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Protecting Public Surface Transportation Against Terrorism and Serious Crime: Continuing Research on Best Security Practices

Mineta Transportation Institute
San José State University
San Jose, CA 95192-0219

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September 2001

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16. Abstract

Assaults on public surface transportation systems have continued to take place worldwide without any indication of abatement. This study continues earlier research on best security practices. It examines security practices in effect at public surface transportation facilities in Tokyo and London—both targets of terrorist attacks—and in the San Francisco Bay Area and the Santa Clara Valley of California. It updates the chronology contained in the previous report and adds an annotated bibliography.

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INTRODUCTION

Terrorist attacks on commercial aviation had declined significantly after reaching a high point in the 1970s. The devastating consequences of the four coordinated hijackings and deliberate crashes of three of the planes into the World Trade Center in New York and the Pentagon in Washington, D.C., on September 11, 2001—an event unprecedented in the annals of terrorism—have wiped out all sense of progress and focused national attention on aviation security. Meanwhile, terrorists have continued to attack public surface transportation worldwide with no indication of abatement in these attacks.[1] With large-scale indiscriminate violence clearly the reality of contemporary terrorism and growing concerns that terrorists might use chemical and biological weapons, to which public transportation systems are extremely vulnerable, the threat has increased.

Surface transportation systems cannot be protected as easily as airplanes, which are housed in fairly closed and reasonably controlled locations; additionally, the airport terminal access to airplanes is controlled by relatively few entry points. Conversely, trains, buses, and light rail systems must remain readily accessible, convenient, and inexpensive for the traveling public.

There are other differences between surface and air transport. Unlike airplanes, which make relatively few passenger transfers, trains and buses make numerous stops along vast open and penetrable corridors. Passenger profiling, passenger screening, and the elaborate deployments of metal detectors, X-ray machines, explosives sniffers, hand searchers, and armed guards that have become features of the passenger landscape at airports cannot be transferred easily to subway stations, bus stops, or light rail platforms. The delays would be enormous and the costs prohibitive. The same open targets that permit penetration serve as easy conduits for escape by assailants. Surface transportation lines, like power lines and pipelines, are extremely difficult to protect.

Open to relatively easy penetration, trains, buses, and light rail systems offer an array of vulnerable targets to terrorists who seek publicity, political disruption, or high body counts. High concentrations of people in relatively

[1] Terrorism can be defined as premeditated, politically motivated violence or deliberate threats of violence against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience. Terrorist attacks are, of course, crimes, but crime in the context of this report refers to ordinary crimes such as murder, assault, extortion, etc.

crowded quarters are inviting fodder for those who would cause mayhem and death. The massive amounts of explosives needed for truck bombs are unnecessary in crowded train stations, bus depots, carriages, or coaches. Even without large numbers of casualties, disruptions to transit can seriously impact a region's economy and the public's faith in the government's ability to provide basic protections to its citizens.

Such conditions do not mean that authorities are without tools of their own. Transportation operators and security officials in areas that have been subjected to terrorist attacks have developed some effective security countermeasures. No security system can stop determined terrorists from setting off bombs, biological weapons, or chemical reactions in public places. Nevertheless, good security measures can make terrorist operations more difficult, increase the terrorists' likelihood of being detected and identified, keep casualties and disruptions to a minimum, reduce panic, and reassure alarmed passengers in a crisis.

ONGOING RESEARCH

For the past five years, the Mineta Transportation Institute at San José State University has led a continuing research program focusing on the security of public surface transportation against terrorist attacks and other serious violent crimes. The effort began with a surface transportation terrorism symposium held in 1996, which brought together security experts from transportation entities, law enforcement, and other government agencies. Their discussions were published by the Institute in *Terrorism in Transportation—A Symposium* (San Jose: Norman Y. Mineta International Institute for Surface Transportation Policy Studies, March 1996).

The following year, the Mineta Institute launched a more formal research program aimed at identifying the best security practices. The initial phase of this effort included four case studies that reviewed transportation security measures in Paris, Atlanta, New York, and on the Amtrak rail system. The Paris case study focused on the immediate aftermath of the 1995 terrorist bombing of a commuter rail station in Paris. The Atlanta case study examined the security preparations connected with the 1996 Olympics and the aftermath of the Centennial Park bombing. The Amtrak case study focused on the response to the deliberate derailing of the Sunset Limited in November 1995. New York was included because of the size and complexity of its system and the incidents and threats that affected it in the 1990s, including the 1993 World Trade Center

bombing and the 1997 terrorist plot to carry out suicide bombings on the city's subways.

In addition to the case studies cited above, Phase I of the research reviewed the security measures employed by nine other transportation systems in the United States, ranging from small rural bus systems to larger multimodal operations. A chronology and analysis of terrorist attacks on surface transport from 1920 to mid-1997 and an annotated bibliography completed the research effort. The results of the examination were published in Brian Jenkins, *Protecting Surface Transportation Systems and Patrons from Terrorist Activities: Case Studies of Best Security Practices and a Chronology of Attacks* (San Jose: Norman Y. Mineta International Institute for Surface Transportation Policy Studies, December 1997).

NEW FINDINGS

Phase II of the research has continued to the present time and is reported upon in this study. It comprises four case studies: the 1995 sarin attack on Tokyo's subways, the United Kingdom's response to the IRA's terrorist campaign against British surface transportation, and security at the Bay Area Rapid Transit District and the Santa Clara Valley Transit Authority. The chronology that began in Phase I has been brought forward to the end of the 2000 calendar year; the annotated bibliography has been updated.

Taken together, this and the earlier two volumes give a comprehensive review of surface transportation security. The case studies cover 14 transportation systems in the United States plus those in Japan, France, and the United Kingdom, yielding a truly global perspective on what has become a global threat to travelers and citizens alike.

The last three case studies were included because they offer an opportunity to examine security and crisis management at transportation systems that have been the targets of major terrorist attacks. Each system experienced a completely different threat. The United Kingdom had to cope with a long-running terrorist campaign aimed at causing major disruption and occasionally some casualties. France confronted a terrorist campaign aimed at causing heavy casualties. Tokyo's subways saw the first large-scale terrorist use of a chemical weapon—a possibility of growing concern in other parts of the world. There have been more attacks and a greater number of casualties in places like India and Pakistan, but the experiences of the United Kingdom, France, and Japan are more comparable to the conditions in the United States.

The studies of the IRA's campaign in England and the sarin attack in Tokyo included in this volume offer us something not available in the other case studies: insight into the terrorists themselves—what they were trying to achieve and how they decided to go about it. Such knowledge is a valuable first step for developing successful countermeasures. That said, the British and Japanese experiences presented completely different terrorist rationales and operations.

The ongoing campaign in the United Kingdom enabled those charged with security to carefully analyze the *modus operandi* of the adversary, determine appropriate countermeasures, discern results, and make adjustments as the campaign evolved. Authorities were able to diagnose, comprehend, and respond to the threat.

The sarin attack was different. Although the Aum Shinrikyo sect made test runs of nerve gas releases prior to the March 20 attack (not recognized by authorities as precursors) and additional low-level attacks occurred afterward, the March 20 attack was a single stunning event. There were no patterns to be discerned, no ongoing campaign to be analyzed. Security was increased, but the system remained virtually defenseless against chemical attacks. Japanese authorities focused on destroying the group and its capacity to wage chemical or biological warfare. The major lessons fell within the category of crisis management, which must be a part of all security programs.

The two studies of security measures in effect at the two transportation systems in Northern California, in turn, differ from the London and Tokyo examples. Crime occurs everywhere and an incident of terrorism can occur anywhere—witness the Tokyo sarin attack and the Oklahoma City bombing—but the terrorist threat to California must be assessed as less than that in the United Kingdom or other places where terrorist activity has regularly occurred over a long period of time.

Given the relative quiet on the domestic front, the security measures taken by the Bay Area Rapid Transit Agency (BART) and the Santa Clara County Valley Transit Authority (VTA) are not nearly as elaborate as those taken in England or Tokyo. This raises the question of threat assessment: If no apparent threat is on the horizon, yet nothing can ever be ruled out, how much security is enough? Is a full-scale terrorist threat the only way to marshal enough security, or should public agencies take action to prevent such a threat? Given scarce resources and relatively low levels of public concern, such questions are always a part of the public policy matrix and not easily answered.

The updated chronology adds 195 entries to the 631 entries listed in the first volume. Inasmuch as some of these entries are multiple events, we now have a database of terrorist attacks and serious violent crimes exceeding 800 incidents, which offers greater confidence in the statistical analysis. The updated chronology shows that the patterns of terrorism in terms of targets and tactics remain stable. The locations of the attacks shift somewhat, reflecting slowly changing patterns of global conflict. Terrorist attacks on transportation targets continue to be significantly more lethal than terrorist attacks overall, underlining the fact that terrorists see train stations, bus depots, cars, and coaches as killing fields.

A separate Executive Overview distills the lessons learned in both phases of the research and describes the best security practices identified in all the case studies and the accompanying security literature. This document will serve as a primer to accompany further briefings and detailed discussions with transportation system operators and security officials, which are envisioned for Phase III.

THE UNITED KINGDOM'S RESPONSE TO THE IRA'S TERRORISM CAMPAIGN AGAINST MAINLAND SURFACE TRANSPORTATION

Any study of "best practices" in securing transportation against terrorist attacks must include an examination of the British experience in dealing with terrorist attacks carried out by the Provisional Wing of the Irish Republican Army (IRA). Few other counties have faced such a sustained campaign of violence. Unlike many other contemporary terrorist groups, the IRA did not hijack or sabotage commercial airliners; armies "do not do such things." However, the organization waged a 25-year campaign against surface transportation, attacking targets in Northern Ireland and Britain.

Transport was not the IRA's only target on the British mainland. The group also attacked public officials, government buildings, tourist sites, public events, and commercial property. The organization's reason for such activities was simple: to remind British officials and the British public that the "troubles" would not be confined to Northern Ireland alone; as long as turmoil existed in Northern Ireland, it would exist in the heart of Great Britain as well. In response to the IRA's terrorist campaign, British authorities were forced to implement extraordinary security measures. The analysis of the terrorist threat, the government's strategic approach to security, response procedures, and involvement of the public are all worthy of examination.[1]

The following case study describes London's Underground, a favorite target of the IRA, as well as light railways, buses, and the national rail network. It then examines the IRA's strategy and the evolution of its terrorist campaign, and describes the transportation security structure and the general approach and specific countermeasures taken to save lives and reduce disruption.

THE UNDERGROUND

The London Underground is the world's oldest and one of its largest underground railway systems. Its first line opened in 1863. Additional lines were added as London grew during the nineteenth century, and expansion

[1] In addition to the cited publications, this chapter draws heavily on interviews in London with, and material provided by, officials of the Department of Environment, Transport and Regions, the British Transport Police, the Metropolitan Police, and the National Terrorist Crime Prevention Unit.

continued throughout the twentieth century. The last route, the Jubilee Line, was completed in 1979. Today, the Underground, or "tube" as it is known, comprises 12 separate lines that crisscross London and extend well into the suburbs.

Only 42 percent of the Underground's rails actually run underground; operation takes place through two types of tunnels. One form, "cut and cover" tunnels, are created by excavating from the surface, then covering the trench; in some parts, the trenches are left uncovered and the trains run just below or at ground level. These tunnels carry 8 percent of the system's lines. The second form, deep-level tubes, are excavated far below the surface and are completely covered upon completion. Thirty-four percent of the rails are deep-level tubes.

To a considerable extent, the form of rail design determines the type of engines that move rail traffic. While steam locomotives initially were used on the subsurface lines, only electrical trains could operate in the deep tunnels, the first of which was completed in 1890. Electrification accompanied expansion of the system, although the last steam engines were not removed until 1962. During World War II, the tunnels were used as air raid shelters and thousands of people slept in them during the bombing campaign. One of the lines was closed and its tunnel used to store treasures from the British Museum.

The Underground's routes total approximately 259 miles (416.7 kilometers) and serve 278 stations. Trains move 150,000 people every hour. During the morning peak travel hours, 34,000 passengers pass through Victoria Station, which has been attacked by the IRA several times. The District Line, the system's busiest, carries 545,000 passengers a day; the Northern Line carries 530,000 passengers; the Piccadilly Line, 520,000 passengers; the Metropolitan and Circle Lines, 500,000 each. In 1999, the Underground carried passengers on 930 million trips, a figure that was expected to surpass 1 billion in 2000. Because the Underground is the circulatory system of the city, even short disruptions can produce enormous problems. This has made it a preferred target of the terrorist campaign.[2]

LIGHT RAIL

Two recently completed light rail systems expand London's Underground network, the Docklands Light Railway and the Croyden Tramlink. Opened in

[2] Anthony Clayton, *Subterranean City: Beneath the Streets of London*, London: Historical Publications, Ltd., 2000.

1987, the Docklands connects the Underground with the Canary Wharf business complex, the Millennium Dome, and other new developments in London's old Dockland area on the eastern edge of the city; eventually the line will reach London's City Airport. Currently the system has 27 kilometers (17 miles) of track, mostly elevated, connecting 34 stations. It operates 30 trains, which carry 110,000 passengers a day.

In February 1996, the IRA detonated a bomb under the railway bridge at Surrey Quay in the Docklands. Two people were killed, and more than 100 people were injured, seven seriously. In a statement to the news media, the IRA indicated that the bombing signaled the end to its 17-month cease-fire and demanded that the British government convene talks involving all parties, including the IRA's political wing, to negotiate a settlement to the conflict.

The Croyden Tramlink, which opened in May 2000, connects the suburb of Croyden with London. Its 21 trams connect 38 stops along 28 kilometers (18 miles) of winding track. The trams, which are designed to handle tight curves, run both on city streets and on previous, abandoned rail lines. Configured in six-car formats, each tram can carry as many as 200 passengers.

LONDON'S BUSES

The double-deck red bus is a symbol of London. More than 4,000 of them move nearly 4 million people daily throughout the 1,500 square miles of Greater London. At one time, there were twice that many, but new Underground lines and private automobiles reduced bus ridership, while budget constraints limited modernization and expansion. Forced to contend with growing surface-street traffic, the buses lost their advantage as efficient and inexpensive transportation sources. Recent policy changes, however, may precipitate a reversal of this trend. Urban architects readily concede that building more roads to and from a city already choked with traffic and suffering from pollution is not the answer.

Buses take up less road space, move more people with less energy, and can be made nearly pollution-free, in contrast to the old black-smoke-belching diesel engines. Restrictions on automobile parking, dedicated bus lanes, and smart traffic signals can reduce delays in schedules.

As noted in the chronology presented in Appendix A at the end of this chapter, terrorist bombs on buses can yield exceptionally deadly results. Recent attacks in India, Pakistan, Sri Lanka, and Israel bear witness to the toll of human

devastation. However, bus explosions cause less disruption to a system than attacks on railways. If the bus is halted and evacuated, or even if the bomb detonates causing casualties, traffic can be rerouted and service restored more easily. Sabotaging rails and placing bombs in stations provide greater opportunities for escape and more time to give warnings that could prevent catastrophe, but the disruptive effects are enormous. Putting bombs on buses entails greater risk and offers fewer opportunities for warning would-be victims.

Although the IRA terrorist campaign in England focused on rail transportation rather than buses, the organization selected buses as the targets of several attacks. On February 18, 1996, less than 10 days after the bombing of the Docklands Light Railway, a terrorist bomb exploded on a London bus near Covent Garden. One person died and eight others were injured in the explosion. The following day, the IRA claimed responsibility, expressing regret for any casualties. The fact that the bombing occurred without any warning caused authorities to suspect that the bomb may have exploded accidentally while being transported to another target. However, because it came so soon after the IRA's deadly attack on the Docklands Light Rail, some people feared that the IRA was intensifying its terrorist attacks in England.

UNITED KINGDOM RAIL

Commuter trains, which provide transportation into and out of London, are part of UK Rail, a network of 25 independent railroads that provide passenger service throughout the United Kingdom. International transfers are available via the EuroStar, a high-speed passenger service that connects London with Paris and Brussels via the Channel Tunnel, or "Chunnel."

As part of its disruptive activities, the IRA carried out a number of attacks on train stations and the rail network, and vandals disrupted the UK Rail high-speed service. Because of these efforts, extraordinary security precautions were put into place to protect the Channel Tunnel against terrorist attack. In 1996, British security forces foiled the only documented attempt by the IRA to shut down the Channel Tunnel by sabotaging the electricity supply.

THE IRA'S TERRORIST CAMPAIGN

Irish resistance to British rule of the island has continued for centuries under a variety of banners. The Irish Republican Army (IRA) traces its history to the 1920 armed rebellion that ultimately paved the way to independence for the

Irish Free State while British rule continued in Northern Ireland. Opposing this partition, the IRA continued a sporadic campaign of terrorism.

In the late 1960s, shortly after widespread violence broke out between Protestants and Catholics in Northern Ireland, the IRA split into the official and provisional wings. It was the Provisional IRA that waged an intense terrorist campaign against the British from 1969 to 1998, at which time the organization agreed to a cease-fire. However, a splinter group calling itself the "Real IRA" has continued to carry out terrorist attacks.[3]

The IRA's strategy was never especially profound. With active members numbering between 50 and several hundred, depending on the year, the group initially confined its campaign to Northern Ireland. Principal efforts focused upon attacking police and military targets, while waging economic warfare through bombings of commercial targets. The organization realized from the start that it could not defeat the security forces arrayed against it in a true military sense; it could try only to keep the faith alive, survive organizationally, continue the fight, and hope to eventually wear down British resolve. Thus, the opposition group operated essentially with a strategy of economic and psychological attrition, or, as one IRA leader described it, "blattering on until the Brits leave."

In 1973, the IRA exported its terrorist campaign to England. Wales and Scotland were left untouched because, like the Irish, they were considered "culters," not English; as such, these groups were perceived as ethnic allies. The terrorists hoped that attacks in England would increase security problems and costs for the British government. Indeed, some of the major terrorist bombings in London caused hundreds of millions of pounds in damages and wiped out insurance coverage, forcing the government to step in as the insurer of last resort. The terrorist threat to London also obliged security authorities to erect the so-called "ring of steel," an elaborate array of traffic diversions, checkpoints, and surveillance designed to keep truck bombs out of the city's financial center.

[3] In addition to the interviews cited above, accounts of the IRA's campaign are based upon: J. Bowyer Bell, *The IRA 1968-2000: Analysis of a Secret Army*, London: Frank Cass Publishers, 2000; C.J.M. Drake, *Terrorists' Target Selection*, Basingstoke: MacMillan Press Ltd., 1998; Tony Geraghty, *The Irish War: The Military History of a Domestic Conflict*, London: Harper Collins Publishers, 1998; and the author's own research.

Terrorist bombs in London, even smaller ones, captured more headlines than terrorist bombs in Northern Ireland, had great psychological impact, and exaggerated the power of the IRA. Terrorism in England also kept the struggle on the British political agenda. Still, the IRA's expectations had to be realistic. As one knowledgeable analyst of the IRA's campaign put it, "If Hitler had not bombed London into submission, the IRA certainly lacked the capacity to do so."[4] The IRA did not seek true submission, however; instead it sought the erosion of public patience and political will. It forced people to ask whether the commitment of British troops in Northern Ireland was worth the blood, the inconvenience, and the fear.

With goals so broadly defined, almost any terrorist action would serve the needs of a terrorist organization. Political or strategic rationales did not dictate IRA targets in England; operational considerations did. The IRA did what was possible, using its available resources. Capabilities in England were limited. Volunteers were its most precious commodity and had to be preserved. This dictated low-risk operations—targets had to be "soft" with few defenses and offering an easy escape.

Two levels of IRA operatives participated in the attacks. Active Service Units composed of better trained volunteers, the "A team," carried out the major terrorist attacks; less sophisticated volunteers, the "B team," waged a continuing campaign of low-level terrorism. There were few technically demanding operations—the attack on Prime Minister Margaret Thatcher at a Brighton Beach hotel, the mortar attack on Number 10 Downing Street, and the two truck bombs in London's financial district. The attacks on the Underground and rail system appeared to be the work of the less sophisticated operators—low-level, but potentially still deadly.

Of the 81 explosive devices that were placed at transport targets, 79 were hand-placed time bombs. Fifty percent of them did not work as intended. Altogether, three people were killed by IRA bombs on the rail system, one at Victoria Station in 1991, and two on the Docklands Light Railway in 1996. This low number of casualties, however, is not due solely to the terrorists' great pains to avoid casualties. Without the authorities' prompt response to threats, the death toll could have been much higher.

Killing by itself, however, was seldom the IRA's goal. The IRA did not seek mass casualties like the Islamic extremists who bombed the Paris Metro or the

[4] J. Bowyer Bell, *op.cit.* p. 229.

Aum Shinrikyo cult members who spread sarin in Tokyo's subways. It had a different set of values and objectives. Too many corpses could alienate perceived constituents—Catholics in Northern Ireland as well as sympathizers and supporters abroad.

