MARC	Maryland, District of Columbia	26	
MBTA	Massachusetts, New Hampshire	143	
Metra	Illinois, Indiana, Wisconsin	380	
MetroNorth	New York, Connecticut		6.8
NJTransit	New Jersey, New York, Pennsylvania	827	
SEPTA	Pennsylvania, New Jersey	107	
VRE	Virginia, District of Columbia	16	
Amtrak (1)	New York, Pennsylvania, Maryland	750	

* Thousands per day ** Millions per day

Note: (1) While not a commuter agency per se, Amtrak carries a significant number of passengers on the Northeast Corridor and Keystone Service

Sources: Amtrak and individual commuter rail agency websites

Table 4: Profiles of Principal Freight Railroads

<u>Railroad</u>	<u>States Operated</u>	<u>Track Miles*</u>	<u>Employees*</u>	<u>Loco- motives*</u>	<u>Car Fleet*</u>
Burlington Northern					
Santa Fe	28	33	38	6.3	220
Canadian National	16	19 (1)	22		
Canadian Pacific	5	14 (2)			
CSX Transportation	23	22	32	3.7	105
Kansas City					
Southern	10	3	3		
Norfolk Southern	21	30	30	3.8	100
Union Pacific	28	32	50	8.0	107

*in thousands of units

Notes:(1) Canadian-based firm. Approximately 40% of route network is in U.S. Owns former Illinois Central Railroad

(2) Canadian-based firm. Approximately x% of route network is in U.S. Owns former Delaware and Hudson, Soo Line and Wisconsin Central Railroads

Sources: Individual railroad websites

Table 5: Taxonomy of U.S. Freight Railcar Use and Ownership

Type	Commodities	Railroad	Private
Boxcars, general	packaged merchandise	X	
	auto parts	X	
	bulk materials (5)	X	
Boxcars, refrigerated	agricultural products		X
Flatcars (1)	equipment	X	
	motor vehicles	X	
	steel	X	
	lumber & building materials		X
Livestock cars	livestock		
Gondolas (2)	refuse	X	X
	bulk commodities	X	X
Hopper cars, covered	agricultural products (6)	X	X
	Fertilizer	X	X
	plastic resins		X
	cement	X	
	dry bulk chemicals (7)		X
Hopper cars, open	coal and coke	X	X
	Ore	X	X
	sand and aggregates	X	
Intermodal cars (3)	container bodies (8)	X	
	highway trailers	X	
Tank cars, pressurized (4)	chemicals		X
	petroleum products (9)		X
Tank cars, non-pressurized	chemicals		X
	slurries		X
	petroleum products		X
	bulk food products (10)		X
Specialized cars	miscellaneous (11)	X	X

- Notes: (1) Includes cars modified for coiled steel, depressed center cars for dimensional loads, center sill and bulkhead cars for lumber and building materials, and heavy capacity platform cars.
- (2) Includes “top gons” or cars with tall sides and no bottom discharge capability, intended for rotary dump service
- (3) In addition to the ubiquitous 86-foot flatcars with fifth wheels and locking container posts, intermodal cars may cover a range of equipment including individual well cars, five well articulated sets, individual light weight spine cars, and five platform articulated sets. Roadrailleurs, a hybrid highway trailer adapted for connection to railway trucksets is not included in this census.

- (4) May include cryogenic tanks used for liquid nitrogen and other refrigerated gases
- (5) Box cars may be used for bulk materials such as grain when there is a season shortage of covered hoppers. Such use requires a bulkhead being placed across door openings.
- (6) Products may include, but not be limited to grain, milled flour, palletized gluten, animal feed and oil seed.
- (7) Dry bulk chemicals may include carbon black, soda ash, fly ash, pulverized limestone, hydrated lime, metallic oxides such as alumina, and a range of refined inorganic intermediates such as trisodium polyphosphate or montmorillonite clay
- (8) Container bodies may include 20-foot and 40-foot international ocean dry van containers, 48-foot and 53-foot domestic dry van containers, and 20-foot ISO tank containers (Use for hazmats is not permitted).
- (9) Pressurized petroleum products are typically liquefied petroleum gas (LPG) and propane
- (10) Bulk food products substantially include vegetable oils and sweeteners that have important food uses, but could also have agricultural or industrial applications
- (11) Miscellaneous rolling stock would include equipment used by equipment fabricators for transporting unusually heavy or oversized loads and the railroads themselves for maintenance-of-way purposes.

Table 6: Intermodal and Multimodal Terminals by Major Railroads in North America

<u>Railroad</u>	<u>Intermodal Terminals</u>	<u>Comments</u>
Burlington Northern Santa Fe	30	
Canadian National	16	8 in Canada
Canadian Pacific	17	10 in Canada
CSX Transportation	47	
Ferrocarril Mexicana		
Kansas City Southern	4	
Kansas City Southern de Mexico		4 in Mexico
Norfolk Southern	46	
Union Pacific	27	

Table 7: Inbound Rail Traffic at Principal U.S. Border Crossings (2003)

Port	Total Tons*	% of Port	
		Total Tons	Containers* (1)
El Paso, TX	870.8	25.9	51
Buffalo-Niagara Falls, NY	6,052.6	30.2	150
Port Huron, MI	12,979.3	44.3	459
Laredo, TX	9,299.0	35.6	313
Detroit, MI	4,852.2	24.5	254
Total NAFTA Traffic	80,867.0	31.8	2,476

*in thousands

Note: (1) Total tons is both carload and containers, hence container statistic represents only a portion of the total imports through a gateway.

Source: America's Freight Transportation Gateways, U.S. DOT, 2004

Table 8: Safety and Security Initiatives Applicable to Rail Transportation

Initiative	Sponsor	Explanation
Freight Railroad Security Plan	Association of American Railroads	Sets a framework for five individual initiatives addressing hazardous materials, operations, information technology and communications, infrastructure and military moves. Also establishes four distinct alert levels.
Container Security Initiative	U.S. Customs and foreign governments	Inspects U.S.-bound containers at major foreign ports of loading
Customs-Trade Partnership Against Terrorism (C-TPAT)	U.S. Customs and Border Protection	Begun after 9/11. Validates firms importing goods into the U.S., the suppliers of those goods, and the international and domestic firms transporting them
Strategic Transportation Asset Tracking (STAT)	Burlington Northern Santa Fe Railroad (1)	Provides a system for the real time tracking of high value and other sensitive cargos

Safety Assurance and Compliance Plan	Federal Railroad Administration	
Technology Asset Protection Association	Consortium of computer and home Entertainment firms	Sets standards for facility and transportation security
Responsible Care	American Chemical Council (2)	Required of all company members involves vulnerability assessment, measurement and public disclosure of chemical hazards and releases
eRailsafe	Joint venture of Class I railroads	Separate entity seeking to provide access clearances for suppliers and contractors entering railroad property

- Notes: (1) Railroad sponsored with intentions of spreading to all members of AAR engaged in interchange service
- (2) A long-standing initiative originally implemented by organization's former name, Chemical Manufacturers' Association

Sources: www.bnsf.com; www.acc.org; www.fra.gov; www.cbp.dhs.gov; www.tapaonline.org

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