Physical Protection of Nuclear Material

THE AGENCY'S ROLE IN RELATION TO PHYSICAL PROTECTION

The Safeguards applied by the Agency pursuant to the agreements to which it is a party have as their objective the detection of diversion of nuclear material to purposes prohibited by the State's undertaking. Also of importance is the question of theft of nuclear material or sabotage of installations by individuals or non-governmental groups, for purposes ranging from personal economic gain to political blackmail. The protection of nuclear material and facilities against illegal acts is an essential supplement to any safeguards system based on accountancy.

There is a general recognition of the need for any State to have a system for the physical protection of nuclear material but the obligation to establish such a system does not arise from the safeguards agreement; the Agency cannot oblige a State to do so. It is, however, in a unique position to render advice on the subject, serve as a clearing house of information and co-ordinate the various approaches towards concerted action in this field.

From 1971 onward the IAEA has been preparing itself to provide, upon request, technical advice to States setting up systems for the physical protection of nuclear material. In June 1971 it convened a Working Group Meeting on the subject; in November of that year consultants met in Vienna and in March 1972 a Panel meeting was held. These three meetings resulted in the publication, in June 1972, of "Recommendations for the Physical Protection of Nuclear Material".

From 3-7 February 1975 the IAEA arranged a Consultants Meeting to consider the up-dating and extension of these recommendations. The consultants made a thorough study of the developments since the previous recommendations were drawn up and prepared a working paper for consideration by an Advisory Group meeting planned for 14-18 April 1975.

It is widely recognized that since the previous meetings took place the need for the adequate physical protection of nuclear materials has increased considerably. Acts of terrorism have grown in frequency and severity. They are perpetrated by an ever-widening variety of groups with different motivations and a range of capability, training and equipment. Having concluded that more serious consideration than hereto must be given to the threat of dispersal of nuclear materials and non-nuclear radioactive materials against theft or sabotage the consultants have defined the elements that should constitute any States' system of physical protection; they have further classified nuclear materials and non-nuclear radioactive materials by their importance from the point of view of physical protection and, lastly, they have made recommendations regarding the level of physical protection needed for each of these classes of material. This article gives the understanding of elements of the system and protection requirements recommended by the consultants.

ELEMENTS OF A STATE'S SYSTEM ON PHYSICAL PROTECTION

A State's system of physical protection should establish conditions which will minimize the possibilities of theft, loss, or sabotage and provide information and technical assistance in support of rapid and comprehensive measures by the State to locate and recover nuclear material whether it is stolen or lost.

A State's system of physical protection should include the following elements.

Regulations

(a) Responsibility, authority and sanctions

The responsibility for the establishment, implementation and maintenance of a physical protection system within a State shall rest entirely with that State.

The State should promulgate and review regularly its comprehensive regulations for the physical protection of nuclear material whether in State or private possession. These regulations should include provision for prevention and timely detection of possible theft or loss of nuclear material and sabotage.

The elements of the State's system of physical protection may be the responsibility of one authority, or they may be divided amongst separate competent authorities provided that arrangements are made for overall co-ordination. A State may delegate the administration of physical protection measures either to a national body, or to duly authorized persons. It is implicit in such cases of delegation that the State satisfies itself that the physical protection arrangements conform to the requirements laid down by the State. Furthermore, the duly authorized persons shall be fully responsible for the continuing confirmation of complete compliance with the physical protection measures. Sanctions are not in themselves part of the physical protection system. They could be, however, a support to the State's system.

(b) Licensing

The State should license activities only when they comply with the physical protection regulations. It should be noted that other regulations such as those relating to radiological safety may also apply.

(c) Classification of nuclear and other radioactive material

The State should regulate the classification of nuclear material and other radioactive material, in order to ensure an appropriate relationship between the materials concerned and the protective measures.

(d) Physical protection requirements for material in use, storage and transit

The regulations should define requirements for the physical protection of nuclear and other radioactive material in use, storage and transit. They should take into account the class of material, its location (use, storage, transit) and the particular circumstances prevailing either in the State or along the transportation route.

