

## An Analysis on Incidents related with Nuclear Facilities or Radioactive Materials from 1961 to 2005

Jeong Ho Lee

KINAC 1534 Yuseong-daero, Yuseong-gu, Daejeon, Korea  
friend25kr@kinac.re.kr

### 1. Introduction

Korean government has been putting much effort one establish legal and regulatory framework of nuclear security. "The Act of Physical Protection and Radiological Emergency" has been legislated for a secure operation and management of nuclear materials and facilities in 2004. According to this act, Korean government set up Design Basis Threat (DBT), description of a representative set of attributes and characteristics of adversaries, in 2009. DBT plays a role as a standard to design or to test physical protection system in nuclear facilities.

Thus, it is important to renew DBT for keeping up efficiency of physical protection system. KINAC is collecting and analyzing risk information with related government agencies or other organizations and reassesses threats in every 3 years to update DBT.

Incidents are good information source for assessing threats. We gathered global incidents related with radioactive material or nuclear facilities happened from 1961 to 2005. We learn a few lessons from them.

### 2. Analysis on Incidents related to Nuclear Facilities or Radioactive Materials

We collect incidents from open information, and then sort out those related with radioactive materials or nuclear facilities. Honestly speaking, the 87 incidents that we have here are not all happened in the world, but they are what we can find. However, it is enough to figure out what overall trend is.

Nuclear materials and facilities are only considered as objectives of states' physical protection regime. However, the idea is gaining publicity to prevent radioactive materials from terrorist activities. The idea is embodied in "International Convention for the Suppression of Acts of Nuclear Terrorism." Therefore, we also gathered incidents related with radioactive materials.

We do not distinguish criminal incidents and terrorist incidents. It is mainly because motives of many incidents were not clear enough. Whatever their motives were, incidents related with radioactive materials or nuclear facilities have pretty similar impacts causing public fear.

The number of incidents in five year term is shown in the Figure 1. During the late 1970s, the number of incidents increased drastically. Then, the number

dropped down for the next decades. It started to soar up from 1990s again.

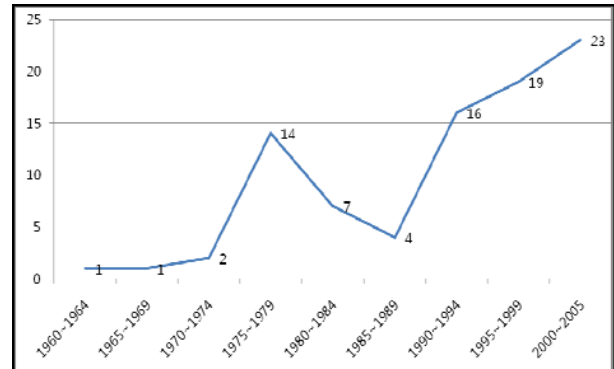


Figure1. The Number of Incidents by Year

From 1967 to 1982, around 20 nuclear power plants were constructed every year to meet the high demand for electricity in developed countries. At that time, however, nuclear energy did not gain public acceptance. Furthermore, frameworks for safety and regulation were not fully organized. Many incidents were taken place against constructing nuclear power plants in those countries during 1970s.

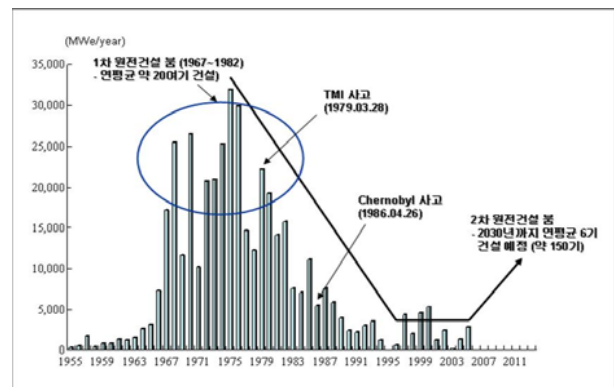


Figure2. Trend of Nuclear Power Plant Construction

From this point of view, the following features of the incidents in 1970s make sense. At first, all incidents happened in developed countries, such as the United States, Spain, France or Swiss. Secondly, 72 percents of incidents were taken place at nuclear power plants. At last, the major motive (36%) was to protest against building nuclear power plants.