A target was chosen simply because it was vulnerable, and once it was selected, the IRA would continue to attack it for as long as circumstances permitted. London's vulnerable Underground met these criteria. While perimeters around government buildings could be pushed out further and hardened, and the financial district of London could be surrounded with a ring of steel, millions of people still had to ride the Underground every day. Surveillance and security could be increased, but, like the Belfast-to-Dublin rail line, which the IRA also bombed repeatedly, terrorist attacks on the Underground and mainland rail lines could not be entirely prevented.

Assaults on the Underground disrupted the lives of millions of passengers, offering the IRA banner headlines and inspiring footage for television news. Moreover, the IRA could magnify the disruption through bomb threats, which required nothing more than phone calls. Because real bombings occurred often enough, authorities could not afford to ignore such phone calls.

The result, as we see in the chronology at the end of this chapter, was a long-running terrorist campaign aimed at the mainland's surface transportation system, with the majority of attacks occurring in four discernible stages:

- between February 1976 and March 1976, comprising four incidents
- between December 1991 and February 1993, comprising 18 incidents
- between February 1996 (the end of a 17-month cease-fire) and April 1996, comprising three incidents
- a final surge in April 1997, comprising four incidents.

Putting aside bomb threats, it appears that except for one period in 1976, the IRA was able to carry out only one or two attacks a month with long hiatuses in between.

Seventeen persons were killed in attacks on all transport in England, 11 of them in the single attack on soldiers and their families traveling on a bus in England. The IRA regarded this as a military target. More than 200 persons were injured, over half of them in a single incident—the 1996 bombing of the Docklands Light Railway. Disruption rather than casualties appears to have

been the objective, but the disruption caused by threats and consequent evacuations and shutdowns rested on the IRA's credibility, and credibility required casualties.

The chronology does not give the total picture of the IRA terrorist campaign. Bombings and shootings occurred frequently in Northern Ireland. The IRA also attacked the Belfast-to-Dublin rail line on numerous occasions. In addition to attacks on public transport in England, the IRA carried out mortar attacks against the Prime Minister's residence and Heathrow Airport, and a number of other attacks including two devastating truck bombs set off in the heart of London in 1992 and 1993. The terrorist threat remained high throughout the period.

Along with the inevitable copycats and malicious pranksters who were inspired by terrorist events, the IRA's campaign imposed a staggering burden on transportation security and a nervous public. Between 1991 and 1997, there were 41 IRA attacks on transportation targets in England involving 81 devices, 29 explosions, and 3 deaths. In addition, there were 6,569 telephone bomb threats; 9,430 suspicious objects were reported and investigated. The Underground and railroads also had to deal with more than a quarter-million lost or abandoned items every year, any one of which might have been a bomb.

THE SECURITY ORGANIZATION

The security network for combating terrorism comprised the intelligence agencies of the British government, the Home Office, the Metropolitan Police (Scotland Yard), other local police departments, and the National Terrorist Crime Prevention Unit (NTCPU). Two organizations focused specifically on the security of surface transportation. These are the Transport Security Division of the Department of the Environment, Transport and Regions (DETR), and the British Transport Police.

The DETR's Transport Security Division is a policy-making body responsible for the security of British surface transportation. The division conducts analysis, recommends legislation, and provides security directions and guidance to transportation operators. One of its special areas of concern is the security of the Channel Tunnel, which has implemented elaborate security precautions in response to the flurry of terrorist threats. In 1998, the DETR initiated its own "best practices" review to improve security at rail stations throughout the United Kingdom and, as part of the process, issued a number of

guideline documents. One review of the DETR status is presented in Appendix B at the end of this chapter.

The British Transport Police (BTP) is the national police force for the railways that provides policing service to rail operators, their staff, and passengers in England, Wales, and Scotland. The BTP also is responsible for policing the London Underground system, the Docklands Light Railway, the Midland Metro Tram System, and Croyden Tramlink. The force does not cover bus transport, which is left to local police departments. In 2000, the British Transport Police had 2,106 police officers and 524 civilian support staff deployed in eight territorial areas. Areas 6 and 7 encompass North and South London respectively, while Area 8 comprises London's Underground.

The devastating results from an IRA bombing of a shopping center in Manchester in 1996 led to an increased demand for security advice from the private sector. Local police departments had no centralized operation for assisting retail stores and other commercial enterprises, nor was there a consistent national approach. In 1998, the Association of Chief Police Officers established the National Terrorist Crime Prevention Unit (NTCPU), a small office that began by formulating a National Terrorist Crime Prevention Strategy. The NTCPU also collates and disseminates "best practices" information for preventing terrorist crimes. It provides training and supporting literature to its "core customers," commercial and professional bodies like the British Retail Consortium and Association of Town Centre Managers. The NTCPU extended its activities at the local level through Counter Terrorist Crime Prevention Officers (CTCPOs) provided by each police department; these individuals, in turn, distribute NTCPU materials to the private sector.

By tradition, security has largely been a reactive enterprise. Although the terrorist threat level remains high, the NTCPU knows that it has to convince business consumers that implementation of recommended security measures will deter or prevent terrorism and reduce ordinary crime. In the United States, liability lawyers provide an additional incentive for implementing security measures, because failure to do so can lead to a charge of negligence and punitive damages; the United Kingdom is less litigious. The NTCPU's approach is to have packages of advice-containing material ready to go. When threats or incidents heighten concern, the material is distributed to a sensitized audience.

INCREASED SECURITY

Two goals drove the security strategy of public authorities: the protection of lives, and the reduction of disruption. Obviously, lives could not be imperiled just to keep the trains running, but shutting down for long periods could disrupt the entire network. Through careful analysis and research, the police learned how to distinguish what terrorists typically do from public behavior. Every incident was closely analyzed; as incidents accumulated, patterns could be discerned. This effort was facilitated by the high volume of terrorist activity and by the tendency of the IRA to adhere to certain patterns.

Security was increased in a variety of ways. Many of these are part of a program called Crime Prevention Through Environmental Design (CPTED), which has attained widespread acceptance.

- **Architectural Liaison Officers**. Each police department designated an Architectural Liaison Officer (ALO) to gather detailed knowledge of blast effects on structure, cladding, glazing, principles of bomb shelter areas (see below), policy and initiatives on new buildings and refurbishments, the counterterrorist impact on fixtures, street furniture, etc. ALOs advise local commercial entities on security issues in design and construction.
- **Visibility**. Where new stations were being constructed or old ones remodeled, new designs ensured good visibility for passengers and camera surveillance systems.
- **Bomb shelter areas**. Bomb shelter areas (BSAs) were identified as areas within a building or other facility likely to suffer minimal damage from any explosion. If time or specific circumstances (such as a car bomb on the street outside) prevented evacuation, people would be routed to a bomb shelter area prequalified by an experienced structural engineer. Government guidelines recommended locating BSAs away from windows, external doors and walls, the "perimeter structural bay," the floor structure between a building's perimeter, and the first line of supporting columns. The guidelines also recommended shelters surrounded by full-height masonry or concrete walls, but not in stairwells or areas with access to elevator shafts that open to the ground level. BSAs were designed to permit access to the "outside" world.
- **Litter bins**. Blast-resistant litter bins approved by the Police Scientific and Development Branch were deployed in accordance with NTCPU guidelines. Operators were warned against removing trash containers, because this could lead to piles of rubbish that might conceal explosive

devices. Litter bins were to be located in prominent, well-lit areas, within view of closed-circuit television (CCTV) systems and away from sources of secondary fragmentation such as windows, mirrors, or overhead glass. Operators were advised to consider all materials located above, below, and to the sides of the litter bin. They were not to be located adjacent to obvious terrorist targets like police stations, post offices, or banks. Bin liners were to be transparent to provide a clear view of litter bin contents.

- **Fencing**. Fencing was improved around stations and, where possible, along rail lines. Analysis showed that when IRA saboteurs placed bombs on rail lines, they followed the existing paths used by trespassers. They also chose locations that had good access from nearby roads to minimize their own risk.
- **Lighting**. Lighting was improved inside the stations to deter crime of all types, facilitate surveillance, and reassure passengers. Bombs often were located in poorly lit areas.
- **Closed-Circuit Television**. British authorities have used CCTV extensively as a deterrent. Initially, more than 3,500—and ultimately more than 5,000—cameras monitored transport activity. CCTV was used to monitor activity, detect suspicious action, recognize individuals, and identify suspects beyond reasonable doubt. All station cameras were directly accessible to the police and could be called up on demand. In locating cameras, transport operators were advised to identify areas where passengers were most vulnerable; situate cameras so that they could not easily be avoided, damaged, or obscured; and use cameras for extending coverage to the immediate surrounding area. Although CCTV proved enormously effective in reducing crime and contributing to the deterrence of terrorism, authorities found that CCTV by itself was not enough. A combination of CCTV coverage plus police patrols and prompt police response made the greatest contribution to security.
- **Passenger communications systems**. Passenger communications systems included public address systems, help points, telephones, and emergency alarms. Passengers were instructed as to what constituted an emergency and were encouraged to use the help points and alarms when appropriate. CCTV cameras covered the help points and alarms so that staff could see who was calling and why. Staff communicated through mobile telephones and two-way radios.
- **Bomb threat paging**. One unique use of technology in the United Kingdom was bomb threat paging. Customers with pagers who subscribed

to the service were alerted through pagers and provided with directions on evacuation or areas to avoid.

- **Extra staff**. Extra rail staff members were deployed to assist in surveillance, help passengers, and contribute to deterrence.
- **Patrols**. Overt and covert police patrols were increased. Both rail staff and police constantly kept a lookout for suspicious objects. In some cases, Underground and rail stations were searched hourly.
- **Handling of unattended items**. The quarter million items left unattended or abandoned in stations and on trains each year imposed a tremendous burden on security. Although no unattended bag was ever linked to an explosive device, every unattended bag had to be checked. A standardized reporting form was used to record where the item was found, its contents, whether the bag was X-rayed, and whether the bomb squad had been called. Every left item was photographed.
- **Detailed guidance**. Security required the active participation of the transport police and local police departments, transport system operators, rail staff, and the general public. To ensure that operators would get the most out of the security measures taken by the operators and their staffs, the police and NTCPU disseminated easy-to-understand guidelines and advice on everything from deploying CCTV cameras and litter bin placements to handling left parcels and responding to bomb threats. These were distributed as booklets, flyers, laminated cards, videos, and through Web sites.
- **Private sector involvement**. The authorities enlisted the private sector as a security partner. As part of an effort to achieve consistency and improve prevention and response, police shared confidential threat information, provided an array of instructional material, and offered direct advice to commercial centers, facility managers, and transport operators.
- **Alert levels with predetermined security menus**. The Security Service distributed written assessments of any terrorist threat to all police forces and to retail and commercial sectors on a confidential basis. Rail operators and commercial centers in train stations also received threat assessments. The system identified four levels of alert. At Level Four, the lowest, commercial companies were advised to continue routine crime prevention measures, terrorism awareness training, frequent testing and regular auditing of security and CCTV systems, and periodic checks of building perimeters. Level Three advised, in addition to Level Four measures, "good housekeeping checks" on perimeters at opening and closing times,

practicing search plans and emergency evacuations, updating emergency contact lists, checking security systems, reporting all suspicious incidents, and raising the profile of security personnel. Level Two advised increasing the frequency of perimeter checks, identifying and securing high-risk areas, escorting all visitors, carefully examining all items brought into the premises, searching regularly for suspicious packages, controlling access to staff and customer car parks, and postponing non-essential maintenance. A Level One notice, the highest level of alert, contained specific guidance from the police and security service to precise locations and companies.

- **Training**. Operating in ways similar to bomb squad hostage negotiators, the CTCPOs and ALOs had specific counterterrorist missions. The nature of terrorism—the fact that terrorists could attack anything, anywhere, anytime—dictated special training for the police. Great emphasis was placed on standardized procedures that would ensure consistency and thereby facilitate coordination.
- **Covert testing**. To ensure that security was being maintained, authorities regularly conducted covert tests, such as leaving a bag containing a suspicious object on a train or in a station.
- **Involvement of the public**. Public involvement was critical to the security strategy, despite the limitations and risks of false alarms, especially immediately following terrorist attacks. Signage and repeated public announcements kept the public alert to the terrorist threat and the need to keep personal packages under direct control, remain vigilant for left parcels, and immediately report suspicious activity or articles to staff. Police remained confident that any left parcels would be discovered in minutes, and because most IRA bombs were set with one hour or more on the timer, police would have time to respond.
- **Dissemination of "good" or "best practices."** Authorities made a continuing effort to identify good security measures or "best practices" and disseminate them through instructional material and advice offered by the NTCPU and the designated Counter Terrorist Crime Prevention Officers in each police force.

Few transport systems experience terrorist events, making it difficult to gauge the effectiveness of security measures. In Britain, however, the persistence of the IRA campaign allowed such measurement. The evolution of the terrorist campaign indicates that the security measures had a discernible effect. In 1991, IRA terrorist attacks centered on stations in London. By 1992, the attackers were pushed out to suburban stations, and by 1993, they were confined to

home counties. The targets of the attackers also shifted from stations to switch boxes and rail lines away from stations. In the later years of the terrorist campaign, there were fewer bombs and more bomb threats.

The security measures against terrorism also had the additional effect of reducing ordinary crime (as did the "ring of steel" around London's financial district). Crime in the Underground, which had been increasing in the late 1980s, reversed direction and declined 54 percent in the 1990s, bucking a national trend.

Despite the increased security and positive effects, the nature of the target precluded any hope of completely preventing terrorist attacks. Some things could not be done: For example, passenger screening or the examination of all briefcases and parcels were not considered realistic measures for a public transportation system used by millions of people daily.

Another measure of effectiveness was disruption. As the authorities became more familiar with the IRA's *modus operandi,* they were able to develop procedures that reduced response time and the duration of disruptions. Increased camera coverage enabled them to identify and deal with suspicious objects or promptly diagnose the situation, while rehearsed procedures reduced the amount of search time. Authorities measured total disruption time in minutes much in the same way that train operators tracked total delays. As responses improved, total disruption time was reduced. However, this type of measure would be possible only in cases of a long-term continuing terrorist campaign.

RESPONDING TO BOMB THREATS

Bomb threat responses posed the most common problem, owing to the great number of hoax threats by pranksters as well as efforts by the IRA to capitalize on their actual bombs in order to increase the overall disruption. Bomb threats might be telephoned to the police, but the potential targets included commercial properties, shopping malls, hotels, and transport operators. Anyone in any of these facilities might receive the call—a secretary, switchboard operator, headquarters office, information line—whatever telephone number the terrorists or hoax perpetrators had available or chose to call.

Given the multiplicity of potential targets, authorities attempted to train everyone involved to obtain as much information as possible and promptly

forward it to the police. Armed with accurate information, the police could assist in the assessment and respond without delay. The government disseminated manuals giving detailed instructions on how to respond to bomb threats, letter bombs, incendiary devices, bombs or suspicious objects found in the facility, and bombs found in adjacent properties. Each new bombing attack was examined for lessons learned, which were then shared with the private sector. The authorities emphasized planning and established procedures for notification, searches, and, when necessary, evacuation. Although there was some risk that the distribution of some of this material outside the police force might enable terrorists and hoax perpetrators to improve their efforts, ensuring public safety took precedence. Interestingly, the IRA never mounted any elaborate hoaxes. They planted bombs and made telephone calls.

Police carefully analyzed each and every terrorist incident and threat to look for patterns that would enable them to more easily distinguish hoaxes from genuine terrorist threats, the merely disruptive from the potentially deadly. Did terrorists communicate differently from hoaxers? Where and how did terrorists plant their bombs as opposed to the hoax devices sometimes found? The objective was to establish guidelines that would take the pressure off the individual decision maker and establish a routine that would protect lives, reduce shutdowns, and be legally defensible if people were hurt.

The patterns were put into the context of the existing threat level, which varied according to whether there was an ongoing surge in terrorist activity, upcoming political events that had prompted terrorist activity in the past, or intelligence indicating possible terrorist attacks. All threats were treated seriously initially and then, depending on the available information, downgraded to probable hoaxes but not dismissed until after the deadline expired. Authorities treated threats thought to come from terrorists more seriously. In such cases, an evacuation might be considered, but evacuations generally were not ordered unless the search turned up a suspect object. Without a located device, it was considered dangerous to evacuate, because people might be moved toward a bomb. Even then, authorities had to worry about a secondary device, which the IRA sometimes employed.

Of the more than 6,500 bomb threats directed against the Underground and railroads between 1991 and 1997, about 100, fewer than 2 percent, were considered serious. Of the 100 serious cases, evacuations or partial evacuations were ordered in 41 cases, or less than two-thirds of 1 percent of the total volume of reported threats.

There is a popular misconception that the IRA deliberately assisted authorities in distinguishing real threats from hoaxes by attaching a secret code word to their communications. The IRA's 1973 attack on the Baker Street Underground Station was the first of the so-called coded calls. The IRA's use of a code ostensibly was intended to advise authorities when and where they had placed a bomb so that the threat would not be considered merely another hoax. This would enable the authorities to evacuate the target, thereby avoiding civilian casualties—the IRA considered members of the bomb squad to be fair game. Thus, the IRA would not bear the moral consequences of wanton killing, while achieving its goals of disruption and property damage if the bomb went off.

All this, however, was only theory. According to authorities, there was never any agreed-upon code, and hoaxers who read about the IRA codes could invent and append their own codes. During the years of the IRA's terrorist campaign, London's Metropolitan Police Department sometimes received up to 200 calls a day, at least 50 of which contained some kind of code word. IRA members themselves invented code words, leaving the authorities to ponder their authenticity.[5]

Even when IRA callers provided a code word they had used before, thus signaling the authenticity of the threat, they were often vague about the location of the device or its timing. Part of this may be credited to the inevitable "fog of war," the confusion that accompanies all military or terrorist operations; poor communications; not calling the right party; and erroneous or ambiguous descriptions of locales that the attackers themselves did not know well. However, some of it also may have been deliberate. Many hoaxes with assorted code words that caused great disruption augmented the IRA's own terrorist campaign. If the public believed that IRA always used a code, then they might blame explosions on the incompetence of the authorities in responding, or worse, think that the government cynically wanted casualties to fan public outrage against the IRA. A perfect arrangement was not in the IRA's interest.

CONCLUSION

Early in its terrorist campaign, IRA terrorists identified public surface transportation in England as a preferred target for terrorist activity. From the inception of their campaign in 1973 to the cease-fire in 1997, IRA terrorists

[5] Peter Gurney, *Braver Men Walk Away: Memoirs of the World's Top Bomb-Disposal Expert,* London: Harper Collins, 1993, p. 50.

continued to attack public transport, principally the London Underground and commuter rail network. The authorities responded to the IRA's campaign by developing a national strategy aimed both at prevention and response and at involving the police, the private sector, and the general public. A feature of this response was the careful analysis of terrorist tactics, an analysis made possible by the volume of the attacks and the terrorists' adherence to set patterns.

Strong security measures did not prevent the terrorists from continuing their campaign against public transport. Indeed, no security measures can prevent terrorists from setting off bombs in public places. However, security did have a discernible effect in obliging the terrorists to retreat to more remote targets, while prompt, well-planned responses avoided needless casualties. A visibly effective response also made it more difficult for the terrorists to carry out incidents calculated to kill, while blaming the result on incompetent authorities. The IRA could have killed wantonly had it chosen to do so, but it could not easily slip the moral burden of its decision. Although second-rate terrorists, reinforced by hoaxers, were able to achieve what the authorities admitted were staggering results, the casualties remained very low and disruptions were kept to a tolerable minimum.

Rail transport security benefited from the existence of a national-level office in the Department of the Environment, Transport and Regions devoted to security and a dedicated and experienced Transport Police. This ensured consistent and high-quality systemwide security. Security measures, by themselves, cannot end the terrorist campaign—that will require a political settlement.

APPENDIX A: CHRONOLOGY OF IRA TERRORIST ATTACKS ON PUBLIC TRANSPORTATION IN ENGLAND

August 23, 1973	Bomb defused at Baker Street Underground Station in London.
September 8, 1973	Bombing at Victoria Station injures 4 people.
February 3, 1974	Bomb on bus in Yorkshire carrying soldiers and their families back to camp kills 11, injures 14.
April 6, 1974	Bomb damages railway station in Birmingham.
October 9, 1975	Bomb at bus stop in London kills 1 person.
February 12, 1976	Bomb defused at Oxford Circus Underground station.
March 4, 1976	Bomb explodes on commuter train in London.
March 15, 1976	Bomb explodes on Underground in London, injuring 8 after the bomber shoots and kills the engineer.
March 18, 1976	Bomb explodes on Underground, injuring 1 person.
February 18, 1991	IRA renews terrorist campaign with bombings of Victoria and Paddington Stations in London, leaving 1 dead, 43 injured.
February 25, 1991	Bomb destroys track in Hertfordshire.
August 29, 1991	Three bombs found under seat in Underground coach.
December 16, 1991	Bomb explodes near Clapham Station in South London.
December 23, 1991	Incendiary devices found on Underground cars in London.
January 30, 1992	Incendiary device found under seat in Underground coach.

