

Establishment of Source Classification for Radiation Protection Optimization to the General Public

Hyun Su Seo, Ki Hoon Kim, Yong Ho Jin, Kwang Pyo Kim*
 Nuclear Engineering Dep.t, Kyung Hee Univ., Gyeonggi-do, Korea
 *Corresponding author: kpkim@khu.ac.kr

1. Introduction

The International Commission on Radiological Protection (ICRP) presented justification, optimization of protection, and dose limits as radiation protection principles. ICRP 103 recommendation has been emphasized radiation protection optimization as a key part of radiation protection. To perform radiation protection optimization, dose constraint which is quantitative criteria should be established. The dose constraint is a prospective and source-related restriction on the individual dose from a source[1]. Therefore, a source classification must be established to set dose constraint.

The Nuclear Safety and Security Commission (NSSC) has established a source classification for occupational radiation dose management. However, there is no source classification for the public radiation dose management. For radiation protection optimization to the general public, dose constraint should be established. Therefore, a source classification should be established accordingly.

The objective of this study is to establish a source classification to radiation protection optimization for the general public in Korea. Therefore, we investigated source classification of international organizations, overseas and Korea. Based on the investigated source classifications, the source classification was established to perform radiation protection optimization for the general public in Korea.

2. Material and Methods

2.1 IAEA

The International Atomic Energy Agency (IAEA) emphasized that dose constraint should be established for radiation protection optimization for the public. Also, IAEA presented a source classification for set of dose constraint[2]. Table 1 shows the source classification presented by the IAEA. The source classification is grouped into five categories.

Table 1: Source classification presented by IAEA

Organization	Classification
IAEA	1. Nuclear Fuel Cycle Facility
	2. Using RI Facility
	3. Naturally Occurring Radioactive Material
	4. Research Facility
	5. Transportation

2.2 UNSCEAR

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) has been collecting radiation dose data from several countries for radiation dose management since 1975. Table 2 shows the source classification presented by UNSCEAR[3]. The source classification is grouped into six categories.

Table 2: Source classification presented by UNSCEAR

Organization	Classification
UNSCEAR	1. Naturally Occurring Radioactive Material
	2. Nuclear Fuel Cycle Facility
	3. Medical Facility
	4. Industry Facility
	5. Military Institution
	6. Others

2.3 U.S

The U.S. Nuclear Regulatory Commission (NRC) is an organization that establishes and implements U.S. federal regulations. NRC proposed 10 CFR 20.2206 to implement the radiation dose management regulations. Therefore, Department of Energy (DOE) periodically publish reports to manage occupational radiation dose according to 10 CFR 20.2206. Also, source classification was presented at this report[4]. Table 3 shows the source classification presented by the DOE. The source classification is grouped into seven categories.

Table 3: Source classification presented by DOE

Country	Classification
U.S	1. Industrial Radiography Facility
	2. Nuclear Fuel Manufacturing and Distribution Facility
	3. Low-level Radioactive Waste Disposal Facility
	4. Spent Fuel Storage Facility
	5. Nuclear Fuel Cycle Facility
	6. Commercial Reactor
	7. Others

2.4 Canada

The Health Canada (HC) is an organization that manages radiation dose in accordance with the Canadian Nuclear Safety Management Act. The HC periodically publish reports to manage occupational radiation dose. Also it presented a source classification in that report. Table 4 shows the source classification presented by the HC[5]. The source classification is grouped into six categories.

Table 4: Source classification presented by HC

Country	Classification
Canada	1. Particle Accelerator
	2. Industry Facility
	3. Medical Facility
	4. Mining Industry
	5. Nuclear Power Plant
	6. Others

2.5 KOREA

The Nuclear Safety and Security Commission (NSSC) is an organization that establishes and implements Nuclear Safety Act. It carries out tasks related to nuclear safety in Korea. The organization established Nuclear Safety Committee Notice No. 2017-76 for the management of radiation dose for workers. Also, it established the Radiation Worker Information System (RAWIS) and the Korea Information System on Occupational Exposure (KISOE) to manage the radiation dose of radiation workers. Table 5 shows the source classification from RAWIS, KISOE[6]. The source classification is grouped into nine categories.

Table 5: Source classification presented by NSSC

Country	Classification
Korea	1. Medical Facility
	2. Industry Facility
	3. NDT Facility
	4. RI Sale and Production Facility
	5. Research Facility
	6. Educational Institution
	7. Public Institution
	8. Military Institution
	9. Nuclear Power Plant

3. Result and Discussion

Figure 1 shows the source classification to perform radiation protection optimization for public established in this study. The source classification is grouped into twelve categories considered international organization, overseas and domestic source classification.

In Korea, nuclear power plants began to be decommissioned. Decommissioning site can cause radiation exposure to public. Therefore, the site after

decommissioning of the nuclear power plant was added to the source classification.

Source Classification	
1. Nuclear Power Plant	7. Industry
2. Research Institute	8. Public Institution
3. Decommissioning Site	9. Sale Institution
4. LILW Disposal Facility	10. Educational Institution
5. Spent Fuel Dry Storage Facility	11. NDT Facility
6. Nuclear Fuel Cycle Facility	12. Medical Facility

Figure 1: Source classification presented in this study

4. Conclusions

In this study, a source classification for domestic sources was established for perform radiation protection optimization for general public. Therefore, IAEA, UNSCEAR, U.S, Canada, and the domestic classification system were investigated. Based on the investigated source classifications, the source classification established grouped into twelve categories. The results of this study can be used as a prior study for setting dose constraints when performing radiation protection optimization for the general public.

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