

Comparison on Radiation Protection Regulations between Mongolia and Korea

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1. Introduction

The first radiation control unit in Mongolia was established in 1973, under the Ministry of Public Health. The Mongolian parliament amended the Nuclear energy law on 13th February 2015, with the Nuclear Energy Commission being established by government decision 72, on 2nd March 2015. Since 2015 the regulatory body has been restructured and transferred from the Nuclear Energy Agency (NEA) into the General Agency for Specialized Inspection (GASI) which contains the Nuclear and Radiation Regulatory Authority (NRRA). The Nuclear Energy Commission (NEC) mission is to regulate and coordinate activities that ensure nuclear and radiation safety by formulating a regulatory framework. The NRRA's scope of responsibilities include regulation of medical, research, and industrial uses of radioactive sources management of radioactive waste depositories as well transport, storage, and disposal of radioactive sources and waste. The details of radiation facilities regulated by NRRA are shown in Figure 1.

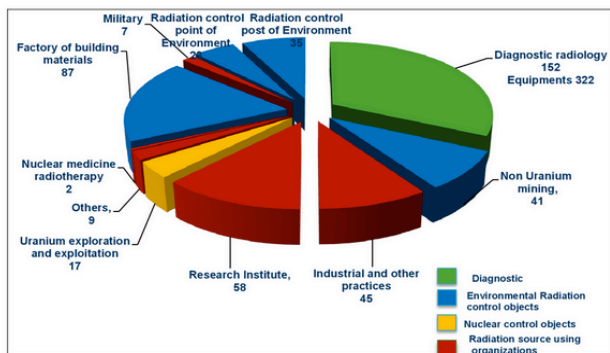


Fig. 1. Nuclear and radiation facilities regulated by NRRA

The Mongolian “Radiation Safety Norm-83” was first published in 1983. The purpose of these regulations was to afford regulatory requirements related to radiation protection and safety of radiation sources from hazards in order to protect radiation workers and the public in medical and industrial radiation facilities. The Mongolian “Basic Rule for Radiation Protection Safety and Security” was revised in 2016 based on the IAEA General Safety Requirements Part 3 (GSR Part 3). In this paper, the Mongolian radiation protection regulations are compared with radiation protection provisions in “Nuclear Laws of Republic of Korea”. The Finland Guide YVL C.2 on Radiation Protection

and Exposure Monitoring of Nuclear Facility Workers [3] is also considered in the comparison. The purpose of this research is to identify the gaps between Mongolian and Korean regulations and offer suggestions for the improvement in regulatory framework of both countries in order to protect the people and environment from harmful effects of radiation. The IAEA GSR Part 3 and International Commission of Radiological Protection (ICRP) are considered in preparing those suggestions for improvement.

2. Methods and Results

In this research, a comparison between Mongolian regulation “Basic Rule for Radiation Protection Safety and Security” and “Nuclear Laws of Republic of Korea” was analyzed. The requirements mentioned in each section of the Mongolian regulations were compared to similar requirements in the Korean regulations. The requirements mentioned in Mongolian regulations are also compared with those in the Finland YVL C.2.0 regulatory guide. This Finland regulatory guide is included in the research to highlight the importance of additional international requirements. It was noticed that Korean regulations explicitly described requirements of radiation protection; some current GSR Part 3 requirements were missing from the Korean regulations. The differences between the Korean and the Mongolian regulations, identified by the comparison method mentioned earlier, are discussed in the following sub-sections.

2.1 Planned, emergency and existing exposure situations

The new concept of radiation exposure situations is mentioned in Mongolian regulation “Basic Rule for Radiation Protection Safety and Security” [1]. This concept classifies the radiation exposure into three types of exposure situations as per GSR Part 3 [2]. The list of facilities which fall under these three types of planned, emergency and existing exposure situation is also mentioned in Mongolian regulation. However, the Korean regulation classifies the exposure only into occupational, medical and public exposure. This new concept of exposure situation is recently emphasized in order to differentiate between the exposure situations. For better protection of people and environment this new concept of exposure situation should be addressed in Korean regulations also. The list of facilities which fall under each type of exposure situation need to be addressed in Korean regulations.