February 7, 1992	Incendiary device ignites on Underground track in east London.
February 28, 1992	Bomb explodes in London Underground station, injuring 25.
March 2, 1992	Bomb defused on tracks in Northern London.
March 10, 1992	Bomb explodes on tracks in South London.
May 8, 1992	Bomb alert empties London's Victoria Station.
June 11, 1992	Bomb scares disrupt Underground.
August 28, 1992	Bomb threats temporarily stop London commuter service.
October 9, 1992	Two bombs explode under cars parked near railway stations in London.
October 13, 1992	Four bombings in central London.
October 21, 1992	Bomb detonates under Harrow Road Bridge in London.
October 22, 1992	Three bombs go off in London; two destroy rail tracks.
December 9, 1992	Bomb explodes in London Underground station.
December 23, 1992	Bomb explodes in London Underground station.
February 3, 1993	Bomb explodes on London-Kent train.
February 4, 1993	Bomb explodes on commuter train in London; another explodes at Underground Station.
October 2, 1993	Three bombs explode in northern London, one near a railway station.
December 14, 1993	Explosion on rail line southwest of London.

December 21, 1993	Three bombs are found in London, one near Victoria train station; coded warnings shut down 40 train stations in southeast England.
March 15, 1994	Bomb found on rail line in Kent.
June 6, 1994	Bomb discovered at railway station in Kent.
February 9, 1996	Bomb on Dockland Railway kills 2, injures 100.
February 18, 1996	Bomb on London bus kills 1, injures 8.
April 25, 1996	Two bombs found under Hammersmith Bridge in London.
September 30, 1996	IRA attempts to block Channel Tunnel.
April 7, 1997	Coded bomb threats disrupt London transportation.
April 18, 1997	Bombs explode at stations in Leeds and Doncaster.
April 21, 1997	Bomb threats at London Underground and train stations.
April 29, 1997	More bomb threats on roads around London.
July 19, 2000	Bomb explodes on tracks in Underground station; coded bomb threats disrupt system.
October 17, 2000	Bomb threats on rail lines north of London.

APPENDIX B: BRITISH SECURE STATIONS SCHEME: MANAGE AND DESIGN TO CUT DOWN CRIME

SUMMARY

In the United Kingdom, public transportation systems present unique challenges for passengers and public authorities. Government research shows that passengers on public transport are most concerned about their wellbeing when waiting at stations. To combat this apprehension, the Government, British Transport Police, and Crime Concern have launched the **Secure Stations Scheme**, which encourages Britain's rail companies to improve security at stations and reassure customers of the government's commitment to passenger safety.

The national scheme includes all aboveground and underground rail stations across England, Scotland, and Wales, which are policed by the British Transport Police (BTP). The program has established national standards of good practice in security, and expects the individual stations, which have worked with the BTP and other local law enforcement partners, to implement a package of security measures. Such measures include the following:

Design

- Good lighting and secure fencing in the station, car parks and approaches
- Up-to-date information and clear signs
- Clear lines of vision

Management

- Security staff presence/closed-circuit television surveillance
- Rapid response in emergencies
- Regular inspection and maintenance
- Special training for staff to deal with conflict and emergencies

Rail authorities are required by the plan to conduct an **independent passenger survey** to ascertain whether passengers actually feel safe at the stations. Authorities also are required to provide quantifiable evidence of **decreasing crime rates** over a sustained period of time.

BEST PRACTICES ACROSS BRITAIN

Many train operating companies have already taken the initiative to improve security and passenger safety at stations. The specific entities and their efforts include:

- **Chiltern Railways**
  - Closed-circuit television (CCTV) monitoring at stations and car parks
  - Improved lighting
  - Security staff at commuter stations between 7 A.M. and 10 P.M. Monday to Friday
  - Secure fencing
- **Connex South Eastern**
  - CCTV monitoring at stations
  - Clear lines of vision and security mirrors in subways, on platforms, and at station approaches
  - Well-positioned lighting and secure railing
  - Dedicated assistance areas such as public telephones on station platforms (trial scheme)
  - Staff training to deal with conflict and emergencies
  - Security officer patrols
  - Work in close cooperation with police and local communities
- **LTS "Operation Safeguard" (Fenchurch Street line)**
  - Security guards at stations and mobile patrols
  - Security patrols at station car parks
  - Crime prevention officers and station staff cooperate closely with the police and local communities
  - Improved lighting and fencing
  - CCTV monitoring at stations
  - Help points are being introduced on all station platforms
- **London Underground**
  - Clear and up-to-date travel and local area information

  - Emergency and information help points at stations
  - Improved lighting
  - Mirrors to give clear line of vision
  - Staffed stations throughout opening hours
- **Manchester Metrolink**
  - CCTV on every platform linked to the control room, which is monitored during opening hours
  - A police patrol unit dedicated to the station and immediately surrounding area
  - Good lighting and secure fencing
  - Passenger emergency call point on all platforms, which goes directly to a member of staff
- **Mersey Rail**
  - CCTV monitoring on stations linked to 24-hour control center
  - Rapid response and covert security guards
  - Station lighting improvements
- **ScotRail (Strathclyde and East Scotland)**
  - CCTV monitoring at 13 stations and car parks linked to staffed control centers; these will be extended to 31 more sites.
  - Information and emergency help points on platforms (monitored by CCTV) and linked to staffed control center for immediate response
  - Control centers have direct link to the British Transport Police
- **South West Trains**
  - Help points (currently linked to 24-hour control center) to be installed at 176 stations
  - CCTV monitoring at stations
  - Cutting back vegetation
  - Improved lighting
  - Security patrols at Richmond, Clapham, and Wimbledon
- **Tyne & Wear Metro**
  - Alarm and enquiry points to be installed at all stations

- CCTV monitoring at all stations linked to 24-hour control center
- Employ extra staff to provide assistance to passengers
- Play classical music at their stations (ongoing at 5 stations)
- Upgraded lighting at all stations
- Youth workers to work with children who loiter at stations

GOVERNMENT RESEARCH FINDINGS

Perceptions of Safety from Crime on Public Transport

- Public transport users feel least safe when they are waiting for train services.
- Twenty-two percent of respondents stated that they would make more journeys by public transport if security measures were introduced. Forty percent of the extra journeys would be for social purposes and in the evening.
- Measures to improve personal safety would result overall in an 11 percent increase in the number of trips by public transport.
- Help points in train stations were widely regarded as an effective and important measure for personal security when there is a immediate response if activated.
- Respondents rated the following as the most effective safety measures at train and underground stations:
  - Good lighting
  - Presence of staff
  - CCTV to provide surveillance.

Recommendations

- CCTV should be highly visible to reassure passengers as well as to deter potential criminals. Publicity should highlight that the CCTV is monitored and is linked to someone who can provide help.
- Staff should wear uniforms that stand out, and they should be out in the stations to reassure the public by their presence.

- Good quality information in stations was felt to be essential to help plan safe journeys (for example, up-to-date information on service departures and interconnecting services).

THE VALLEY TRANSPORTATION AUTHORITY

OVERVIEW

The Valley Transportation Authority (VTA) offers two forms of public transportation for users in Santa Clara County—the heart of Silicon Valley. Since 1972, the agency has provided bus service, with a fleet that now numbers 525. Approximately 154,000 riders use the bus system each weekday, with service connecting 79 routes at six transit centers located in Eastridge Shopping Center, Gilroy, Mountain View, Palo Alto, San Jose Transit Mall (downtown), and West Valley College. A tax measure passed in November 2000 allows for a substantial increase in the fleet.

In 1987, the VTA also began service on light rail, a small system that was originally 21 miles in length and which, in December 1999, was increased to 28 miles. According to VTA officials, the system is one of the longest built in the past 50 years. Currently, the system operates 50 rail cars that pass through 45 stations, all at ground level or above. The light rail system carries about 24,000 passengers per day. Service operates 24 hours a day, seven days a week, at various intervals.

VTA light rail service is growing. As a result of a measure passed by the voters in 1996, a new 8.3-mile east-west extension (the Tasman East-Capitol line) is under construction, providing linkage between north First Street (site of much high-tech business) and Capitol Avenue in east San Jose. With the passage of Measure A in 2000, funds have been set aside for construction of the Vasona line, a north-south route between downtown and Campbell. Work on this 6.8-mile route, which began in 2001, will be completed in approximately 2004. The VTA is rapidly becoming a major source of surface transportation in Santa Clara County.

CONCERNS AND STRATEGIES

The VTA has never experienced an incident remotely similar to terrorism on surface transportation. Nevertheless, the agency has a crisis management protocol for responding to questionable activities. Whether bus or light rail, drivers are the “first line of defense” in detecting and responding to suspicious circumstances. Thus, their job goes well beyond the roles of strictly transportation providers.

In addition to vigilant drivers, the VTA considers other personnel part of the agency's counterintelligence group. These individuals include mechanics, administrators, and custodians, along with the traveling public. As the Chief of VTA security states, "they're [anyone remotely connected with VTA functions] all part of the team. We need all of them to be aware." The major areas of concern are means for dealing with the following:

- **Chemical weapons.** Employees are instructed to determine the content of any suspicious substance to the best of their ability, without endangering themselves in the process. Employees are instructed to contact the Fire Department, which is much more prepared to respond to chemical-related issues, as soon as the situation has been assessed.

  Although chemical attacks would be very effective against a single bus or a single light rail car, most chemicals would dissipate once the doors opened. Agency personnel are not overly concerned about the threat of chemical weapons, because VTA operates above ground throughout the system. In addition, the open-air configuration of light rail stations and the fact that buses have limited exposure beyond the individual units of operation further mitigate the likelihood of damage, should a chemical assault take place. However, military-grade chemical weapons like VX or mustard gas, which are persistent, would pose a significant threat to both initial victims and rescuers and would make cleanup complex.

- **Bombs.** The presence of a bomb aboard a VTA transportation unit generates a different response, depending upon whether the unit is a bus or a light rail train. In the case of a bomb (or suspicious package believed to be a bomb) on a bus, drivers are instructed to notify local authorities, then remove the bus from a populated area. If drivers or other onboard authorities believe that the bomb is unstable (because of a timing device or its physical location), drivers are directed to clear the bus of all passengers immediately without regard to location.

  Light rail drivers have less flexibility because of the fixed track upon which the system operates. Should operating personnel determine or suspect that a questionable device is on board, they are instructed to stop the train and remove all passengers as soon as possible; VTA personnel will proceed to cordon off the area.

- **Mentally disturbed passengers and physical property damage.** VTA officials are much more concerned with the presence of unstable individuals on agency vehicles than with chemical or bomb attacks.

Whether the problem is emotional instability, inebriation, or substance abuse, the Chief of Security defines these as the real instances of "surface transportation terrorism" in Santa Clara County. "Tagging," or the use of spray paint in public areas, is another agency concern. Here the problem rests in offenses to the eye, rather than any potential loss of human life.

The potential disruption by individuals with emotional problems and those who would cause property damage creates problems for VTA officials in terms of obtaining assistance from higher levels of government. Because these activities do not fit within established definitions of surface terrorism, agency officials find it almost impossible to capture the attention of public policy makers and bureaucrats, let alone any funds that are organized in specific categories.

SECURITY ORGANIZATION AND PERSONNEL

The VTA operates with a very small security staff. With virtually no history of terrorism or terrorist threats, agency officials believe that it is unnecessary to dedicate more than minimum funds to this area. The security staff includes 25 armed deputies, 125 contracted security officers who are unarmed, and 9 unarmed fare inspectors who move randomly from train to train on the light rail system.

Buses carry fare boxes, unlike the light rail service, for which passengers purchase tickets on the honor system. Therefore, agency fare inspectors do not board buses. However, a three-person troubleshooting unit travels by car along problem-prone routes, with officers occasionally boarding a bus on a random basis to check for any problems (see the Rapid Deployment Team discussion, below).

In addition to the presence of these permanent personnel, agency officials occasionally call upon a small number of Santa Clara County Sheriff's Department Reserve deputies. However, the number of Sheriff's Reserve deputies changes daily, and they are not considered part of the VTA security network. The permanent personnel generally are considered sufficient for the perceived level of threat.

SECURITY AND DETECTION TECHNOLOGY

The VTA has no modern technology designed to deal with surface transportation terrorism threats. Agency personnel are not overly concerned

about this because of the long peaceful history of the system. Should any serious issue or terrorist threat arise, the agency's security personnel would call upon local police or the Santa Clara County Sheriff's Department. "We're not in the policing business," the Security Chief notes, expressing a point of view considerably different from that of his security-minded colleagues in Tokyo and London. "Our job is to move passengers from part of the service area to another, period."

The VTA has come to rely upon the City of San Jose to plan a response to potential terrorism. With 900,000 residents, this city's police department has jurisdiction for most of the VTA light rail and bus system lines. Because the city's Fire Department covers the area where most of the transit lines operate, there are no plans for VTA personnel to go through hazardous materials training.

The VTA does utilize some anticrime resources in a preventive capacity, although it remains unclear as to the value of their assistance in a true terrorism crisis or other volatile situation. The major activity lies with what is described as a Rapid Deployment Team, a three-person unit that drives throughout the district along selected bus lines. Two of the members randomly board buses in these targeted areas, while the third follows behind the bus in an unmarked car. The agency hopes to add at least one more team in the near future. Other than random fare inspectors, there are no security personnel on light rail vehicles.

The VTA clearly expects user tranquility as part of the daily operating regimen, but such optimism may have limits. Given the possibility of disruption, the agency is becoming more active in its security management. One change with respect to detection may soon come in selected elements of the light rail system. The Security Chief hopes to install closed-circuit television at all of the light rail stations and vehicles in the near future. In August of 2000, the cost for this network was estimated to be between $2 million and $3 million. The head of VTA security believes that with the installation of such security cameras, "50 percent of the agency's problems will go away."

There are no closed circuit camera plans for the network of agency buses. These vehicles are considered less vulnerable from the standpoint of systemwide shutdown because of their relative mobility and detachment from other elements of the transportation network.

COMMUNICATIONS EQUIPMENT AND PROCEDURES

All VTA vehicles have two-way radios for communication with the Control Center near VTA headquarters. When a threat to the system occurs or is detected, personnel are to call the Control Center for instructions. Serious issues usually are transferred to local police or fire agencies in the region. The agency makes no pretense of being self-contained in its ability to manage serious problems.

A new Control Center is currently under construction. It will be located adjacent to the Sheriff's Department headquarters, permitting even closer cooperation between the two jurisdictions, although not suggesting any change in the dependency upon other law enforcement personnel.

PERSONNEL TRAINING

VTA bus drivers and light rail train operators go through six to eight weeks of training. Virtually all the instruction deals either with bus and train mechanics or passenger treatment. There is no employee training per se on terrorism or potential assaults on either the bus or light rail systems. The lack of attention to these matters reflects the opinion of the Chief of Security that the occurrence of such events is highly unlikely. Instead, the Chief of Security says, drivers and operators need to use "common sense."

Despite the paucity of terrorism training, the agency depends upon drivers and operators to use a simple "psychological profile" to determine the presence of suspicious individuals or behavior. For example, if a driver spots a "suspicious package" or something out of the mainstream, he or she is to call headquarters if, upon exercising his or her own judgment, there is reason to do so. Indeed, "judgment" stands out as the key word for action. With little attention other than common sense directed to the terrorism question, it would appear that the agency is allowing each driver to decide when and how to respond.

The biggest concern in the minds of security personnel is the possibility of a person boarding a bus or train with a gun or other weapon. Such a person might be a gang member, someone who needs to show off, or a mentally disturbed individual. Because the appearance of these individuals often blends in with other passengers, they are difficult to spot and, therefore, to manage.

TERRORISM? WHAT TERRORISM? BART AND VTA COMPARED

The Bay Area Rapid Transit Authority (BART) and VTA cases simultaneously reveal similarity and distinct contrast. They are similar in that neither system has ever experienced any act remotely related to terrorist activity.

The two transportation agencies are quite different with respect to their expressed concerns about potential terrorist activity. BART security representatives worry about such a possibility and attempt to prevent it through training and coordination; this effort is ongoing internally as well as through interagency cooperation. Although VTA is part of interagency terrorism response planning, its personnel are less concerned with the thought of a terrorist threat than such issues as fare avoidance and graffiti.

THE BAY AREA RAPID TRANSIT DISTRICT

OVERVIEW

The Bay Area Rapid Transit District (BART) is the largest automated rail system in California. Currently serving a potential population of more than three million people in Alameda County, Contra Costa County, San Francisco County, and northern San Mateo County, BART tracks cover 95 miles (153 kilometers).

In existence since 1972, BART has carried over 1.5 billion passengers more than 18 billion passenger miles. Today, the system averages approximately 325,000 passengers per day. The rail system has slowly expanded over its 30-year history, with service connecting to San Francisco International Airport expected to begin in late 2001. The fiscal year 2002 budget for BART will be $367,931,100.

Currently, Santa Clara County hopes to expand BART service to several locations in the county. With nearly two million people in a fast-growing part of the greater San Francisco Bay Area, the county hopes to connect residents and commuters with employment sites. This need has been exacerbated by the fact that as of 2001, San Francisco-Oakland and San Jose had the dubious distinctions of having the second- and fifteenth-worst automobile traffic congestion in the nation. In November 2000, more than 70 percent of the voters in Santa Clara County passed a ballot initiative that called for the addition of one-half cent to the local sales tax for 30 years, estimating the collection of $6 billion over the period. Of that amount, approximately $2 billion will be set aside to fund BART, an amount that represents about half the total cost of the 21-mile extension. Negotiations are underway to resolve the many institutional, financial, technical, and other issues remaining before the expansion can occur.

BART is a valuable link for moving people throughout the area, making the system's policies against surface terrorism worthy of examination.

MAINTAINING VIGILANCE AGAINST SURFACE TERRORISM

BART has never had a terrorism-related incident; the dissemination of mace by a disgruntled passenger is the most serious incident ever to plague this regional transportation agency. Nevertheless, its public safety personnel are acutely

aware of incidents such as the 1995 event in Tokyo and IRA threats in the United Kingdom and maintain vigilance at all times. Uniformed and station personnel are on constant alert. In addition, the agency cooperates with the Bay Area Terrorism Working Group, a planning organization whose members include the FBI, the state's Office of Emergency Services, and some transit agencies, as well as police, fire, and other emergency personnel in various jurisdictions between San Jose and Marin County. They also participate in simulated transportation-related disaster exercises conducted annually by the Metropolitan Transportation Commission (MTC). Since 1995, the agency has attempted to enhance its agility by dividing its territory into four decentralized zones.

BART uses the federal definition of terrorist threats:

- Chemical, perceived as the most serious threat because of the relative ease with which harmful materials can be transported into or along a transportation corridor and the fact that its use gives the terrorist instant, yet potentially long-lasting, gratification from his or her activities;
- Biological, serious because of the nature of the potential disaster and the fact that the full effects of activity may not be determined for three to five days after it takes place;
- Radiological (nuclear), which is significant—although rarely discussed—because of the ease with which someone can expose thousands of people to low-tech, easy-to-get devices.

As part of its general preparedness, BART management personnel have strategies for radiological, chemical, and biological incidents that could take place along the system's train lines and in stations. Each plan carries detailed instructions and procedures pertaining to a particular type of incident and place where it occurs. General elements include:

- Isolating the incident area to contain the effects of the material in the smallest space possible
- An evacuation process that works to move people away from the source of the attack in an orderly, yet quick, fashion
- Cessation of train service to prevent material from spreading into previously uninfected areas
- Turning off the ventilation system to the extent that it helps to contain materials that would otherwise travel by air

- Dealing with the media to keep people apprised of events
- Coordination with other governments in ways that are seamless, rather than duplicative or contradictory.

According to agency protocol, any remotely related terrorism incident, or terrorist threat, will trigger a notification to the FBI. Because of the FBI's superior resources, availability of experts for rapid threat assessments and evaluation of technical feasibility, and ability to marshal other federal resources in response to Weapons of Mass Destruction (WMD), their early notification is considered critical to a coordinated and effective response.

CRISIS MANAGEMENT STRATEGY—PERSONNEL AND PROCEDURES

As part of its ongoing preparedness program, BART maintains an elite group of personnel who will serve as the first response team to a surface terrorism-related incident. This carefully trained group of specialists (approximately five to eight people on any given day) is available to assist with the management of any WMD incident related to system disruption, including terrorist-related activities. With agile responsiveness a high priority, the group can assemble at any crisis site along the 95-mile system within 45 to 60 minutes of an incident's occurrence.

To ensure the most rapid response possible, core group members carry special suits, hoods, gloves, and other protective equipment in their cars. Protective equipment also is stored at strategic locations throughout the BART system. These locations are known only to the specialists who have access to these materials.

BART relies upon its trained personnel as a first line of defense against terrorism or any other disruptive behavior. All employees are on alert at and near each of the system's 39 stations. Of particular concern are the 14 subway stations along the lines of the system because of the inherent difficulties in ventilating toxic fumes and removing people. The 12 surface and 13 aerial stations present less risk to the system because they are located in open environments, although they are more vulnerable to penetration by assailants.

