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AVIATION SECURITY

Immediate Action Needed to Improve Security

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Mr. Chairman and Members of the Committee:

We appreciate the opportunity to testify before this Committee as it assesses aviation security and the measures needed to reduce the vulnerabilities that exist in the current system. Protecting civil aviation against a terrorist attack is now an urgent national issue. The 1988 terrorist bombing of Pan Am 103, which killed 270 people, and the more recent, but as yet unexplained, explosion of TWA flight 800 have shaken the public's confidence in the safety and security of air travel. The Federal Aviation Administration (FAA), using information provided by federal intelligence agencies, is responsible for analyzing the threat to aviation security of terrorist attacks and prescribing and enforcing security measures.

Mr. Chairman, our testimony today responds to the Committee's request for information about the threat to aviation and what can be done to increase aviation security. The testimony is based on several issued GAO reports and work we have undertaken for the House International Relations Committee and Senator D'Amato. Today, we will discuss (1) the threat to aviation from terrorist attacks; (2) the roles of FAA, the airlines, and airports in providing aviation security and the vulnerabilities in the existing security system; and (3) the availability of explosives detection technology and other methods used to address the threat. Finally, we want to emphasize that the Congress, the administration—including FAA and the intelligence community, among others—and the aviation industry need to agree on methods of improving and financing security procedures. To the extent necessary, the international aviation community should be involved.

In summary:

- The threat of terrorism against the United States has increased. Aviation is and will remain an attractive target for terrorists.
- Aviation security is a shared responsibility of FAA and the airlines and airports. FAA has mandated additional security procedures as the threat has changed; however, the domestic and international aviation system has numerous vulnerabilities. For example, conventional X-ray screening of checked baggage has performance limitations and offers little protection against a moderately sophisticated explosive device.
- Explosives detection devices are commercially available for checked and carry-on baggage and could improve security, but all of the devices have shortcomings. Some of these devices are already being used in foreign

countries. Other devices are under development and may be available in the next 2 years for screening passengers, but technologies for cargo and mail at airports are not as far along. A mix of technology and procedures will likely be needed to improve security. FAA has estimated that the cost of adopting some new technology and other methods to counteract terrorism, such as identifying for additional security checks those passengers who meet specific profiles associated with terrorist groups, could cost as much as $6 billion over 10 years.

- Recent events underscore the need for improved security to protect the traveling public. To improve security, the Congress, the administration—including FAA and the intelligence community, among others—and the aviation industry need to agree and take action on what needs to be done to meet the threat of terrorism and who will pay for new security measures. On July 25, the President asked the Vice-President to lead a commission to review aviation safety and airport security and to report within 45 days on actions to be taken. The international aviation community also may need to be involved to improve security procedures.

The Threat Has Increased, and Aviation Is an Attractive Target

The threat of terrorism against the United States has increased, according to the intelligence community. The experts believe that aviation is likely to remain an attractive target for terrorists well into the foreseeable future. Until the early 1990s, the Federal Bureau of Investigation (FBI), the State Department, FAA, the Department of Transportation (DOT), and airline officials had maintained that the threat of terrorism was far greater overseas than in the United States. However, the World Trade Center bombing and the recent convictions of individuals charged with plotting to bomb several landmarks in the New York area revealed that the international terrorist threat in the United States is more serious and more extensive then previously believed.

By 1994, reports by several agencies indicated a change in the pattern of terrorism. In 1994, the State Department reported a decline in attacks worldwide by state-sponsored, secular terrorist groups but an increase in attacks by radical fundamentalist groups, who operate more autonomously. The FBI reported in the same year that the most important development in international terrorism inside the United States was the emergence of international radical terrorist groups with an infrastructure that can support terrorists' activities. These groups are more difficult to infiltrate, and consequently, it is also more difficult to predict and prevent their attacks.

