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Agenda Item 4. AVSEC
4.2 Regional AVSEC Activities

MEETING THE 100 PERCENT HOLD BAGGAGE SCREENING REQUIREMENT IN JANUARY 2006

(Presented by the United States of America)

SUMMARY

Among the critical aviation security issues facing States is the quickly approaching deadline for 100 percent hold baggage screening, which is to be implemented by January 1, 2006. The requirement is a result of Amendment 10 to Annex 17 and the expectation is for countries to meet this requirement by employing realistic, reliable mechanisms for screening every bag that is loaded onto an originating international flight. The challenge facing States is to ensure that the most effective means of baggage screening is used to protect the traveling public. States should be encouraged to consider the *probability of detection* when evaluating the various means available to achieve 100 percent hold baggage screening.

1. Introduction

1.1 A critical aviation security issue facing ICAO Member States is the fast approaching deadline for 100 percent hold baggage screening that must be implemented by January 1, 2006. The U.S. Government's international policy objective is to encourage States to provide the most robust system available for screening hold baggage and to consider "probability of detection" as a critical factor to achieving both a high level of security and a standard of equivalency for baggage screening. Annex 17 (Seventh Edition) Standard 4.4.8 reads: "From 1 January 2006, each Contracting State shall establish measures to ensure that originating hold baggage intended to be carried on aircraft engaged in international civil aviation operations is screened prior to being loaded into the aircraft." The challenge facing States is to balance the conflicting demands of efficiency, cost, and passenger privacy against the ultimate goal of security to provide or require the best baggage screening systems available to protect our citizens.

1.2 The United States encourages States to meet this requirement by employing realistic, reliable mechanisms for screening every bag loaded onto an originating international flight. The challenge facing all States is to provide the most effective means of baggage screening available to protect our citizens.

2. **Discussion**

2.1 When the aviation community first began to screen hold baggage with conventional x-ray, we quickly recognized the shortfalls of technology, human performance, and vigilance in addressing this difficult job. We, therefore, proceeded to develop a variety of automated technologies to screen baggage with minimal human intervention. The screening of checked baggage is a challenging process requiring a high commitment of manpower and resources to detect a small quantity of explosives that may be well concealed among the millions of checked bags that are flown daily. Below is an overview of the various options available to States with a discussion of their respective strengths and weaknesses.

2.2 **Physical Search**: The initial approach taken in the early years of aviation security was hand inspection. This approach is slow, labor intensive and, if conducted thoroughly, may raise passenger privacy concerns. The concealment of a bomb within a common article of commerce means that either the bomb will escape detection or the screener may be forced to destroy the passenger's property to conduct an inspection. Hand inspection is widely used to resolve an alarm (often by a bomb squad), but is more effective when used in combination with information derived from other technological approaches.

2.3 **Canine**: Our first trace explosive detectors were trained explosive detection dogs (often referred to as K-9s). Although currently canines are only used to evaluate suspect items for aviation, U.S. Customs and the U.S. Department of Agriculture also use them for routine detection of prohibited contraband or food. The routine use of dogs to screen checked baggage poses several problems. The effectiveness of the dog team is dependent on a number of variables, including the following: the training and readiness of the handler and the dog, the care used for handling and storing training aids, and the frequency of recurrent training. Additionally, high training and maintenance overhead costs, and short duty cycles plague canine programs. Although many handlers periodically use training aids to maintain their dog's interest, the process can be flawed if training aides become contaminated with other recognizable scents such as the handler's scent, the scent of the explosive storage bunker, or even the scent of the rubber gloves sometimes used to handle the training aides. For this reason, training aides are often substituted to mitigate this effect. Dog teams may be better suited to perform airport or aircraft searches than the routine screening of bags.