In the event of an incident, the train operator, circulating patrol officer, or station attendant is expected to notify the operations control center (known as Central) in Oakland. Upon receiving such information, Central will isolate the

area and organize immediate evacuation. Central and the BART Police Department assume responsibility for contacting all other agencies with specially trained first responders such as cooperating police departments, fire departments, hazardous materials agencies, and the FBI. The potential for downwind plume impacts and a concern for the surrounding community can affect the extent of the contacts.

COORDINATED RESPONSE

BART recognizes that a terrorist act, or use of any WMD, will require a coordinated response by all first responders to minimize casualties among both the responders and impacted citizens. BART's Nuclear/Biological/Chemical Response plan and its general emergency plan are distributed to other first-responding agencies to enable them to understand BART's anticipated response activities. In addition, BART has been the simulated venue for regional table-top exercises involving the handling of terrorist incidents by first responders from throughout the San Francisco Bay Area.

PREVENTIVE MEASURES

BART personnel acknowledge that there are no foolproof preventive measures against a terrorist determined to disrupt the system or harm passengers. Except for the tubes and underground corridor, the system is too open. Nevertheless, the agency's mission is to discourage antisocial behavior through carefully trained personnel and equipment. Thus, BART officials rely primarily upon a battery of cameras, police patrols, and psychological profiles as a collective first line of defense against would-be terrorist activity.

Security Training

The BART system operates with 175 sworn (armed) officers, all of whom have received police academy training. The system also employs approximately 300 unarmed station attendants. Although located only in the front cab of the train, operators are also trained to watch for suspicious people both on board trains and along the 95-mile track system.

Each officer employed by BART goes through four hours of training related to chemical/biological/nuclear/explosive terrorism threats. A core set of specialists takes another four hours of training. Every new employee must attend a four-hour training video as a condition of employment, and several attend conferences on terrorism and terrorism-related issues each year.

Psychological Profiles

The BART crisis team has periodic table-top meetings, at which members discuss potential crises, exercises, and possible responses. Once a year, the BART system conducts a simulated multicasualty terrorist or disaster activity with dozens of participants at a designated site. This drill is usually carried out early on a Sunday morning so as not to disrupt normal traffic.

As part of its interaction with residents and passengers, the agency maintains an awareness of any festering community issues as well as any threats that could occur because of unusually challenging events or activities. These include the Millennium, sports events, concerts, ethnic-related events, or other activities that bring unusually large numbers of individuals into the system over a brief time span.

Police Patrols

Police patrols circulate through the stations on a regular basis. The presence of these personnel is a valuable deterrent to would-be assailants. As part of their deterrence activities, agency personnel routinely intercept questionable people, those who appear out of place or out of sorts. Such individuals usually depart the area after such meetings.

Station attendants perform a second-tier level of ongoing surveillance. While they have neither the training nor coercive power of BART police, attendants serve as “eyes and ears” for any unusual activities. Often their mere appearance is enough to discourage antisocial activities, because they are eye witnesses to any unusual activities.

Stations

Stations contain emergency alarms inside each agent’s booth. In addition, white courtesy telephones are located near the elevators that take passengers to and from the platforms. At selected stations, fixed cameras remain focused on the telephones and elevator waiting areas at all times. Outside the stations, cameras and infrared spotlights placed in BART parking lots ensure continuous surveillance of these areas for any type of criminal activity.

Cameras

Remote-controlled cameras are directed from the Control Center in Oakland. These instruments monitor traffic at selected stations along the system, including the fare gates and platform areas. There are no cameras out on open track, because people do not congregate there, nor are there cameras along the transbay tube or any other underground areas in Oakland, San Francisco, and Berkeley. BART security personnel believe that underground track areas (not underground stations) are the most vulnerable spots in the system because of the lack of cameras and other detection equipment in relatively closed environments. BART has made some progress in obtaining funding to install equipment at the transbay tube entrances and other critical underground access points. Pedestrian alarms and closed-circuit television cameras should be installed soon.

Security on Trains

Each car contains an emergency door release for quick exit in the event of illegal or suspicious activity. Should passengers need to communicate with the train operator, they can use intercoms that are located in every car. Stations have public address systems to make announcements regarding train problems or issues.

Secured Perimeters

Chain-link and barbed-wire fences exist along all right-of-way areas and pedestrian bridges. In addition, BART security personnel have taken precautions against intrusion through the installation of roll-up doors, gates, stainless steel doors, and motorized shutters at all station entrances and exits. An intrusion alarm system protects all restricted gates and doors to the system, further reducing the likelihood of penetration. Shrubbery and landscaping are kept to a minimum at all points along the system, thereby minimizing the likelihood of hidden or concealed illegal activity. As a result of these combined efforts, unauthorized entry into the BART system is difficult to carry out without going through significant effort.

Vulnerability

The Control Center at Oakland manages, oversees, and troubleshoots all movements and related issues as well as the camera monitoring system. With just a few key personnel, the facility can oversee virtually all sensitive areas of

the system. Nevertheless, there is no backup to the Control Center, which is considered a weak spot for the system.

Without an alternative site, there is the pressing question of what would happen to BART in the event of a shutdown at the Oakland Control Center, whether it were caused by earthquake, flood, or any other disaster. Thus, the system's nerve center remains its most vulnerable sector. This condition causes concern, if not profound anxiety, among agency officials.

Needs

The allocation of federal and state transportation funding in California is subject to planning and action by agencies composed of elected city and county officials. In the San Francisco Bay Area, each county's Congestion Management Agency determines local priorities, and the Metropolitan Transportation Commission makes the final decisions for the region. Elected BART officials are not members of the voting boards of these agencies. Thus, vital funding decisions affecting BART depend on the good will and consideration of persons with potentially competing priorities. As a property-tax-funded special district, BART is constrained by Proposition 13 with respect to tax increases. Because of these limits and uncertainties, BART leaders hope the federal government will establish funding categories specifically for systems like BART.

Regardless of future assistance from the federal and/or state governments, one fact will remain clear: The safety of BART will only become more important as larger and larger numbers of Bay Area residents come to rely upon the transportation system.

THE TOKYO, MARCH 20, 1995, SUBWAY SARIN ATTACK

On March 20, 1995, members of the Japanese religious cult Aum Shinrikyo released sarin (nerve gas) on Tokyo's subways, killing 12 persons and making thousands of others ill. It was the first large-scale use of a poison gas by a nongovernment group and, although Aum Shinrikyo previously had not been identified as a terrorist group in the traditional sense of that term, the incident was promptly labeled an act of terrorism. Seen as a precedent-setting event, the attack fueled fears that future terrorists would employ chemical weapons, and it added impetus to government programs to prepare for such contingencies.

The incident also raised new problems for those charged with the security of public transportation. Japanese authorities greatly increased security immediately after the incident, although few security innovations were introduced. Instead, police concentrated on neutralizing the suspected source of the attack—the Aum sect. The following case study is based on published accounts plus the author's discussions with officials in Japan's Ministry of Transportation and National Police Agency, and Tokyo's Metropolitan Police Department.[6]

TOKYO'S SUBWAYS

Tokyo's vast subway network comprises two separate subway systems. The TRTA, also known as TEITO or Eiden Lines, is the older and larger system. It began operations in 1927 and currently runs 1,677 motor cars and 536 trailer cars over eight lines with a total mileage of 154.6 kilometers (96 miles). Three of its lines—Marunouchi, Hibiya, and Chiyoda—were the targets of the 1995 chemical attack. The second system, the TOEI, is run by the municipal government. It operates 524 cars on four lines with a total mileage of 64.3 kilometers (40 miles). In addition, Japan Rail operates an extensive

[6] The most thorough published accounts are those provided in David Kaplan and Andrew Marshall, *The Cult at the End of the World: The Incredible Story of Aum* (London: Arrow Books Limited, 1996) and Haruki Murakami, *Underground: The Tokyo Gas Attack & the Japanese Psyche* (London: The Harvill Press, 2000). See also Kaplan's excellent chapter "Aum Shinrikyo (1995)" in Jonathan B. Tucker (ed.) *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons* (Cambridge, Massachusetts: MIT Press, 2000) pp 207-26; D.W. Brackett, *Holy Terror: Armageddon in Tokyo* (New York: Weatherhill, Inc. 1996); National Police Agency (Japan), *Aum Shinrikyo: An Alarming Report on the Terrorist Group's Organization and Activities, 1995*; and The Japan Times Special Report, *Terror in the Heart of Japan: The Aum Shinrikyo Doomsday Cult* (Tokyo: The Japan Times Ltd., 1995).

commuter network, and the adjoining city of Yokohama has its own two subway lines.

The combined system is extensive, rapid, and clean. A 1998 study of public transportation in four cities—London, Paris, New York, and Tokyo—rated Tokyo as the best ride, with a perfect 100 percent record for punctuality during peak hours. Keeping the trains running on time was a factor in the response to the March 20 chemical attack.

Public transportation is vital in the huge metropolitan area of Tokyo. Millions use it daily, encouraged by the fact that 86 percent of Japanese companies pay the full travel costs of their employees. Without its subways, the city would stop. During peak hours the subways are fantastically overcrowded, with station staff sometimes literally pushing passengers into the cars. This too may have been a factor on March 20. The attack took place at the height of the morning rush hour, when passengers are accustomed to boarding the trains rapidly, without necessarily heeding what is going on. This not only provided concealment for the attackers, but also meant that even as ill passengers were stumbling off the contaminated coaches, new passengers were shoving their way on board. Within minutes, more than a thousand people had been exposed to the poison gas.

AUM SHINRIKYO

The Aum Shinrikyo (Supreme Truth) cult was established in 1987 by Shoko Asahara, a con man guru who claimed supernatural powers. Despite the improbability of his boasts, which included levitation and miraculous cures, the cult quickly grew into an organization of 10,000 members seeking spiritual comfort, New Age enlightenment, and freedom from personal choice. Organized along quasi-government lines, with its own ministries and departments, all under the Supreme Leader Asahara, the empire included a diverse business conglomerate bringing the cult an estimated net worth exceeding $2 billion. Religious cults of this type are not unusual in either primitive or advanced industrial societies, but Aum Shinrikyo was noteworthy in combining its apocalyptic world view (also not uncommon in cults), a fascination with weapons of mass destruction, an ability to recruit scientists, and access to immense financial resources.

Visions of a violent end drove the cult's members. To them, the evidence was clear—the return of Halley's comet, political developments in Russia, the unification of Europe, and numerous sightings of UFOs all confirmed that the

end was near. According to Asahara, Armageddon would occur in 2001 or 1999; he later moved the date forward to 1997. Before then, sect members believed, the cult would become more powerful than the state. Aum's army would invade the Holy Land. The apocalypse would follow. Mount Fuji would explode. Japan would sink into the sea. Asahara would die, but those who adhered to his beliefs would survive, while those who did not would perish in the flames of hell.

Much of the cult's intrinsic paranoia reflected the hypochondriac paranoid fantasies of its supreme leader, who claimed that he and his followers were themselves being attacked by chemical weapons. To battle against its numerous enemies and to prepare for its role in the fantastical future imagined by its members required that the cult obtain the most advanced weapons of mass destruction. That, in turn, required scientists, technicians, secret laboratories, front companies, a covert arms acquisition program, international connections, and huge sums of cash.

Aum's takeover of Japan was to begin with a coup. Units of Aum followers, dressed in the uniforms of Japan's Self-Defense Forces—some of them actually soldiers who had been recruited into the sect—would seize physical control of the government. The sect's weapons of mass destruction then would deter any counterattack.

EXPERIMENTS WITH EXOTIC WEAPONS

Cult technicians experimented with a variety of biological and chemical substances. Notes from one of the sect's officials also suggest that they may have tried to purchase a nuclear warhead in Russia; although they failed in that endeavor, they did acquire other Russian military equipment. Working in well-equipped laboratories, supported by a well-financed worldwide purchasing structure, Aum's corps of scientists unquestioningly sought to implement the mad schemes of the supreme leader. They contemplated vaporizing Japan's royal family with a laser on the occasion of the prince's wedding. Unable to mount that attack, they instead sprayed central Tokyo with botulinum toxin on the prince's wedding day. It is not known whether the city's physicians treated a greater number of patients with unusual symptoms, but no deaths occurred and no one noticed. In another try, they sprayed the city with anthrax from a tall building in Tokyo. Again nothing happened, this time because they had not incubated the spores properly. They also tried to obtain samples of Q Fever and the Ebola virus in Africa. Overall, their biological warfare program was unsuccessful.

They had better results in developing chemical weapons and constructed a clandestine plant capable of producing a highly impure version of sarin, a nerve agent first developed by German scientists. On June 27, 1994, the Aum scientists launched their first sarin attack in the town of Matsumoto, chosen because the cult had a land dispute with local authorities. The cult's technicians had rigged a refrigerated delivery truck with a crude atomizing system and loaded it with 44 pounds of sarin, which they dispersed at night. The attack resulted in seven deaths and more than 200 injuries. By November 1994, police had diagnosed the cause as sarin, but initially did not suspect Aum. Instead, authorities focused on a local resident who they alleged had accidentally produced a sarin-like substance in the course of making his own herbicides.

Further incidents of chemical contamination resulting from accidents at the cult's chemical plant on Mount Fuji might have alerted authorities to the sect's activities, but Japan's decentralized policing structure and reluctance to interfere with religious groups hampered investigations. Gradually, however, police began piecing together the various investigations of local complaints, mysterious disappearances, suspected murders, and the strange chemical purchases of the cult through its various front companies. Determined to push the investigation, police planned a nationwide search of Aum's facilities, using the cult's suspected involvement in a kidnapping as a basis for the action. (Japanese law did not prohibit the mere possession of sarin until April 1995.) With the authorities closing in, Aum planned a devastating counterattack.

THE ATTACK

The cult's first scheme involved a laser gun—this time Aum would destroy Tokyo's police headquarters or at least blind its occupants; but when attempts to build or buy a laser of sufficient power failed, Aum's scientists went back to gas. On March 5, 1995, 11 commuters on a train in Yokohama were hospitalized as a result of mysterious fumes that swept through the train. It was a rehearsal for the cult's next planned assault in Tokyo. Again, the group tried botulism. The deadly toxin was to be placed in dispensers inside briefcases that contained small electric fans to disperse the material. Three of these devices were left on station platforms, where they would be triggered by the vibrations of passing trains. The focus of the attack was Tokyo's Kasumigaseki Station, the one closest to police headquarters, but it failed because someone in the cult had failed to load the toxin into the containers. Even had pangs of conscience or mere incompetence not foiled the attack, its effect would have been limited by the simple fact that Tokyo's subways are kept extremely tidy. All three

abandoned briefcases were promptly noticed and collected by the stationmasters.

With its spies now reporting that police intended to raid Aum's facilities throughout Japan on March 21, Aum switched to the more reliable sarin. The dispersal method was crude. The hastily concocted sarin was loaded into homemade plastic bags, each containing about 20 ounces of the solution. Each member of the team would carry two or three bags onto the train, puncture them with a sharpened umbrella, and escape. The sarin would slowly seep out and vaporize into a deadly mist.

The initial plan called for 12 bags, but there was enough sarin for only 11. Instead of attacking the entire subway system, the five attackers aimed at the three lines converging at the Kasumigaseki Station. They scheduled the attack for 8 A.M. to coincide with the morning commute, when the trains were especially crowded. They hoped to kill hundreds of Tokyo's police officers as they traveled to work, but the inevitability of thousand of civilian casualties was not a constraint.

Boarding the trains at different stations, the five attackers succeeded in puncturing the bags within a few minutes of each other and escaping into the crowd. By 8:10 A.M., the attack was complete. Three subway lines and 16 stations were affected.

One attacker, wearing a surgical mask like those commonly seen in Japan to prevent the spread of germs, boarded a southwestbound train on Chiyoda Line at 7:48 A.M. He punctured only one of the two bags of sarin he carried at the Shin-ochanomizu Station, then left the train and fled to a waiting automobile driven by an accomplice. The train went on to the Kasumigaseki, where two station attendants died after taking the bags from the train, then to the Kokkai-gijidomae Station, where all the passengers were evacuated. In addition to the two dead, 231 people were seriously injured on this drop.

Meanwhile, another man boarded the westbound Marunouchi Line at the Ikebukuro Station. Hesitating, he briefly got off the train at the Myogadani (or Korakuen) Station, then, overcoming his doubts, reboarded another coach on the same train. When the train reached Ochanomizu Station, he punctured the two bags and fled to a waiting car. However, he had inhaled some of the fumes himself and, in the car, injected himself with atropine, which all the attackers carried. As the train continued, passengers in the contaminated car began to feel ill and spilled out into the stations of central Tokyo. In the morning rush

hour, the trains usually ran fairly empty after the last downtown stops. When the train reached the Nakano-sakaye, only two unconscious passengers, a man and a woman, were left on the coach. The station attendant thought at first it had been a double love-suicide. Then, spotting the two plastic pouches, he picked them up and put them on the platform. Fortunately, he was wearing the white nylon uniform gloves that all station attendants wear, and therefore did not feel the effects of the sarin until later. With the help of the train's driver and conductor, neither of whom had any idea what had taken place, the two passengers were carried off the train, which resumed its run to the other end of the line at Ogikubo. There, other attendants mopped the floor of the train as it reversed for its eastbound run. The fumes, however, caused the cleaning crew and the new load of passengers to become ill. Something clearly was wrong on the train, and two stops later it was removed from service. One passenger died and 358 persons were seriously injured.

The third attacker had boarded an eastbound train on the Manouchi Line at Shinjuku Station, punctured his bags five stops later, and left the train at Yotsuya Station. In his haste, however, he punctured only one of the two bags he dropped on the floor, and that one spilled it contents very slowly. As a result, fewer people became ill. At the end of the line in Ikeburo, the train was evacuated and searched, but the attendants missed the two packets and the train was reboarded and sent on its westbound run. More passengers became ill as the contents of the bag slowly seeped out onto the floor. At the train's fourth stop, a station attendant found the bags and removed them. The contaminated train, however, continued its run to the end of the line, where it reversed again for another eastbound run. It was not until 9:27, one hour and forty minutes after the attacker punctured the sarin-filled packet, that the train was taken out of service. Two hundred persons were seriously injured.

The fourth attacker boarded a northeastbound train on the Hibiya Line at the Noka-meguro Station. He punctured his bags at the next station and left the train. He, too, suffered the effects of minor contamination. Passengers quickly became ill and began to spill out of the train at each subsequent stop. By the time the train reached Kasumigaseki Station, ground zero of the attack, its first coach was empty; passengers on the remaining cars were evacuated. One person died, 532 were seriously injured.

The fifth attacker carried three packets of sarin. At 7:43, he boarded a southwestbound train on the Hibiya Line. At Akihabara Station, two stops later, he punctured his three bags and left the train. Passengers immediately began to feel ill. Spotting the leaking newspaper-wrapped parcel, one

passenger kicked it onto the platform at Kodemmacho, where it quickly filled the station with deadly fumes. Four persons died there. More violently ill passengers spilled out at each stop until one person pressed the emergency button at 8:10 A.M. and the train halted at Tsukiji. The driver reported that something seemed to have exploded in the train, and word of an explosion at Tsukiji Station spread to the other stations. Attendants at the station, however, quickly recognized the problem as poison gas and evacuated the station. Twenty-five minutes later, at 8:35, the central subway authority shut down the entire Hibiya Line and evacuated all remaining passengers and personnel. Eight people died and 175 were seriously injured.

Many passengers reported that they became aware of foul-smelling fumes. (Sarin itself is odorless, but the cult's brew contained numerous impurities.) Some victims immediately fell to the ground, writhing in convulsions. Others, choking, coughing, foaming at the mouth, their vision rapidly fading, staggered off the trains and toward the exits. As the trains continued on their course, at each stop disgorging more victims, the streets above rapidly filled with thousands of casualties. Some, who received only a whiff of the poison, went on to work feeling ill, to be sent to hospitals later in the day as their symptoms worsened.

Fumes from the subway began wafting up from station entrances and through the vents to street level, making more persons ill. (Authorities subsequently contemplated raising street-level vents to above pedestrian height.) Sarin is heavier than air and hugs the ground, but the cult's mixture contained other noxious ingredients. Passengers who had stepped on or crawled through the liquid also carried the sarin to street level. Still more people fell ill. Casualties climbed past the 3,000 mark.

THE IMMEDIATE RESPONSE

Police, fire, and medical crews responded rapidly to the disaster. Too few ambulances were available, so police vans were used to ferry hundreds of victims to hospitals. Rescue of those still in the stations was more difficult. Rushing into the underground stations, the first responders themselves became ill. Paramedics and emergency room staffs, exposed to clothing contaminated with sarin, also fell ill.

Initially, it was unclear exactly what had happened. The first emergency calls to the authorities came in at 8:20 A.M., with the initial reports indicating explosives, but the injuries appeared to come from some kind of fumes. As

reports from subway stations and first responders multiplied, it became clear to authorities that they were not dealing with an explosion or series of explosions, but with some type of gas. Sarin was immediately suspected, but then rejected; if the deadly nerve gas were the cause, there should have been many more deaths. By 10:30 A.M., however, sarin was identified as the cause. Subsequently, police capabilities to analyze chemical substances were improved.