Figure3. Features of 1970s' Incidents

Two Tragedies occurred -- one at Three Mile Island in the US in 1979 and the other in Chernobyl in the former Soviet Union in 1986. Due to those accidents, the world stopped to construct nuclear power plants. This might be the reason why the number of incidents decreased in 1980s.

In the early 1990s, the former Soviet Union fell apart. There is correlation between Political or economic instability in those countries and the soar of incidents in 1990s.

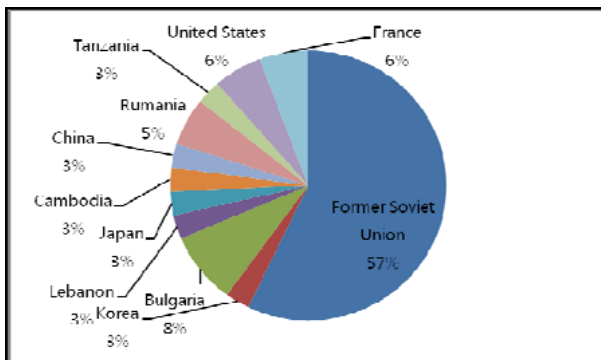


Figure4. Features of 1990s' Incidents

Another notable feature of incidents in 1990s is that the number of incidents related with radioactive materials started to increase. Industries using radioactive materials such as medical diagnosis or nondestructive inspection are invigorated from 1990s. This industrial trend resulted in increasing the amount of radioactive materials both used and transported. Therefore, the materials become easy target for both criminals and terrorists.

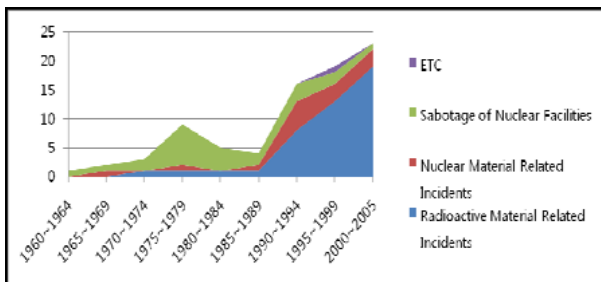


Figure5. Types of Incidents

### 3. Conclusions

We analyzed the 87 incidents related with radioactive materials or nuclear facilities from 1961 to 2005. Based on this, we reconfirm several important facts that can

provide a few clues to enhance states' physical protection regime.

First of all, it is expected that attacks to nuclear materials or facilities would increase. Due to the environmental reason and fossil fuel shortage, developing countries, as well as developed countries, are starting or planning to construct more nuclear power plants. This might result in world-wide commotions against nuclear power utilization once again. Thus, each state requires reinforcing readiness against threats to the nuclear materials and facilities. Additionally, the international society has to help and support developing countries to establish secure physical protection regime.

In addition, incidents related with radioactive materials tend to increase. As the materials were applied to various industrial areas, they become handy for criminals and terrorists to make use of them. Therefore, states have to establish plans for sterner measures to prevent radioactive materials from being used in crimes or terrorist activities.

Finally, illegal trafficking of radioactive or nuclear materials is increasing to make money in developing countries, especially countries in the former Soviet Union. To stop those to be used in domestic crimes, states tighten up their import controls. As well, states pay more attention to suspicious freights from politically or economically unstable countries.

### REFERENCES

- [1] Hamid Mohtadi and Antu Murshid. "A Global Chronology of Incidents of Chemical Biological, Radioactive and Nuclear Attacks: 1950-2005"
- [2] Jsohnston, R. Database of Radiological Incidents and Related Events: <http://www.johnstonsarchive.net/nuclear/>
- [3] 이정훈 외, " 위협대응설계기준(DBT) 개발과 설정 및 유지관리 방법론," 원자력통제기술원 기술보고서(KINAC/TR-041/2009), 2009.
- [4] 이영환, " 해외 원자력 발전소 건설시장 - 그 현황과 전망," CERIC Journal, 2010. 2.
- [5] 원자력지식저보관문국, 세계의 원자력발전 설비용량: <http://www.atomic.or.kr/atomica/figure.html?chapter=2-6-1-6&fig=F&num=1>