

Analysis of Occupational Radiation Exposure in Nuclear Power Plant in Korea

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1. Introduction

The number of radiation workers in radiation and nuclear industries is increasing every year. In Korea, there are the largest number of radiation workers in nuclear power plants. Radiation workers in nuclear power plants are exposed by various factors such as waste management during the operation of nuclear power plants.

Radiation exposure data in nuclear power plants are collected and managed monthly. The radiation exposure dose in nuclear power plants is necessary to manage the radiation workers.

In this study, radiation and nuclear industries were classified by industry and we analyzed the number of radiation workers, collective dose, and average dose in 2017. In order to analyze the radiation exposure in nuclear power plant, we analyzed the collective dose and average dose for the last 10 years (2008-2017).

2. Materials and Methods

Radiation exposure data is collected from Korea Information System on Occupational Exposure (KISOE). Radiation and nuclear industries were classified into 10 types. To analyze the radiation exposure dose to radiation workers, use a SAS program that is suitable for the analysis of big data. As of 2017, the number of radiation workers, collective dose, and average dose of radiation and nuclear industries were analyzed. To analyze in detail detailed, we analyzed the collective dose and average dose of nuclear power plants for the last 10 years (2008-2017).

3. Results

Fig. 1 shows the number of radiation workers in each industry in 2017. As of 2017, the total number of

radiation workers in Korea was about 42,000. Nuclear power plants accounted for the highest percentage of the total number of radiation workers, about 33%. Non-destructive test institutions, medical institutions and general industries were 14%, 13.1%, 12.8% each.

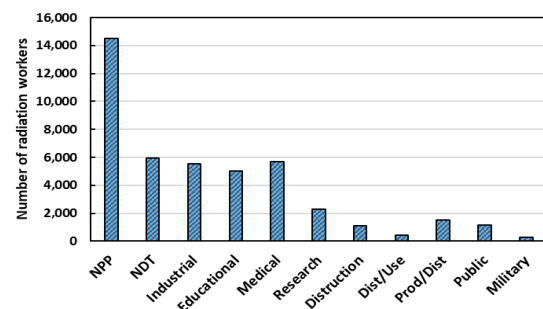


Fig. 1. The number of radiation workers with institution classification.

Fig. 2 shows the collective dose and average dose for each industry in 2017. As of 2017, the collective dose of all industries was about 17,000 man·mSv and the average dose was about 0.4 mSv. The collective dose was about 7,300 man·mSv in nuclear power plant, accounting for 42% of the total. Non-destructive test institutions and medical institutions were 36%, 14% each. The average dose of non-destructive institutions was the highest, followed by nuclear power plants and medical institutions.

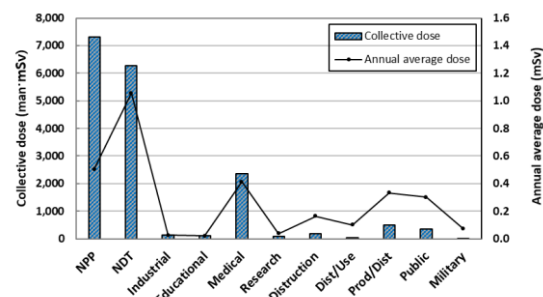


Fig. 2. Collective dose and annual average dose with institution classification.

Fig. 3 shows the trend of the collective dose and average dose for the last 10 years (2008-2017). In 2017, the collective dose and average dose of nuclear power plants have decreased by about 30% compared with last year. Over the last 10 years, collective dose and average dose have generally decreased, reaching their lowest in 2017.

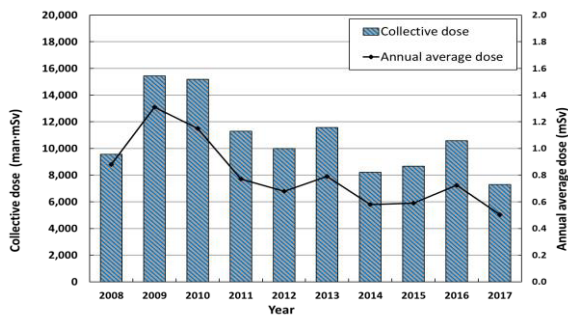


Fig. 3. Collective dose and annual average dose for a decade in NPP.

Fig. 4 shows the number of radiation workers in nuclear power plants by dose range over the last 10 years (2008-2017). In 2017, the number of workers included in the dose range of 1 mSv or less accounted for more than 85% of the total workers. Over the last 10 years, the number of workers in the dose range of 1 mSv or less occupied the largest portion. The number of workers included in the 1-15 mSv dose range was the lowest in 2017 over the last 10 years.

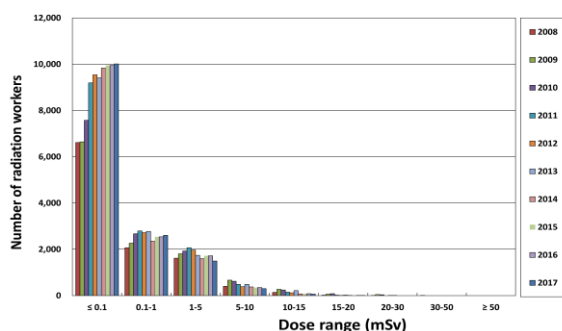


Fig. 4. Collective dose and annual average dose for a decade in NPP.

4. Conclusion

In this study, the number of radiation workers, collective dose, and average dose of radiation and nuclear industries were analyzed based on radiation

exposure data. To analyze in detail, we analyzed the collective dose, average dose, and number of workers in nuclear power plants by dose range. As a result, it accounted for 33% of the total number of workers in nuclear power plants in 2017. The collective dose was 42% of the total collective dose. Over the last 10 years, collective dose and average dose in nuclear power plants have generally decreased, reaching the lowest in 2017.

The data analyzed through this study can be used as basic data for radiation dose management and radiation safety management of radiation workers in nuclear power plants. It will contribute to the reduction of radiation dose of radiation workers.

ACKNOWLEDGEMENT

This study was supported by (Development of base data for analysis of occupational radiation exposure in 2017) the Korea Institute of Nuclear Safety.

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