An Analysis of Truck Cargo Security at Southwestern Borders and Potential Impacts of Cross-Border Trucking Services of Mexican Carriers on Terrorism Risk Exposure

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Executive Summary

In this current era of heightened alertness of domestic terrorism threat, security of incoming cargo has taken a crucial role. Bureau of Customs and Border Protection (CBP) takes the lead in protecting the nation from illicit weapons and explosives. Each year, CBP processes approximately 20 million sea, truck and rail containers, but physically inspects only a fraction of these containers. Limited resources render 100% physical inspection practically impossible. The agency has adopted a layered approach to improve security at different nodes of the supply chain with the realization that it may be too late when certain weapons or explosives reach US borders unimpeded. CBP seeks cooperation of companies involved in trade and foreign governments to ensure the transparency and integrity of cargo en route. A number of initiatives and programs have enlisted foreign port officials’ efforts into inspection of cargo overseas destined to the United States. However, cargo that arrives at land ports of entry does not go through the procedures that are set forth by these initiatives and programs.

Truck crossings at the southwestern ports of entry increased steadily over the years prior to 9/11. Despite the recession that ensued after the terrifying terrorist attacks, the annual number of truck crossings remains above 4 million. According to CBP, these crossings are made by approximately 80,000 trucks, 80% of which are Mexican owned. This study examines security issues pertaining to Mexican commercial truck crossings at US borders. We propose a model that examines the risks at various phases of intermodal transportation, beginning with the loading of cargo at the warehouse and including processing of cargo at both foreign ports of entry (FPOE) and US customs ports.

Cross-border trucking accounts for 85% of all US-Mexico trade under the North American Free Trade Agreement (NAFTA). ¹ This 1994 agreement established an open trade relationship between the United States, Mexico and Canada. The three countries agreed to dismiss tariffs and restrictions on numerous goods and services, including agriculture, textiles and motor vehicles crossing through borders. However, a 4-year US moratorium on Mexican trucks, has been a stumbling block for the free flow of trade that was expected upon NAFTA’s implementation. Concerns that prompted the moratorium ranged from environmental and safety concerns to labor union disputes. But in the aftermath of 9/11, security concerns further hinder Mexico’s ability to bring their commercial trucks through US borders. As the demand for cross-border truck services increased, wait times along the US-Mexico border increased significantly, at times taking days for a truck to cross. Delays disturbed production schedules for manufacturing companies in Mexico as well as the United States,² introducing another complexity into the fine balance between the security of incoming cargo and facilitation of trade.

In short, we aim to assess the feasibility of Mexican truck border crossings beyond the current commercial zone of 20 miles, while maximizing the federal government’s ability to deter and intercept smuggling of weapons and nuclear materials. This assessment includes a review of inspection processes on either side of the border and security challenges faced by Mexican factories, truck-drivers and customs brokers. It also includes an evaluation of inspection procedures conducted by the US Customs and Border Protection (CBP) at the checkpoints along the southwestern border.

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I. An Overview of NAFTA and Cross-Border Truck Operations

Free flow of trade between Canada, Mexico and the United States borders was established under NAFTA. The agreement significantly increased the volume of truck traffic along the southwestern border. In 1993, 1.9 million trucks crossed into the US from Mexico. Four years after NAFTA, that number had reached 2.8 million. One of the provisions set forth by the agreement stipulated a phasing-in of Mexican commercial trucks into the US, which was prohibited prior to NAFTA’s passage. Immediately following NAFTA’s enactment, a moratorium, prompted by a coalition including the Teamsters Union, environmental groups and road safety advocates, was implemented. A formal dispute ensued, and in 2001 a NAFTA arbitration panel ruled that the US blanket moratorium on Mexican-domiciled trucks was a breach of the Agreement. The panel then authorized the US to impose stricter safety standards for foreign trucks crossing US borders. Currently, Mexican commercial vehicles are allowed to cross past the US boundary into a 20-mile commercial zone, where cargo is transferred to American trucking companies.

Despite environmental and labor pressures, Mexican cross-border trucking appears to be in the future of free trade. The Bush Administration and numerous elected officials have publicly vowed to move the NAFTA policy in this direction. However, environmental and safety concerns continue to loom. In the aftermath of 9/11, there exists an emphasized need to account for national security and to increase measures against weapons and explosives smuggling across US borders.

A. Domestic Tensions over the Moratorium

Delayed implementation continues due in part to pressures imposed by a coalition of Teamsters members, environmentalists and vehicle safety advocates. The environmental concern is that many Mexican trucks do not comply with US emissions standards. Many of these trucks are also not in compliance with Mexican emissions standards, a result of the grandfathering of older carriers that continue to be in use by trucking firms. It is believed that 66% of the Mexican truck fleet are 1993 model years and older. Engines manufactured before 1993 have no built-in computer controls that could reduce emissions. In the case of Department of Transportation v. Public Citizen, public interest watchdog group, Public Citizen, attempted to block Mexican truck entry due to these concerns. The organization challenged NAFTA’s provisions that allowed Mexican trucks to cross US borders, arguing that the government had not complied with environmental impact statement (EIS) requirements prior to NAFTA’s implementation. The court ultimately ruled that Mexican trucks are not required to undergo the same EIS regulations as domestic carriers.

Advocates of NAFTA argue that Mexican long-haul trucks are not expected to put more burden on the environment than US long-haul trucks. A recent study concluded that while Mexican trucks emit more pollutants on average, the difference is statistically insignificant. An interesting result from this study is that the emissions data collected from Salt Lake City, which is approximately 650 miles away from the

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4 NAFTA Secretariat, 2001
6 NAFTA/Mexican Truck Emissions Overview, 2005
commercial zone at the border, reveals that one in every five trucks operating in this region have environmentally hazardous emission rates; a fraction higher than any US or Mexican location.

In addition to environmental concerns, proponents of the moratorium also challenge the safety of Mexican carriers. According to a 1997 study by GAO, these trucks, typically three to four times older than their US counterparts, fail US customs inspections in 45% of all cases, whereas US truck failures rate remain at 28%. Safety advocates also fear the increased use of drayage vehicles, or short-haul trucks in the United States. Typically used to transfer cargo short distances, these vehicles are often lacking lights, sufficiently functioning brakes or safety windows. Drivers of drayage vehicles are generally younger and less skilled than those of long-haul vehicles.

Advocates of NAFTA respond to safety related concerns by arguing that the removal of the blanket moratorium would reduce the number of drayage vehicles in Mexico, because they cannot be used for long-distance cargo transportation. Most Mexican trucking companies are expected to employ more modern trucks if they are permitted to operate beyond the current limited commercial zone. Furthermore, they believe that the Mexican trucks that went through safety compliance inspections were not selected randomly, overestimating the actual percentage of Mexican trucks that operate in the US and fail to maintain minimum safety standards. Non-random selection notwithstanding, trucks in some states in the US perform worse than Mexican trucks. The DOT Inspector General’s report in 2001 reveals a decreasing trend in the percentage of trucks found to be in safety violation as the number of trucks inspected is increased. The report argues that Mexican truck safety violation rates are correlated with the level of inspection resources at the border. In particular, 27% of Mexican trucks are banned from access to US highways in California, whereas this rate goes up to 41% in Texas.

In California, threats of job insecurity, resulting from the presence of Mexican trucking firms in the US, sparked resistance to a lifting of the truck moratorium as well. The trucking industry fears that California truckers will be replaced with their Mexican counterparts, who have access to cheaper diesel, in addition to accepting lower wages. NAFTA proponents reply that there is in fact a truck driver shortage in the cross-border trade industry. While Mexican drivers may accept lower wages, costs to insure these drivers would be higher, in addition to language and cultural barriers that in some instances would make employment more challenging. However, other experts argue that the cross-border trucking practices will not change in the short-term, mainly because of the lack of business relationships of Mexican carriers with US importers and the monetary and non-monetary costs of customs procedures.