As we reported in January 1994, terrorists' activities are continually evolving and present unique challenges to FAA and law enforcement agencies.[1] We further reported in March 1996 that the bombing of Philippines Airlines Flight 434 in December 1994, which resulted in the death of one passenger and injuries to several others, illustrated the potential extent of terrorists' motivation and capabilities as well as the attractiveness of aviation as a target for terrorists.[2] According to information that was accidentally uncovered in early January 1995, this bombing was a rehearsal for multiple attacks on specific U.S. flights in Asia. Officials told us that they rarely have the advantage of a detailed, verifiable plot to target U.S. airlines. They also said that the terrorists were aware both of airports' vulnerabilities and how existing security measures could be defeated.

Aviation Security System and Its Vulnerabilities

Even though FAA has changed security procedures as the threat has changed, the domestic and international aviation system continues to have numerous vulnerabilities. Aviation security is a shared responsibility. The intelligence community—the Central Intelligence Agency (CIA), the National Security Agency, the FBI, among others—gathers information to prevent actions by terrorists and provides intelligence information to FAA. On the basis of this information, FAA makes judgments about the threat and establishes procedures to address it. The airlines and airports are responsible for implementing the procedures. For example, the airlines are responsible for screening passengers and property, and the airports are responsible for the security of the airport environment, including security personnel. FAA and the aviation community rely on a multifaceted approach that includes information from various intelligence and law enforcement agencies; contingency plans to meet a variety of threat levels; and the use of screening equipment, such as conventional X-ray devices and metal detectors. However, many of these measures, such as walk-through metal detectors, were primarily designed to avert hijackings during the 1970s and 1980s, as opposed to the more current threat of sophisticated attacks by terrorists that involve explosive devices.

For flights within the United States, basic security measures include the use of walk-through metal detectors for passengers and X-ray screening of carry-on baggage; these measures are augmented by additional procedures

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[1]Aviation Security: Additional Actions Needed to Meet Domestic and International Challenges (GAO/RCED-94-38, Jan. 27, 1994).

[2]Terrorism and Drug Trafficking: Threats and Roles of Explosives and Narcotics Detection Technology (GAO/NSIAD/RCED-96-76BR, Mar. 27, 1996).

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that are based on an assessment of risk. These additional procedures are contained in the contingency plans developed by FAA in coordination with the aviation industry. FAA's plans describe a wide range of procedures that can be invoked, depending on the nature and degree of the threat. Among these procedures are (1) passenger profiling, a method of identifying potentially threatening passengers who are then subjected to additional security measures, and (2) passenger-bag matching, a procedure to ensure that a passenger who checks a bag also boards the flight; if the passenger does not board, the bag is removed. FAA mandated higher levels of temporary security measures several times in 1995 because of the increased threat of terrorism, and the current measures in place are at the highest level invoked since the Gulf War.

Because the threat of terrorism had been considered greater overseas, FAA has mandated more stringent security measures for international flights. Currently, for all international flights, FAA requires U.S. carriers to implement the International Civil Aviation Organization standards at a minimum, including the inspection of carry-on bags and passenger-bag matching.[3] FAA also requires additional, more stringent measures—including interviewing passengers that meet certain criteria, screening every checked bag, and screening supplementary carry-on baggage—at all airports in Europe and the Middle East and many airports elsewhere.

In the aftermath of the 1988 bombing of Pan Am 103, a Presidential Commission on Aviation Security and Terrorism was established to examine the nation's aviation security system. This Commission reported that the system was seriously flawed and failed to provide adequate protection for the traveling public. In spite of the Commission's finding and the Congress's enactment of the Aviation Security Improvement Act of 1990, our work illustrates that many vulnerabilities are persistent.[4]

Aviation Security System Has Vulnerabilities

Providing effective security is a complex problem because of the size of the U.S. aviation system, differences among airlines and airports, and the unpredictable nature of terrorism. In our January and May 1994 reports on aviation security, we highlighted a number of vulnerabilities in the overall

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[3]The International Civil Aviation Organization is a United Nations organization that develops standards and recommended practices for aviation safety and security.

