

## Implementation Test of Two-dosimeter Algorithm for More Precisely Estimating Effective Dose during Maintenance Periods at KNPPs

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### 1. Introduction

The application of a two-dosimeter and its algorithm and a test of its use in an inhomogeneous high radiation field is described. The goal was to develop an improved method for estimating the effective dose during maintenance periods at Korean nuclear power plants (NPPs). The use of the method in domestic and international NPPs including USA, Canada and Japan was also investigated. The algorithms used by the Canadian Ontario Power Generation (OPG) [1] and American ANSI HPS N13.41 [2], Lakshmanan [3], NCRP [4], EPRI [5] and Texas A&M University [6,7,8] were extensively analyzed as two-dosimeter algorithms. The possibility of their application to NPPs was evaluated using data for each algorithm from two-dosimeter results for an inhomogeneous high radiation field during maintenance periods at Korean NPPs.

### 2. Methods and Results

In Korean NPPs, two additional dosimeters (TLD) are provided before the start of high radiation work and the maximum measured value of the dosimeter is selected as the effective dose value; however, this value is overestimated by approximately 10 to 50 percent. Three additional dosimeters, on the other hand, provided to radiation workers who wear them on the head, chest and back, simultaneously, and the measured values are analyzed for the purpose of adopting a two-dosimeter algorithm for Korean NPPs among several algorithms during the maintenance periods.

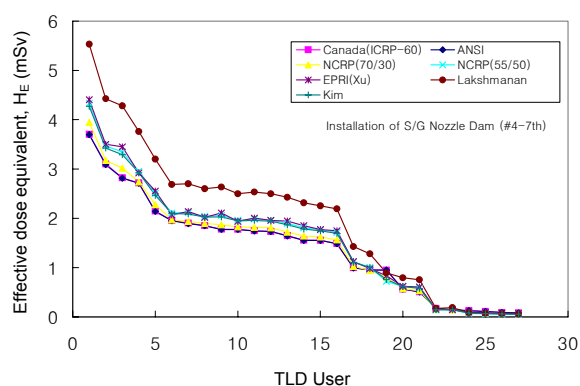


Figure 1. Application of two-dosimeter algorithm for the installation of S/G nozzle dam (#4-7th) at Yonggwang NPPs no. 2

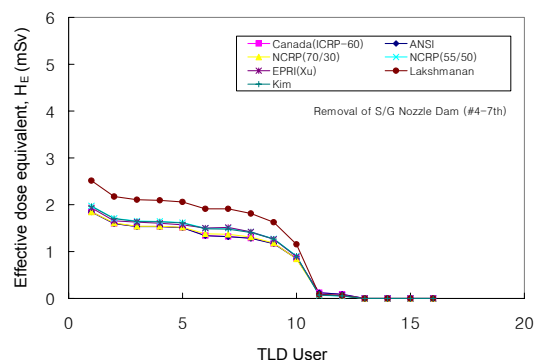


Figure 2. Application of two-dosimeter algorithm for the removal of S/G nozzle dam (#4-7th) at Yonggwang NPPs no. 2

The results indicate that the algorithms of OPG, ANSI, NCRP, EPRI (NRC) and Texas A&M University show the almost the same tendency without Lakshmanan's algorithm. Thus, there is no problem in applying any of the above algorithms without Lakshmanan to Korean NPPs in an inhomogeneous high radiation field and the current multi-TLD radiation dosimetry could be improved, if it were to be applied.

### 3. Conclusion

In this study, the NCRP (55/50) algorithm of the National Council on Radiation Protection and Measurements (NCRP) was adopted because of its reliability and for technical reasons. Hence, a method in which two TLD dosimeters are worn on the chest and back, will be used for radiation workers instead of wearing an TLD at the head and chest. In addition, the two-dosimeter condition is based on the INPO 91-014 guideline and will be modified with regard to radiation exposure limits and distributed to Korean radiation workers at NPPs.

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