B. Congestion at the US-Mexico Crossing

The 9/11 attacks caused a dramatic shift in the rules regulating cross-border trucking operations. The sudden demand for increased transportation security resulted in longer delays in border inspections.\textsuperscript{17} Congestion can be a security risk, as fewer trucks undergo inspections during peak hours of congestion.\textsuperscript{18} A typical wait time at a heavily utilized port of entry runs between 2-3 hours for most commercial trucks\textsuperscript{19}. The waiting period is contingent upon the time of day, the port of entry, and the goods undergoing inspection. Often, Mexican port authorities release trucks in groups, producing inspection delays. This is a result of the Mexican classification system, which tracks their shipments by units that may be transported by many different trucks.\textsuperscript{20} Figure 1 below illustrates the volume of traffic at various ports of entry along the southwestern border.

\textbf{Figure 1: 2003 Incoming Truck Movements: Top Ten Ports of Entry from Mexico}\textsuperscript{21}

\begin{center}
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\end{center}


\textsuperscript{18} Commercial traffic data of FY1998 in GAO/NSIAD-00-25 suggests that fewer trucks are examined at ports of entry where higher volume of traffic is experienced.


\textsuperscript{20} \textit{Ibid.}

\textsuperscript{21} \textit{Ibid.}
Traffic is higher at certain ports of entry over others. For instance, wait times for inspection at Laredo’s Lincoln-Juarez Bridge sometimes extend beyond three hours.\textsuperscript{22} More than half of truck crossings into the United States take place at the Laredo port of entry.\textsuperscript{23} Due to its high volume of traffic, Laredo typically inspects only every 10-12\textsuperscript{th} truck that crosses the border.\textsuperscript{24} This port of entry often referred to as the most important southwestern border-crossing point, processes the majority of trucks due to its strategic location between Chicago and Mexico City, a path commonly used in the trade of goods.\textsuperscript{25} In addition to long-haul traffic, approximately 2,500 drayage trucks cross Laredo borders with cargo daily, many of which cross several times daily.\textsuperscript{26}

According to CBP Commissioner Robert Bonner, Laredo’s is working to improve expedited inspections through an increased number of canine inspections, radiation portal monitors and an emphasis on inspector selectivity in their choices for truck inspections. Currently, the State of Texas is building two new safety inspection stations at two nearby international bridges. Together, the stations are expected to inspect 5,500 trucks daily.\textsuperscript{27}

Congestion varies by season. The Nogales POE attracts nearly two-thirds of US and Canadian winter produce. During the winter season, delays at Nogales may reach 2 to 3 hours, when up to 1,400 trucks cross through this port of entry daily.\textsuperscript{28}

Additional contributing factors to border congestion are maquiladora schedules of transport. Maquiladoras, or assembly plants that are generally located in close proximity to the US border, transport cargo through customs inspections on a regular basis. Ports of entry in close proximity to large maquiladora production centers include Ysleta in El Paso, Texas and Otay Mesa, California, where the majority of maquiladoras operate based on “just in time” (JIT) procedures. Orders at such factories are submitted in the morning and are shipped later that day, contributing to significant congestion at checkpoints in the afternoon.\textsuperscript{29}

The congestion and delayed inspection processes also increase the likelihood of smuggling or tampering with cargo, particularly on the southern side of the border, where corruption and theft are rampant.\textsuperscript{30} Cargo trucks, which at times have waited 2-3 days during an inspections process, are increasingly vulnerable to tampering as the cargo remains unattended for longer periods of time.\textsuperscript{31} Additionally, long inspection times lower incentives for Mexican trucking firms to use newer, more secure long-haul vehicles instead of

\textsuperscript{22} Ibid.
\textsuperscript{23} Cappiello, 2005
\textsuperscript{24} FY2006 Homeland Security Appropriations Committee Hearing. 2005.
\textsuperscript{28} Rotstein, Arthur H. Arizona Governor Says Port Upgrades hold Key to Trade Future. Associated Press. 06 June 2003.
\textsuperscript{30} Based on an interview with Mitch Masoner, Business Agent for Teamsters Union Local 399. Interview Conducted on October 6, 2005.
\textsuperscript{31} Homeland Security Subcommittee, 2005
drayage trucks which are more susceptible to security threats. Using drayage vehicles is more profitable as delays increase operation costs for carriers utilizing their higher quality vehicles for cross-border operations.\(^{32}\)

A 2000 evaluation of the safety inspection process for commercial traffic at the US-Mexico border concluded that factors ranging from insufficient use of technology to poor coordination among agencies resulted in inefficient, lengthy inspection procedures. GAO cited six distinct factors that exacerbate border congestion along the southwestern border: \(^{33}\)

1. Multiple border inspections and lack of coordination between federal and state agencies
2. Staffing shortages at some border crossings
3. Insufficient use of technology to process incoming commercial traffic
4. Scarce space for expansion of port inspection facilities
5. Inadequate roads leading to certain checkpoints and bottlenecks that increase congestion
6. Poor coordination between the US and Mexican governments

While most of these issues are well recognized by border security officers and administrators, the implementation of improved practices and technologies still presents a challenge. Norm Mineta, then-Secretary of Transportation, expressed a continuing need for electronic technologies linking databases between insurance agencies, operating authorities and the US and Mexico motor vehicle departments. Additionally, he expressed the importance of increased enforcement of fines and penalties for violations of safety and security regulations.\(^{34}\) Higher penalties for violations are expected to have a deterrence effect on violations as expected costs of violations may exceed the cost of compliance.

C. Drug Smuggling and Links to Contraband

The National Drug Intelligence Center determined that it is possible for drug traffickers to use commercial trucks to smuggle illicit drugs into the United States.\(^{35}\) CBP has previously reported instances of marijuana and cocaine seizures discovered through gamma-ray and canine inspections of trucks entering the US from Mexico. Mexican drug traffickers have studied NAFTA policies and procedures in order to determine which products move quickly through border inspection.\(^{36}\) Some drug cartels use a technique called “shot-gunning,” where large amounts of drugs are divided into segments and are distributed throughout different shipments that go through CBP checkpoints simultaneously.\(^{37}\) Other smugglers have used multiple trucks to pass inspection, using one suspicious-looking truck to distract inspectors while a second truck containing


\(^{34}\) Norman, Mineta Secretary of Transportation, testifies on cross border truck operations to the US Senate Appropriations Committee on transportation. 2002 Jun. 27. Washington Transcript Service.


hidden illegal drugs easily passes through the checkpoint.\textsuperscript{38} There are also instances where smugglers purchased legitimate businesses or factories and used their shipments for drug smuggling purposes.\textsuperscript{39}

While there are no reported efforts to smuggle weapons or explosives using truck cargo, reports have emerged that postulate a relationship between drug smugglers and terrorist agencies. The Congressional Research Service postulates that any type of smuggler may pose a national security threat, as “the same groups that smuggle cigarettes across the border today may smuggle drugs or weapons across tomorrow.”\textsuperscript{40} The threat is particularly imminent with the increasing use of drayage vehicles for cross-border cargo transportation. The less experienced drivers of drayage vehicles are, the more likely they are to accept bribes and payoffs in exchange for the smuggling of drugs or contraband.

While it is useful to study drug smuggling efforts as a way of understanding possible avenues for terrorist weapons smuggling, terrorist tactics may pose a larger challenge in terms of interdiction efforts. Drug smugglers who typically follow a consistent pattern in their methods allow CBP officials to detect these patterns and focus their inspection procedures on those identified patterns. Terrorist smugglers are less likely to follow a pattern, as their tactics are rarely repeated. Studying terrorist methods may be less effective as a result.\textsuperscript{41} Despite the lack of repetitiveness, it is still possible to detect potential terrorist efforts to introduce harmful contraband if they choose to employ methods historically used by drug dealers.

