

Good Practices Guide to Secure Air Transport of Civilian Nuclear Material

Nuclear Security Summit Transport Gift Basket

*Lessons Learned from Air Tabletop Exercise and Sharing the Experiences
based on INFCIRC/225/Revision 5 and its Implementing Guide*

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1. Introduction

1.1 Background

Each nation bears an obligation and responsibility to protect and secure nuclear material. The International Atomic Energy Agency (IAEA) outlined principles and recommendations to protect this material in its Nuclear Security Recommendations on Physical Protection of Nuclear Materials and Nuclear Facilities (INFCIRC/225/Revision 5). The Nuclear Security Summit (NSS) Transport Security Working Group, led by Japan, held four tabletop exercises (TTX) designed to assist nations in implementing INFCIRC/225/Revision 5 recommendations on the transport of nuclear material. These exercises were based on Section 6 of INFCIRC/225/Revision 5 and the 30 September 2014 draft of the Security of Nuclear Material in Transport: Implementing Guide. Each exercise covered one mode of transportation and was led by a mode lead: air (U.S.), road (Japan), rail (Kazakhstan), and maritime (UK). These exercises were designed to highlight practical applications for the protection of category I and II non irradiated civil nuclear materials while in transit. Due to the sensitive nature of operations involving nuclear materials, the participants to this NSS transport gift basket agreed that materials produced in support of and resulting from the exercises contain only non-sensitive information.

1.2 Contents

This practical guide offers general advice to safely and securely plan air transport category I and II non irradiated civil nuclear materials and reflects information discussed during the U.S.-led air TTX. The guide's structure follows the TTX:

- Pre-operational planning, coordination, and logistics which includes (1) Security planning (e.g., route selection, information security); (2) Transport time considerations; (3) Physical protection measures; (4) Personnel; and (5) final pre-departure actions.
- Execution of transport, including (1) disruption of transport; and (2) route security
- Emergency response, including (1) security force response to an incident; and (2) communications
- Post mission analysis

1.3 Regulation Framework

As INFCIRC/225/Revision 5 states, it is important to have legislative and regulatory frameworks in place governing the physical protection of nuclear material. The U.S. has laws and regulations to do so. At the implementation level, the U.S. Air Force, which is responsible for most U.S.-led air transport missions involving Category I & II nuclear materials

(INFCIRC/225/Revision 5, Table 1, Categorization of Nuclear Materials), has published rules for these missions in Air Force Instruction (AFI) 13-526, Volume 2, DOE/NNSA Category I & II Special Nuclear Material (SNM) Cargo Airlift Operations. This manual outlines the requirements for U.S. air transport missions.

The final version of the air TTX is provided in Appendix I. The Air Force Instruction (AFI) 13-526, Volume 2 is provided in Appendix II.

2. Pre-operational planning, coordination and logistics

2.1 Planning

A number of recommended capabilities and actions can better ensure the safe and successful execution of a nuclear cargo mission. First, addressing shipment procedures in the manner of a “centralized control but decentralized execution” strategy has proven highly effective. For example, before a planned mission is executed, a central command and control authority should be responsible for the decision to proceed with a shipment. However, if an emergency occurs during mission execution, the aircraft commander/pilot should be responsible for making safety of flight decisions. Robust and specific communications plans are also recommended to synchronize planning, command and control, and operations procedures. During mission execution, redundant communications systems should be in place (e.g., aircraft satellite phones, secure two-way messaging and tracking equipment) to maintain communications between command and control entities and the aircrew.

2.2 Threat assessment

Threat analysis informs both the strategic security posture and tactical decisions for shipments, making intelligence and/or law enforcement support key to an air transport mission and major factors in deciding to proceed with mission execution. In the case of the U.S. Air Force, the intelligence community and law enforcement provide inputs on potential threats at all locations the aircraft might transit; typically both primary and secondary divert airfields will be reviewed. Threat analysis pertains to direct threats to the shipment or general unrelated threats in the area (e.g, local crime reports). Designated authorities at each transit location should contact command and control if it is determined that the local threat situation has become too dangerous for a shipment. Factors such as weather, natural disasters, and civil unrest are considered in determining the flight route and whether to proceed with a shipment. The threat assessment and risk management assessment are the main factors that should inform the

senior decision-maker on whether to proceed with an air shipment. Prior to take-off, the intended destination and pre-coordinated divert locations along the flight route must acknowledge their readiness to accept the cargo at their facility. Only after all locations confirm their capability to provide required support should the transport mission be authorized to execute.

2.3 Decision authority

It is important to identify the entity or person who has overall decision authority in the execution of nuclear logistic movements. Identifying appropriate levels of command authority is important during normal operations and critical in the event of an accident or contingency. Before shipping nuclear material via air, the United States regularly conducts both TTXs and field training exercises (FTX), particularly with the involvement of security forces personnel. Consideration is given to the use of an “independent set of eyes,” such as a third party (e.g., inspectors, functional experts), to validate exercises in order to identify weaknesses or gaps in support capabilities. Exercises address two questions: (a) are procedures being followed? and (b) do the procedures work? Inspections of the processes and people involved in activities related to the transportation of nuclear materials are also conducted frequently on a no-notice or short notice basis, if possible.