Fortunately, the police had been planning to search Aum Shinrikyo's facilities on March 22. Anticipating that they might encounter laboratories with sarin, the police trained for dealing with nerve gas. They had requested protective masks and clothing from the military and had 30 of these suits on hand in Tokyo at the time of the subway attack.

Hospitals, expecting to treat people for burns and smoke, instead had to deal with some type of chemical poisoning, but the symptoms mystified emergency room crews. According to one account, at 10:30 A.M., more than two hours after the attack, a military doctor treating the casualties concluded that the culprit was sarin and ordered that atropine be administered. However, Dr. Nobuo Yanagisawa, Head of the School of Medicine at Shinshu University, says that by shortly after 9 A.M., it was clear even from televised interviews of victims that the problem was oganophosphorus toxicity, a nerve gas like that used in the attack at Matsumoto. On his desk was a copy of the Matsumoto Sarin Incident Report, which had not yet been distributed. Dr. Yanagisawa and his colleagues began telephoning Tokyo hospitals and faxing copies of the report to emergency rooms. He heard later, however, that physicians at St. Lukes, one of major treatment centers, were still looking for clues to the toxin at 11 A.M.

Had Aum's hastily mixed batch of sarin contained fewer impurities, the death toll would have been in the hundreds, perhaps thousands. As it turned out, only 12 persons died; 5,500 is the number given as those treated at hospitals. However, this is not entirely certain. Aum's scientists also may have laced the sarin with a chemical agent to slow vaporization, not only to protect themselves and the attackers against instant death but also to achieve greater effects. A more lethal version that killed instantaneously might have reduced exposures—people likely would not board a coach filled with corpses. It was only because the effects were not instantaneous that more people got on the contaminated coaches. Was lethality a trade-off for quantity?

Of the more than 5,000 people who became ill, only 26 percent, about 1,300, were treated for actual exposure to the gas; approximately 74 percent were diagnosed as suffering only from psychologically induced symptoms or concerns. More than a hundred persons showed up at hospitals in the following weeks suffering from the effects of nerve gas to which they had been exposed on March 20. Japanese prosecutors listed the official number of injuries at 3,398. Murakami's account says that 1,596 were injured seriously.

By 1:30 P.M., police wearing gas masks and protective clothing borrowed from the military had identified and recovered the plastic bags and began decontaminating the stations. The Self-Defense Forces sent 60 chemical warfare experts and 105 infantry to assist in the cleanup. Despite the magnitude of the disaster, by late afternoon, Tokyo's subway system was operating again.

The Tokyo Metropolitan Police Department, which had taken charge of the rescue operation, mobilized 10,000 additional police officers to increase security at and around locations where crowds gathered, including subway stations, major shopping areas near train stations and government buildings, and sports arenas. The public, which quickly had learned that nerve gas had been used in the attack, was warned not to approach and touch suspicious objects found abandoned, but to report such discoveries to police immediately.

Efforts against the Aum sect, which authorities immediately suspected, were accelerated, although there were public complaints that police were not moving fast enough. The sect had to be linked to the attack—suspicion alone was not enough. Within two days of the incident, however, 2,500 officers of the Metropolitan Police searched the sect's offices and facilities in Tokyo and raided its industrial headquarters near Mount Fuji on suspicion of kidnapping. Police units from all parts of the country assisted the Tokyo police in surrounding other Aum facilities and keeping them under surveillance. Although Aum spokesmen, interviewed frequently on television, denied that the cult had anything to with the attack, the haul from the continuing police searches provided mounting evidence of the group's involvement with chemical weapons; however, no arrests were made until early April. By mid-April, more than a hundred cult members were in custody, but none was immediately charged with the sarin attack.

FURTHER INCIDENTS

Cult members still at large fought back. On March 30, a gunman attempted to assassinate the chief of the National Police Agency. Although badly wounded, the chief survived. A caller later warned that if the investigation of Aum did not stop, more police would die. The next target, said the caller, would be the head of the Tokyo police. The caller's voice later was identified as that of a cult member.

April 15, a date that Asahara had predicted would bring catastrophe to Japan, brought high anxiety to the nation. Police patrols were increased further. Chemical warfare units remained on alert. Hospitals stood ready. Believing a rumor that sect members might poison the water supply, people filled their bathtubs and waited, but the day passed without incident.

On April 19, it briefly appeared that the cult had struck again as choking, blinded commuters spilled out of the Yokohama Station. Police and chemical warfare units responded instantly. More than 600 persons were hospitalized. This time, however, the fumes were not deadly sarin but only mace, and the perpetrator turned out to be not a soldier of the Aum sect, but a lone petty gangster with serious mental problems.

The cult struck next on April 23. Its objective was not mass murder but the elimination of its own "chief scientist," who was stabbed to death in front of television cameras. He was still at large because the police could not yet make a supportable connection between Aum's activities and the Tokyo attack. Had he been in custody and talked, he, of all the cult members, could have provided the most complete picture of Aum's secret weapons program.

May 5 was Children's Day in Japan, a traditional occasion for family outings. Despite the atmosphere of fear that prevailed, the subways were packed, especially Shinjinku Station, which encompasses a vast underground shopping mall. At 7:40 P.M., the station's staff responded to a fire in a public restroom, but the burning bag that caused the fire began to emit choking fumes. The staff retreated until firemen with breathing apparatus arrived to douse the flames.

Investigators discovered that the package contained two condoms, one filled with sodium cyanide, the other with sulfuric acid. Had the device worked as planned, the acid would have eaten through the condom to mix with the sodium cyanide, producing hydrogen cyanide gas, the same substance used to murder millions of Jews in the Nazi death camps. The gas then would have

entered the ventilation system and spread to the nearby train platforms. Police calculated that the infernal device contained enough chemicals to kill 20,000 people.

On May 16, cult members attempted to assassinate the Tokyo Metropolitan Governor with a parcel bomb. The bomb exploded in the governor's office, seriously injuring his secretary.

Japan's nerves were rattled again in June, when an individual claiming to be an Aum sect member hijacked an All Nippon Airways 747 by threatening to puncture a clear bag that he claimed contained sarin. After 15 hours of negotiations, police stormed the plane. The man was not a sect member, and the bag contained only water.

By June, police had rounded up hundreds of sect members including Asahara himself, who was arrested on May 16. Working on information gained through interrogation, the authorities desperately sought to cripple the sect's scientific capability, dismantle its laboratories, and recover its dangerous chemical stockpile before further attacks occurred.

The last attacks occurred on July 4, with four more attempted gas attacks on Tokyo's subways. Two attacks involved condoms filled with chemicals to produce hydrogen cyanide, as in the attack at Shinjinku. None of the devices worked, but for thousands of people it was a narrow escape.

PSYCHOLOGICAL IMPACT

"Saranoia" was the term used to describe Japan's psychological state during the spring and summer of 1995. In less than four months, there had been seven spectacular attacks. In addition, numerous false alarms, hoax threats, and rumors rattled Japan in the wake of the March 20 attack. Two attacks—the mace attack at Yokohama Station and the ANA hijacking—were not carried out by sect members, but by mentally disturbed individuals who had been inspired by the headlines. Two more attacks were aimed at individuals: the attempted murder of the National Police Agency's chief and the silencing of the Aum sect's own scientist. The remaining three attacks were calculated to kill thousands of people. Subsequent investigations revealed that there had been 17 biological and chemical attacks carried out by the sect, some of which did not work or, at the time, were not seen to be connected.

Bad chemistry, technical incompetence, possibly pangs of conscience, and simple good luck prevented tragedy from becoming national catastrophe. However, the fact that tens of thousands of people had narrowly escaped death provided little psychological comfort. Nerves were on edge as the enormity of the sect's evil intentions and covert capabilities came to light.

Declines in train ridership, however, were only temporary. Japan depends on its public transportation system, especially its network of trains and subways. Alternatives are unavailable. Private auto travel is not a viable substitute. Taxi use increased, but taxis in Japan are extremely expensive and, at any rate, could not handle the extra volume. Six million passengers ride Tokyo's subways daily; with 1.6 million entering or exiting Shinjinku Station. For commuters, life went on.

The nation's fear turned to impatience with authorities. Although deeply respectful of individual rights and especially tolerant of religious diversity, people wanted the Aum sect rounded up and done with and expressed anger at police for proceeding too slowly. The police strategy of focusing on dismantling the sect rather than pretending that Japan's vast, vulnerable public transportation system realistically could be protected was correct, but it required building a solid case that the Aum's chemists and chemistry were responsible for the Tokyo attack, and that took time.

Moreover, dealing with an organization of 10,000 members is not the same as dealing with a small conspiracy. The prompt arrest of Timothy McVeigh following the Oklahoma City bombing, which occurred shortly after the Tokyo attack, was the result of luck. Had the Oklahoma bombing been the act of a larger militia group, the task of U.S. authorities would have been much greater. Membership alone is not a cause for arrest. It would have taken time to determine responsibility and build cases against those who participated in the attack as well as those who authored it. As it turned out, it took only 48 hours to strike a devastating blow to the Aum sect, and it took eight to ten weeks for Japan's police to round up its ringleaders. Justice in Japan, however, moves slowly. Trials continued into the year 2000.

The Tokyo attack reverberated beyond Japan. It confirmed what many analysts of violence had feared—that terrorists seeking high body counts would move beyond truck bombs into the realm of chemical and biological weapons. Although no other terrorists have attempted to carry out attacks like the one in Tokyo, governments have devoted increasing resources to dealing with the possibility. Prior to March 1995, a large-scale chemical attack on a public

transportation system was considered a remote threat. Today, it is a scenario for which emergency response crews routinely train.

LESSONS LEARNED

It does not appear that the Tokyo subway system was operating under any special alert on March 20. If true, this is curious given the previous Yokohama and Kasumigaseki attempts that might have provided early warning. The earlier Matsumoto incident also was ignored. An alert status could have facilitated a more rapid response.

It is difficult to identify any security measures that would have prevented the attack. An increased police presence might have had some deterrent value, but sect members were determined. The millions of people using Tokyo's vast subway system daily would have overwhelmed attempts at passenger screening. Nor did increased security measures prevent further chemical attacks on Tokyo subways.

Greater use of closed-circuit television might have contributed to a deterrent effect, but the attackers knew that cameras were present and were not deterred. Subsequent examination of the videotapes showed that one of the five attackers on March 20 was caught by a surveillance camera as he fled the station; the other four were not noted. Moreover, the sarin-filled bags were not punctured in the stations, but aboard trains packed with commuters where there were no cameras and the crowds made visual surveillance extremely difficult. Finally, the attackers were not only highly motivated but, as fugitives, expected to be protected by a powerful organization.

Could the trains have been stopped sooner? Explosions are finite events limited in time and space; thus they are easier to address than chemical attacks, which may produce ongoing effects and where it may not be apparent immediately what is going on. It took at least a few minutes for the effects of the sarin to be felt, trains to reach the first station after the bags were punctured, and ill passengers to begin stumbling off. By the time a problem was apparent at one station, the train would be on its way to its next stop. In fact, it would take several stops before it was realized that the trains had become the carriers of a dangerous chemical. This is a key issue. Prevention is not a realistic goal, and response to an attack that causes large-scale casualties, especially one involving chemical substances, is the responsibility of emergency services; therefore, the role of the transportation operating authority in such an attack is reduced to a narrow band between the occurrence

of the event and the response by public authorities. The key decision that the operating agency may be called upon to make is when to shut down and evacuate part or all of the system.

Until reliable detection and identification technology can be deployed, transportation authorities will be forced to rely upon disparate and potentially erroneous accounts of events, augmented by what they can see with closed-circuit television. It will not be easy to grasp the overall picture, and public transportation operators are reluctant to shut down. Almost all public transportation emergency planning is geared toward keeping the system going, minimizing disruption, or rapidly restoring service if it is shut down somewhere.

In the case of the Tokyo attack, station attendants were the first to note the apparent effects, people becoming ill. All five attacks were completed by 8:10, but even before then, attendants observed violently ill passengers exiting the trains as they approached Tokyo's Kasumigaseki Station. Drivers apparently were not aware of what was happening on their trains. Attendants noted noxious odors, removed passengers, picked up packets, and mopped floors—all hurriedly so as not to delay trains unduly and snarl the system. Some personnel thought it might have been an explosion or a lovers' suicide; others quickly concluded poison gas.

We do not know what was reported, when it was reported, or how the operating authority compiled and interpreted the reports, but the trains went on running. It was above ground, as the stations in central Tokyo began to disgorge hundreds of violently ill passengers, that the magnitude of the problem became so visible. Even if the attendants at each station promptly and accurately reported the situation, it would take several more minutes to discern that the subway lines appeared to be under a major coordinated assault. By that time, most of the damage was done. It is not clear that faster action would have reduced casualties significantly; however, one can wonder whether delays of 20 minutes, or more than an hour in the case of the Marunouchi train, were warranted.

It cannot be argued that a more lethal form of sarin in Tokyo would have killed most of the 1,200 to 1,500 persons exposed to the gas, since a rapid accumulation of corpses probably would have sent passengers running from the stations instead of boarding contaminated trains. However, should a future attack occur, transportation system operators could find themselves in a situation where people are becoming ill, and the longer the system continues to

run, the more people will become ill. In such circumstances, rapid communication, rapid diagnosis that turns tactical intelligence into a strategic assessment, and a willingness to shut down and evacuate despite obvious disincentives to do so, are essential. Minutes will count.

Systemwide surveillance cameras might have assisted train officials in assessing the situation more rapidly, shutting down the trains carrying the lethal gas, and advising others at stations in back and in front of the affected trains to evacuate immediately. This kind of remote diagnosis also would have been useful in directing rescue operations.

CCTV surveillance capabilities subsequently were increased. Alarms were also installed in public restrooms to ensure prompt response to incidents like the May 5 cyanide attack.

To be effective, CCTV, alarms, and reports from on-scene personnel must be integrated and made part of protocols and response procedures that, while attempting to minimize disruptions, indicate circumstances in which temporary shutdown is the safest course of action—waiting for an order from public authorities may take too long. This is an operator responsibility that merits further examination.

Gas masks, along with established procedures and training, would have been useful to subway employees, especially station staff. They were, and always will be, the first responders. They deserve training. At the least, these would have reduced their chances of becoming casualties themselves. Greater availability of gas masks and protective clothing also would have facilitated rescue.

Prompt detection (alarms to signal the presence of gas) and faster identification of the substance used in the attempted mass killing would have facilitated treatment. For two hours, emergency room crews remained baffled by the symptoms, despite the prior event in Matsumoto. This problem can be addressed with technology and training of hospital staff; it is a component of overall security, but not the specific responsibility of transport security. Since the Tokyo attack, detection, identification, and rapid diagnosis technology have become a priority in government research programs.

Coordination was improved among Japan's various police agencies and between the police and the military, the latter of which has the capability to deal with large-scale incidents involving chemical or biological substances.

The Ministry of Transport has set up an Accident Investigation Panel to investigate and analyze railway accidents and develop countermeasures.

Police also recognized the necessity of improving their capability to analyze and identify biological pathogens and chemicals that might be used in chemical attacks or to fabricate chemical weapons. Connecting the sarin used in the Tokyo attack with the chemicals found at Aum's facilities was a prerequisite to successful prosecution.

The most effective security measure, however, was exactly what the Japanese police did—launching an all-out offensive against the group suspected of the attack.

ISSUES RAISED DURING THE ATTACK

The March and subsequent attacks on the Tokyo and Yokohama subways raise a number of security issues. Some are general; some apply specifically to the unique circumstances of a chemical attack. These include:

- **Contingency planning** for large-scale disasters, accidental or humanmade.
- **Chemical/biological preparedness**. The March 20 sarin attack was unprecedented, but chemical and biological attacks now must be accepted as a possible event in security planning.
- **Coordination** between transport operators and public authorities.
- **On-going threat analysis** to detect an increased threat.
- **The limitations of physical security**.
- **The utility of detection and identification technologies** which, if available, may provide immediate warning of a lethal contaminant and its nature.
- **The utility of on-board CCTV**, which can alert train drivers to the nature of the problem and facilitate prompt diagnosis by central management.
- **The utility of CCTV at subway stations**, which can further aid diagnosis.
- **The utility of CCTV coverage of the aboveground area around station entrances,** which may show the accumulation of casualties and thus aid diagnosis.
- **Anticipation of multiple attacks or a rolling contamination** in contingency planning.

- **The necessity of rapid diagnosis**.
- **Computerized modeling of air flows and dispersal** in stations and tunnels to aid in diagnosis, isolation, and evacuation. (The Tokyo subway system had the capacity to reverse the air flow, if required.)
- **The decision-making process for shutdown and evacuation**.
- **The necessity of staff training**—transportation staff will always be the first responders and also figure among the casualties.
- **The possible utility of special apparatus, that is, gas masks, for train staff.**
- **The availability of airtight containers** to hold suspicious objects and stop contamination.
- **The development of some type of sealing foam or spray-on substance** that will neutralize suspicious puddles or wet spots.
- **Guidance for immediate, on-site treatment of victims**—can train staff perform any useful first aid for victims of chemical attacks?
- **Decontamination, clean-up, and all-clear signals**.
- **The recovery of transport operations**.
- **The restoration of passenger confidence**.

The Aum Shinrikyo attack stands out as the collection of the most traumatic terrorism events ever to strike surface transportation. The lessons learned from the attacks and their management may help authorities worldwide respond to future attacks.

A CHRONOLOGY OF RECENT TERRORIST ATTACKS AND OTHER SERIOUS INCIDENTS OF CRIME INVOLVING PUBLIC SURFACE TRANSPORTATION SYSTEMS

(JULY 1, 1997 - DECEMBER 31, 2000)

INTRODUCTION

Only by understanding the threat can we develop effective security measures. Although the United States has been largely spared the kind of terrorist campaigns waged against public surface transportation in places like the United Kingdom, France, and Japan, or that in less-developed countries, this unfortunately rich history of violence elsewhere can be used better to understand terrorist tactics, targets, and techniques.

The previous volume of this research effort included a chronology of terrorist attacks and other significant criminal incidents involving public surface transportation systems from 1920 to June 30, 1997.[7] The following chronology picks up where the previous one left off, and takes us to the end of the twentieth century. It includes 195 entries that, since some describe simultaneous multiple attacks, cover more than 200 incidents. Added to the 631 entries of the previous chronology, some of which were also multiple events, we now have a database approaching 900 incidents. A series of charts allows us to identify the patterns of targets, tactics, and locations of the attacks in the 1997 to 2000 period; pairs to these charts then illustrate the patterns found in the entire chronology from 1920 to 2000.

The descriptions of the incidents were compiled from published accounts in the news media, books on terrorism, and terrorism databases maintained by the U.S. government, the RAND corporation, and the Kroll-O'Gara Company. No classified or proprietary information is included.

The chronology should be considered representative rather than comprehensive. Although it is believed to include all the significant incidents, no claim can be made that the research has captured every event. Thousands of

[7] Brian Michael Jenkins, et al. *Protecting Surface Transportation Systems and Patrons from Terrorist Activities, Case Studies of Best Security Practices and a Chronology of Attacks*. San Jose: Norman Y. Mineta International Institute for Surface Transportation Policy Studies, 1997.

incidents of ordinary crime—individual murders, rapes, armed robberies, and other assaults—are not included. Nor does the chronology report all the many bomb threats, which are a common headache for transportation system operators.

The chronology includes guerrilla and terrorist attacks in which the transportation system or passengers were the principal target. It excludes acts of warfare, such as aerial bombing or artillery fire.

This addition of 42 months to the original chronology permits us to confirm, with a database expanded by a third, some of the patterns and trends noted earlier and to discern possible differences. As we shall see, the patterns in terms of targets and tactics, for the most part, have remained stable. There are a few changes in where most of the action is taking place, reflecting shifting patterns of global conflict, but here, too, much remains as it was in the first chronology.

There is no apparent increase in the volume of attacks since the publication of the first chronology. That one noted a significant jump in the 1990s, but this could have been the result of more complete reporting: 430 attacks were recorded from January 1991 through June 1997, an average of five a month; a few more than 200 attacks were recorded from July 1997 through December 2000, roughly the same average.

The overall lethality of these attacks has remained roughly the same. It was noted in the previous chronology that contemporary terrorists see public surface transportation as a killing field. Roughly 20 percent of all incidents of international terrorism involve fatalities: 35 percent of attacks on surface transportation recorded in the previous chronology and 43 percent of the incidents recorded in the most recent chronology resulted in fatalities—a dangerous trend if it continues. Two-thirds of the attacks recorded in the earlier chronology clearly were intended to kill (bombs in crowded places), whether or not they succeeded, while 63 percent of the incidents in the current chronology appear intended to kill. In both the percentage of fatalities and of attacks intended to kill, one should exercise caution, given the small size of the more recent chronology—200 events. It appears safer to say that with more than 800 events in the combined chronologies, about two-thirds were intended to kill and about 37 percent of the total involved fatalities.