2.2 Dose Limit for lens of eye

Dose limits are specified in the Mongolian regulations. However, the value of dose limit for the lens of eye for radiation workers mentioned in Mongolian regulation is less than that is mentioned in Korean regulation. The ICRP suggested in the recent epidemiological studies that an eye is more sensitive and there are some tissue reactions [4]. The new dose limit is also mentioned in ICRP 118. Therefore, the lens of the eye should be protected and the dose limit of 20 millisieverts (mSv) per year as specified in Mongolian regulation as well as GSR Part 3 requirement need to be addressed in the Korean regulations.

2.3 Requirements for scanning of Humans

Human imaging is a non-medical use of ionizing radiations. Earlier in BSS-115, human exposure for other than medical purposes were not allowed. However, now each country is concerned about their national security and a large number of backscatter X-ray machines have been installed and are used for scanning humans. Hence, human imaging becomes a useful tool due to various security related issues. As such exposure is used for security purposes only and does not provide any medical benefit; the justification of such exposure is a significant issue. As radiation is harmful to the human body and humans cannot be exposed regularly due to the health effects. It is the decision of governments to decide whether to allow or not allow such human imaging. If it is allowed, then there should be radiation protection measures for the safety of the public who may undergo such exposure. Human imaging is a new kind of exposure that has been addressed in the Mongolian regulations and also in GSR Part 3. The requirements regarding the justifications and radiation protection need to be addressed in Korean regulations.

2.4 Requirements for injected dead persons

Radiation sources are used for medical purposes and have a certain half-life. Some radionuclides have a short half-life and some have long. These radionuclides may be taken by the patient as radiopharmaceutical or may be permanently located inside the body for treatment. These radiotherapy procedures may continue for longer times. However, there is a possibility that the patient may die and the radioactive material will remain inside the body. The existence of radioactive material in corpses can cause radiation exposure to the general public before the body is either buried or cremated. Care should be taken while handling the deceased person and specific instructions related to safety should be followed. Mongolian regulation includes GSR Part 3 and ICRP requirements related to the handling of deceased persons. These requirements for the handling

of deceased persons need to be addressed in the Korean regulations.

2.5 Special measures for less than 18 years of age & visitors

Mongolian regulations address requirements for workers under 18 years of age. The workers who are less than 18 years of age may be allowed to work as trainees under supervision only [1]. There should be special instructions for such personnel. The requirements for trainees and others personnel involved in handling of radiation sources, and visitors need to be addressed in Korean regulations.

2.6 Requirements under radiation protection program

The Mongolian regulation address requirements under radiation protection program such as controlled area, supervised area, personal protective equipment, and monitoring and recording of public exposure. The Korean regulations address these requirements; however, it is not mentioned explicitly to include these requirements in radiation protection program. Such requirements need to be included in radiation protection program of the facility.

2.7 Requirements for existing exposure situations

Mongolian regulation addresses in detail the requirements for existing exposure situation. These requirements include exposure from radon, exposure of air-crew and space-crew members and arrangements for residual radioactive material [1]. The IAEA GSR Part 3 classifies such exposure as an existing exposure situation. However, the concept and the requirements of existing exposure in Korean regulations are separately provided in different national acts. Therefore, this exposure situation needs to be addressed together with the other exposure situations such as planned and emergency situations in accordance with the IAEA GSR Part 3.

2.8 Compensation for Nuclear Damage

Korean regulations address in detail the requirements for compensation in case of damage to the person or property from radiation hazard due to the operation of nuclear facility or accident [5]. The requirement of compensation is necessary to protect the rights of personnel. It is also important so that the nuclear facility become responsible for its action and ensures the safe operation of the facility and protects people and the environment from the effects of ionizing radiation. The requirements for compensation in case of nuclear damage need to be included into Mongolian regulation as addressed in the Korean regulations.

3. Conclusions

In Mongolia, the Nuclear Energy Commission (NEC) prepares regulations for nuclear and radiation safety. The General Agency for Specialized Inspection (GASI) is responsible for conducting inspection of these facilities and controlling their safe operation. The Mongolian national regulations provide guidance and regulatory requirements for licensees, for the safe operation of radiation facilities. In this study, the regulatory requirements of Mongolian national regulations “Basic Rule for Radiation Protection Safety and Security” are compared and analyzed with radiation protection requirements in Korean regulations. The Finland regulatory guide for nuclear radiation workers YVL C.2.0 was also analyzed to review and consider more information for this study. As result of this study, it was found that there are some areas not addressed in Korean and Mongolian regulations.

This study suggests requirements which are necessary to include in the regulatory framework of Korea and Mongolia to protect radiation workers and the public from ionizing radiation.

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