Database Design for Development of Waste Management Program for Clearance Level Waste

Gyo Hyeok Song[1], Ji Young Song[1], Seung Cheol Oh[2], Bo Haeng Lee[1], and Kwang Pyo Kim[1,*]

[1] Kyunghee University, 1732, Deokyoungdae-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea

[2] Korea Institute of Nuclear Safety, 62, Gwahak-ro, Yuseong-gu, Deajeon, Republic of Korea

[*]kpkim@khu.ac.kr

1. Introduction

The Kori Nuclear Power Plant unit 1 was permanently shut down in 2017. From now on, as the decommissioning proceeds, it is expected that a substantial amount of the radioactive waste will be generated. Most of waste generated during decommissioning are clearance level waste. This is approximately 90% generated decommissioning waste.

To dispose the clearance level waste, it should meet the legal requirements. In terms of self-disposal, nuclear operator should consider whether they obey clearance level waste legal standards and whether they effectively manage the clearance level waste. Thus it is necessary to develop program for effective management.

In this study, we performed database design of the management program for clearance level waste. To design the database, we investigated the legal requirements and management requirements. Based on this, database design was performed.

2. Investigation of data items

2.1 Legal requirements

To develop clearance level waste management program, data items of legal requirements should be reflected. In this study, data items of legal requirements reflected article 9, 10 and 11 of the in NSSC (Nuclear Safety and Security Commission) No. 2017-65. A total of 17 data items was derived NSSC No. 2017-65. For example, there are radioactive concentration by radionuclides, alpha/beta radioactive concentration, individual dose and collective dose. This is shown in Fig.1.

2.2 Management requirements

To design the database, data items of management requirements should be required as well as legal requirements. Data items of management requirements reflected the data items required in terms of maintaining counter traceability, waste tracking management, radioactive concentration calculation, sample management and record management.

Data items of the maintaining counter traceability include validity period of the counter calibration, the counter efficiency etc. Data items of the waste tracking management consist of management number. Data items of the radioactive concentration calculation include information of measurement time, and count rate etc. Data items of the sample management are information on the sample mass and management number etc. Data items of the record management consist of the person in charge of information and record date. There are a total of 71 data items of management requirements. This is shown in Fig.1.

Legal requirements data (17)		Management requirements data (71)
•Existence of nuclides •MDA by radionuclides •Radioactive concentration by radionuclides •Permissible concentration by radionuclides •Fraction by radionuclides •Gross alpha radioactive concentration •Gross alpha MDA •Gross beta radioactive concentration	•Gross beta MDA •Waste type •Waste weight •Waste disposal method •Individual dose •Collective dose •Surface dose rate •Dose satisfaction •Calculation Program	•Weight scale information (5) •Radionuclide analyzer information (6) •Low level alpha/beta counter (6) •Inspection step information (16) •Dose rate detector information (6) •Alpha/beta measurement step information (28) •Dose assessment step information (4)

Fig. 1. Data items for legal and management of clearance level waste.

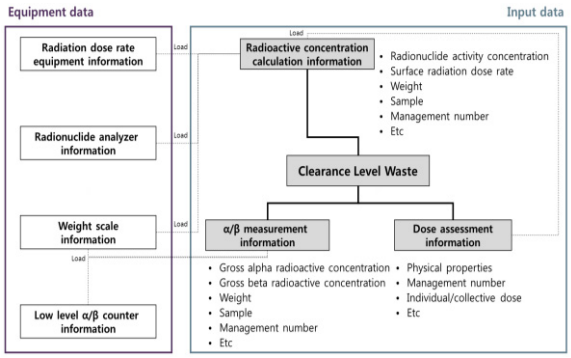

Fig. 2. Database design between equipment data and input data.

3. Database design for developing system

In this study, to structuralize the data items and translate that into programing language, we grouped data items and defined their relationships. Data items were grouped into equipment data and input data. The equipment data is the detector and the weight scale information. There are three categories of input information: radioactive concentration calculation, alpha/beta radionuclide measurement, and dose assessment in accordance with the legal requirements of clearance level wastes.

To define the relationships of grouped data, we analyzed characteristic of grouped data. The equipment data can be made into a library and necessary data items can be loaded from the input data. The equipment data required to calculate radioactive concentration: weight scale, radionuclide analyzer and radiation dose rate equipment. To measure alpha/beta radionuclides, equipment data with weight scale and low level alpha/beta counter can be loaded. For dose assessment, data on the radioactive concentration derived earlier can be loaded. This relationship is shown in Fig.2.

4. Conclusion

In this study, we structured database to develop clearance level waste management program. To proceed with the structure design, data items were derived by investigation the legal requirements and management requirements for clearance level waste. The derived data items were grouped, we performed relationship design defining the relation among the grouped data items. This study will be used to develop a radioactive waste management program when nuclear facilities are decommissioned.

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