An Assessment for Emergency Preparedness Plan in Hanul Nuclear Power Plant

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1. Introduction

The purpose of emergency preparedness aims to protect the accident and mitigate the radiation damage of public by setting emergency preparedness plan.

In order to perform successfully the emergency preparedness plan, it should be optimized through a quantitative analysis. There are so many variables to analyze it quantitatively. It is mission to classify a realistic and suitable variables among these variables. If it is quantified after classification of variables, a decision for emergency preparedness could be more effective than now.

The realistic variables is converted to the decision node in decision tree which is helpful to decide what evacuation or sheltering is effective to mitigate public damage. Base on it, it's idealistic method to analyze offsite consequences for each end points in the decision tree.

In this study, we selected the reference plant which already has the emergency preparedness plan. Among the plan, we implemented offsite consequence analysis for a specific plan by using MACCS 2 code. [1,2]

2. Methods and Results

The emergency preparedness plan of public consists typically of evacuation, sheltering and evacuation after sheltering. Such plan can be evaluated quantitatively by MACCS 2 code.

2.1 MACCS 2 code

MACCS 2 code is the level 3 PSA program. The main purpose of MACCS 2 code is to quantify early and late fatality by inputting information of radiation material, weather and site. We can assign the certain emergency preparedness plan in this program.

2.2 Selection of reference

We selected Hanul nuclear power plant unit 5, 6. Its type is OPR (Optimized Power Reactor) 1000. The reason why we selected it is that his plant has a weakness which the residents within 60km are around 600000, rainfall is lower and wind speed is greater than other region. Therefore, Hanl nuclear power plant is vulnerable for radiation accidents.

The selected scenario is an evacuation after sheltering. The specific information is that sheltering site is Bugu elementary school and evacuation pathways are Bugu elementary school, Bridge of Juin, Samdang elementary school and Uljin middle school. The selected pathway is shown in Fig. 1.

Fig. 1. The selected pathway of evacuation after sheltering.

Emergency preparedness plan of Hanul unit 5, 6 has proposed 33 sheltering sites and 18 evacuation pathways. It was selected by various approaches such as type of public, optimized pathway. [3]

It is difficult to accurately estimate the number of people gathered in place 1. Because such region is located in center, we assumed 1000 people live in the sector. In addition, the shaded sectors mean that such people are evacuating at the sector. It is shown in Fig. 2.

However, it is not enough to make a decision. We make a decision tree to decide an optimized emergency preparedness plan based on quantitative results. The decision tree is shown in Fig. 3.

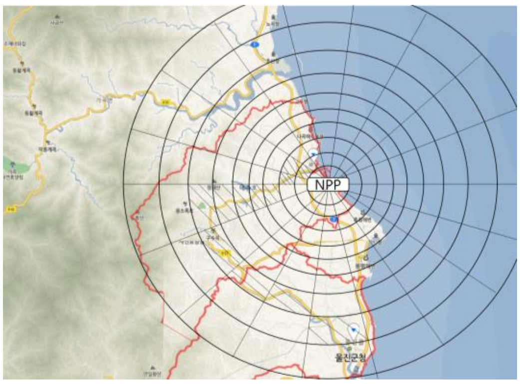

Fig. 2. The shaded sectors

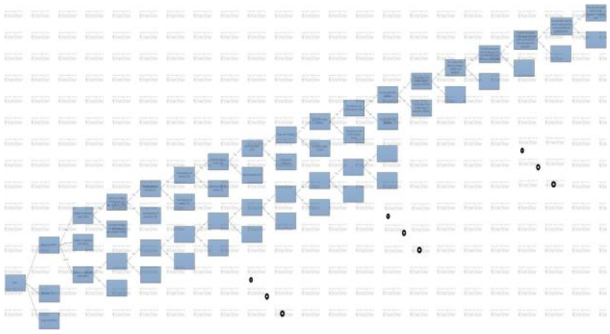

Fig. 3. Decision tree

The description of each nodes is below as.

Table I: Description of decision node

	Decision node
1	*Alarm time*
2	*Duration of radioactive cloud*
3	*Start time of release for radioactive cloud after shutdown*
4	*Shielding factor of normal*
5	*Shielding factor of shelter*
6	*Ratio of evacuation*
7	*Travel point*
8	*Evacuation speed*
9	*The reference time point for actions*
10	*The evacuation time*
11	*The duration of the middle phase of evacuation*
12	*The number of the difference between LASMOV and NUMEVA*
13	*The delay that elapses from the reference time point REFPNT to when individuals take shelter*
14	*The delay that elapses from the beginning of the shelter period to when individuals begin their evacuation*
15	*The destination direction of every spatial element in the evacuation and sheltering region*
16	*The outermost spatial interval of the evacuation movement zone*

3. Conclusions

In this study, target group is people who gathered in place 1 have sheltered and evacuated along the pathway. the offsite consequences analysis result of the group are 1.17·10-9 (early fatality), 1.77·10-7 (late fatality).

Various cases need to be quantified for make an optimized decision. In the future, we will perform the verification and modification of decision node. After

The assessment of emergency preparedness plan for Hanul nuclear power plant unit 5, 6 might be contribute to establish the optimized decision making of emergency prepared plan.

REFERENCES

[1] US NRC, Code Manual for MACCS2: Volume 1, User Guide, NUREG/CR-6613, Vol 1, 1998

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[3] Korea Hydro Nuclear Power, Emergency Preparedness Plan of Hanul, revision 1

[4] Korea Hydro Nuclear Power, PSA report of Shin Kori 3, 4