



Development of International Guidelines for RAM Shipment Security

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Abstract

In October of 2003 a weeklong IAEA Technical Meeting developed a set of guidelines for providing security to consignments of radioactive materials in transport. These guidelines will be published shortly in an IAEA TECDOC¹. The guidelines produced reflect consideration of many influences and concerns that currently revolve around the potential for terrorist use of radioactive material for malevolent ends. The influences discussed here include: public perception of hazard and concern that new requirements will further limit global shipping capability, international efforts to control sealed sources, national efforts to increment protection on selected materials, the basis for exemption of materials, concern for cost impacts of overly broad requirements, questions on how to adjust requirements for a national threat assessment, and issues relating to consistency within the international community on security needs.

Background

Following the 9/11 terrorist attacks on targets in the US and the discussion of the potential for attacks on nuclear power plants came the realization that steps might need to be taken to control the potential for radioactive materials to be used for terrorist purposes. Many national competent authorities acted quickly to require additional security measures on hazardous materials in production, transport, storage, and use. For example, the USNRC required their licensees to implement additional security measures on certain materials and radioactive devices in transport and use; and the USDOT acted to require, among others, development and implementation of security plans² for "highly hazardous materials" that included Class 7 goods in excess of a Highway Route Controlled Quantity³ (3000A2).

The United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods also have acted to develop security requirements for a wide variety of dangerous goods, including radioactive materials (Class 7), in international commerce. The requirements singled out a subclass of "high consequence dangerous goods" for enhanced protection, which included consignments of radioactive materials. Initially, Class 7 goods in this category included radioactive materials in quantities requiring Type B or C packaging (exceeding an A1 or A2 quantity). In a subsequent version Class 7 only consignments containing more than 3000A2 or 3000A1 were placed in the high consequence category. The initiative by the Committee of Experts to promulgate security requirements for radioactive materials was somewhat unusual in that requirements to be applied to radioactive materials in transport usually flow from the IAEA to the modal regulations. Because these requirements appear in the current version of the "Orange Book"⁴, these requirements will flow directly from the work of the Committee of Experts to the 2005 versions of the international modal regulations (ICAO, IMO, etc).

In a complementary manner the member states of the IAEA pushed aggressively for the agency to internationalise efforts in the area of security, which accelerated the ongoing development of the Code of Conduct on Safety and Security of Radioactive Sources⁵ (begun prior to the 9/11 events in 1998) and a set of supporting documents that include recommended security measures during transport⁶. In addition, an initiative went forward to develop draft requirements for security that were to be broadly applicable to the transport of radioactive materials. Those draft requirements were the base from which the October 2003 technical meeting in Vienna developed a set of security guidelines that might be implemented in laws of member states and international modal regulations.

The draft consultant's requirements document (DCRD) was developed in a series of 3 consultant meetings at IAEA that began in September 2002. The consultants included representatives of government agencies in the US, UK, France and Germany, commercial interests represented by WNTI and BNFL, IAEA staff from both safety and safeguards organizations, and a secretary who was an independent transport consultant from the US. The consultant group's efforts, as modified by comments of uninvolved reviewers and informed relative to the agency's work related to source classification⁷ to support Code of Conduct issues, yielded a DCRD of the security requirements that paralleled the structure of the Orange Book text and included:

- Extensive introductory material defining the basis for IAEA action in this area

- Two tiers of requirements (Security Levels 1 and 2) depending upon the activity contained in a conveyance
- Quantitative lower limits for activity content in terms of multiples of A1 and A2 for each security level, i.e.,
 - Special form material - lesser of 100A1 and 3000A2 for Security Level 1 and the lesser of 10A1 or 100A2 for Security Level 2
 - Material not in special form - 3000A2 for Security Level 1 and 100A2 for Security Level 2.
- Security requirements inclusive of those set forth by the Committee of Experts, but with additions to extend coverage or rigor of the requirements (some of these were derived from Section 8 of INFCIRC/225/Rev 4⁸)
- Exclusion of nuclear materials that would be within the scope of INFCIRC/225/Rev 4 as well as consignments that include excepted packages, LSA/SCO material, and material with unlimited A2 values

At about the time that the DCRD was completed, the Agency decided that producing a requirements document would be premature and that the emphasis of the October 2004 technical meeting should be to produce a draft TECDOC, "Guidelines for Security in the Transport of Radioactive Material". In this way member states could evaluate the guidelines and determine whether they were appropriate for publication as model requirements in a manner analogous to INFCIRC/225. With the draft materials developed by the consultants completed, the technical meeting was convened on October 20, 2003 to consider the DCRD and to modify the guidelines as needed to produce useful security guidance for member states to consider adopting to increase the level of security for radioactive material shipments. The number of attendees numbered approximately 70 from 50 IAEA member states, international agencies, non-governmental organizations, and industrial organizations. The report on the meeting generated by the meeting chair, Ms. Ann Margaret Ericsson⁹, provides an account of the activities in the meeting. This paper provides an additional overview of the issues and concerns that surfaced during the deliberations and their impact on the final product that emerges from the effort.