2.4 **Trace Detection**: In the late 1990s, Canada, the United Kingdom, and the United States conducted tests on the expected contamination levels when a careful terrorist builds a bomb, conceals it in an object designed to evade visual inspection, and places the object in a hold bag. Based on lessons learned from these tests and situations in which trace detection is used for primary screening, the United States devised a strategy that requires a certain number of bags be inspected on the following: exterior only; both the exterior and interior; and, another number requiring a complete screening of all objects large enough to conceal a bomb. Passengers identified as "Selectees" (meaning they are selected for more thorough inspection) are directed to a full search. High labor costs and slow processing times of trace detection limit this mixed strategy. The challenge is not the speed of the equipment, which provides detection and the identification of the explosive in ten seconds, but rather in bag handling and sample acquisition by the screener. U.S. experts have found that if the sampling process is not done systematically, detections will be missed. Currently, it is the smallest of the 450 airports in the United States that primarily use trace for screening hold baggage. The transition from a trace-based checked

baggage clearing system at smaller airports to the use of explosives detection systems (EDS) at all U.S. airports will take years and billions of dollars due to the number of airports to be transitioned.

2.5 **Conventional X-Ray**: The use of conventional x-ray inspection to screen checked baggage continues and is much improved from its development in the 1970s. The original systems were fluoroscopes with poor penetration, resolution and dynamic range, and a high radiation dose to the baggage and possibly the human screener. Systems have since improved and can now provide the screener with information (via dual x-ray energy) of the composition of the contents of the bag. The x-ray identifies organic materials like explosives, and most other items in the bag, in one color. Metallic objects are identified to the screener in a second color. Although advances in technology make it easier to separate metallic clutter from the subtler image of a bomb, the task remains a difficult one. Unlike weapons, bombs have no pre-determined shape. The challenge facing regulators is that the process is dependent on the training, motivation, perception, and vigilance of the screener. Performance of the system is difficult to measure, and unannounced, random testing often reveals that the system does not attain a level of effectiveness needed to detect explosives.

2.6 **Advanced Technology**: Equipment manufacturers have developed advanced technology (AT) x-ray systems that process bags at a high rate and make explosive detection decisions. Several equipment manufacturers have attempted to achieve automated detection with AT. Some of the AT systems employ multiple transmission views and dual energy to help with the explosive detection decisions. Several States have deployed these AT systems as the first level of checked baggage screening followed by on-screen alarm resolution and certified EDS Computed Tomography-based technology. The United States has repeatedly tested this technology and determined that it does not meet the detection standards adopted by ICAO for all threat explosive categories. The vulnerability created by undetected critical threats leaves an exploitable gap in explosive detection. A system relying on AT as the first stage contains this vulnerability.

2.7 **Explosive Detection Systems**: Several States have adopted Computed Tomography (CT) based automated EDS as the primary method of screening hold baggage. EDS provides a high level of detection across the total ICAO threat base coupled with an operationally manageable false alarm rate. Since September 11, 2001, the United States has deployed over 1,300 EDS systems for hold baggage screening and is aiming to reach the goal of 100 percent hold baggage screening *using EDS*. The rapid deployment of a large number of these systems has been a challenge in the United States. The systems are heavy, large, expensive (more than US$800,000), and require integration into the baggage handling system to operate most efficiently. Regardless, the deployed systems have been operating reliably and do provide the highest level of protection to the traveler. Some States include certified EDS technology within their baggage screening systems to resolve un-cleared alarms from AT and screener on screen alarm resolution. The problem with this approach is that the level one technology will have any number of missed detections, which will then proceed to the aircraft. Several States are conducting research and testing to identify more effective and efficient approaches to screening hold baggage and to expand the list of threats addressed. They are exploring combinations of innovative and new technologies.

3. Conclusion

3.1 Ensuring that a robust system for screening hold baggage is used for international flights is the challenge faced by all States as the ICAO 100 percent deadline approaches. While many States will reach the 100 percent requirement through a combination of methods described above, States should consider that the *probability of detection* is critical to our quest for achieving a high level of security, a standard of equivalency for baggage screening, and, in the long-term, a global aviation network that is as fully and effectively protected as technology or methods allow.

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