\textbf{D. Cargo Theft in Mexico}

In light of the NAFTA dispute, the United States is motivated to encourage Mexico to increase their security measures. The current safety situation in Mexico, particularly along the US border, is one that is highly vulnerable to security breaches. Theft in truck cargo began swiftly increasing in 1995, during the rapid decline of the Mexican economy. At that time, truck assaults took place approximately 200 times yearly. In 1999, that estimate increased to 12,000-

\textsuperscript{13} 000 yearly,\textsuperscript{42} and by 2000, estimates of registered cases of stolen cargo reached over 97,000.\textsuperscript{43} The increase in theft is correlated with the rise of the consistently burgeoning black market in Mexico.\textsuperscript{44}

The Mexican Chamber of Transportation states that 80 to 90 percent of robberies take place in Mexico City and surrounding areas, where a high volume of commercial trucks and other vehicles pass through. Most hijackers are “well-armed and highly organized, with brisk distribution networks to fence the cargo.”\textsuperscript{45}

\textbf{References}

\textsuperscript{38} Ibid.


Drivers often face thieves disguised as police officers or security guards attempting to hijack the truckload. Because corruption is rampant in Mexico, driver and cargo security is highly dependent on bribes to such hijackers or even police officers, resulting in an additional security expense for Mexican trucking firms.46

The risk of cargo theft increases based upon various factors, including travel distance to the nature of the cargo. One insurance company president assessed that truck thefts are of the highest risk level, and that the likelihood of theft increases for companies with a higher number of contracted carriers and longer-traveled distances.47 Shipments of items that have sales potential on the black market, such as jeans, are at a higher risk for theft. In order to reduce this risk, more and more trucking firms have begun to equip their trucks with tracking devices that help locate stolen cargo, such as Global Positioning System (GPS) equipment. The cost of equipment varies between $1,000 and $3,000 per truck. While 4,000 registered Mexican trucking companies have installed such equipment, more than 296,000 firms in Mexico, many of which are smaller firms, have not yet achieved the financial status where such equipment would be affordable.48 Keeping costs down becomes a priority to maintain competitiveness despite theft risk posed on cargo. In this environment, improvement of security rests on either providing the incentives to the trucking industry or regulations.

E. Risks of Drayage and Empty Truck Crossings

Further complicating the security system in Mexico is the use of the drayage system for cargo transport. These short-haul trucks carry shipments from one side of the border to the other, where long-haul carriers collect the shipment.49 Most short-haul trucks do not return with cargo after transferring their load to long-haul carriers. Therefore, use of these trucks results in an unusually large number of empty trucks crossing the border on a regular basis, consequently increasing traffic delays and reducing the number of completed inspections by CBP officials.

The drayage link to the terrorist threat is a result of low security levels in drayage vehicles. Due to high turnover and budgetary limitations, most drayage companies are not able to provide personnel security clearances for their drivers.50 As stated earlier, the less experienced drayage drivers are more susceptible to accepting bribes in exchange for smuggling illegal goods, drugs, weapons or explosives. Furthermore, cargo transfers made during a cross-border run using a drayage vehicle compromises the security level. Because Mexican trucks are not permitted beyond a 20-mile free trade zone, drayage vehicles usually drop off cargo within that zone for US pickup. This adds additional intermodal transfer points that increase the likelihood of cargo tampering, smuggling or other criminal activities.

NAFTA supporters argue that elimination of the moratorium will eliminate the use of drayage trucks, as Mexican trucking firms are expected to use long-haul trucks to carry goods across the United States. However, CRS estimates that the drayage industry in Mexico is not likely to diminish in the near future. The use of these short-haul trucks is still more affordable to smaller trucking firms, particularly in the current

46 Based on an interview with Mitch Masoner, Business Agent for Teamsters Union Local 399. Interview Conducted on October 6, 2005.
congested traffic conditions at inspection points that increase maintenance and fuel costs for trucking firms. Additionally, the drayage industry has become a well-established part of some local economies. Drayage carriers have become a large source of employment in Mexican border communities. Partnerships built between Mexican brokerage firms and drayage companies have proven to be financially beneficial to both parties, and brokers would be hesitant to sever their ties and risk financial loss.51

F. High Transportation Costs in Mexico

The major financial obstacles facing the Mexican government in relation to truck security are countless, characterized by “lack of facilities, outmoded equipment, customs delays, labor problems, and a poorly integrated infrastructure, compounded by topography, climatic contrasts and sheer distances involved...”52 Transportation in Mexico is costly due to poorly constructed roads and inadequate access to highways and other major transportation routes. 53 High interest rates discourage investments in new, safer and more secure equipment. Rising cost of fuel and toll roads throughout Mexico are a significant expense.

Insurance is also costly due to high rate of theft.54 While smaller trucking companies are less able to reduce the risk of cargo tampering due to tight competitive pressure, larger trucking companies have taken extreme measures to battle theft and hijacking. Many firms equip their trucks with GPS technology that is generally not cost efficient for smaller firms in Mexico. Many larger companies also hire truck security escort services that accompany convoys of trucks during their cross-border journey.56 The economic toll of cargo theft on the trucking sector is huge. Annually, truck hijackings in Mexico cost the country around $100 million US dollars.56 Mexico’s government has displayed a significant amount of interest in improving some of these security issues. Many areas of the transportation sector, such as the construction of new customs facilities and toll highways, have become privatized as an effort to improve the time and cost efficiency of these projects.57 As Mexico’s transportation infrastructure continues to improve, the costs for trucking operations are likely to decrease.

II. Cargo Movement

We analyze the cargo movement under five phases. There are many points throughout the border crossing process where smuggling may take place. Stephen Flynn, a cargo security expert at Council of Foreign Relations and author of the book “America, the Vulnerable”, asserts that

54 Ibid.
56 Ibid.
...there is ample time and opportunity within a Mexican and US border city for these illicit transfers to occur between the forwarder facility where the short-haul rig picks up a load, and the border where it is likely to receive only a cursory examination by a hopelessly overworked Customs inspector.\textsuperscript{58}

**Figure 2: “Cargo Movement of Goods from Place to Place”\textsuperscript{59}**

<table>
<thead>
<tr>
<th>Source Zone</th>
<th>Transit Zone</th>
<th>Destination Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory →</td>
<td>FPOE</td>
<td>DPOE → Buyer</td>
</tr>
<tr>
<td></td>
<td>Transshipment Port</td>
<td></td>
</tr>
</tbody>
</table>

- Warehouse
- Consolidation Center
- Intermodal Exchange
- Road/Rail Infrastructure

- Warehouse
- Deconsolidation Center
- Intermodal Exchange
- Road/Rail Infrastructure

The process of transporting cargo across borders is a lengthy, involves many points of transfer or shifting of cargo, and consequently poses many different security threats. Figure 2 above provides a generic summary of the cargo movement process. Weapons may be introduced into a cargo container while in transit in Mexico, or may arrive at a Mexico seaport to be transferred into the US through a land based POE. Both security threats can be analyzed using the similar five phase approach; only difference arises in the assessment of risks in the first phase. In the first case, analysis of physical and procedural security at loading facilities in Mexico is required. However, in the second case the illicit cargo is presumably introduced in another foreign country, which reduces the complexity of analysis in the first phase as the event that illicit cargo is introduced does not take place in Mexico and the risk factors that pertain to conditions in other countries are not considered in detail in our risk analysis framework. Figure 3 illustrates the phases in cargo movement as envisioned in a risk analysis study in this report.

**A. Phase 1A: Cargo Storage and Loading Phase at the Warehouse**

Before cargo is loaded on a container and shipped to its final destination, it is stored at a warehouse or a distribution center. Terrorists may exploit vulnerabilities in physical and procedural security at these sites to load illegal weapons and explosives. Some of the vulnerabilities in this phase include:


• Gaps in physical security around the facility. These could be in multiple forms: unlocked doors and gates, insufficient monitoring in and around the warehouse, easily penetrable fences, lack of guardians protecting the facility, etc.
• Insufficient background checks for workers
• Lax procedures for visitor admission
• Insufficient training of workers to detect and respond to anomalies at the facility
• Improper storage of empty containers

Figure 3 Phases of Cargo Movement

Various physical security measures can be installed at the shipper’s loading facilities to deter, detect and respond to unauthorized intrusions. Unauthorized intrusions are less likely to occur at sites known to employ tight physical security measures as the intruders will find it risky to carry out their plan. However, it is not possible to deter terrorists forever. Terrorists may adapt to the new security environment and increase their capabilities to breach improved security systems. Thus, the next step is to detect and respond to those making an attempt for an illegal entry. Access control technology, video surveillance systems, intrusion detection equipment, various forms of physical and human barriers are among the components of an effective physical security system. However, these traditional security measures are less effective in case the shipper is already cooperating with terrorists, as some shippers have done over the years to smuggle drugs. Terrorists may take the ownership of a company that is known to legally operate across the border for many years and hence is “trusted”. As such, procedural security should complement physical security measures by enhancing document processing, cargo manifest, shipping and receiving procedures. A third potential type of illegal activity at loading facilities could be shipping illicit cargo through insider help. Background checks and implementing personnel security measures are required to reduce any risk of insider cooperation with the terrorists.