A further indication of lethality is the percentage of incidents with multiple fatalities. In the current chronology, of the 84 incidents with fatalities,

74 percent involved more than one fatality and 23 percent involved 10 or more fatalities.

The distribution of targets shows little change apart from the increase in attacks on buses, which climbed from 29 percent in the earlier chronology to 41 percent in the current chronology, and the corresponding decline in the proportion of attacks on subways and trains, which dropped from 27 percent to 22 percent (Figure 1). One possible trend to be noted is the growing number of terrorist attacks on tourist buses. Looking at the combined chronologies in Figure 2, however, one still sees a roughly even split between attacks on rail systems (trains, subways, stations, and rails) and bus systems (buses of all types and bus depots).

Tactics also show few changes. Even with an incomplete count of bomb threats, bombings continue to predominate (Figure 3). Overall, bombings account for 60 percent of all incidents from 1920 to 2000; ambushes and armed assaults, 11 percent; standoff attacks, 9 percent; hostage situations, 5 percent; and mechanical sabotage, 5 percent (Figure 4).

India and Pakistan still account for the most incidents with fatalities in the current chronology. Algeria remains near the top. Turkey and Russia have been replaced in the rankings by Sri Lanka and the Philippines (Figures 5 and 6). Overall, India, Pakistan, Algeria, and Sri Lanka have seen the most violence (Figures 7 and 8).

The chronology is misleading in one important sense. By definition, it includes only attacks on public surface transportation, thereby excluding terrorist attacks involving other targets. In many instances, the attacks listed here refer to ongoing conflicts—civil wars, guerrilla wars, terrorist campaigns. These include Naga tribesmen and Assam separatists in northeastern India; Kashmiri and Sikh separatists in northwest India; Tamil separatists in Sri Lanka; Marxist guerrillas and Islamic separatists in the Philippines; the sectarian violence in Pakistan; Chechen rebels in the southern Caucasus of Russia; Palestinians in the Israeli-occupied territories; Islamic extremists in Algeria and Egypt; Casamance separatists in Senegal; the IRA in the United Kingdom; and the civil war in Colombia. Often these combatants bring their violence to the capital cities seeking international attention and reminding complacent populations that they will have no peace while distant wars rage.

Attacks on public transportation are only one facet of these conflicts. Under the circumstances, they are to be expected. The threat level is high. The violence is

ferocious. Governments and transportation operators are obliged to take extraordinary measures that would be difficult to justify outside these conflict zones.

Leaving out countries with ongoing civil wars, guerrilla wars, and long-term terrorist campaigns would eliminate about two-thirds of the incidents for the period covered in this chronology and give us a different picture of the threat. Japan and Germany would head the list, followed by China. Bomb threats and acts of sabotage, extortion, robbery, assaults, and isolated crimes (mentally deranged hijackers) would predominate. There would be fewer fatalities. Overall, the threat would be less predictable.

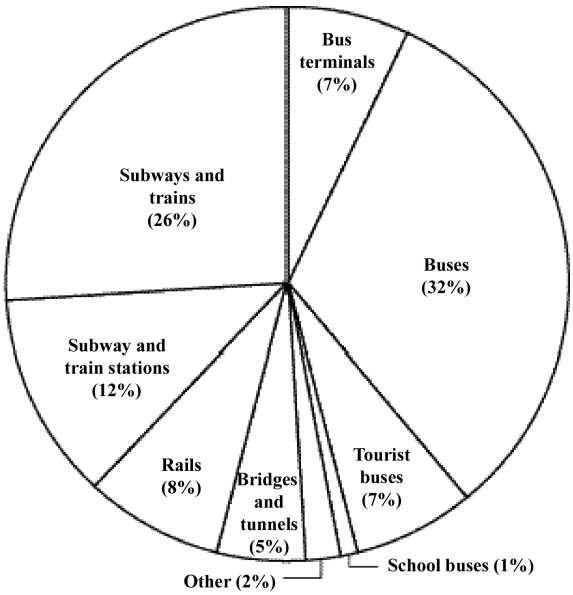

Figure 1. Targets of Attacks on Public Surface Transportation Systems (1920 - 2000)

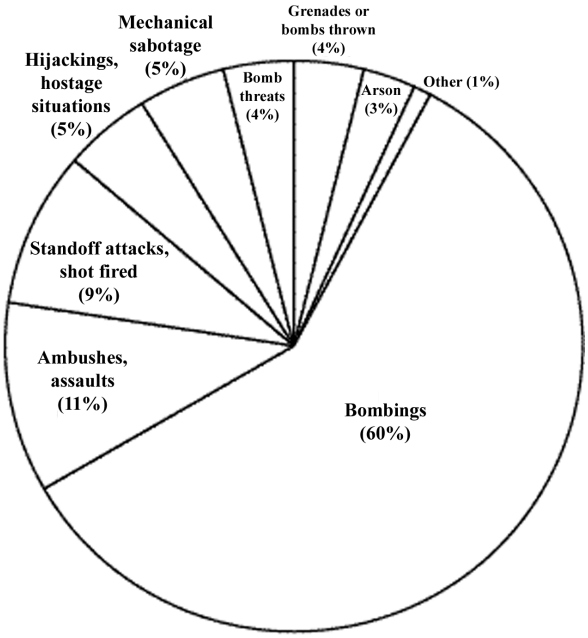

Figure 2. Tactics Used Against Public Transportation Systems (1920 - 2000)

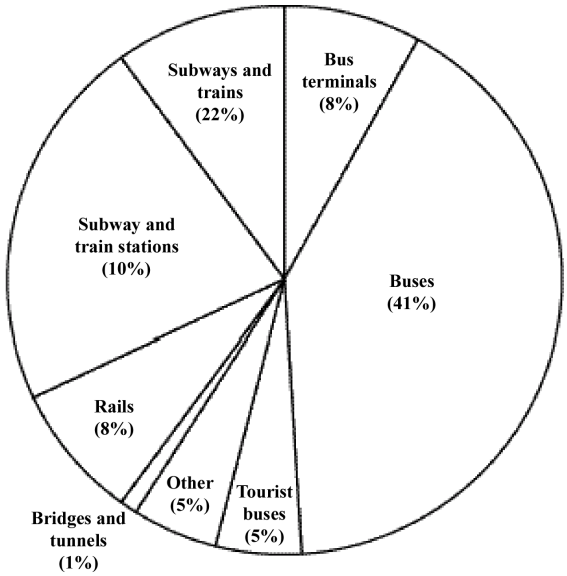

Figure 3. Targets on Attacks on Public Surface Transportation Systems
(July 1997 - December 2000)

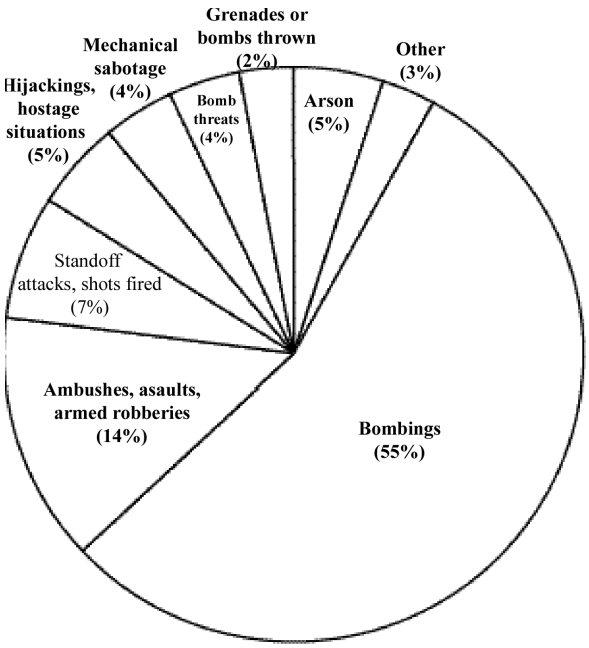

Figure 4. Tactics Used Against Public Transportation Systems
(July 1977 - December 2000)

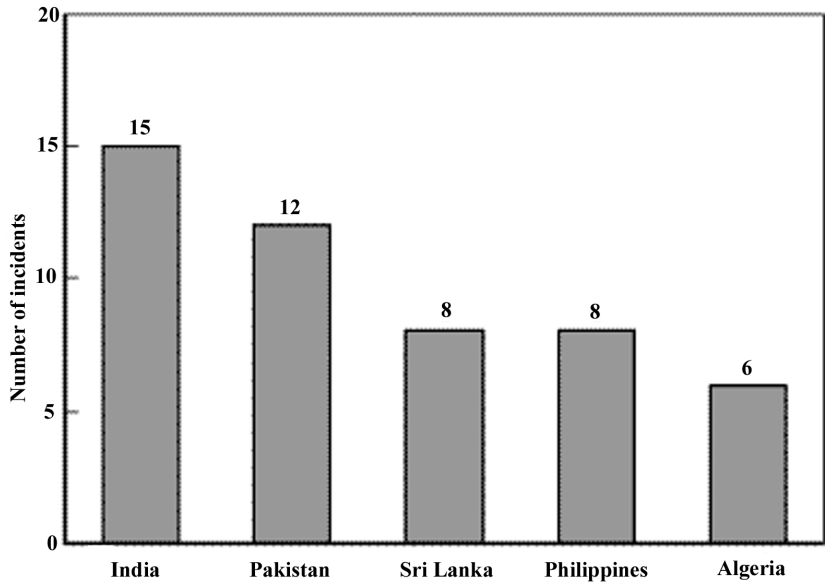

Figure 5. Location of Attacks with Fatalities on Public Surface Transportation Systems (July 1997 - December 2000)

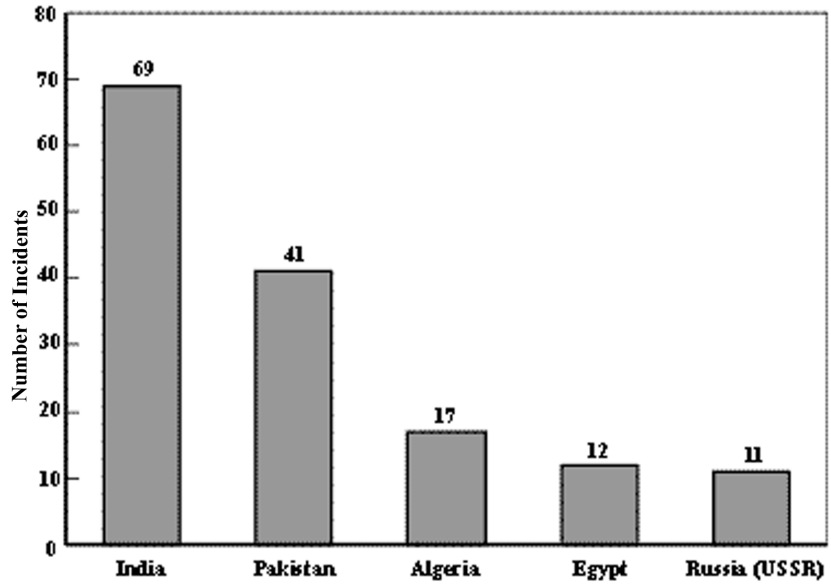

Figure 6. Location of Attacks with Fatalities on Public Surface Transportation Systems (1920 - 2000)

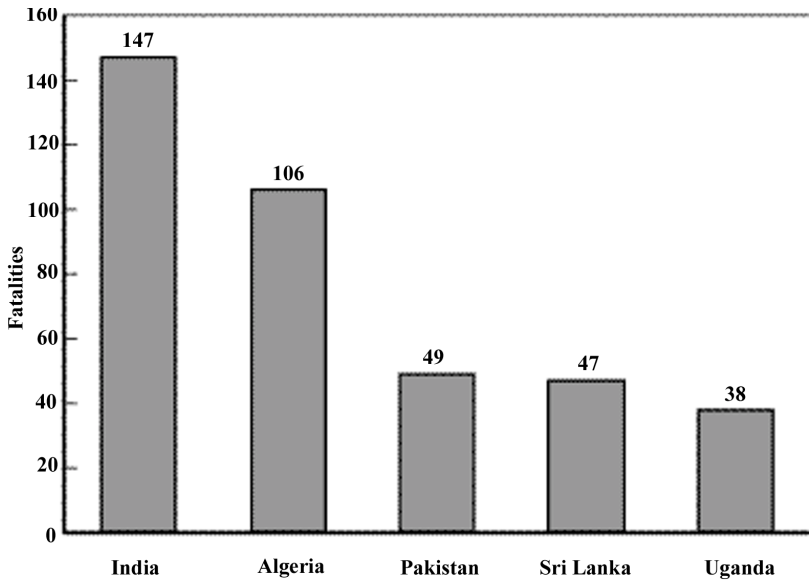

Figure 7. Countries with the Most Fatalities in Attacks on Public Surface Transportation Systems (July 1997 - December 2000)

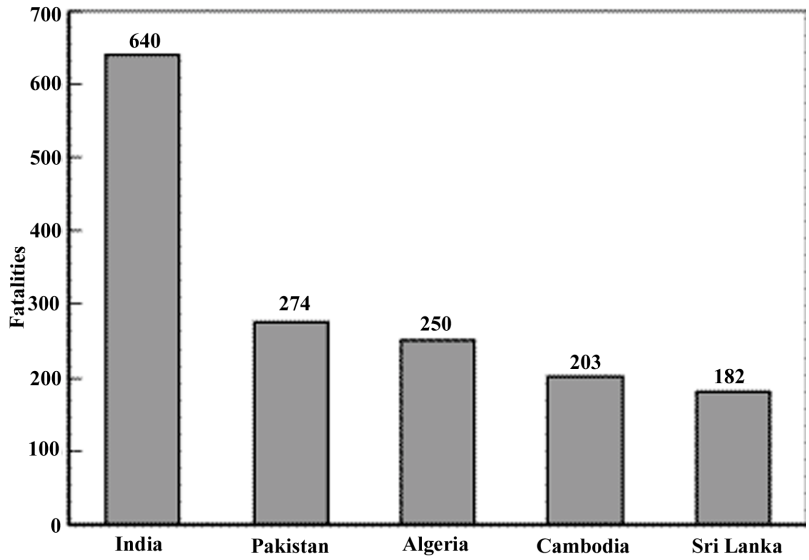

Figure 8. Countries with the Most Fatalities in Attacks on Public Surface Transportation Systems (1920 - 2000)

RECENT CHRONOLOGY

Hungary - July 1, 1997 - Firebomb thrown at railway station in Budapest
Suspected organized crime members were believed responsible for a firebomb thrown at the Kelei railway station that set fire to one of the shops. There were no injuries. Authorities believed that rival gangs, fighting over turf, were responsible for this and other bombings in Budapest.

India - July 8, 1997 - Bomb on train kills 36
A bomb planted under the floor exploded on a crowded passenger train in the state of Punjab, killing 36 and injuring at least 70 others. Although no group claimed responsibility, authorities suspected Sikh or Kashmiri separatists.

Israel - July 11, 1997 - Roadside bomb attack on bus
A bomb exploded as a bus carrying Jewish seminary students passed. No one was injured on the bus, but two nearby policemen suffered wounds.

Macau - July 11, 1997 - Bomb on tourist bus
Police discovered a bomb underneath a tourist bus outside a hotel. After removing the deadly parcel, bomb squad authorities detonated it without casualties.

India - July 14, 1997 - Two bombs explode on Delhi buses
Six persons were killed and 13 more injured when a bomb exploded on a bus. A second bomb injured six more persons aboard a commuter bus.

India - August 4, 1997 - Train sabotage injures ten
Ten persons were injured when a train derailed near New Delhi. Police suspected sabotage.

India - August 4, 1997 - Bomb explodes in passenger train
An incendiary device exploded on a passenger train near Bangalore, India, wounding 15 persons. The explosion may have been caused unintentionally by explosives carried by one of the passengers, although authorities remained suspicious.

Tajkistan - August 5, 1997 - Bomb explodes in bus terminal
A bomb exploded at the bus terminal in Tursunzade, injuring two persons. Authorities failed to determine a motive for the attack.

Georgia - August 8, 1997 - Gunmen open fire on bus
One person was killed and three were wounded when masked gunmen opened fire on a bus. Their motive may have been robbery, according to police authorities.

Czech Republic - August 21, 1997 - Bomb threat to Prague metro
A bomb threat halted service for three hours on one of Prague's metro lines. No bomb was found. This was one of several bomb threats on the Prague metro in 1997.

India - August 26, 1997 - Bomb explodes under bus
A bomb exploded under a bus in the state of Jammu-Kashmir, wounding 25 persons.

Senegal - August 30, 1997 - Antitank mine explodes under bus
Separatists belonging to the Movement of Democratic Forces of Casamance were suspected of responsibility for the detonation of a mine under a bus in the southern Casamance region of Senegal. Five persons were killed, 10 others were wounded. The mine may have been intended for passing military vehicles.

India - September 7, 1997 - Passenger train damaged by bomb
A remotely detonated bomb destroyed a segment of track in Jammu-Kashmir just as a passenger train was passing. Five persons were injured and rail traffic came to a standstill. Authorities suspected Kashmiri extremists.

Russia - September 9, 1997 - Bomb threat on Moscow Metro
An anonymous caller informed authorities that a mine had been placed in the Komsomolskaya Metro station. Police searched the station and found an inactive grenade.

Venezuela - September 9, 1997 - Explosive device in Caracas subway station
Police discovered a small explosive charge and propaganda leaflets. After isolating the material, authorities were able to defuse the charge.

Egypt - September 18, 1997 - Moslem fanatics attack tourist bus in Cairo
Three assailants threw hand grenades and fire bombs at a tourist bus in front of the Egyptian museum in Cairo. The attack killed nine German tourists and wounded 19 others.

Germany - September 20, 1997 - Antinuclear protestors sabotage railway
Approximately 300 antinuclear demonstrators set fire to a stretch of railway near the Kruemmel atomic energy plant in northern Germany. Police dispersed the crowd and put out the fires before serious damage was done.

India - September 22, 1997 - Tribesmen kill 15 rival tribe members on bus
Kuki tribe members stopped a bus at Nungdolan in the northeast state of Manipur and shot 15 Naga tribe members. The two tribes have been fighting over control of a road leading to Myanmar that is used to smuggle more than $1 billion in drugs each year.

Georgia - September 28, 1997 - Bomb explodes on passenger train
A bomb exploded on a train about to depart for Tbilisi from Zugdidi, injuring one passenger. Another bomb exploded in the town's marketplace. No one claimed responsibility.

Honduras - September 29, 1997 - Grenade thrown at bus
Unknown assailants threw a grenade at a bus near a police station in San Pedro Sula; the blast injured seven nurses.

India - October 1, 1997 - Three bombs on train
Unknown attackers, probably Punjabi or Kashmiri separatists, set off three bombs on a train from New Delhi to Amritsar, killing two people and injuring 30 others.

Turkey - October 3, 1997 - PKK rebels kidnap bus passengers
Members of the rebel Kurdistan Workers Party (PKK) kidnapped eight civilians from a bus stopped at a roadblock in southeast Turkey. Two were released hours later, but six were held by the attackers.

Uganda - October 3, 1997 - Rebels ambush bus
Rebels from the Lord's Resistance Army ambushed a bus north of Kampala; the attack resulted in eight deaths.

Israel - October 5, 1997 - Bomb on Tel Aviv bus
A small bomb exploded on a Tel Aviv bus. Passengers evacuated the bus before the bomb went off, thanks to an observant passenger who witnessed an individual place an object in a trash bin on the bus and then flee the scene. There were no injuries.

India - October 10, 1997 - Indian gang leader kidnaps six from tour bus
Veerapan, a notorious gang leader in southern India, kidnapped six passengers from a tourist bus.

Algeria - October 11, 1997 - Muslim rebels kill bus passengers
In one of the worst massacres in the Oran region of Algeria, Muslim extremists killed between 33 and 50 bus passengers at a roadblock approximately 200 miles west of Algiers; 20 motorists were also injured in the attack.

Tajkistan - November 14, 1997 - Bomb destroys railroad tracks on bridge
An explosion occurred in the center of Dushanbe, the capital of Tajkistan. Miraculously, there were no casualties. The city had been plagued by a series of bombings since September.

India - December 6, 1997 - Three bombs on trains kill 11
Members of the previously unheard-of "Islamic Defense Force" claimed responsibility for a series of bombings on passenger trains in Tamil Nadu. Two simultaneous blasts killed six people and injured 15. The third bomb killed five and injured 39 persons.

Japan - December 18, 1997 - Tear gas on commuter train
A gang of pickpockets sprayed tear gas in a commuter coach, injuring 65 persons; 11 passengers and two undercover policemen were hospitalized. The gang was observed stealing a purse and when police moved in on them, they sprayed the gas to create confusion. Fearing it was another sarin attack similar to that which occurred in 1995, passengers panicked. Four of the thieves escaped; one was arrested by local authorities.