Issues Raised at the Meeting

Public Perception of Hazard – Instituting additional security requirements was seen by some participants as playing into the hands of anti-nuclear groups by suggesting that radioactive materials needed additional protection because of their intrinsic hazard. Of course, the Committee of Experts had already placed Class 7 goods more in the public eye as having "the potential to cause mass casualties or mass destruction"¹⁰ by including consignments in Type B or Type C packages (in a later draft those greater than 3000A1 or 3000A2) in the table of "Particularly Sensitive Dangerous Goods. This designation furthers the public perception, encouraged by non-government interest groups and media coverage, that radioactive materials are a potential threat to public safety either through accidents or terrorist use.

It is difficult to argue that dispersal of radioactive material in public spaces would not cause significant hysteria and profound social and economic consequences such as occurred in Goiana Brazil. However, it has been generally agreed after some significant studies¹¹, that a dirty bomb or surreptitious irradiation devices will not yield mass radiological casualties or mass destruction as suggested by the inclusion of Class 7 goods in the table referred to above. In addition to the Class 7 goods entry, the table includes materials that truly fit the table heading, e.g., explosives, toxic gases, flammable gases, etc. While it can be argued that some radioactive materials deserve protection in transport and use to prevent them from being used in malevolent purposes, placing them in the same category as bulk explosives, poison gas and the like exacerbates the already difficult time radioactive goods has in achieving fair treatment in the transport environment.

Cost Impacts – The frequently repeated assertion that radioactive material is already more highly regulated and has a better safety record than other hazardous goods in transport was made. In addition, concern was expressed that inclusion of stringent security requirements would contribute to further limits on global shipping capability and/or through higher costs. Participants expressed concerns that additional security requirements required in transport will cause port, airport and cargo terminal authorities to ban radioactive material shipments or increase costs to levels that are prohibitive. This argument reflected a trend that was discussed in some detail in a paper¹² presented at the IAEA sponsored meeting in Vienna in July of 2003.

Practicality of Requirements – A major concern of the meeting participants was the practicality of the proposals for application in transport conditions. Particular issues that were the focus of concern was the need for 2 security levels and using the total radioactive materials content of the conveyance as the trigger for applying additional security. The need to have two security levels was dispatched quickly when it was noted that the differentiation provided by the additional level were not supported by the content of the requirements proposed in the DCRD and that

it added complexity and cost without adding actual value. Similarly the added complexity of accounting for the total radioactive material content of a conveyance continuously during its travel and adjusting security provisions accordingly was seen as placing an accounting burden on carriers that could make Class 7 shipments unwelcome or prohibitively expensive.

Exempted Materials – The radioactive materials designated as exempted in the draft were generally accepted by the participants at the meeting, but a spirited argument was raised that all materials used for medical purposes (radiopharmaceuticals, their feed materials and teletherapy units) should also be exempted. The basis for the argument was the potential for additional cost and the potential that public opinion on medical-use radioactive materials, which currently enjoy favorable public image, would be included with the poorly regarded fuel cycle materials. The removal of conveyance content as trigger for extra security resolved the issue of radiopharmaceuticals, but the potential for terrorists to do harm with the large quantities of the other materials, no matter how valued their intended use, led to rejection of the request to exempt all medical consignments. However, the discussion did lead to a decision to look more deeply into the question of “attractiveness” of a given nuclide for terrorist purposes. Attractiveness in this context alludes to the radiological, chemical, and physical properties of specific classes of radioactive materials, e.g., short half-life, that might make them more or less attractive for use in terror attacks. Some efforts in this vein have already taken place^{13, 14}. Some additional effort using a consultants meeting at IAEA was suggested by the meeting participants (see ref 6) and flagged for possible future action.

