

## **Guideline for Radiation Protection Program of Radiation Facilities in Kazakhstan**

Muratbekova Kuralay<sup>a</sup> and Han Seung Jae<sup>b</sup>

<sup>a</sup>*Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Guseong-dong, Yuseong-gu, Daejeon*

<sup>b</sup>*Korea Institute of Nuclear Safety, 62 Gwahak-ro, Guseong-dong, Yuseong-gu, Daejeon*

\* Corresponding author: [kuralaym@kaist.ac.kr](mailto:kuralaym@kaist.ac.kr)

### **1. Introduction**

Establishing a radiation protection program is a national responsibility to protect people and the environment from the harmful effects of ionizing radiation. In Kazakhstan, the Committee of Atomic and Energy Supervision and Control (CAESC), is an agency of the Ministry of Energy, which is responsible for nuclear and electric energy usage. There are five research reactors which are going under reconstruction, and more than 1000 radiation facilities regulated by CAESC, where licensing is the main instrument of ensuring nuclear and radiation safety in these facilities. Licensing is a necessary tool to ensure the ability of licensees to work safely in compliance with existing nuclear and radiation safety rules and regulations.

Licensing activities and detailed procedures are outlined in the following two documents, respectively: paragraphs 17-26 of the Law of the Republic of Kazakhstan № 202-V "About permissions and notifications", and in the Order of the Minister of Energy of the Republic of Kazakhstan, № 122 "Qualification requirements and the list of the documents confirming compliance with it, for the activities in the field of nuclear energy usage".

The whole licensing procedure is sometimes confusing for applicants since there is no consolidated guideline for radiation facilities with a list of required information. Licensees are always provided with consultation sessions to clarify certain requirements and documentation required from them. While this consultation system attempts to solve the problem caused by the lack of a clear guideline, the consultations require financial and human resources that could be more effective in other roles. With complete and concise guideline for radiation protection program applicants are more likely to have a clearer understanding of the requirements and it will ensure more efficient licensing process.

### **2. Methods and Results**

The IAEA Occupational Radiation Protection safety guide, the current IAEA GSR Part 3 requirements, the Order of the Minister of Energy of the Republic of Kazakhstan "Qualification requirements and the list of the documents confirming compliance with it, for the activities in the field of nuclear energy usage", and the Law of the Republic of Kazakhstan "About permissions and notifications", were used as a base to compile a consolidated guideline for radiation facilities in Kazakhstan. Non-ionizing radiation effects are outside

the scope of this study.

#### *2.1 Introduction to facilities*

The scope of this guideline will apply to facilities, which contain any radioactive material or produce ionizing radiation such as irradiation facilities, radiation generators, facilities processing radioactive ore, or nuclear installations. All facilities carrying possible sources of radiation exposure should introduce a radiation protection program.

#### *2.2 Organizational structure*

According to the order of Ministry of Energy, a copy of the graphic scheme or a textual description of the organizational structure of the applicant must be prepared and must define the hierarchy of official's responsibility within the organization regarding radiation protection and safety.

#### *2.3 Classification of areas*

Whenever there is an occupational exposure to radiation, two types of work areas need to be classified, controlled and supervised areas. An area should be designated as a controlled area where the possibility exists to receive an effective dose higher than 6mSv in a year. Licensees should prepare a description of such areas, designate those areas by physical means, display a warning symbol, and establish occupational protection and safety measures. Also, arrangements necessary to work in a controlled area must be setup including access control, protective clothing and equipment, and contamination monitoring.

The supervised area is an area where occupational exposure may be greater than 1mSv in a year even though specific protection measures and safety provisions are not normally needed. Licensees should designate a supervised area by appropriate means, display approved signs, and periodically review the conditions to determine any need for protective measures and safety provisions or changes to the boundaries of supervised areas. The conditions in supervised areas should be such that employees are able to enter with a minimum number of formalities.

#### *2.4 Radiation dose monitoring system*

Radiation monitoring is a measurement related to the assessment or control of exposure to radiation and radioactive materials. It requires concise interpretation

and assessment. An applicant is responsible for the evaluation of occupational exposure where appropriate based on an individual monitoring system for workers who exposed to occupational radiation or for workers who work in controlled areas where monitoring should be done by authorized dosimetry service providers. In situations where individual monitoring is not applicable, occupational dose assessment should be based on the results of monitoring of the workplace, locations, and duration of the workers' exposure. Appropriate arrangements should be made with dosimetry services under an adequate quality assurance program so equipment (survey meter) is calibrated once in a year to meet appropriate standards noted in the order of the Ministry of Energy of the Republic of Kazakhstan.

### *2.5 Security and accountability of radioactive sources*

The term "source" is used to indicate a physical entity like radioactive material or x-ray machine, procedures such a nuclear medicine or environmental radiation, or installations like a hospital or nuclear power plant. For example, in a situation where radiation release is detected from any installation into the environment, the whole installation can be regarded as a source. Licensees should clearly state their responsibilities and accountability, as well as the technical and organizational measures for protection and safety of radioactive sources for which they are authorized.

Sources should be kept secure and protected from any loss, damage, and theft. Licensees should maintain accountability records with description, activity, and storage location of all radioactive sources. Records of transfer and disposal must be maintained to prevent any unauthorized transfer and access.

### *2.6 Education and training*

All organization workers should be provided by the basics of radiation protection principles and trained on radiation protection requirements in order to optimize the protection of other people. For workers whose work is directly related to ionizing radiation need to be trained the radiation risks management, principle requirements of radiation protection, and introduced with their main responsibilities.

Additionally, an organization needs to provide all workers with information regarding potential health risks, operational incidents, and accident conditions due to their occupation. In order to prevent accidents and maintain safety, protective actions such adequate instruction and periodic retraining programs need to be obtained. The licensee should keep records of the training programs they provided for every individual worker.

### *2.7 Records*

The licensee should maintain a record of exposure for every worker who is exposed to radiation as a result of their occupation. Records should be available as appropriate in addition to any other necessary information to allow retrospective assessments of the doses received. Each workers' exposure records should be retained until the worker reaches the age of 75 years, and should be preserved for at least for 30 years after the termination of the work involving occupational exposure. The licensee needs to submit exposure records to the CAESC upon request.

## **3. Conclusion**

The Committee of Atomic and Energy Supervision and Control (CAESC) ensure the protection of the public, workers, and the environment from radiation exposure in Kazakhstan. The CAESC obtains safety through various means including licensing. This consolidated guideline will provide information about a variety of requirements including those for facilities description, organizational structure, classification of areas, radiation dose monitoring systems, security of radioactive sources, records, and education and training of personnel. Since licensing is a tool to ensure the ability of applicants to work safely, formulation of a consolidated guideline will give an applicant a clearer understanding of requirements, rules, and regulations for obtaining their license for better radiation protection and safety in Kazakhstan.

## **REFERENCES**

- [1] International Atomic Energy Agency. Occupational Radiation Protection. Safety Standards Series, Guide No. RS-G-1.1, IAEA, Vienna, 1999.
- [2] International Atomic Energy Agency. Safety Standards Series No. GSR Part 3, IAEA, Vienna, 2011.
- [3] The Law of the Republic of Kazakhstan. "About permissions and notifications", № 202-V, May 16, 2014.
- [4] The Order of the Minister of Energy of the Republic of Kazakhstan, "Qualification requirements and the list of the documents confirming compliance with it, for the activities in the field of nuclear energy usage", № 122, Nov.13, 2014.