2.4 Aircraft

Nuclear airlift missions are scheduled as far in advance as reasonably possible to provide ample time for mission planning, coordination, and aircraft preparation processes. Mission planners, aircrew, and shipper and receiver personnel review and coordinate on all scheduled operations and the sequence of events. In order to increase the reliability of aircraft used for nuclear airlift operations, the United States imposes enhanced maintenance and aircraft inspection requirements as compared to typical mission aircraft. In order to increase reliability and minimize the chances of aircraft maintenance issues during mission execution, it is recommended that nuclear airlift-designated mission aircraft be pre-selected and undergo rigorous aircraft maintenance inspection processes by specially selected and trained maintenance personnel. Additional consideration is given to further constraining accepted maintenance tolerances used to determine an aircraft’s airworthiness to conduct nuclear airlift operations. Due to the extensive time, planning, and prior coordination associated with executing nuclear airlift movements, a primary and a backup aircraft is prepared for home-station departure to minimize the chances a mission is cancelled or delayed. If available, a backup aircrew may be considered to minimize the chances of last minute mission cancellations.

If tasked, the backup aircrew should have the same level of prior planning and mission awareness as the primary aircrew.

2.5 Information sharing

A recommended practice is to establish a mission communication process that synchronizes planning and execution requirements among geographically separate entities involved in the mission. Such a process could include classified or sensitive information concerning mission itinerary, cargo types and quantity, security, identified divers and support requirements for locations involved in the mission. It is advisable to make changes to the mission communication process only when absolutely necessary. If critical mission information is publicized and/or compromised, it may be necessary to reschedule or cancel the mission.

2.6 Airfields

Because of security concerns associated with transporting nuclear cargo, it is essential that airfields used in loading operations meet basic security protocols to mitigate threat conditions and manage risk. Military airbases are the preferred takeoff and landing locations due to their inherent security posture and dedicated mission resources. Dual-use airports used by both military and civilian aircraft are an alternative option if they have security capabilities appropriate for protection of a nuclear transport mission. If a military or dual-use airfield is not available, a civilian airport may be an acceptable alternative depending on mission requirements. Convoy times and security vulnerabilities from storage facilities to designated airfields will impact which airports are used in the operation. Additional security will likely be required to bolster organic airfield capabilities. National and local laws may impact the ability of a particular airport to accommodate nuclear cargo. Planners should be aware of all applicable laws and ensure plans are compliant.

2.7 Security personnel

In order to promote aircraft security, the number of personnel authorized on nuclear transport aircraft should be kept to a minimum. With this in mind, it is recommended that the air transport group (i.e., aircrew with specialized training) assume custody of the nuclear material after it is loaded onto the aircraft by the ground transport group. Some nuclear cargo may require specialized monitoring in flight which may require additional personnel to accompany the material. Ground security personnel are responsible for securing the area around the aircraft from the time the cargo leaves its storage facility until it is airborne. Security personnel

should remain in place for at least 30-minutes before being released in the event the aircraft must immediately return to the point of origin.

2.8 Securing aircraft

Before nuclear cargo is loaded, U.S. military regulations require designated mission aircraft to be “sanitized.” Sanitization is a physical inspection of the entire mission aircraft and crew baggage, and may include an inspection by a certified explosives detection dog. It is intended to locate potential portable explosive devices and paraphernalia that could be hazardous to the aircraft or cargo. If sanitization is accomplished prior to the day of mission execution, it can only be maintained if the aircraft is secured by qualified guards. Aircraft doors and other points for aircraft access must be sealed and marked to identify unauthorized aircraft access while the aircrew is away. If security lapses at any time, aircraft sanitization must be re-accomplished. Therefore, it is preferable to begin the mission shortly after the aircraft is sanitized to minimize the need for additional aircraft security requirements prior to mission execution. There is a significant amount of planning involved to ensure close coordination and cooperation between the aircrew, security, and cargo handling personnel. Loading and offloading of the aircraft is vested with the aircraft commander, who personally monitors the operation.

3. Execution of transport

3.1 Limiting travel time

Minimizing the total time nuclear material remains outside secure storage facilities is of the utmost importance. Reducing nuclear cargo transport time as well as the number and duration of nuclear material transfers is a critical safety and security measure. When nuclear material is transported via air, U.S. policy, for example, requires use of the most efficient air routes possible with the shortest transit times and least number of stops to minimize the risk (preference is given to direct flights).

3.2 Overflight Clearance

Diplomatic overflight clearances and other agreements may significantly constrain the airspace over which nuclear material may be flown, as well as when and where an aircraft’s authorized overflight is permitted. Although stipulations in diplomatic overflight clearance are unique to each country, the U.S. stipulations are routinely found in the Foreign Clearance Guide. Of note, many stipulations for diplomatic overflight clearance require advance notification of any

hazardous cargo on board and the International Civil Aviation Organization (ICAO) nomenclature of the cargo.