B. Phase 1B: Arrival of Cargo from Overseas

Terrorists may use cargo containers shipped from overseas to the United States through a Mexican seaport instead of exploiting security breaches at the loading facilities in Mexico. While some of the
Mexican seaports are taking initiatives to improve detection capabilities (see Figure 4 below), none of the Mexican seaports are currently participating in the Container Security Initiative (CSI); a program seeking to enlist foreign seaports’ cooperation to detect illicit cargo in containers. This raises the question of whether terrorists operating overseas will use a relatively less secure Mexican seaport to ship weapons or explosives concealed in a container. This scenario should be seriously considered that US allocated more of its resources to step up security at maritime ports over the years. Another possible scenario is cargo tampering in a storage yard. Terrorists may plant explosives and detonate them when they reach a port of entry that is located close to an urban center. A recent incident that involved the Mexican Port of Tampico raised questions about the level of security at major seaports in Mexico. A ship with inadequately secured explosives was detained at the Honduran port of Puerto Cortes after failing to notify the authorities. Before arriving at Puerto Cortes, the ship took on the explosives at the Port of Tampico.

Figure 4 Two Portal VACIS on adjacent traffic lanes at Manzanillo Seaport in Mexico

Port congestion in Southern California, partly due to increased inspections, has already been a factor in shifting container traffic to other ports in the United States, and major overseas shipping companies consider alternative ports in Canada and Mexico to handle trade from Asia. Involvement of Mexican

60 US officials: Explosives Pose a Serious Threat Aboard. AP Worldstream. 02 December 2004.
61 Source: Orphan, Victor et al. Advanced Cargo Container Scanning Technology Development. 7th Marine Transportation System Research & Technology Coordination Conference. November 2004. Port of Manzanillo is one of Mexico’s most important seaports with approximately 450,000 TEU’s of cargo imported through the port in 2005 and recently agreed on a contract to improve cargo security at the terminals.
seaports in US overseas trade is expected to increase as Mexico’s transportation infrastructure is modernized. For instance, a recent agreement with the Port of Lazaro Cardenas in Mexico will enable direct shipment of goods imported from the Far East with minimal border delay to the inland port of Kansas City. Containers arriving at Lazaro Cardenas will be prescreened before arrival and suspicious cargo will be screened through non-intrusive inspection machines while in Mexico. This new cargo container route is expected to compete with the Los Angeles/Long Beach route as the delays at these ports have already motivated a search for ports with extra capacity. In particular, medium to high value Asian imports that already suffer from bottlenecks on the West Coast and are bound to inland points and East Coast are expected to follow this new route.

Ports in the East Coast of the US have already gained share in US-Asia trade at the expense of ports in the Pacific Coast. From 2000 to 2003, Pacific Coast ports lost approximately 4.2% of their market share of Chinese export, cargo whereas ports in the East Coast increased their share by 5.1%. Cargo is primarily shipped through the Panama Canal, which has limited capacity and is unable to service large containerships. This raises the possibility of using Mexico as a land bridge, utilizing rail or highway systems between two major ports in Mexico to transport US-Asian trade from the Pacific to the Atlantic, or vice versa. Mexican authorities are determined to seize this opportunity by expanding the capacity of seaports currently operating, constructing new ports and investing in railways and highways to connect Mexican seaports to the US market. Mexican authorities have the desire to be a key player in the US-Asia transportation network, because improving intermodal transportation security in Mexico should gain some currency in the future in bilateral talks between the two nations.

C. Phase 2: In Transit from Loading Facility to FPOE

A Mexican carrier collects goods from a factory, warehouse, consolidation center or point of intermodal exchange and transports the shipment to a FPOE along the border. Trucks are the dominant mode in this phase, as 80% of the US-Mexico trade by value move by trucks. They offer a flexible door-to-door service on all ranges of shipment distances for a large class of shipment sizes. It is the shipper’s responsibility to arrange for transportation and brokerage services in Mexico, load the trailer and inform the long-haul trucking firm and customs brokers about the contents of the cargo. The long-haul carrier is responsible for security after the loaded trailer or container is picked up from the loading facility. Most shipments from Mexico’s golden industrial triangle (region between three major cities: Mexico City, Monterrey and Guadalajara) take one to two days to reach the border. Therefore, many truckload (TL) shipments have multiple stops in the interior region before reaching the border.

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In some cases, factories with smaller shipments contact freight forwarders, whose role is to consolidate less-than-truckload (LTL) shipments from numerous shippers into one shipment for transport. Freight forwarders act as a third party between the carrier and the shipper. While involvement of freight forwarders are justified by taking advantage of carriers’ cheaper marginal rates for consolidated shipments, the security vulnerability of the load is increased as coordination is required between shippers, carriers and customs brokers to prevent smuggling as LTL shipments are consolidated. This also increases the number of transfers underway for the cargo, which increases opportunities for tampering or theft.

Vulnerabilities during this phase of transport include:

- Security breaches at transfer points
- Insufficient background checks on truck drivers
- Frequent stops in transit
- Funding challenges for security improvements
- Lack of anti-tamper technology to prevent unauthorized tampering

D. Phase 3: Internal Transfer of Goods between FPOE and DPOE

In this phase, Mexican brokers and possibly US Customs (who sometimes have offices within Mexican brokerage firms) process paperwork for the vehicle and cargo prior to transport towards the border. Mexican Customs laws impose penalties on brokers for failure to comply with customs regulations. Hence, to ensure that customs declaration is correct and provides adequate information and that all duties are paid, Mexican brokers check the documents and the cargo itself. However, the broker is not required by law to unload and physically review the cargo. Cargo manifests are electronically submitted to Mexican Customs, where only 2% of the trucks undergo further inspections. As the truck crosses the border, the next phase of the cross-border transit begins at the US port of entry.

With the exception of maquiladora trucks, long-haul carriers transfer cargo to drayage trucks in the beginning of this phase. A drayage vehicle receives the load and transports the cargo to a Mexican customs facility, and finally to the US customs inspection station. During this phase, cargo may be transferred from trains, other trucks or even ships. These intermodal transfers pose an additional security threat, particularly at transfer terminals that handle a heavier volume of cargo than others. This phase contributes to added congestion at the border as many trucks stop here to assemble paperwork for US entry. Added congestion diminishes the effectiveness of the CBP inspection process. Customs brokers often release trucks in batches at a time, contributing to longer lines and wait times. Another reason for congestion is empty trucks crossing the border. Since drayage companies have minimal business relationships with US shippers, most drayage trucks return without a load. Payment of bridge tolls is also a contributing factor. In Texas, trucks must stop to pay bridge tolls, which are manually collected and further stall the cargo.

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71 Ibid.
Most maquiladora plants ship their precleared exports by their own trucks.\textsuperscript{73} This practice eliminates Mexican brokers’ and drayage vehicles’ involvement in the border crossing and reduces border delays as well as cargo tampering risks.