Guatemala - December 15, 1997 - Bandits attack tourist bus
Six armed men forced a bus off the road and drove it to a remote area, where the passengers were tied up and robbed.

Guatemala - December 17, 1997 - Gunmen rob tourist bus
Several passengers, including three Americans, were robbed at gunpoint near Zacapa after their vehicle was forced off the road.

Germany - December 23, 1997 - Neo-Nazis beat Chinese passenger on Berlin train
Ten assailants severely beat their victim before disembarking the train at Schoenholz Station. They were later apprehended.

India - December 23, 1997 - Naga tribesmen attack bus
Naga tribesmen in India attacked a bus carrying rival Kuki tribe members, killing 10 persons. The two tribes continue to battle for control of illegal drug traffic on the highway.

Georgia - December 27, 1997 - Bomb extortion against subway stations
An extortionist threatened to blow up several subway stations, where he claimed to have planted explosives, unless paid a ransom. He was arrested and no bombs were found.

India - December 30, 1997 - Bomb on bus kills four
Four persons were killed and 24 injured when a bomb exploded on a crowded bus in New Delhi. No group claimed responsibility for the action.

Turkey - December 30, 1997 - Bomb on commuter train injures six
A bomb placed under the seat went off at the Bakirkoy Station during rush hour. Authorities had received warnings of possible attacks during the New Year celebrations.

Russia - January 1, 1998 - Bomb injures three in subway station
A bomb exploded at the Tretyakovskaya Metro Station in Moscow, injuring three subway employees. No one claimed responsibility.

Russia - January 12, 1998 - Gunmen open fire on tram
One person was killed and three others wounded when gunmen opened fire on a crowded tram in Moscow. There had been two other shooting incidents in the same area in the previous 36 hours. Police suspected the shootings were part of a showdown between two organized criminal gangs.

Belgium - January 15, 1998 - Bomb injures five near central train station
A bomb exploded at a café near Antwerp's central train station, wounding five persons. Police believe the attack was connected with organized crime.

Guatemala - January 16, 1998 - Tourist bus ambush
Gunmen ambushed a bus carrying 16 U.S. college students and staff. The assailants forced the bus to drive to a sugarcane field where they robbed all the victims and raped five women. The suspects were eventually arrested; they included two former members of the army. In 1997, there had been four bus hijackings involving U.S. citizens in Guatemala.

Algeria - January 20, 1998 - Bomb on bus
A bomb exploded on a bus in Algiers, killing four persons and injuring 22 others.

Japan - January 22, 1998 - Bus hijacked in Nagasaki
A man angry at local police boarded a bus, poured kerosene over a passenger, and threatened to light her on fire if the driver did not take him to a police station in the city. The driver drove through rush hour traffic for 30 minutes before pulling off to the side of the road, where police boarded the bus and persuaded the man to surrender.

Pakistan - January 28, 1998 - Bomb on bus kills one
A bomb exploded on a bus near Lahore, killing one and injuring 16 others. It was the fourth bomb attack in the Lahore area in one week.

Brazil - February 4, 1998 - Armed robbers attack tourist train
A gang of armed thieves ambushed the train carrying tourists from Rio to the mountaintop statue of Christ the Redeemer. Thirty-four of the 85 passengers were robbed at gunpoint. No one was injured.

United Kingdom - February 5, 1998 - Bomb explodes at west London bus stop
A small bomb was detonated at a west London bus stop, injuring no one. Police suspected that the event might be linked to the so-called "Mardi Gras [sic]" bomber, believed responsible for dozens of small bombings since 1994. The assaults were part of an extortion scheme directed against Barclays Bank and Sainsbury grocery stores. This bomb was 350 yards away from a Sainsbury store previously targeted by the bomber, who got the label from the phrase in his first extortion letter, "Welcome to the Mardi Gras."

China - February 14, 1998 - Bomb on bus kills 16
Sixteen persons were killed and 30 others were injured when a bomb exploded aboard a bus in the city of Wuhan.

Algeria - February 23, 1998 - Bomb kills 18 on commuter train
A bomb detonated on a commuter train in Algiers, killing 18 and wounding 25 others. It was part of a wave of bombings in the capital city.

India - February 23, 1998 - Land mine kills five on bus
A bus carrying security personnel from election duty struck a land mine in the state of Andhra Pradesh, killing five and wounding 26 others. A local radical group called the People's War Group was blamed for the attack.

Germany - March 3, 1998 - Antinuclear activists sabotage railway cables
German police accused antinuclear activists of sabotaging railway cables between Hamburg and Bremen. Claw-shaped hooks attached to the overhead cable caused a high-speed train to rip hundreds of yards of cable down, halting all train traffic for several hours. Authorities found a note at the scene that linked the attack to protests against the rail shipment of nuclear waste.

Sri Lanka - March 5, 1998 - Bomb on bus kills 28
At least 28 persons were killed and another 235 injured when a bomb exploded on a bus as it traveled under a pedestrian bridge in the capital city of Colombo. Authorities believed that the rebel Liberation Tigers of Tamil Eelam (LTTE) were responsible for the tragedy.

Algeria - March 7, 1998 - Bomb at bus station injures 12
A bomb, possibly detonated by Muslim rebels, exploded at a bus station in Algiers, wounding 12 people.

Pakistan - March 8, 1998 - Bomb in Punjab kills 7
A bomb on an express train en route from Lahore to Quetta exploded, killing seven persons and injuring 35 others. No one claimed responsibility.

Pakistan - March 10, 1998 - Bomb on commuter train kills 8
A bomb went off on a commuter train in Lahore, killing eight persons and injuring 34 others. No one claimed responsibility.

Russia - March 19, 1998 - Poison gas attack threatened
A man identifying himself as a member of the Aum Shinrikyo sect, which had a following in Russia, threatened to release gas on Moscow's Metro on the third anniversary of the sarin attack in Tokyo. Security was increased and the day passed without incident.

Pakistan - March 25, 1998 - Bomb at bus depot
A bomb was detonated at a bus depot in Sukkur, in Sindh Province of Pakistan. One person was injured.

Pakistan - April 7, 1998 - Bomb explodes on bus
A bomb exploded on a passenger bus in Sukran 100 miles north of Karachi. Five passengers were killed, and 20 others suffered injuries.

Italy - April 20, 1998 - Police warn women not to travel alone on trains
Following the murder of two women traveling alone on trains (both shot in the head in bathrooms), police warned women not to travel alone on the rails. Police believed that the murderer may have been linked to the deaths of six prostitutes in the same region during the previous year. Police later arrested a suspect in the eight murders.

India - April 24, 2998 - Four on bus kidnapped
Tribal separatists in the state of Tripura in northeastern India stopped a bus, robbed all the passengers, and took the driver and three passengers hostage. The area has been known for ransom kidnappings.

Colombia - April 28, 1998 - Guerrillas murder 17 on bus
Guerrillas, possibly belonging to Colombia's paramilitary forces, halted a bus in the Department of Antioquia, ordered passengers to lie face down, and killed at least 17 of them. Some victims were shot as many as 18 times.

Japan - May 1, 1998 - Unidentified saboteurs strike high-speed bullet train tracks
Saboteurs removed 25 bolts from train tracks which, if undiscovered, would have resulted in a derailment with heavy casualties. Rail employees discovered the sabotage before the morning trains began their routes. On the same day, stationmasters across the country received letters threatening derailments that would kill as many as 10,000 people. Police suspected members of Kakumaru-ha, a leftist group active in the 1960s.

Belize - May 2, 1998 - Armed bandits halt buses
Three buses were halted by gunmen who staged a false accident on an isolated section of a main highway running through the country. Passengers were forced off the bus and ordered to lie face down in a field. Police arrived and a shootout resulted in four injuries.

China - May 8, 1998 - Explosion on bus kills 12
An explosion on a bus in Anhui province killed 12 and injured 14 others.

Colombia - May 25, 1998 - Guerrillas block vehicles
Guerrillas belonging to the National Liberation Army (ELN) blocked transportation routes in Antioquia Department. Local bus companies suspended service for fear of attack.

India - June 5, 1998 - Separatists blow up bridge
Brodo tribal separatists blew up a national highway bridge in Assam State. The same group had attacked three other bridges along the same route earlier in the week.

India - June 24, 1998 - Assam separatists detonate bomb in railway station
Calcutta and the neighboring state of Sikkim were placed on alert following a bomb explosion at a railway station 375 miles north of the city. The United Liberation Front of Assam (ULFA) claimed responsibility for the attack, which killed nine and injured more than 80. The same group was responsible for a bombing at the main railway station in the capital of Assam in August 1997.

India - June 25, 1998 - Train derailed in Kashmir
Kashmiri separatists detonated a bomb on a railway track, injuring 23 people and derailing seven cars.

China - July 9, 1998 - Police arrest train robbers
The *South China Morning Post* reported on July 9 that police in Wuhan province had arrested four people in June for offering passengers drugged food and beverages. Thieves would rob their victims when they fell unconscious from the drugs.

Nigeria - July 11, 1998 - Armed robbers kill 10 on luxury buses
Thirty armed robbers attacked five luxury buses traveling in northeastern Nigeria, killing 10 and injuring several others. Such attacks are common in rural Nigeria.

India - July 26, 1998 - Bomb kills two at bus station
Two people were killed and five others were injured when a bomb exploded at the Maharana Bus Station in New Delhi. Terrorists were suspected.

Germany - July 27, 1998 - Bomb threats disrupt Deutsche-Bahn service
Police arrested a disabled pensioner who they believed responsible for up to 20 bomb threats against trains at stations in Munich, Augsburg, Regensburg, Stuttgart, and Ulm, which had forced the evacuation of several trains. No bombs were ever found.

Bosnia - July 28, 1998 - Bomb explodes on Sarajevo trolley
An explosion caused property damage but no casualties. No motive for the attack was ever determined.

Russia - August 10, 1998 - Terrorists attack bus in Dagestan
An attack by an armed gang of terrorists appeared to be a robbery attempt. Four passengers were wounded.

Uganda - August 25, 1998 - Grenade on bus kills 30
A hand grenade exploded on a crowded bus en route to Kigali, Rwanda, killing 30 people. The rebel Allied Democratic Forces were believed to be responsible for the attack.

Russia - September 19, 1998 - Bomb threat at St. Petersburg railway station
Police evacuated the immediate area following a telephone call in which an unknown individual alleged that a bomb had been planted at the Moskovsky Station. No bomb was found.

Georgia - September 21, 1998 - U.N. bus ambushed
An assault on a United Nations bus took place in Sukhumi. There were no fatalities, but several U.N. personnel were injured. The activity was one of several attacks in the Abkhazia region.

Israel - September 24, 1998 - Bomb explodes at Jerusalem bus station
One person was injured when a bomb went off at a bus station near Hebrew University.

Congo - September 28, 1998 - Several killed at rail station
Local militiamen were believed responsible for several attacks along the Congo-Ocean railway line. This attack, in which several died, occurred at the Goma Tsese Station near Brazzaville, resulting in a suspension of rail service.

Senegal - October 12, 1998 - Rebels kill four on bus
Four people died and four others were wounded when members of the Movement of Democratic Forces of Casamance attacked a bus in the Sehihou district of Casamance.

Israel - October 29, 1998 - Two die in suicide car bomb attack on school bus
Two died and six others were injured in a suicide mission. The driver, who died in the explosion, rammed an army jeep escorting the bus—a security routine in Israel. Hamas claimed responsibility for the attack.

Philippines - November 2, 1998 - Bombs on two buses kill one
Two bomb attacks were carried out by gangs in Mindinao trying to extort money from local bus companies. One individual died and 40 others were injured.

Turkey - November 7, 1998 - Terrorists kill one in attack on bus
Several unidentified attackers set a bus on fire, killing one person; several passengers were robbed.

Italy - November 10, 1998 - Terrorist threatens Milan metro, train stations, and airport
Police increased security after receiving an anonymous threat that there would be a terrorist strike. The threat was made by anarchists, although authorities believed other actors could be responsible as well.

Colombia - November 10, 1998 - Guerrillas dynamite railroad track
Members of the Revolutionary Armed Forces of Colombia (FARC) dynamited the rails linking the departments of El Cesar and Magdalena. This was the second bombing of the track in 1998.

Mexico - November 10, 1998 - Gunmen attack train, killing one
A Swiss tourist was murdered and three Italian tourists were wounded when 10 gunmen attacked a passenger train in the state of Chihuahua. The Swiss citizen was killed when he attempted to take photos of the bandits and resisted their attempts to destroy the camera.

India - November 16, 1998 - Bomb blast wounds 25 at bus terminal
An explosion occurred in the town of Kaithel, northwest of New Delhi. No one claimed responsibility.

China - November 16, 1998 - Attack on a tourist van in Macau
Two motorcyclists firebombed the van, which authorities believed was owned by a local organized crime figure.

Senegal - November 16, 1998 - Separatist rebels kill one in attack on bus
Five others were wounded in the attack, which occurred in the southern province of Casamance. This was one of a growing number of attacks on public transportation in the region.

Philippines - November 19, 1998 - Bomb on bus kills driver, wounds 20
One bomb exploded on a bus in Dipolog City on the island of Mindinao; another went off at a bus terminal in Plaridel. Authorities believed that the attacks were part of an ongoing extortion effort, given the attacks that occurred on November 2, 1998, in the same region.

Iran - November 21, 1998 - U.S. tourists attacked
Members of Fedayeen Islam attacked a bus carrying visiting U.S. businessmen and their wives in northern Iran. There were no serious injuries. The visitors had been invited to Iran by the government, but hard-line newspapers, opposed to rapprochement with the United States, described them as CIA agents posing as tourists.

Philippines - December 7, 1998 - Another bus bomb kills one in Mindinao
In a continuing extortion campaign, a bomb explosion on a bus killed one person and injured 11 others. This was the tenth bombing in the previous two months, the total of which took six lives.

Philippines - December 13, 1998 - Another bus attack kills three
Continuing the torrid series of attacks in the region, a gang of 20 men fired on a jeepney in Cotabato in the southern Philippines. Three people died and sixteen others were injured.

Germany - December 18-19, 1998 - Three rail sabotage incidents
On December 18, a train derailed after tracks were tampered with. On December 19, a train nearly derailed after hitting concrete blocks placed on the tracks; another train crashed into trees lying across the rails. Germany's national rail system Deutsche Bahn reported that the company had received four extortion letters from "Friends of the Railways" demanding a payment of $6 million. Police used air force planes equipped with infrared cameras for night surveillance to ensure passenger safety.

Mexico - February 10, 1999 - Armed gang terrorizes police buses
Mexico City police launched an intensive search to capture members of an armed gang that had been targeting public buses known as *peseros*. Typically,

three or four men would board a bus, force the driver to leave his route, tie up and rob the passengers, rape one or two of the women, then escape.

Sri Lanka - March 9, 1999 - Terrorists bombs kill one on bus, hit other transportation targets
A bomb killed one person and injured 12 others. Another bomb detonated on a train in a rail yard. Authorities assigned responsibility to the separatist Tamil Tigers (LTTE).

Turkey - March 12, 1999 - Firebomb thrown at city bus
There were no casualties from firebombs that were thrown by unidentified people at various targets in Istanbul, including a city bus.

Sri Lanka - March 17, 1999 - Bomb found on rail line
A fire and a half-pound bomb were discovered on a rail line in Colombo just minutes before the beginning of the morning rush hour. Police authorities suspected the separatist Tamil Tigers (LTTE). On March 16, a suicide attack claimed four lives in Colombo.

Guatemala - April 5, 1999 - Armed attackers set fire to buses
A group of four armed men carried out three attacks on buses in Guatemala City, robbing drivers and passengers and then setting the buses on fire before their escape.

Sri Lanka - April 11, 1999 - Bomb kills two on bus
A young ethnic Tamil woman placed a bomb on a bus in Kandy, which exploded shortly after she stepped off the bus. The explosion killed two and injured 20.

China - April 29, 1999 - Two executed for bombing railway
Two low-ranking officials in Hebei province were executed for bombing a railway. They said they wanted to “get back at society.”

Nicaragua - May 15, 1999 - Armed gang kill two motorists
An armed gang carried out a series of attacks on vehicles traveling east of Managua, killing two people. One of the attackers was later killed by police, and two others were captured.

Georgia - June 23, 1999 - Mine kills three on bus
Three people died and thirteen others were injured when a bus hit an antitank mine that had been planted on the road in the Abkhazia region.

Australia - July 6, 1999 - Bomb explodes at commuter railway station
A bomb explosion that occurred during the afternoon rush hour in the western part of Sydney injured three persons. Police apprehended a 16-year-old boy believed responsible for the attack. His motive was unknown.

Greece - July 13, 1999 - Bus passengers held hostage for two days
An angry, emotionally distraught Albanian immigrant seized 50 hostages aboard a bus near Thesaloniki. He demanded two pistols, $780,000 in cash, and safe passage to Albania. Police negotiated with the man for two days, winning the release of all but five hostages. On July 15, they stormed the vehicle and killed the hostage-taker.

Pakistan - July 27, 1999 - Bomb kills seven on bus in Kashmir
Seven passengers died and nineteen others were injured when a bomb exploded on a bus in Pakistan-controlled Kashmir. Pakistani authorities blamed the bombing on Indian agents.

India - August 7, 1999 - Bomb damages bridge just ahead of passenger train
A bomb damaged a bridge span, making it unusable for train traffic. An approaching train with more than a thousand passengers stopped before traveling over the damaged span. No one was injured. Authorities suspect the separatist United Liberation Front of Assam.

India - August 9, 1999 - Bomb derails train in northeast
An explosion derailed a freight train, causing five injuries.

India - August 16, 1999 - Explosives found at railway station
Railway police found more than 30 pounds of ammonium nitrate in fuel oil (ANFO) on the platform of a busy train station in Calcutta. Authorities believed that the explosives were being transferred to Kashmir by Pakistani agents.

Russia - August 17, 1999 - Attempted bombing of passenger train
An unidentified man tried to board a train in the North Caucasus with a large fragmentation bomb. He was stopped and no one was injured.

Philippines - August (NA), 1999 - Two bombs exploded on buses
Two bombs exploded on buses belonging to the Weena Express Company in Davao on the island of Mindinao. Extortionists were believed responsible for

the activities. These were the sixth and seventh attacks on the company, leading police to step up monitoring of major bus stops.

Philippines - September 4, 1999 - Grenade kills two at bus terminal
An unidentified man threw a grenade near a bus terminal in Zamboanga del Sur on the island of Mindinao. The explosion killed two and injured two others.

Philippines - September 20, 1999 - Communist rebels hijack bus
Rebels operating on Mindinao hijacked a bus, forced passengers off, and set the bus on fire. There were no injuries. Both communist rebels and Muslim separatists have long histories of extorting payments from transportation companies in the Mindinao region.

Philippines - September 21, 1999 - Bomb kills four on bus
As part of an apparent continuous campaign of violence aimed at extortion, terrorists set off a bomb. The blast killed four and injured dozens of others. Authorities blamed this action on Muslim separatists.

Sri Lanka - September 26, 1999 - Bomb kills one on bus
A bomb explosion killed one person and injured 28 others in Badulla, 85 miles east of Colombo. Tamil Tigers (LTTE) were believed responsible.

Brazil - October 20, 1999 - Bomb explodes on commuter train in Sao Paulo
A bomb explosion on a commuter train injured seven persons. No one claimed responsibility.

Israel - October 30, 1999 - Attackers open fire on bus
Five Israeli passengers were injured when suspected Palestinian attackers opened fire on a bus traveling in the West Bank.

Pakistan - November 4, 1999 - Bombs kill one
Three bombs exploded in the town of Muridke, north of Lahore. One device exploded at a bus stand, another near the railway station, and a third at a hotel. One person was killed and three others were injured. Some 150,000 people had assembled in the town for the annual meeting of an Islamic militant group that has been fighting for Kashmir independence.

Brazil - November 9, 1999 - Assailants kill tourist in Rio taxi
A French couple were lured to a gypsy cab at the airport. Once inside, they were robbed and the wife killed. Such crimes are common in both Brazil and Mexico.

India - November 11, 1999 - Thirteen killed in bomb explosion on train
Thirteen people died and fifty others were injured when a device detonated on an express train traveling from Jammu in Kashmir to New Delhi.

Togo - November 22, 1999 - Bandits attack bus, kill one
Bandits attacked two buses near the Togo-Benin border, killing one person and injuring several others. Ten women were also raped.

Pakistan - November 29, 1999 - Two killed in bomb on bus
Two people were killed and nine others injured when a bomb exploded on a bus in Hyderabad. A group supporting ousted Prime Minister Nawaz Sharif claimed responsibility. The same group detonated a bomb in Lahore on November 20, killing eight.

Argentina - November 30, 1999 - Airport bus passengers robbed
Three gunmen posing as passengers robbed 35 passengers aboard a bus after it left the Buenos Aires Ezeiza Airport. They then jumped into a van that had been following the bus. There were no injuries.

Pakistan - December 1, 1999 - 15-pound bomb found on main track
A device was discovered by an employee at the Kotri railway station in Hyderabad. It was set to go off later that morning. Police defused the bomb and there were no injuries.