(e) System of information

The State's system of physical protection should include an information system which enables the State:

- to have continuous flow of information on the features of physical protection of nuclear material in its territory;
- to make known to the bodies concerned any change in the State's system of physical protection which may affect implementation of physical protection measures.

Implementation of the physical protection measures prescribed by the regulations

Physical protection measures may be implemented by the State itself, the operator or any other entity duly authorized by the State.

Control of compliance of the implemented measures with the prescribed physical protection measures

The State's system of physical protection should make provision for periodic review of the licensed activities to ensure continuous compliance with physical protection regulations.

CLASSIFICATION OF NUCLEAR AND OTHER RADIOACTIVE MATERIAL

In developing a physical protection system a State should provide a classification of nuclear and other radioactive material, ensuring an appropriate relationship between the materials and the protective measures.

This classification should be based on the potential hazard of the material, which itself depends on: the type of material (i.e. plutonium, uranium, thorium); isotopic composition (i.e. content of fissile isotopes); physical and chemical form; radiation level; quantity.

REQUIREMENTS FOR PHYSICAL PROTECTION

Material in use or storage

The requirements for physical protection of material and facilities depend upon the class of material. The most comprehensive set of requirements obviously correspond to the most dangerous material. These requirements include measures as limitations and control of access; procedures for custody of material in the area; structural measures to improve physical security, and surveillance and communications. The access of non-authorized vehicles and persons should be prohibited; persons working in the area should be under surveillance; the number of exits and entrances should be minimized; there should be permanent security patrols both inside the area and around its perimeter and there should be exact plans for actions during emergencies. In the case of the least dangerous material measures could be restricted largely to the education and annual security survey of the staff involved, strict records on movements of material and keys, and the plans of action for emergencies may be simpler.

Material in transit

The transportation of nuclear material in the fuel cycle and especially international transportation, is probably the operation most vulnerable to an attempted act of theft or sabotage and as such it is important that adequate protection measures should be provided and that particular attention is given to the recovery system.

In the case of international transport between two States responsibility for physical protection and the point at which physical protection responsibilities transfer from one State to another should be the subject of an agreement between the States.

(cont. page 43)

When international shipments transit the territory of States other than the sending State and the recipient State, the arrangements between the shipping and receiving States should, to the extent practicable, identify the States involved in such transit with a view to securing in advance their co-operation and assistance for protection and recovery actions on the territory of such States.

States may wish to consider the possibility of establishing a convention wherein they could aid each other in the protection and recovery of nuclear material in any cases where such aid would be of value.

The most comprehensive set of requirements for physical protection of nuclear and other radioactive material in transit includes a clear definition of responsibility for the material all along the transport route, a system of advance notification to the receiver, selection of the means and route of transportation, communications between the means of transport of the shipper and the receiver, guards, and a number of other requirements connected both with the mode of transport and depending on the nature of the material, the routes to be followed, the hazards that may be met and the ultimate destination.

For material at the lower level of classification the requirements are again correspondingly less: advance notification to the receiver and confirmation by him of arrival within a reasonable time and a careful check of the modes of transport may be adequate in such cases.

RESEARCH AND DEVELOPMENT OF PHYSICAL PROTECTION MEASURES

The establishment of a physical protection system within a State is recognized as being the responsibility of that State.

So far, the Agency has limited itself to giving technical advice to States requesting this in the establishment of the system for physical protection. For this purpose the Agency has sponsored the development of recommendations for the physical protection of nuclear and other radioactive material.

There is, however, a technical link with the work done by, and under the aegis of, the Agency on safeguards development. Physical protection systems may use the same containment and surveillance techniques which are used in the application of safeguards to complement verification of accountancy. To serve for this latter purpose such techniques would have to provide verifiable information, for instance: on the movement of nuclear material, in such a manner as to permit verification that no unrecorded movement has taken place. Obviously, therefore, the development of certain physical protection techniques may serve the purpose of the State, facility operators as well as the IAEA. In its development work the Agency has a useful co-ordinating role to play.