[4]Aviation Security: Development of New Security Technology Has Not Met Expectations (GAO/RCED-94-142, May 19, 1994); Terrorism and Drug Trafficking: Threats and Roles of Explosives and Narcotics Detection Technology (GAO/NSIAD/RCED-96-76BR, Mar. 27, 1996).

security framework, such as the screening of checked baggage, mail, and cargo. We also raised concerns about unauthorized individuals gaining access to critical parts of an airport and the potential use of sophisticated weapons, such as surface-to-air missiles, that could be deployed against commercial aircraft. More recent security concerns include smuggling bombs aboard aircraft in carry-on bags or on passengers themselves.

Specific information on the vulnerabilities of the nation's aviation security system is classified and cannot be detailed here, but we can provide some information. We have a classified report in process that discusses the system's vulnerabilities in greater detail. FAA believes the greatest threat to aviation is explosives in checked baggage. For those bags that are screened, we reported in March 1996 that conventional X-ray screening systems (comprising the machine and operator who reads the X-ray screen) have performance limitations and offer little protection against a moderately sophisticated explosive device. There are also vulnerabilities in screening passengers because the walk-through devices that currently screen for metal objects are unable to detect explosives carried by passengers.

Although Not Without Shortcomings, Technologies Are Available or in Development for Detecting Concealed Explosives

Aviation security rests on a careful mix of intelligence information, procedures, technology, and security personnel. New explosives detection technology will play an important part in improving security, but it is not the panacea. In response to the Aviation Security Improvement Act of 1990, FAA accelerated its efforts to develop explosives detection technology, and devices are now commercially available to address some vulnerabilities. Since October 1, 1990, FAA has invested about $150 million in developing technologies specifically designed to detect concealed explosives. FAA relies primarily on contracts and grants with private companies and research institutions to develop these technologies. The act specifically directed FAA to develop and deploy explosives detection systems by November 1993. However, this goal has not been met.

In September 1993, FAA published a general certification standard that explosives detection systems must meet before they are deployed. The standard sets certain minimum performance criteria, such as what kinds of explosives must be detected and how many bags per hour the device processes.[5] However, the specifics of the standard are classified. To

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[5]The certification standard sets minimum performance criteria for (1) the explosive substances to be detected, (2) the probability of detection, by explosive, (3) the quantity of explosive, and (4) the number of bags processed per hour. In addition, the standard specifies the maximum allowable false alarm rate, by explosive.

minimize human error, the standard also requires that the devices automatically sound an alarm when explosives are suspected; this feature is in contrast to currently used conventional X-ray devices, where the operator has to look at the X-ray screen for each bag. In 1994, we reported that FAA had made little progress in meeting the law's requirement because of technical problems, such as slow baggage processing. Since then, one system has passed FAA's certification standard and is being operationally tested at two U.S. airports in Atlanta and San Francisco.

Explosives detection devices can substantially improve airlines' ability to detect concealed explosives before they are brought aboard aircraft. While most of these technologies are still in development, a number of devices are now commercially available. For example, some devices are in use in foreign countries, such as the United Kingdom, Belgium, and Israel. None of the commercially available devices, however, is without shortcomings. On the basis of our analysis, we have three overall observations about detection technologies:

- First, these devices vary in their ability to detect the types, quantities, and shapes of explosives. For example, one device excels in its ability to detect certain explosive substances but not others. Other devices can detect explosives but not in certain shapes.
- Second, explosives detection devices typically produce a number of false alarms that must be resolved either by human intervention or other technical means. These false alarms occur because devices use various technologies to identify characteristics, such as shapes, densities, and properties, that could potentially indicate an explosive. Given the huge numbers of passengers, bags, and cargo processed by the average major U.S. airport, even relatively modest false alarm rates translate into several hundreds, even thousands, of items per day needing additional scrutiny.
- Third, and most important, these devices ultimately depend upon human beings to resolve alarms. This activity can range from closer inspection of a computer image and a judgment call to a hand search of the item in question. The ultimate detection of explosives depends on security personnel taking extra steps—or arriving at the correct judgment—to determine whether or not an explosive is present. Because many of the devices' alarms signify only the potential for explosives being present, the true detection of explosives requires human intervention. The higher the false alarm rate, the more a system needs to rely on human judgment. As we noted in our January and May 1994 reports, this reliance could be a weak link in the explosives detection process. This fact has implications for the selection and training of operators for new equipment.