Limiting Levels for Enhanced Security Requirements – After elimination of the lower security level, the issue of the activity levels at which higher security was required became a hotly debated issue. While the meeting quickly accepted the value of 3000A2 as a lower limit for enhanced security for material not in special form, the same was not the case for special form materials. Participants from member nations and IAEA who had been active in developing the Code of Conduct supported setting the level to include all sources that fell into the three highest “dangerous source” categories specified in IAEA TECDOC-1344¹⁵. This would, in their view, achieve harmonization with the Code of Conduct in that sources to be subject to greater control in facilities, would also be those commanding greater security in transport. Since such a designation would imply that numerous Type A packages containing special form sources would have to be provided enhanced security with consequent cost and complexity, it was clear that a somewhat higher level would be required. After a series of calculations and discussions a value of 50 A1 emerged as a level that provided an appropriate balance between hazard and potential cost/complexity resulting from providing enhanced security for a very large number of consignments. The limiting value, 50 A1, was between the levels proposed in the DCRD for the two security levels (10A1 and 100A1) that were based on limiting radiation dose to resulting from several plausible exposure scenarios. The 50A1 level also meets most Code of Conduct harmonization goals since it includes all of the sources in the top hazard category from the TECDOC-1344 and most of those in the second level.

Independence of Threat – A basic issue raised in the meeting was that the guidelines for security requirements were essentially independent of an assessment of the threat posed by terror groups within the national borders where the security measures contained in the guidelines might be enacted. As a result it was suggested that the effort to develop the guidelines was somewhat misguided or perhaps wasted effort. Usually the enactment of security requirements is a result of assessing the threats posed to the facility or activity. Such an assessment leads to definition of a design basis threat and an evaluation of the vulnerability of the target to the threat and thence to additional security measures as required. This assumes that an attack on the facility or activity could pose consequences sufficiently severe to be of concern in a national context.

It is clear that designing effective and needed security for materials in transport demands clear evaluation of the threat spectrum and vulnerability as they are related to radioactive materials of concern in transport. However, it was argued that the guidelines might be considered as a minimum protective practice and that a well-formulated national threat assessment should be the basis for any additional requirements above those provided in the guidelines. In addition, the guidelines are in rather good company since they are quite similar in form to those provided in INFCIRC/225 and to those in the Orange Book developed by of the Committee of Experts.

Harmonization – As indicated above harmonization was invoked frequently as a basis for decision on issues coming before the technical meeting. It is correct that the work on the Code of Conduct predated the effort to develop security guidelines for transport of radioactive materials. However, that fact does not mean that the decisions made primarily for managing safety and security of sealed sources in fixed facilities, should translate directly to the transport environment. The full spectrum of radioactive materials and their forms in transport do not present the same security needs as sealed sources. The Chair, in her report on the meeting stated that:

“The group was requested to strive towards consistency and harmonisation with other documents, INFCIRC225, the UN “Orange Book” and TECDOCs 1344 and 1355. The harmonization with all these documents proved to be an impossible task, as these documents were not harmonized with one another. ... The IAEA Secretariat is urged to develop a general transport security approach... The process may reveal the need to harmonize also earlier documents with the decided approach.”

Comparison of the Orange Book and TECDOC Requirements

The security requirements in the TECDOC and Orange Book track well closely because one is modelled after the other. Some provisions contained in the TECDOC extend those in the Orange Book and a few are new additional requirements. Other than issues discussed above, the areas of enhanced coverage are described below (not in great detail):

- Identifying and using capable carriers for high consequence consignments
- Informing carriers and consignees relative to existing threats (by the Competent Authority)
- Requiring security plans to reflect the threat existing at the time of application
- Tracking high consequence consignments with appropriate telemetry or other tracking devices
- Persons involved in transport high consequence consignments should be screened for trustworthiness
- Requiring communication between consignors and consignees relative to consignment transport details
- Providing communication means from conveyance to control offices during transport
- Requiring basic security provisions for detection (e.g., alarms, lighting), delay (e.g., locks) and denial (e.g., guards) of attempts to divert shipments.

Conclusion

The IAEA will soon publish a TECDOC containing a set of draft guidelines for transport security measures for dissemination to member states. These may be a basis for future incorporation in an IAEA standard, and, perhaps, for interim use in national regulations. These security measures are envisaged as applying to consignments of radioactive material in excess of 50A1 or 3000A2 (whichever is more limiting), which were determined to present the greatest potential for use in malevolent applications. In the near future the current Orange Book requirements will become part of the international modal regulations, but the extension and improvement in security provisions provided by the guidelines TECDOC would not be included. The guidelines deserve study by IAEA member states to determine if they are appropriate for inclusion in their national regulations. In the national context, the relationship of the security enhancements provided by the draft TECDOC and those that might be dictated by an assessment of national terrorist threats will need to be rationalized together with the need for additional nuclide/material exemptions. With those evaluations at the national level, member states can take a position on whether the draft guidelines (or a modified version) should be formally adopted by IAEA as model regulations for inclusion in future international modal regulations

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