E. Phase 4: Inspection at DPOE

Upon arrival at a checkpoint in the US, cargo undergoes primary and, if necessary, secondary inspections. During primary inspection, truck drivers undergo questioning regarding the nature of the goods they are carrying and submit paperwork to US Customs officials. Based on the questioning and canine truck inspections, officials determine a need for secondary inspection.\textsuperscript{74} During secondary inspection, the cargo is either unloaded or the truck is processed through non-intrusive inspection (NII) equipment. Shipments that typically undergo secondary inspection include agricultural goods, medical equipment and hazardous materials.\textsuperscript{75}

The nature of the cargo typically determines which federal agency is responsible for secondary inspection. There are various agencies represented at each checkpoint, including the Fish and Wildlife Service, the Department of Agriculture, the Food and Drug Administration, and Immigration and Customs Enforcement.\textsuperscript{76} GAO cites some overlap in the inspections process between these agencies, bringing about further congestion and delays. In addition to the number of federal agencies, state agencies, such as departments of public safety or state National Guard, units may also be involved with safety checks, drug interdiction efforts, administrative checks and other types of inspection.\textsuperscript{77}

The use of technology at US ports of entry has not been problem free. NII equipment used to inspect trucks includes the Vehicle and Cargo Inspection System (VACIS), Radiation Portal Monitors (RPMs), Radiation Isotope Identifier Devices (RIIDs) and Personal Radiation Detectors (PRDs). VACIS is a gamma-ray imaging system that takes radiographic snapshots of containers and highway trailers. Trained border inspectors are required to interpret the images taken by VACIS and identify illegal cargo. However, attrition rates are high among border inspectors as “inspectors who are trained to work as US Customs agents quickly move on to more lucrative jobs within the agency or elsewhere in the government.”\textsuperscript{78} As far as the performance of VACIS devices is concerned, human element is key to deny entry to illegal cargo, therefore experience in this task is a major plus.

RPMs scan the containers for radiological and nuclear content. Many RPMs deployed at the land ports of entry are “passive” detectors “and are ultimately limited by the physical properties of radiation that they are designed to detect, specifically with regard to range of detection.”\textsuperscript{79} Radiological content can be effectively


\textsuperscript{74} Ibid.

\textsuperscript{75} Ibid.


shielded by steel and scrap material and evade detection. To overcome this problem, sensitivity of the device can be increased. However, increased sensitivity results with higher rate of false alarms as these devices can be set off by items such as granite, porcelain toilets and bananas.

Empty trucks are sometimes inspected by the US Department of Transportation during secondary inspections.\textsuperscript{80} Nearly 43% of all Mexican trucks crossing into the US in 2002 were empty.\textsuperscript{81} As mentioned earlier in the report, empty truck crossings are largely a result of drayage business practice. Trucks that clear primary and possibly secondary inspection are sent to a final checkpoint. Fewer trucks are subjected to supplemental inspections based on the outcome of the secondary phase.

As proven by the recent successful attempt to transport radiological material through the borders by GAO investigators, document security is an important aspect of border control. In 2005, GAO investigators were able to purchase a small amount of radiological material by posing as an employee of a fictitious company, which they later transported through a southwestern port of entry.\textsuperscript{82} Despite detection by the radiological detector, border inspectors authorized the crossing as they failed to identify counterfeit documents. GAO reported that the material was in adequate quantity to manufacture a dirty bomb. This incident is another reminder of how important human element is in ensuring security along the US borders.

F. Phase 5: In Transit/Transfer to a US Carrier

After finishing the customs procedures, the drayage vehicle transports the cargo within the 20-mile US trade zone to a US commercial carrier. A US long-haul truck driver takes the load to its final destination after the drayage drops the load at a cargo transfer point. The Mexican truck may or may not return to the border with a new load of cargo.\textsuperscript{83} As mentioned earlier, the practice of employing drayage trucks that drop the load within the 20-mile commercial zone introduces an extra cargo transfer point, hence adding to cargo tampering risk. Cargo theft is a huge problem across the United States. According to the Federal Bureau of Investigation (FBI), cargo theft related loss to businesses is approximately $3.5 Billion in the US.\textsuperscript{84} In this report, we will not elaborate more on cargo security threats in the United States as those threats do not necessarily originate beyond the US borders.

III. Border Crossing Partnerships and Information Sharing Systems for Risk Mitigation

Customs and Border Protection Commissioner Robert Bonner noted that through current truck inspection processes, "we often don’t know who the truck is, where it’s coming from, or what’s supposed to be in it until it actually arrives at the port of entry."\textsuperscript{85} Several notable programs are implemented and various


\textsuperscript{82} GAO Testimony GAO 06-939T. Border Security: Investigators Transported Radioactive Sources Across our Nation's Borders at Two Locations. 05 July 2006.


\textsuperscript{84} Whitney, Sally. Vanishing Act (Impact of Cargo Theft). Best's Review. 01 December 2000.

technologies are used to reduce the risk of cargo tampering, although none have yet been comprehensively implemented across US ports of entry.

A. Free and Secure Trade (FAST)

FAST is a US-Mexico and US-Canada partnership in which inspections are expedited for commercial carriers that frequently transport cargo into the US. The program aims to improve free trade and national security simultaneously through streamlined and standardized procedures for frequently traveling cargo transportation. FAST streamlines registration procedures between the US and neighboring countries by granting FAST registered drivers access to dedicated lanes for expedited border crossing and reduced customs compliance costs. Drivers and cargo that participate in FAST are considered low risk. Currently, FAST is implemented at 15 checkpoints along the southwestern border. CBP plans to expand the program to several additional land ports of entry. FAST enrollment centers are available at seven of these checkpoints. FAST registration, however, does not account for the majority of commercial cargo crossing the US southwestern border. A larger number of FAST participants would result in unmanageable paperwork and a need for a substantial increase in US-Mexico administrative coordination.

B. Customs-Trade Partnership Against Terrorism (C-TPAT)

C-TPAT is a voluntary program between private sectors and public organizations to improve supply-chain security. The government seeks to employ private sectors’ leverage on their global suppliers to improve containerized cargo security. Private firms need to participate in C-TPAT for FAST eligibility. Registrants in C-TPAT provide manufacturer, importer and carrier registration to US Customs. Initiated in April of 2002, C-TPAT importers are required to satisfy numerous manufacturer, seal integrity, and carrier or drayage responsibilities, including:

- Conducting self-assessments of security procedures based on C-TPAT guidelines
- Requirement to affix seals on cargo at manufacturer’s place of origin
- Establishing a system for seal verification involving a thorough container inspection process prior to checkpoint arrival
- Maintaining restricted access to seals and a log of all seals in use
- Pre-Employment verifications, background checks and investigations for shipping company employees
- Physical security and information technology security measures at cargo storage and handling facilities

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86 US CBP Website: Online Application for US/Mexico Highway Carriers
88 CBP Website. FAST: Free and Secure Trade Overview (US-Mexico Program).
90 CBP Website: Seal Requirements for Manufacturers.
91 Ibid.
92 Ibid.
93 CBP Website: Online Application for US/Mexico Highway Carriers.
94 Ibid.
US-Mexico C-TPAT participants are approved based on their history of complying with customs regulations, provided they have registered adequate information regarding their cargo in advance and employ drivers who are registered with FAST.

C. Security and Prosperity Partnership (SPP)

SPP is a partnership announced in 2005 between the United States, Canada and Mexico seeking to improve cooperation and information sharing to harmonize the efforts to combat threats to conducting business in North America. This partnership has a potential to improve transportation security and hence minimize the likelihood of terrorist intervention in supply-chain networks. An exciting feature of the partnership is its stated goal of increasing information sharing and investing in technologies that would increase transparency of cargo traveling in North America. Since its conception, SPP has yielded some tangible benefits such as increased number of FAST lanes, installation of NII devices at Mexican ports of entry and increased information sharing on hazardous cargo crossings. It is expected that the partnership will propel development of a common approach to border security problems.

D. Business Anti-Smuggling Coalition (BASC)

In addition to federal programs, the Business Anti-Smuggling Coalition (BASC), an international organization, establishes safety and security standards for its global members. Many trucking firms who participate in BASC are easily admitted into the FAST program. BASC also assists firms in FAST processing. In the 1980s, the San Diego and Tijuana-based organization was formed as a response to the increased demand for higher security standards by maquiladora manufacturers to protect their shipments from drug smuggling. Participation in the program is voluntary, and three chapters are currently in operation in Mexico.