Devices Are Available to Address Some System Vulnerabilities, and FAA Has Developed Some Cost Estimates

A number of explosives detection devices are currently available or under development to determine whether explosives are present in checked and carry-on baggage or on passengers, but they are costly. FAA is still developing systems to screen cargo and mail at airports.

Checked Bags

Four explosives detection devices with automatic alarms are commercially available for checked bags, but only one has met FAA's certification standard (the CTX 5000). FAA's preliminary estimates are that the one-time acquisition and installation costs of the certified system for the 75 busiest airports in the United States could range from $400 million to $2.2 billion, depending on the number of machines installed.

- A computerized tomography (CT) device, which is based on advances made in the medical field, offers the best overall detection ability but is relatively slow in processing bags and has the highest price, costing approximately $1 million each. This device was certified by FAA in December 1994.
- Two advanced X-ray devices have lower detection capability but are faster and cheaper, costing approximately $350,000 to $400,000 each.
- The last device, which uses electromagnetic radiation, offers chemical-specific detection ability but only for some of the explosives specified in FAA's standard. The current price is about $340,000 each.

All of these devices require additional steps by security personnel when there are indications that an explosive is present. FAA is funding the development of next-generation CT devices from two different manufacturers. These devices are being designed to meet FAA's standard for detecting explosives and processing speeds; they could sell for about $500,000 each. Advanced X-ray devices with improved capabilities are also in development.

Carry-on Items

Explosives detection devices are commercially available for carry-on bags, electronics, and other items but not yet for screening bottles or containers that could hold liquid explosives. Devices for liquids, however, may be commercially available within 2 years.

Carry-on bags and electronics. At least five manufacturers sell devices that can detect the residue or vapor from explosives on the exterior of carry-on bags and on electronic items, such as computers or radios. These devices,

also known as "sniffers," are commonly referred to as "trace" detectors and range in price from about $45,000 to $170,000 each. They have very specific detection capability as well as low false alarm rates. The main drawbacks are (1) the possibility of insufficient residue on the exterior of the item concealing the bomb and (2) nuisance alarms, where the device accurately detects explosive material—for example, a heart patient's nitroglycerin medication—but the source is not a bomb.

An electromagnetic device is also available that offers a high probability of chemical-specific detection, but only for some explosives. The price is about $65,000.

Detecting liquid explosives. FAA is developing two different electromagnetic systems for screening bottles and other containers, likely to sell for $25,000 and $125,000 per device. A development issue is processing speed. These devices may be available within 2 years.

Passengers

Although a number of commercially available trace devices could be used on passengers if deemed necessary, passengers might find their physical intrusiveness unacceptable. In June 1996, the National Research Council, for example, reported that there may be a number of health, legal, operational, privacy, and convenience concerns about passenger screening devices. Accordingly, FAA and the Department of Defense (DOD) are developing devices that passengers may find more acceptable. FAA estimates that it would cost $1.9 billion to provide about 3,000 of these devices to screen passengers.

- A number of trace devices in development will detect residue or vapor from explosives on passengers' hands. Two devices screen either documents or tokens that have been handled by passengers. These devices should be available in 1997 or 1998 and sell for approximately $65,000 to $85,000 each.
- Five devices under development use a walk-through screening checkpoint similar to the current metal detectors. Three will use trace technology to detect particles and vapor from explosives on passengers' clothing or in the air surrounding their bodies. Ranging in expected selling prices from approximately $170,000 to $300,000, one of these devices will be tested at an airport as early as this month, and another device may undergo airport testing next year. Two other devices, based on electromagnetic technology, are in development. Rather than detecting particles or vapor,

these devices will provide images of items concealed under passengers' clothing. Prices are expected to be approximately $100,000 to $200,000.