Russia - December 15, 1999 - Two men commandeer bus in Moscow
Two gunmen boarded the bus posing as shoppers and threatened passengers with guns and hand grenades. After robbing the passengers, the assailants fled to a waiting vehicle.

Israel - December 24, 1999 - Pipe bomb explodes at bus station
A bomb went off at the central bus station in the City of Netanya. There were no injuries.

Japan - December 24, 1999 - Bomb found in trash bag on bullet train
A device was found hidden in a trash bag that had been on the train. The bomb exploded in a train yard in Osaka after it was removed from the train.

Japan - December 26, 1999 - Fires on three trains to Narita
Three deliberately started fires broke out on the express trains that run between Tokyo and Narita airport. Police suspected that the arson was the work of extremists opposed to the expansion of the airport.

Japan - December 27, 1999 - Bomb explodes at train station
An explosion injured one person at the Urawa train station north of Tokyo. The device had been placed in a coin locker. Police advised railway companies to be alert for suspicious objects.

Costa Rica - January 1, 2000 - Bandits attack bus
Bandits on horseback held up the bus near the Nicaraguan border. Police suspected that they were former guerrillas from Nicaragua.

Philippines - January 3, 2000 - Guerrillas torch buses
Members of the communist New People's Army set two buses on fire in South Cotabato province on Mindinao. Passengers were ordered off the buses, but no one was harmed. Police attributed the attack to the bus company owner's resistance to "revolutionary taxes."

India - January 6, 2000 - Bomb injures 12 at rail station
A bomb in a briefcase was placed under a seat on a train at Old Delhi railway station and exploded, injuring 12 persons. No group claimed responsibility.

Albania - January 9, 2000 - Assailants open fire on bus
Three people suffered gunshot wounds when armed robbers opened fire on a bus in the Gjirokaster.

Philippines - January 18, 2000 - Rebels destroy buses in Mindinao
In an ongoing series of attacks to extort "revolutionary taxes" from the Weena Bus Company in Davao and Cotabato, communist rebels blew up two buses. There were no casualties.

India - January 19, 2000 - Bomb derails train
A freight train was derailed by a bomb explosion on a rail line in Assam State. In related incidents, 15 pounds of explosives were found aboard a bus on January 18 and three unexploded bombs were discovered on another rail line. Authorities blamed the attacks on the separatist United Liberation Front for Assam.

Sri Lanka - January 30, 2000 - Bomb on bus injures 16
An explosion occurred on a bus bound for Colombo. Separatist Tamil Tigers (LTTE) were believed responsible.

India - January 26, 2000 - Explosive device found on Mumbai train
A passenger found a clock left in a suburban train on the Marine Lines in Mumbai. The passenger took the clock home. It exploded on the way, causing minor injuries.

Yugoslavia - February 2, 2000 - Assailants fire rocket at bus, killing two
A bus carrying Serb civilians was hit by an antitank rocket. Two people died and five were injured.

Sri Lanka - February 3, 2000 - Three bomb attacks on buses
Explosions that occurred near Colombo injured 30 people.

Pakistan - February 6, 2000 - Bomb on train kills five
An explosion occurred on the coach of a passenger train just after it left Hyderabad Station; 44 persons were injured.

Sri Lanka - February 7, 2000 - Bus bombings injure 37
In a continuing terrorist campaign probably carried out by the separatist Tamil Tigers (LTTE), two bombs exploded on buses in the Monogaral area, wounding 37 people.

Sri Lanka - February 8, 2000 - Two bus bombings kill three
Two people were killed and 47 others injured in bus bombings. One bomb exploded just as passengers were boarding an intercity bus in Colombo. The second occurred on a bus just north of the capital. Tamil Tigers (LTTE) were believed responsible.

Algeria - February 14, 2000 - Islamic rebels kill 16 bus passengers
Assailants opened fire on passengers of two buses at a fake roadblock. Sixteen people died and 30 others were injured.

Senegal - February 20, 2000 - Rebels kill four on tourist buses
Casamance separatists attacked two tour buses 150 miles south of Dakar, killing four and injuring 20 foreign tourists. This was the first attack on tourists by the separatist group.

Philippines - March 15, 2000 - Bomb on bus injures five
An explosion occurred on a bus in a passenger terminal in the town of Matalam on the island of Mindinao, continuing a pattern of violence.

Poland - March 18, 2000 - Tourist bus robbed
A bus was flagged down on a remote stretch of highway by a vehicle with flashing red lights. Five masked and armed men boarded the vehicle and robbed the passengers.

India - March 21, 2000 - Bomb injures four on commuter train
An explosion occurred aboard a local commuter train in Mumbai (Bombay). The device was a metal pipe filled with gunpowder and linked to a timer. Police suspected that the attack was intended to spread panic on the eve of President Clinton's visit to India, given that the explosion happened near the area where Clinton was scheduled to stay.

Brazil - March 28, 2000 - Angry commuters set fire to train
Angered by interrupted service, commuters set fire to the commuter train after it broke down on the outskirts of Sao Paulo. There was extensive damage but no injures.

Pakistan - April 7, 2000 - Bomb at bus station injures 15
A bomb exploded in Lahore's main bus station, injuring 15 people.

Colombia - April 16, 2000 - Paramilitary gunmen kidnap bus passengers, kill four
Gunmen blocked a bus in Antioquia department and kidnapped 15 passengers. Four of them were shot near the scene; the other 11 disappeared.

Belgium - April 18, 2000 - Three boys cause trains to derail, killing one
One person died and 22 others were injured as a result of an intentional train derailment. Three boys (aged 8, 9, and 13) were arrested by police for causing the incident.

Guatemala - April 25, 2000 - Rioters destroy city buses
Protests against fare increases turned violent when demonstrators, mostly university students, began attacking and burning buses throughout the city.

Ecuador - April 27, 2000 - Rioters attack buses in Quito
Protesting against the pegging of Ecuador's currency to the U.S. dollar, students attacked buses throughout Quito.

Japan - May 3, 2000 - One person killed in bus hijacking
A 17-year old boy armed with a knife hijacked an express bus on the Island of Kyushu. Two women were stabbed and one later died. Police halted the vehicle after a four-hour chase. The motive appeared to have been personal.

Russia - May 3, 2000 - Bomb threats delay trains in St. Petersburg
An anonymous bomb threat delayed the departure of several trains carrying World War II veterans on their way to ceremonies in Moscow to commemorate the end of the war.

Algeria - May 3, 2000 - Islamic extremists kill 19 on bus
An attack by extremists resulted in the deaths of 19 passengers. The attack occurred after the terrorists stopped the bus at a fake roadblock 50 miles south of Algiers.

Indonesia - May 25, 2000 - Protesters attack bus
Student protesters attacked and set fire to a bus in Jakarta; they also burned other vehicles as part of their violent protest activities.

South Africa - June 1, 2000 - Bus drivers shot and wounded
As part of an ongoing turf war between the bus company and taxi operators, three bus drivers were shot and wounded in Cape Town.

Laos - June 6, 2000 - Bomb blast on bus kills two
Two people died and 10 others were injured in an explosion on a bus. The vehicle was parked near a morning market that had been the target of another bombing 10 days earlier.

Philippines - June 7, 2000 - Bomb found on Manila Metro
An explosive device was discovered by a train operator. It was detonated on the scene by a police bomb disposal unit. Train operations were suspended for five hours. This seemed to be part of a wave of bombings and bomb threats that began in Manila in May.

Colombia - June 7, 2000 - Guerrillas kill two in attack on bus
When the driver refused to stop at a checkpoint set up by rebels, they opened fire on the bus, killing the driver and a passenger and causing the bus to crash.

Brazil - June 12, 2000 - Hostage situation on bus ends in two deaths
A fleeing robber boarded a bus and seized six hostages. After four hours of negotiations with the gunman, who was using a woman passenger as a shield, police opened fire. Both the gunman and his hostage were killed.

United Kingdom - June 12, 2000 - Vandals attempt to derail high-speed train
Maintenance equipment was deliberately placed on tracks in an apparent attempt to derail a high-speed train near Daventry. Similar attacks using concrete blocks and steel bars on tracks recently had caused derailments in France and Belgium.

United Kingdom - June 13, 2000 - Vandals attack commuter train
Similar to the previous day's activity, a commuter train was halted by concrete blocks placed on the tracks near Coventry. When the train stopped, the driver was pelted by rocks and several coach windows were smashed.

Sri Lanka - June 14, 2000 - Suicide bomber kills two
A suicide bomber attempted to ram his explosive-filled bicycle into a bus, but was prevented from doing so by heavy traffic. The bomb exploded prematurely, killing two bystanders and injuring eight others.

Pakistan - June 21, 2000 - Bomb in bus terminal kills one
A bomb exploded in Rawalpindi's main bus terminal, killing one and injuring nine others.

Latvia - June 23, 2000 - Group threatens a "war of the rails"
A group calling itself The Fighters of Democratic Latvia threatened a "war of the rails" unless the government legalized the Communist Party and placed the Russian language on an equal footing with Latvian. The threat was sent in a letter to newspapers, in which the group also claimed responsibility for an explosion that damaged tracks near Riga. Riga's main train station also received a bomb threat the previous week.

United Kingdom - June 30, 2000 - Rail line linking Belfast and Dublin bombed
Protestant extremists were suspected of responsibility for bombing the railway track that links the capital of Northern Ireland with that of the Irish Republic. There were no injuries.

Pakistan - July 7, 2000 - Bomb at bus station kills one
Near Lahore, a remote-controlled device was placed under an intercity minibus shortly before it was scheduled to depart. One person died and four others were injured in the blast.

Pakistan - July 16, 2000 - Bomb on train kills nine
Nine people died and 35 others were injured in a train explosion that occurred just outside of Hyderabad. This was the second bombing of a train in Hyderabad in 2000.

United Kingdom - July 19, 2000 - Bomb threats disrupt Underground
Responding to a coded phone call, police located and detonated a bomb placed on the tracks of a London subway station during the morning rush hour. Threats also were made to two other stations, but no devices were found. The events caused police to shut down portions of the Underground for several hours. The caller used the same code word that was used by someone prior to the June 30 bombing of the rail line between Belfast and Dublin.

Russia - July 20, 2000 - Terrorist plots failed
On July 19, police arrested three Chechens who possessed bomb-making materials and reportedly were planning to bomb a railway station in Volgograd. On July 20, police in Moscow arrested a Chechen who planned to plant a large bomb at Moscow's Kursky railway station. They recovered detonators, remote control mechanisms, and a significant amount of explosives.

India - July 24, 2000 - Bomb on bus kills seven
Seven people died and 16 were injured when a bomb exploded aboard a bus in the Jalandar, Punjab state. No one claimed responsibility.

Ukraine - July 24, 2000 - Passenger train derailed
Damaged track caused a train to derail, injuring 40. The circumstances of the damage were not clear, and no one claimed responsibility for the incident.

Germany - July 27, 2000 - Bomb explodes at entrance to Duesseldorf Underground
An explosion caused by a fragmentation device injured nine persons. No one claimed responsibility for the event. However, the victims of the attack were recent immigrants from the former Soviet Union, many of them Jewish, suggesting that the attack was motivated by anti-Semitic or anti-foreign sentiments.

South Africa - July 27, 2000 - Two killed on commuter bus
A group of armed men attacked a commuter bus owned by the Golden Arrow Company in Cape Town, killing two and injuring five others. This was part of a series of attacks on Golden Arrow buses by illegal taxi drivers engaged in a turf war.

India - July 31, 2000 - Bomb on passenger train kills 12
A remotely controlled device exploded on a passenger train in Assam State west of the capital, killing 12 and injuring several others. A freight train was blown up in same area on July 30. Authorities believed that The United Liberation Front of Assam was responsible for the act.

Russia - August 8, 2000 - Bomb kills eight in underground passage
Eight deaths and many injuries were caused by the explosion. Chechen rebels were believed responsible.

Colombia - August 8, 2000 - Guerillas burn buses
Guerrillas of the National Liberation Army (ELN) set up a roadblock and burned a number of vehicles, including two buses, in Cesar department. In Magdelena department, ELN guerrillas burned two more buses.

Russia - August 10, 2000 - Explosives found in Moscow railway station
Following an explosion in an underground passage on August 8, police found nine pounds of TNT and seven detonators in a suitcase in the lost luggage office of the Kazansky railway station. The device was not wired for detonation.

India - August 14, 2000 - Bomb on train kills 10
Ten deaths and 36 injuries occurred when a device exploded on an express train in Uttar Pradesh. Authorities speculated that the bomb was planted by Kashmir or Assam separatists.

Pakistan - September 4, 2000 - Bomb in bus station kills two
Two people died and 12 were injured in a Lahore bus station explosion. No one claimed responsibility.

Cote D'Ivoire - October 5, 2000 - Four killed planting bomb at bus station
Four deaths and seven injuries took place when a bomb terrorists were planting exploded prematurely at the main bus station in the capital Abdijan. The country was already in a state of emergency as a result of tensions caused by the growing political instability.

United Kingdom - October 17, 2000 - Train accident raises terrorism concerns
A high-speed train derailed, killing four persons and injuring 35 others. Although the incident was judged to be an accident, there were reports of unspecified telephone threats that a bomb had been planted on a rail line north of London.

United States - October 20, 2000 - Bomb threat halts Amtrak train
A bomb threat forced the evacuation of an Amtrak train traveling from Washington, D.C., to Chicago. About 100 passengers were taken off and the train was moved out of town to reduce the possibility of damage to the community. No device was found.

India - October 26, 2000 - Bomb on passenger train kills one
One person died and at least 30 others were injured by an explosion on a train in Punjab.

Israel - November 20, 2000 - Bombing of bus kills two
Two people were killed and nine people were injured when a bomb exploded near the bus in which they were traveling near a settlement in the Gaza Strip.

Sri Lanka - November 28, 2000 - Land mine kills seven on bus
An explosion occurred as a civilian bus hit a mine planted on a road 100 miles north of Colombo. Seven people died and 20 others were injured. Tamil Tigers (LTTE) were believed to be responsible.

Sri Lanka - December 6, 2000 - Land mine kills three on bus
An explosion in the eastern part of the country killed three people and injured more than 20 others. Tamil Tigers (LTTE) were believed to be responsible.

Georgia - December 6, 2000 - Gunmen open fire on bus
Four passengers were wounded when unidentified gunmen opened fire on a bus traveling between Tbilisi and Istanbul. Attacks on buses in the area are not uncommon.

Russia - December 16, 2000 - Bomb threat against Moscow metro
Police closed off portions of the Moscow metro system after receiving a warning that a bomb was left at the Dmitrovskaya Station. No bomb was found.

India - December 18, 2000 - Bomb on bus kills four
Four died and fourteen others were injured when a bomb exploded on a bus in the state of Nagaland. No one claimed responsibility, but Naga separatists were suspected.

Algeria - December 18, 2000 - Terrorists open fire on buses, killing 20
One ambush took place on a highway near Tenes west of Algiers, resulting in the deaths of 15 persons. Five more were killed in a similar attack in Khermis Miliana. Authorities suspected Islamic extremists.

Thailand - December 26, 2000 - Bus hijacking ends in shoot-out
A gunmen hijacked a bus to rob passengers. After the driver alerted police at a checkpoint, a gunfight resulted in which four passengers were injured.

Israel - December 28, 2000 - Fourteen injured in bomb explosions on bus
Two explosions occurred on a bus in Tel Aviv, wounding 14 passengers. A previously unknown group calling itself the Saladin Brigades claimed responsibility for the attack.

Philippines - December 30, 2000 - Bomb kills nine on metro
Five bombs rocked Manila, killing 11 and injuring more than 90 others. Most of the casualties (nine dead and more than 60 wounded) were caused by a bomb on a light rail transport train as it pulled into Manila's Blumentritt Station at noon. Police suspicion focused on the radical Abu Sayyf group, which has been fighting for a separate Islamic nation.

Philippines - December 30, 2000 - Bomb kills one at bus terminal
Another of the five bombs described above exploded in Quezon city's main bus terminal, killing one and injuring 15. A third bomb exploded near a large aviation fuel depot at Manila's international airport, a fourth at a park bench near the American embassy, and the fifth at a gas station across from Dusit Hotel in Manila.

CONCLUSIONS

That surface transportation terrorism has become an international phenomenon is beyond dispute. The nearly 800 accounts described in two volumes of examination testify to the extent that the practice of this abhorrent activity extends almost everywhere. Clearly, some areas of the world are more susceptible to such assaults than others. Just as clearly, governments differ not only in their concern for surface transportation terrorism, but in their approaches, preparation, and strategies.

Based on the four studies examined in this report, there well may be certain themes that help to account for not only different assault methodologies, but also different capabilities and different government responses. The data are by no means conclusive. Nevertheless, there appear to be differences with respect to historical references, cultural values, and government organizational arrangements. An analysis of these elements helps to suggest why some surface terrorism efforts succeed, some fail, and others never occur.

HISTORICAL REFERENCES

Some areas of the world accept surface transportation terrorism as the "cost of doing business" to the extent that it is the easiest way for disfranchised elements to make themselves heard in a meaningful way. Most examples along these lines have occurred in developing societies, where the rule of law is not necessarily accepted as legitimate by those with long-festering political grievances. Authorities in other political systems are much less tolerant of terrorism and keep close watch on the persons who perpetuate such activity. Either way, surface transportation terrorism may be common because it is relatively easy to carry out.

The voluminous accounts of assault and counterassault in India and Pakistan, the Philippines, the Middle East, and parts of Eastern Europe reveal surface transportation terrorism as a way of attempting to upset the status quo and, at times, to express revolutionary fervor. Some such activity is little more than political alienation; in other cases, such as the strikes in London, the attacks represented the expressions of serious grievances. Rarely have perpetrators of surface transportation terrorism sought to take lives as a primary objective, although the work of Aum Shinrikyo in Japan would seem to stand out as an example of such activity.

CULTURAL VALUES

The attitudes of authorities and the general public play large roles in the management of surface transportation terrorism and the threat—implied or real—of such assaults. Authorities in London were vigilant about responding to attacks on "the system." They worked hard to foil the efforts of the Irish Republican Army and its allies. In Tokyo, initial deference to religious and cultural values kept authorities from moving quickly lest they offend not only the alleged perpetrators, but also others of strong convictions.

Matters have been quite different in the two U.S. cases. Representatives from the BART system in the San Francisco Bay area have prepared for possible assault on some level, as shown by the cameras, HazMat suits, and "dry run," or simulated, chemical and/or biological events. In San Jose, the authorities protecting the VTA have given virtually no thought to any potential incident, choosing instead to leave any response to other law enforcement authorities, should such ever be necessary. Ironically, the United States has been touched by terrorism—the bombings of the World Trade Center in New York and the Murra Federal Building in Oklahoma City stand as examples.[8] Nevertheless, at least in the BART and VTA cases, these instances have not been viewed as signs of vulnerability as much as indications of the work of extremists; thus, they have not been perceived by most authorities as readily replicable.

GOVERNMENT ARRANGEMENTS

The structure of government authority may help to explain the different response patterns to surface transportation terrorism in particular, and the threat of terrorism in general. The police in London were given wide latitude in the management of the IRA attacks. Similar organization in Tokyo permitted the police there to respond in an organized fashion, although their actions were not as quick.

In the United States, government organization is considerably more complex. The variety of local agencies in both the BART and VTA systems suggests a complex response pattern. For BART, the issue is unusually convoluted, because the BART police, a separate jurisdiction, is combined with local police authorities from a dozen or more jurisdictions. VTA is slightly less complicated, with the San Jose Police Department and Santa Clara County

[8] Note that this report's peer review and authors' responses were completed prior to the events of September 11, 2001.

Sheriff sharing responsibilities with other police jurisdictions. As long as no attacks occur, the response problems will be theoretical. Should a real threat come to pass, however, local authorities might be hard pressed to act with consistency, absent an emergency declared by the governor (state intervention) or president (National Guard intervention).

With only four cases examined in depth, it is difficult to know with certainty whether any of the factors cited above could be decisive. However, differences do exist and, lacking information to the contrary, it may be that one or more of these factors has accounted, at least in part, for the different ways the issues have been managed. One fact regarding the management of surface transportation systems remains indisputable: Whatever the differences in history, values, or government capabilities, surface transportation terrorism can never be stopped altogether.

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ACRONYMS AND ABBREVIATIONS

ALO	Architectural Liaison Officer
BART	Bay Area Rapid Transit Agency
BSA	bomb shelter area
BTP	British Transport Police
CCTV	closed-circuit television
CPTED	Crime Prevention Through Environmental Design
CTCPO	Counter Terrorist Crime Prevention Officer
DETR	Department of the Environment, Transport and Regions
FBI	Federal Bureau of Investigation
IRA	Irish Republican Army
JR	Japan Rail
NTCPU	National Terrorist Crime Prevention Unit
TEITO	Tokyo Rapid Transit Authority
TOEI	Transportation Bureau of Metropolitan Tokyo Government
VTA	Santa Clara County Valley Transit Authority
WMD	Weapons of Mass Destruction

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