E. Accord of the States of the Gulf of Mexico (GOMSA)

This accord was signed by eleven gulf states in the US and Mexico in 1995, following NAFTA. GOMSA seeks to promote regional collaboration on economic and infrastructure development as well as to enhance port and transportation security in the Gulf region. The accord states work towards these objectives with its business counterpart the Gulf of Mexico States Partnership. As far as homeland security is concerned, both organizations have so far put more emphasis on maritime security in the Gulf of Mexico. In 2003, they signed a memorandum of cooperation with Department of Transportation’s Maritime Administration (MARAD). The goal is to improve information sharing in the maritime domain between signing parties. One of the initiatives that the Gulf of Mexico States Partnership is leading is a study that will elaborate on regional seaport security improvements. These non-federal initiatives have a potential to complement CSI in improving security at foreign seaports.

F. Automated Targeting System (ATS)

ATS is the backbone of risk-based cargo inspections at US ports of entry. It is used to screen 100% of the cargo arriving into the US everyday. It is a system that uses cargo manifest information, targeting rules based on complex algorithms, and shipper and carrier history to select high risk cargo for inspection. ATS assigns a risk score to each container it scans. Containers receiving a “low risk” score are released without

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further inspections. A “high risk” score indicates that the container will go through a secondary inspection. ATS serves as the first layer of defense once the container is on its way to the US.

G. Automated Commercial Environment (ACE)

ACE is an online information sharing and customs processing system between CBP and trade communities and other governmental agencies. Electronic manifests are made electronically on ACE. Electronic manifests should be made one hour prior to crossing for regular carriers, and thirty minutes for FAST members. Information submitted on the platform is then used to prescreen cargo through ATS. This system is currently active at selected ports in Arizona, Texas and California. It will eventually replace the old Automated Commercial System (ACS). Truck carriers that participate in the program enjoy faster customs processing at land ports of entry.

H. Pre-Arrival Processing System (PAPS)

In 2006, FAST participants will enroll in PAPS or a modified version of the National Customs Automated Prototype (NCAP) under FAST. NCAP uses computerized data to expedite the cargo release process prior to truck arrival at the borders. Under PAPS, CBP officials will be able to scan cargo barcodes (submitted to CBP one hour prior to checkpoint entry) to retrieve registration information and speed up the shipment’s processing time at the border. PAPS uses an automated targeting system (ATS) and Border Cargo Selectivity (BCS) technology to process the barcode data. While PAPS is not yet implemented along the Mexican border, the program is currently in operation through the US-Canada FAST program.

I. Border Release Advanced Screening and Selectivity (BRASS)

Currently in place is CBP’s BRASS which tracks commonly shipped goods. Through barcode scans, CBP is able to verify that the cargo’s barcode matches that of the data on the submitted invoice statement. Following the initial application process, cross-border entry is expedited and processing is minimized for future trips.

IV. Feasibility of Mexican Commercial Security Capabilities

While increased intermodal transportation security is beneficial to the Mexican economy, several obstacles impede implementation of an effective security system.

A. Financial Obstacles

Cost is a significant stumbling block to increasing Mexican truck security. Current transportation structures are obsolete, reflecting independent economic development policies that did not take into account the needs of free trade. As such, the need for infrastructure improvements is significant, but funding availability is scarce. In addition to the limited amount of federal funding available for such projects, Mexican municipalities do not have the capacity to supplement these costs, and international borrowing is

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96 CBP Website: FAST: Free and Secure Trade Overview (US-Mexico Program).
limited in Mexico by law.\textsuperscript{99} Municipalities have turned to local banks and the private industry to assist in the funding of such projects. As such, the development of improved transportation security is slow. Scholars have suggested joint bond contributions from the US, Mexico and Canada to fund free-trade transportation needs, in the hope that development in the transportation sector will spur private investment that will bring additional funding.\textsuperscript{100}

**B. Bureaucratic Obstacles**

The collaboration of various government agencies and lack of security-based public-private partnerships is a significant impediment to security development. Mexico’s primary transportation manager, the Secretariat of Communications and Transport (SCT), maintains a complicated jumble of roles and responsibilities within the transportation sector. Their mixed role as regulator, policy-maker, investor and manager has deterred investors who see Mexico’s ineffective regulatory abilities as a high security risk.\textsuperscript{101}

Public and private sector roles have also become unclear. Much of Mexico’s transportation sector has recently become privatized, but the roles of public and private entities are not yet clearly delineated.\textsuperscript{102} Poor coordination between sectors is reflected in Mexico’s disorganized intermodal capabilities. Research recommends that “coordination between different actors in the intermodal chain must be improved, facilities such as inland ports built, legal documentation streamlined, true intermodal operating companies created and tariffs lowered.”\textsuperscript{103} The current situation is slow and costly, and impedes the growth of a competitive market. A 2005 CRS report summarizes the problem as follows:

*The OECD notes that some imports can require as many as 40 separate documents in order to complete the journey from the point of origin in the source zone to the destination. Each time a shipment changes hands from person-to-person or place-to-place…it requires documentation. The required documentation generally includes two primary sets: commercial documents that move cargo from each private sector actor (carrier, broker, freight forwarder, consolidator, driver, etc.); and customs entry documents which contain information that can be used both for security and commercial compliance screenings.*\textsuperscript{104}

The amount of paperwork involved in cross-border cargo transport for security and tracking purposes slows down free trade flows. While paperwork is an essential component to effective cargo security measures, overlap in paperwork should be eliminated. Inter-agency data sharing (as well as carefully selected data sharing with the Mexican government) would significantly expedite processing or paperwork.

**V. A Risk Analysis Model to Evaluate Technological Countermeasures and Policies**

In this section, we introduce a risk analysis methodology to evaluate countermeasures and policies. Our approach analyzes cargo transportation in five different phases as discussed in section II. Depending on the potential insertion point for the illicit cargo, we created five different risk analysis templates. It should

\textsuperscript{99} Ibid.
\textsuperscript{100} Ibid.
\textsuperscript{102} Ibid.
\textsuperscript{103} Ibid.
be noted that one can construct a wide array of scenarios after fixing the point of insertion. Type of weapon shipped, insertion method used, degree of assistance from individuals and companies legally involved in the supply-chain network, etc. are all variables that have an impact on the likelihood of events in the risk template which eventually determine the likelihood of terrorist success in alternative scenarios. Critical events whose likelihood establish the overall terrorism risk profile at land ports of entry are included in the template to give the user the flexibility to analyze multiple scenarios. The user is expected to enter the probability and consequence information based on the scenario constructed. It is clear that most of information required to conduct the analysis is available in exact sense to most potential users. To overcome this problem, the template is constructed to do sensitivity analysis.

**Figure 5 Cargo Movement, Critical Events and Decisions for Layered Security against Transport of Weapons in a Container through a Mexican Seaport**

**Pre-Mexico**

**Dirty bomb insertion?**

**Interdiction?**

**Mexican Seaport/ Mexican Port of Entry/ US Port of Entry**

**Events:** Targeting? Detection?

**Decisions:** New VACIS? New RPM? Background Checks?

**More inspections? Better targeting system?**

**In Transit/ Drayage**

**Events:** Detection?

**Decisions:** Driver training?

**Mexican Broker**

**Events:** Targeting? Detection?

**Decisions:** Broker training? Equipping brokers with technology?

**Consequences**

**Economic:** Direct? Indirect? Psychological?

**Human:** Casualties?

**Final Destination**

A. Point of Insertion: Before Arriving at a Mexican Seaport

First point of insertion is before cargo reaches Mexico. In this case, cargo is shipped to the United States from another country and enters Mexico from a seaport before it arrives into the US. If terrorists choose this route, then all points in the supply-chain are potential points of intervention before cargo reaches its final destination. As an example, terrorists may plant a dirty bomb in a European country, choose a “trusted” company container to conceal the bomb, and finally ship it to a land port entry close to an urban area (i.e., San Diego, El Paso, Laredo). They may use a Global Positioning System (GPS) to monitor the location of
the container to remotely detonate the bomb as soon as it reaches the targeted land port of entry. Critical events and decisions in each phase of the cargo movement are identified in the template. Figure 5 above summarizes cargo movement, critical events and decisions included in the risk analysis template for the scenario described above.