Cargo/Mail

Cargo and mail continue to represent vulnerabilities in the system. Screening cargo and mail at airports is difficult because individual packages or pieces of mail are usually batched into larger shipments that are more difficult to screen. Although not yet commercially available, two different systems for detecting explosives in large containers are being developed by FAA and DOD. Each system draws vapor and particle samples and uses trace technology to analyze them. One system is scheduled for testing in 1997.

In addition, FAA is considering for further development three nuclear-based technologies, originally planned for checked-bag screening, for use on cargo and mail. These technologies use large, heavy apparatus to generate gamma rays or neutrons to penetrate larger items. However, they require shielding for safety reasons. These technologies are not as far along in the development process as many other devices. They are still in the laboratory development stage rather than the prototype development stage. If fully developed, these devices could cost as much as $2 million to $5 million each.

Blast-Resistant Containers

To reduce the effects of an in-flight explosion, FAA is conducting research on, among other things, blast-resistant containers. FAA's tests have demonstrated that it is feasible to contain the effects—blast and fragments—of an internal explosion. However, because of their size, blast-resistant containers can be used only on wide-body aircraft that typically fly international routes. FAA is working with a joint industry-government consortium to address concerns about the cost, weight, and durability of the new containers and is planning to blast test several prototype containers later this year. Also this year, FAA will place about 20 of these containers into airline operations to see how well they function in actual use.

Other Methods to Improve Aviation Security

In addition to technology-based security, FAA has several procedures that it uses, and can expand upon, to augment domestic aviation security or use in combination with technology to reduce the workload required by detection devices, such as random hand searches. On July 25, the President announced additional measures for international and domestic

flights that include, among other things, stricter controls over checked baggage and cargo as well as additional inspections of aircraft. Two procedures that are routinely used on many international flights and could be implemented in the short term for domestic flights are passenger profiling and passenger-bag matching. FAA officials have said that profiling can reduce the number of passengers and bags that require additional security measures by as much as 80 percent.

Profiling and bag matching are unable to address certain types of threats. However, in the absence of sufficient or effective technology, these procedures are a valuable part of the overall security framework. These methods may also be expensive. FAA has estimated that incorporating bag matching in everyday security measures could cost up to $2 billion in startup costs and lost revenue. The direct costs to airlines include, among other things, equipment, staffing, and training. The airlines' revenues and operations could be affected differently because the airlines currently have different capabilities to implement bag matching, different route structures, and different periods of time allowed for connecting flights.

The Congress, the Administration, and the Aviation Industry Need to Agree on Actions to Improve Security and Who Will Pay for It

Aviation security has become an issue of national importance, but no agreement currently exists among the Congress, the administration—including FAA and the intelligence community, among others—and the aviation industry on the steps necessary to meet the threat and improve security in the short and long terms or who will pay for new security initiatives. While FAA has increased security at domestic airports on a temporary basis, FAA and DOT officials believe that more permanent changes are needed. The cost of these new security initiatives will be significant and may require changes in how airlines and airports operate and will likely have an impact on the traveling public. The law makes airlines responsible for screening passengers and property.

In November 1995, senior FAA officials stated that they planned to recommend a high-level national policy review of civil aviation to develop a consensus in government and industry on the nature and extent of the threat, appropriate types of responses, and who would pay for those responses. FAA officials told us that standard cost-benefit analyses would likely reject many initiatives and that a consensus was needed among the Congress, industry, and the executive branch before any regulatory action is taken. There has been considerable debate about how to fund the deployment and operational costs for new security initiatives. Several options have been discussed: (1) government funding, if viewed as a

national security issue, (2) industry financing as a cost of doing business, and (3) a fee assessed on air travelers.

