

MCNP Modeling of Kori Unit 1 for Radioactivity Distribution Change according to the Reinforced Concrete

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Keywords: MCNP modeling, Radioactivity distribution, Bioshield, Reinforced concrete, Kori Unit 1

The modeling of Kori unit 1 was performed using Monte Carlo N-particle transport code 6 (MCNP6) simulation, which is one of the Monte Carlo techniques, to confirm the radioactivity distribution on the reinforced concrete inside the structure. The Kori unit 1 which is the first commercial nuclear reactor in Korea will be dismantled as its lifetime is over. Prior to this, it is essential to evaluate the dose of workers for the bioshield during dismantling of a nuclear power plant in order to ensure the safety of workers. The bioshield is the concrete which surrounds the reactor and absorbs neutrons emitted from the reactor core. In order to evaluate the dose of workers for the bioshield, it is necessary to visualize the radioactivity distribution of the structure from the core to the bioshield by describing the distribution of the radionuclides concentration of the facility irradiated with neutrons. In addition, since there are many reinforcing bar supports in the structures, it is necessary to evaluate the radioactivation according to the reinforcing bar for the accurate radioactivity distribution in the bioshield.

In this study, the geometric model required for MCNP modeling is shown by simplifying the reactor structure of Kori unit 1, and is composed of barrel, bypass, thermal shield, downcomer, reactor pressure vessel, air, and bioshield concrete [1]. The MCNP modeling was performed as shown in figure 1. The neutron activated distribution according to the reinforced concrete will be compared, and the core will be modeled in more detail to perform accurate evaluation.

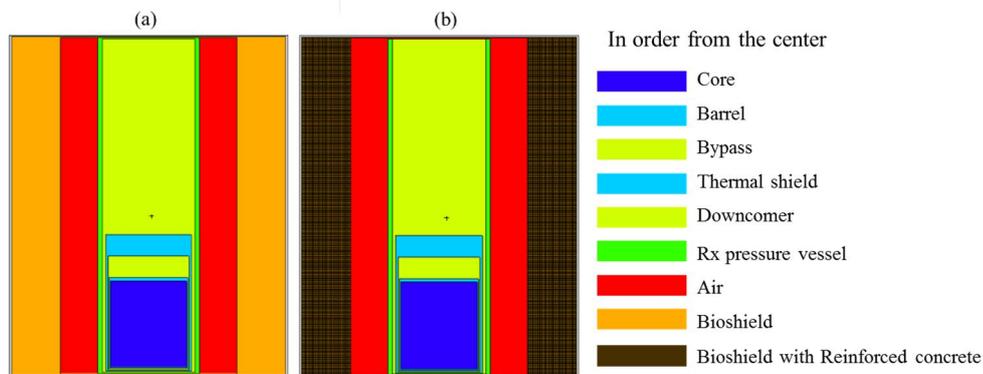


Fig. 1. Schematic diagram of MCNP geometry modeling (a) without and (b) with reinforced concrete

Acknowledgments

This work was supported by the Korea Institute of Energy Technology Evaluation and Planning(KETEP) and the Ministry of Trade, Industry & Energy(MOTIE) of the Republic of Korea (No. 20203210100150).

References

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