For the dirty bomb scenario, the first layer of security is before the cargo reaches the Mexican seaport. Since our analysis does not aim to evaluate cargo movement beyond Mexican borders in detail, the user of the template is asked to enter probabilities of two critical events: dirty bomb insertion and interdiction. If the container is loaded with a dirty bomb and reaches the Mexican seaport, it may go through detailed inspections which may foil the plot before the container is loaded on the truck. As such, the user is asked to enter the likelihood of two events: container targeting and detection of the dirty bomb in the targeted container. Then, the probability of interdicting the dirty bomb at the Mexican seaport is,

\[ P(\text{interdiction of the dirty bomb}) = P(\text{targeting of the container}) \times P(\text{detection of the bomb | container is targeted}). \]

Probability information is required as an input from the user reflects the current status. The goal of effective security at the seaport is maximizing the probability of interdiction. Expenditures on new detection technology, targeting systems or customs officer training may be made to increase the probability of interdiction. For instance, the user may be interested in determining the value of new computer software which is expected to enhance the targeting capability given a fixed capacity for inspections. Three pieces of information are extremely critical: level of expenditure made, percentage increase in the likelihood of targeting the container with a dirty bomb, and risk profile of the rest of the supply-chain network. It is not profitable to install the new targeting system if expected benefits do not exceed the level of expenditure made. Clearly, the higher the percentage increase in the likelihood of targeting the container with a dirty bomb is, the higher the expected benefits are. Conversely, if the security level in the rest of the supply-chain network is already high and thus the probability that the dirty bomb reaches its target is already low, then marginal benefits from improving targeting systems are low.

If the container loaded with a dirty bomb is not interdicted, then it goes through the next transit land phase in Mexico. Since the container does not go through any inspections, it is very likely that the dirty bomb will not be discovered in this phase. Truck drivers may be equipped with handheld radiation detectors to scan the container, or they may be trained to detect anomalies with the cargo. As minimal as the probability of interdiction may be in this phase, the template asks the user to enter his elicitation for the probability of interdiction in this phase. After this phase is completed, the container reaches the cargo transfer point where the drayage company begins hauling the load across the border. Another layer of security exists at this point. Brokers at the southern side of the border check the cargo and associated documents. As such, they may be able to spot anomalies. The user is asked to enter his elicitation of the probability of interdiction in this phase and is given the option to evaluate alternatives to improve brokers' capabilities of interdiction.

If the dirty bomb moves undetected into Mexico, then it successfully reaches Mexican land of entry. Analysis framework for the Mexican land port of entry is similar to that of Mexican seaport with one particular difference. Both sides of the land ports of entry are in close proximity. Therefore, terrorists may decide to remotely detonate the bomb if the land port of entry is close to an urban center. The user is asked to input his judgment on likelihood of remote detonation at the Mexican land port of entry. This input is required in the next phase as well. At the US land port of entry, inspections are carried out in two stages. This two stage approach constitutes the only difference between the analysis of Mexican and US POE. As for the dirty bomb threat that targets an urban area in close proximity to a land port of entry is concerned, the analysis terminates at the US port of entry.
B. Point of Insertion: A Mexican Seaport

The container may arrive at a Mexican seaport with no harmful load. Security breaches in container yards in the port area or around the port perimeters may be inviting targets for terrorists interested in tampering with a US bound container, making the container storage areas around Mexican seaports potential insertion points for harmful cargo. The risk analysis template begins from the seaport phase. Since the container tampering occurs while the container is stored at a seaport, likelihoods of two critical events are expected from the user: tampering and detection. To minimize the likelihood a successful container tampering operation by terrorists, certain improvements could be made in physical security at seaports, criminal background checks of port workers and even in training of port workers to identify anomalies in their work environment. If the container loaded with harmful cargo is picked up by a truck from the container yard, then the transit phase begins. Events and decisions modeled in the template for the subsequent phases are exactly the same as in section A. Figure 6 below summarizes the process.

Figure 6 Cargo Movement, Critical Events and Decisions for Layered Security against Transport of Weapons in a Container from a Mexican Seaport

Two differences arise in analysis of the scenario described in section A and in this section. First, the scenario in this section does not include any parameters from the container movement beyond Mexico because the container is assumed to arrive without a dirty bomb. Second, key events and decisions in the Mexican seaport phase are not the same. In section A, physical security issues at the Mexican seaport are
ignored because they do not carry any relevance in a scenario where container tampering is assumed to take place beyond Mexico. Rather, terrorism risk is a function of targeting and detection capabilities for incoming cargo. In this section, the container is assumed to be tampered with after customs processing. Hence, the evaluation of physical security at Mexican seaports enters into the analysis.

Figure 7 Cargo Movement, Critical Events and Decisions for Layered Security against Transport of Weapons in a Container from a Mexican Loading Facility

C. Point of Insertion: A Loading Facility in Mexico

In previous sections, the container was assumed to be shipped from overseas through a Mexican seaport. Instead, the container may originate from a loading facility in Mexico and reach the US without any sea transit phase. As seen in Figure 7, dynamics of this scenario is much the same as the previous sections. The only difference arises in the first phase where the user is expected to evaluate the level of security at loading facilities in Mexico. Input probabilities in this phase are for two events: tampering and detection. In general, terrorist may use three alternative methods to tamper with cargo: unauthorized tampering, insider help and ties with one of the companies involved in the supply-chain. The user is expected to enter his elicitation of the tampering probability considering the likelihood of these alternative methods. Likewise, detection probability is a function of the method of tampering. Decisions in this phase are similar to that of the first phase in the previous section.
D. Point of Insertion: Land Transit in Mexico

As mentioned earlier in this report, truck robberies are a huge problem in Mexico due to security problems on highways. Terrorists may exploit the loopholes in security in this phase. As for the template is concerned, if terrorists choose to insert weapons or explosives in this phase, point of origin of cargo does not make any difference. As opposed to the scenarios discussed in the previous sections, physical security measures taken in land transit are incorporated into the analysis as they may be effective tools to deter and interdict terrorists. The user is given the option to set probabilities for tampering and detection events as well as expected improvements by installing new physical security measures or performing more comprehensive background checks.

E. Point of Insertion: Cargo Transfer from a Long-Haul Truck to Drayage Truck in Mexico

Cargo transfer points are also vulnerable to tampering as containers may lay unattended for extended periods of time. Analysis of these risks is similar to the analysis in the previous section with the exception of cargo transfer phase modeling and exclusion of the land transit phase. Land transit security as well as the earlier phases of cargo movement have no relevance for a cargo transfer point scenario.

VI. Policy Recommendations

Recommendation 1: Numerous actors control the security of truck cargo throughout the phases of the transportation process. It is to the benefit of both the United States and Mexico to increase collaborative efforts between these parties, who include buyers and sellers, manufacturers, buying agents and freight forwarders, customs brokers, truck carriers, warehouse agents, consolidators, and customs agents and port operators on either side of the border. While FAST and C-TPAT are excellent starting points for increased security measures, they are not implemented at all ports of entry, nor are they available for all regular commercial carriers. Many independent trucking firms have a harder time qualifying for FAST and C-TPAT. These firms comprise a large portion of the Mexican trucking industry crossing through US borders.

One such example of cross-border coordination is the Partners in Protection Program (PIP). The program between Canada and private sector industries aims to coordinate border security. Companies undergo a self-assessment procedure and are asked to identify current security vulnerabilities and future improvements that they plan to implement. The assessment considers physical security measures in addition to their personnel security process, including screening and background checks, management structure and protocol for reporting and addressing security vulnerabilities. Participation in PIP is a requirement for Canadian firms who wish to participate in US-Canada FAST. Other benefits of participation include expedited movement through customs and an improved reputation within the trade industry.