In January 1996, FAA briefed the National Security Council (NSC) on the threat to civil aviation and the need for a high-level national policy review on ways of increasing aviation security. FAA recommended the establishment of a presidential commission as a means of obtaining the essential elements of consensus and a legislative mandate. At that briefing, FAA provided preliminary estimates on the cost of various options, including the deployment of new explosives detection technology for passengers and baggage and other new security procedures. Depending on the option selected, FAA estimated that costs would range from $1 billion to more than $6 billion over a 10-year period. While no agreement was reached on how to finance these improvements, FAA estimated that it would cost the traveling public between $0.20 and $1.30 per one-way ticket. As a result of this meeting and two others, FAA and NSC agreed to submit a proposal to FAA's Aviation Security Advisory Committee to establish a working group to review the threat against aviation and recommend options for improving security.

In addition to FAA's effort, on July 15, 1996, the President established a Commission on Critical Infrastructure Protection, whose mission includes assessing the threat and vulnerabilities and making recommendations on how to protect telecommunications, electrical power, banking and finance, water supply, gas and oil storage, emergency services, and transportation. Senior DOT officials told us that they intend to provide several staff to this effort but that it is uncertain how much attention will be placed on transportation and, specifically, aviation security. However, recent events will likely influence the focus of this effort and place greater emphasis on aviation security.

On July 17, 1996, the same day that TWA Flight 800 exploded, FAA proposed a joint government-industry working group to its security advisory committee. The committee agreed to establish a working group that will include representatives from FAA, the aviation community, the NSC, the CIA, the FBI, the Departments of Defense and State, and the Office of Management and Budget. This group will (1) review the threat to aviation, (2) examine vulnerabilities, (3) develop options for improving security, (4) identify and analyze funding options, and (5) identify the legislative, executive, and regulatory actions needed. The working group established a goal of submitting a final report to the FAA Administrator by October 16, 1996. Any national policy issues would then be referred to the

President by the FAA Administrator through the Secretary of Transportation.

Recognizing the importance of aviation security as a national policy issue, the President established a commission on July 25, 1996, headed by the Vice-President, to review aviation safety and airport security. This commission is to report back to the President within 45 days.

The international aviation community may need to be involved in developing new procedures to improve security. The administration is working with the Group of Seven industrial nations on additional ways to cooperate on countering terrorism.

In summary, Mr. Chairman, we face an urgent national problem that needs to be addressed at the highest levels of government now. The threat of terrorism has been an international issue for some time, with events such as the bombing in Saudi Arabia of U.S. barracks. But other incidents such as the bombings of the World Trade Center in New York, the federal building in Oklahoma City, possibly at the Olympics in Atlanta, and perhaps of TWA 800—if in fact this is determined to be an act of terrorism—have made terrorism a domestic as well as an international issue. Public concern about aviation safety, in particular, has already been heightened as a result of the ValuJet crash, and the recent TWA 800 crash has increased that concern. If further incidents occur, public fear and anxiety will escalate and the economic well-being of the nation will suffer because of reductions in travel and the shipment of goods.

Three separate initiatives are under way that may address the concerns about aviation security. In our view, a unified and concentrated effort is needed to address this national issue. The commission that the Vice-President heads could be the focal point to build a consensus on the actions that need to be taken to address a number of long-standing vulnerabilities. As we noted, procedures and technology can be used to improve aviation security but will require substantial resources.

We believe several steps need to be taken immediately: (1) conduct a comprehensive review of the safety and security of all major domestic and international airports and airlines to identify the strengths and weaknesses of their procedures to protect the traveling public, (2) identify vulnerabilities in the system, (3) establish priorities to address the system's identified vulnerabilities, (4) develop a short-term approach with

immediate actions to correct significant security weaknesses, and (5) develop a long-term and comprehensive national strategy that combines new technology, procedures, and better training for security personnel. Because terrorism is an international problem, close cooperation with foreign governments is also required. In addition, the time has come to inform and involve the American public in this effort. If there was ever a time that public will accept new security measures, it is now. This concludes my prepared statement. I would be glad to respond to any questions.

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