

Development, Establishment and Maintenance of the Design Basis Threat for Korean Nuclear Facilities

Jounghoon Lee*, Hyungmin Seo

Korea Institute of Nuclear Nonproliferation and Control, 573 Expo-Ro, Yuseong-Gu Daejeon, Korea

*Corresponding author: jhlee@kinac.re.kr

1. Introduction

The Physical Protection of Nuclear Material and Nuclear Facilities as outlined in INFCIRC/225/Rev.4 (Corrected) [1] describes the design basis threat (DBT) tool and recommends development of a national DBT. The Act of Physical Protection and Radiological Emergency, also suggests that the Korean government should establish and renew the DBT every three years. Based on this legal framework, the government established the DBT on December 2009. This paper discusses the historical aspects of the development and establishment of the DBT.

2. Description of a DBT

A fundamental principle of a physical protection is that it should be based on how a state currently evaluates a threat. This evaluation is formalized through a threat assessment process. A DBT is derived from this threat assessment in order to facilitate the development of physical protection system on the basis of a state's evaluation of a threat. A DBT is a description of the attributes and characteristics from potential adversaries (internal or external) who might attempt a malicious act. These acts could include unauthorized removal of nuclear material or sabotage [2].

2.1 Purpose of a DBT

In the absence of a sufficiently detailed and accurate description of a threat, it is difficult to determine with precision the amount of protection that would be appropriate and effective for a given facility or activity in order to prevent unacceptable consequences from an adversary. Given the potentially consequences of a serious malicious act and the high costs of providing protection, uncertainties about a threat are unlikely to be acceptable to a state authority who are responsible for deciding how much protection is appropriate. Without a specified threat, it may be very difficult to determine with confidence whether protection is adequate and sufficient. Therefore, in order to address the need for a well-specified description of a threat, the concept of a DBT was introduced.

3. Establishment of the DBT

3.1 DBT Life Cycle and progress of national DBT

The methodology for developing a DBT is well defined and organized by the IAEA. So we followed this methodology shown schematically in figure 1.

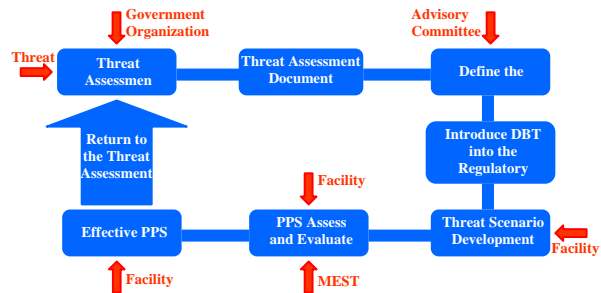


Fig. 1. DBT Life Cycle

A threat assessment is a formal process of gathering, organizing and assessing information about existing or potential threats that could result in or lead to a malicious act. For an effective threat assessment, personnel with different areas of expertise from various organizations need to work closely together. Therefore, government officers, national intelligence service personnel, security personnel at nuclear facilities and researchers at national laboratories are needed in this process. Open sources from internet websites were also used for gathering information. From this, a threat assessment document was drawn up by KINAC in May, 2007.

In July 2007, an advisory committee for the DBT was launched. Members of the committee were selected by security-related personnel from the National Intelligence Service (NIS), the Ministry of National Defense (MND), the Ministry of Education, Science and Technology (MEST), the Korean National Police Agency (KNPA), Korea Hydro and Nuclear Power (KHNP), and KINAC. The committee held four meetings to discuss the threat assessment document. They concluded their work on the definition of the national DBT on January of 2008. An IAEA advisory group confirmed the feasibility of the national DBT estimate in June of 2008.

After the confirmation put forth by advisory group, the national DBT was submitted to the National Physical Protection Committee on December of 2009, and passed.

3.2 Other Approaches for Application of the National DBT

A State could use several different approaches to formalizing the use of a DBT by the operators, including the following [2]:

(a) The regulatory authority provides a DBT to an operator together with a general requirement to protect against specified characteristics of an adversary. The operator is required to interpret the DBT and to design and implement an effective physical protection system.

(b) The regulatory authority establishes performance requirements for physical protection systems that are effective against the DBT. The operator is required to design and implement a physical protection system that satisfies these performance requirements.

(c) The regulatory authority specifies prescriptive protection measures based on the DBT. The operator is required to comply with those prescriptive requirements.

Considering the number of facilities and operators that will be governed by the regulation, KINAC chose approach A and provided the national DBT to operators on December 2009. Therefore, the operators should interpret the DBT and develop threat scenarios for assessing their physical protection systems.

3.3 Maintenance and Review the National DBT

A formal review process should be established in order to maintain the validity of a DBT. The review process should include a continuing assessment of the existing threat environment. The process should also include an assessment of how quickly developing threats can be dealt with.

A number of events may trigger consideration for a review of the DBT that are outside the periodic review process. The competent authority should decide what trigger conditions or events are appropriate. These trigger events may include:

(a) An event or act, internal or external, to the state that significantly changes the perception of, or, the actual level of a threat.

(b) Significant changes in government policy, law, or international arrangements that affect the responsibility of the state's authorities or the operator.

(c) A proposal for review by an interested party.

According to the law on Korean physical protection, the government should review the national DBT every three years. However, the formal review process has not been established yet.

4. Further Works

After a long period of work, the creation of a national DBT was proclaimed on December 2009.

Now, the actual application of the national DBT is the main issue concerning Korea's physical protection regime. In order to accomplish this, both the developed

of threat scenarios, as well as a capacity for designing and implementing an effective physical protection system are needed. Also, a formal review process should be developed for the maintaining the DBT.

REFERENCES

- [1] The Physical Protection of Nuclear Material and Nuclear Facilities, INFCIRC/225/Rev.4 (corrected), IAEA, Vienna, 1999.
- [2] Development, Use and Maintenance of the Design Basis Threat, IAEA Nuclear Security Series NO. 10, 2009