Liaisons coordinating between agencies would assist in further streamlining of paperwork and procedural overlap between agencies. Organizations such as BASC, who work closely with the private sector, would be useful facilitators in this process. A collaborative effort would help to increase the number of Mexican manufacturers registered with C-TPAT, only 5% of which are registered today, most of which are

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105 Ibid.
107 Canada Border Services Agency Website: Partners in Protection.
Another collaborative effort is the Security and Prosperity Partnership between the United States, Canada and Mexico, where each administration would propose work plans to increase security measures in North America by streamlining their efforts. Proposals include real time information sharing for high-risk cargo and joint efforts to improve cross-border infrastructure.\footnote{Foreign Affairs Canada Website: Security and Prosperity Partnership of North America.}

**Recommendation 2:** It is in the economic interests of the Mexican government to increase their intermodal transportation security operations. While low-cost labor and an affordable exchange rate are also offered by countries throughout Asia, Mexico has a key comparative advantage in the global economy due to its geographic proximity to the US and Canada and their corresponding free trade agreements.\footnote{Eaton, David. Roads, Trains and Ports: Integrating North American Transport.  *Institute for Research on Public Policy.* 2004.} The success of their free trade advantage relies partly upon their ability to increase intermodal transportation security. While the Mexican economy is limited in their funding of truck security, there are ways in which the US, through increased coordination with Mexican government officials and agencies, can help the government reduce their expenses.

**Recommendation 3:** Reducing congestion and delays is important. This would minimize operating costs, and also encourage the use of long-haul vehicles over the existing drayage system.\footnote{US Government Accountability Office. North American Free Trade Agreement: Coordinated Operational Plan Needed to Ensure Mexican Trucks’ Compliance with U.S. Standards. GAO-02-238. December 2001.} We have two recommendations to this end:

- Truck volume varies by hour, by day, and by season. Traffic updates and careful planning for truck arrivals can help to mitigate heavy traffic congestion at the border. CPB should work with brokerage firms and the Mexican government to spread truck inspections as evenly as possible between congested ports and underutilized ports of entry.

- Border congestion may also be reduced by extending inspection facilities in locations farther from the port of entry. This can reduce border congestion and expedite inspections procedures upon border crossing. With such a policy, increased security is necessary between the newly established checkpoints and the border, as this would be a highly vulnerable region.

- Congestion pricing has been recommended to reduce peak load.\footnote{Ojah, Mark I.; Villa, Juan Carlos; Stockton, William R.; Luskin, David M.; Harrison, Rob. Truck Transportation Through Border Ports of Entry: Analysis of Coordination Systems. *Texas Transport Institute.* November 2002.} An increase in fees for customs processing may shift the demand during congested hours to off-peak periods. An alternative is a value pricing policy which offers premium customs processing for an extra fee. A drawback of value pricing is that it may require additional infrastructure at POE.

**Recommendation 4:** We recommend extending the responsibilities and training of Mexican safety inspectors for contraband related inspection procedures. Mexico’s Secretariat for Communication and Transportation is responsible for commercial vehicle safety inspections prior to travel on federal highways. Through their partnership with the United States Federal Preventive Police, many of whom are trained through US border state inspectors, they examine trucks pulled over for a traffic violation. The police are
not legally permitted to inspect trucks for any other reason. Additional training for contraband-related inspections of trucks while south of the border is likely to decrease the number of suspicious trucks undergoing inspections at ports of entry, thereby reducing commercial traffic congestion into the United States.

**Recommendation 5:** Mexico’s high theft rate increases truck vulnerability to weapons or explosives smuggling into the United States. As such, the CBP must work with Mexican officials to encourage increased security policies for Mexican trucking firms:

- Trucking companies can increase the accountability of their cargo by placing some of the responsibility on their shippers. It has been suggested that limiting the number of shippers in contract with a trucking firm increases their level of liability for thefts and smuggling. The increased responsibility will add another partner to the coalition of private and public parties within the US and Mexico who has a vested interest in increasing border security for the trucking industry.

- Companies should introduce fueling standards that would make sure that trucks are full with fuel prior to departure to eliminate any unnecessary stops. Fuel stops increase the cargo’s vulnerability to theft or tampering, especially if the cargo is left unattended.

- Deliveries should take place on weekdays over weekends, evenings or holidays as often as possible. Shipments that arrive during non-office hours and must wait overnight for their recipients are more likely to be stolen or contain smuggled goods.

- In addition, US and Mexican officials must improve tracking measures for cargo theft. Currently, there is little tracking in place as firms are hesitant to reveal failures in their own security measures. This is particularly troubling as a 1995 Journal of Commerce survey determined that approximately 80% of cargo thefts take place internally within a trucking company. Increased tracking methods would increase accountability of trucking companies and push for further deterrence of internal corruption attempts. As an added incentive, trucking firms that increase security measures are likely to receive better insurance rates.

**Recommendation 6:** Increased use of technology is an imperative for improvement of truck security. Those developed and tested methods such as x-ray systems and radiation portal monitors must be distributed more widely across land border ports of entry. Additionally, CBP must work with universities and the private sector in the continuous research and development of preventative detection and enforcement technologies. One such advancement is reported by CRS in regards to the development of truck-stopping

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113 Prince, 1998
115 Ibid.
117 Ibid.
devices that could be used against trucks thought to a security risk. Border enforcement officials would be able to activate air-brakes for trucks bearing hazardous or suspicious cargo.\textsuperscript{119}

Technological advancements for border inspections are not only more effective in contraband detection, but also expedite the inspection process as a whole, and thus reduce security vulnerabilities associated with checkpoint wait times. Improved technologies will also assist CBP officials in any staffing shortages which may take place. Customs officials determined that the use of truck x-ray systems may take as little as 10 minutes. Alternatively, inspectors must unload, inspect and reload cargo onto the truck, which may take hours.\textsuperscript{120}

**Recommendation 7:** Random inspections of trucks should be implemented to support targeted inspections. As recommended by the Congressional Research Service:

*Random changes and random inspections are a useful supplement to targeting, in order to determine what you don’t know—in terms of identifying gaps in present algorithms for setting targets. It also increases risks for terrorists, who may be studying the inspection process carefully in order to exploit any predictable patterns to avoid interdiction.*\textsuperscript{121}

Examples of such tactics include movable checkpoints and changed methods of primary and secondary inspection procedures.

**Recommendation 8:** Future evaluative measures would be simplified with improved data collection methods. A federal report, released in 2005, revealed that southwest border patrol checkpoints are not effectively measuring the successes and failures in interdiction and border enforcement efforts.\textsuperscript{122} Increased data collection would strengthen CBP’s evaluation abilities, increase accountability, and efficiently move border inspection procedures towards their goal of maximizing homeland security.

**Recommendation 9:** Mexican seaports should be encouraged to join the CSI. Mexican seaports have a special status in that they may process containers that are bound to enter US from either sea or land based ports. Targeting and inspection process should include both types of containers. Non-intrusive inspection technology should be deployed to all the seaports handling US bound cargo. After being targeted and inspected at Mexican seaports, containers should be sealed with tamper-proof locks and should go through reduced inspections upon reaching a US land port of entry. This will help reduce delays at the border.

**VII. Conclusions**

The US Government must find a balance between maintaining their agreement to Mexican trucking firms through NAFTA and protecting homeland security. While Mexico faces great obstacles in improving truck security, it is in their benefit, as well as the United State’s, to do so. As such, we recommend that the US government collaborate with the Mexican government and the private trucking sector to improve security measures prior to full implementation of NAFTA trucking regulations. The extent to which traffic patterns


and border crossing behaviors of trucking firms will change upon the lifting of the moratorium is unclear, but it is important that the US government take measures to ease the transition and increase cross-governmental coordination for national security purposes. Streamlined paperwork, coordination with various actors in the trucking industry, and improved inspection technologies are some of the ways in which the US can preserve free trade and homeland security simultaneously.

A systems approach to evaluate alternative policies and countermeasures is necessary. Evaluation should be performed by analyzing the impact of security improvements on the overall system, rather than a single phase of cargo movement. The biggest advantage of this approach is it enables us to compare risks across the cargo movement process as well as alternative security improvements in various phases. Another advantage is recognition of the adaptive nature of terrorists to strike at the system’s vulnerable points. This report has provided a discussion on a system wide risk analysis tool that offers these advantages, and it is our intention to present our findings in a future paper.