Measurement of Environmental Factors at a Nuclear Facility Decommissioning Site

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1. Introduction

During decommissioning of nuclear power plant, a variety of equipment will be installed in field for dismantling of buildings, treatment of radwastes, radiation monitoring and so on. Among those, some precision instrument can be influenced by decommissioning environment. Additionally, noise caused by dismantling of building should be managed for industrial safety and civil complaint.

For example, BNS recently developed a modular system for evaluation and classification of soil and concrete wastes from the generation (i.e., Nuclear Power Plant decommissioning field). As the system is modular type, when some modules are replaced due to its failure, leveling between modules will be important for reliable system operation. So, vibration can be occurred around the system should be analyzed before installation of decommissioning equipment.

According to the noise analysis, some protective gear might be provided for workers or sound absorbing wall might be installed around the dismantling work filed.

In this study, as environmental factors, noise and vibration generated during dismantling of nuclear buildings were measured and the behavior was analyzed.

2. Methods and Results

As dismantling for decommissioning of research reactor and its auxiliary buildings is performed at Seoul branch of KAERI, environmental factors (i.e., noise and vibration) were measured in the research reactor site. In this section, tools and results of measurement are described.

2.1 Noise

As a background, noise at office was measured 10 times and averaged as 48.4 ± 0.2 dB. And then, behavior of noise depending on distance from a dismantling work was analyzed by measuring noises during the work at several positions from the noise source. For noise measurement, TES 1358C Sound Analyzer was used.

For 1 date set, noises were measured 5 times and averaged at 1 m, 10 m, 20 m 30 m and 40 m from the noise source respectively. And totally, 3 data sets were measured for a work.

As shown Fig. 1, the noise was decreased as distance between measurement point and the noise source increased.

Although only 1 data set was used due to industrial safety issue, Fig. 2 shows similar trends as Fig. 1.

Behavior of noise were analyzed for some works and the results are shown in Table I. At the table I, KRR1 and KRR2 means research reactor unit 1 and unit 2 respectively. As described earlier, for some cases only 1 or 2 data set were used for the analyzed due to industrial safety issue during dismantling work.

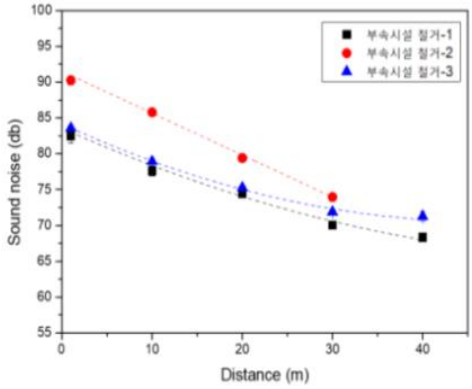

Fig. 1. Behavior of noise depending on distance from a dismantling work (dismantling of auxiliary building)

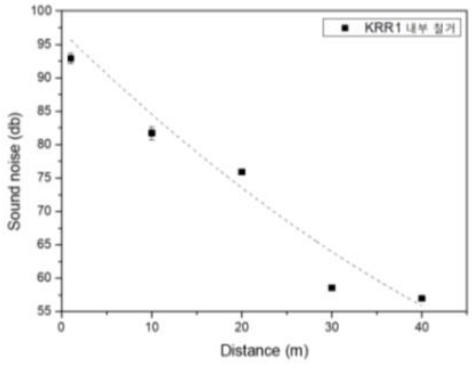

Fig. 2. Behavior of noise depending on distance from a dismantling work (dismantling of KRR1 inside)

Table I: Behavior of noise for dismantling works

Dismantling of buildings	Behavior of noise (dB/m)			Avg. (dB/m)
	M1*	M2*	M3*	
Aux. Bldg.	-0.365	-0.570	-0.322	-0.419
Inside KRR1	-0.969	-	-	-0.969
KRR1 Bldg.	-0.250	-0.531	-0.452	-0.411
Inside KRR2	-0.352	-	-	-0.352

KRR2 Bldg.	-0.387	-0.440	-	-0.413

* M1, M2 and M3 represent 1 data set respectively

2.2 Vibration

Vibrations during dismantling works were measured by similar method as noise measurement. For measurement, BVB-8207SD model of Lutron was used.

At office, as a background the vibration was measured as 0.0 m/s^2. And the vibrations at various position and dismantling work were measured.

In Fig. 3, it is shown that behavior of vibration can be different due to the media. In the Fig., while vibration for dismantling of Aux. building-1 was measured on concrete, vibrations for dismantling of Aux. building 2 & 3 were measured on soil. When comparing Aux. building-1 case with others, there was more than 0.55 m/s^2/m decrease on average. So, it can be concluded that behavior of vibration is dependent on the media.

In Fig. 4, vibration measured at 40 m position is not due to dismantling work but movement of heavy equipment.

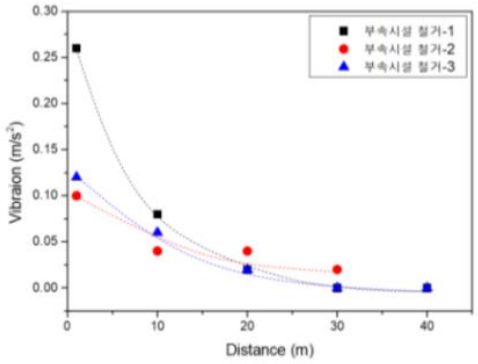

Fig. 3. Behavior of vibration depending on distance from a dismantling work (dismantling of auxiliary building)

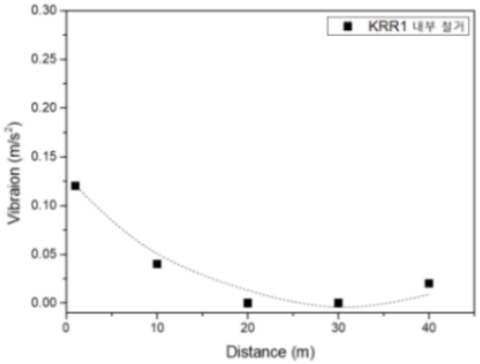

Fig. 4. Behavior of noise depending on distance from a dismantling work (dismantling of KRR1 inside)

Behavior of vibration for some works are shown in Table II.

Table II: Behavior of vibration for dismantling works

Dismantling of buildings	Behavior of vibration (m/s^2/m)			Avg. (m/s^2/m)
	M1*	M2*	M3*	
Aux. Bldg.	-0.0060	-0.0024	-0.0030	-0.0038
Inside KRR1	-0.0024			-0.0024
KRR1 Bldg.	-0.0047	-0.0034	-0.0032	-0.0038
Inside KRR2	-0.0045			-0.0045
KRR2 Bldg.	-0.0016	-0.0014		-0.0015

* M1, M2 and M3 represent 1 data set respectively

3. Conclusions

In this study, as decommissioning environmental factors, noise and vibration due to dismantling works were analyzed. Measurement was performed at KRR1 & KRR2 decommissioning site. The results show that noise due to dismantling was decreased 0.352~0.969 dB/m. Decrease of 0.969 dB/m was found in inside KRR1 case and it because the work was performed at a room with walls.

Decrease of vibration was 0.0015~0.0045 m/s^2/m and it is dependent on the media such as concrete and soil.

Results of this study can be applied for the operation of precision equipment at nuclear power plant decommissioning site and will be helpful for efficient management of decommissioning field.

ACKNOWLEDGEMENT

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. 20203210100200).