3.3 Crew Duty Day

In addition, the U.S. requires nuclear airlift flights shipments be completed within a specified period of time defined in the U.S. as a Crew Duty Day (i.e., the amount of time one crew is on duty). Shortened Crew Duty Days ensure the aircrew is fully alert to safely execute assigned missions.

3.4 Refueling

Air refueling is another key component to nuclear air transport which extends aircraft endurance and minimizes unnecessary landings at intermediate locations. In compliance with international agreements, air refueling operations are usually conducted over water. In the United States, air shipments are scheduled to favor departing and arriving during daylight hours and routed to avoid overflight of heavily populated areas.

3.5 Routes

Air transport plans should avoid the use of predictable movement schedules by varying times and routes and limiting the advance knowledge of transport information. The routes and schedules of a nuclear shipment are not advertised outside official coordinating agencies, such as the receiver, or alternate landing sites.

4. Security

4.1 Layered approach

It is recommended to employ a layered security strategy during transport. Physical security mechanisms (for example, cargo locks and tamper-proof tags) should be present. In the case of the U.S. Air Force, the aircrew is responsible for the security of the cargo in flight. Other than the aircrew, additional personnel traveling with the cargo should be kept to a minimum and only include personnel responsible for maintaining cargo custody or monitoring cargo safety. Limiting the number of personnel authorized on board the aircraft minimizes the potential for an “insider threat.” To ensure the physical and emotional status of the aircrew, each crewmember is subject to specific overall health and medical readiness requirements. A

personnel reliability program is in place to monitor personnel directly associated with nuclear operations. Crewmembers engaged in nuclear airlift operations must also observe the two-person concept (TPC) which prohibits a lone individual from having unsupervised access to nuclear cargo. The TPC is critical for the detection of incorrect procedures, intentional or accidental, or unauthorized acts and adds an additional layer of cargo security.

4.2 International policies

Nuclear airlift operations must comply with international rules, regulations and associated agreements of states directly and indirectly involved in the shipment. Special agreements concerning diplomatic, cargo, and overflight clearances must be coordinated prior to planned nuclear airlift movements. Countries planning nuclear airlift operations should initiate planning coordination as far in advance as necessary to accommodate any delays in clearance processing. It is also advisable to have clearances with multiple countries in case one clearance is not obtained. Finally, aircrew operating nuclear airlift missions must have full knowledge of all agreements and comply with coordinated guidance to avoid international incidents.

During flight operations with nuclear cargo on board, the aircraft must comply with international law applicable to state aircraft and all conditions of applicable clearances. Unintended crossings into national airspace without prior clearance must be avoided. If an aircraft is delayed while enroute, the aircrew should inform command and control authorities who will in-turn update affected agencies.

4.3 Tracking

Furthermore, the aircrew should avoid landing early at designated destinations to ensure the receiver and required security is fully ready to meet and secure the aircraft and accept the nuclear cargo. Command and control centers maintain real-time aircraft positional awareness using any technical means available. High-fidelity and secure global-positioning monitoring devices are used for all air shipments. Secure two-way voice communications between command and control authorities, the aircrew and security forces are employed.

5. Emergency Response

5.1 Planning

Pre-coordinated primary and secondary alternative landing sites should acknowledge their ability to accept mission aircraft. In the U.S., if an emergency occurs that requires a safety or security-related response, the military facility closest to the aircraft would normally respond. In an emergency scenario away from a military installation, civil agencies would provide the initial response. Additionally, civil agencies would provide security if the emergency is beyond the immediate reach of military security. In the event of an emergency that precludes landing at the primary or secondary airfield, the crew also has information for alternative airfields that could accommodate the aircraft and cargo. City, state, and local law enforcement may be used to provide necessary support. If necessary for safety or security purposes, shipment information can be shared with these emergency responders but should be kept to a minimum.

5.2 Communications

If an incident forces an unplanned landing, the aircrew's first response should be to coordinate with Command and Control and communicate the location of the divert and the reason for the divert. If a divert is the result of an aircraft malfunction, it may be preferable to repair the aircraft with the cargo on board, thereby minimizing the need for additional cargo handling or exposure. If Command and Control determines the aircraft cannot be repaired quickly, steps should be taken to move the cargo to a secure storage facility or crossload to another aircraft for onward movement. Cargo crossload operations to replacement aircraft require extensive coordination between the aircrew, security forces, ground support agencies, Command and Control, and local authorities. Appropriate force protection measures should be continually assessed by the on-scene and central Command and Control authorities.

6. Post Mission Analysis

Upon completion of each nuclear mission, the aircrew and each location, including the host airfield, provide official feedback to Command and Control to communicate any issues associated with the mission. If problems are identified, the information should be passed to an appropriate office (e.g., safety, security) to review and initiate required corrective actions. Additionally, once the aircrew returns to home station, they provide a verbal report to designated authorities summarizing the mission and any issues associated with it. The mission is formally complete with final notification to the Command and Control agency.

APPENDIX I: 2016 Nuclear Security Summit Transport Security Gift Basket Air TTX

APPENDIX II: Air Force Instruction (AFI) 13-526, Volume 2, DOE/NNSA Category I & II Special Nuclear Material (SNM) Cargo Airlift Operations