The Status of The Radioactive Waste in HANARO

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1. Introduction

HANARO is a research reactor operated by KAERI and is being used for various research fields such as neutron beam utilization, RI production, capsule irradiation, NAA and fuel performance test. A stable operation and reliable management of HANARO are important parts for a good service to the research mentioned above. The management of the radioactive waste from the HANARO operation is an essential element of the reactor management and efforts have been made continuously to reduce the amount of radioactive waste. This paper describes the trend of the radioactive waste generation from the reactor operations. In addition, considerations to reduce the amount of the radioactive waste are given.

2. Radioactive Waste Status

2.1 Solid-type Radioactive Waste

Solid-type radioactive wastes in HANARO are categorized into inflammability waste, nonflammable ones, used resin and used filter. These are produced from the maintenance work, process system operations and experimental works. They are collected separately and packed in drums, and are moved to the temporary reservation facility in KAERI. As can be seen in Fig. 1, the quantity of them in 2004 is 8,315 liters and it has increased 68.8 % when compared with the records for 2003[1]. This increase is mainly due to the increase of inflammable wastes. The increase of maintenance work during a reactor overhaul, the increase of NTD services, and the visitors to HANARO have brought about an increase in the use of gloves, shoe-covers, and decontamination paper and others[2].

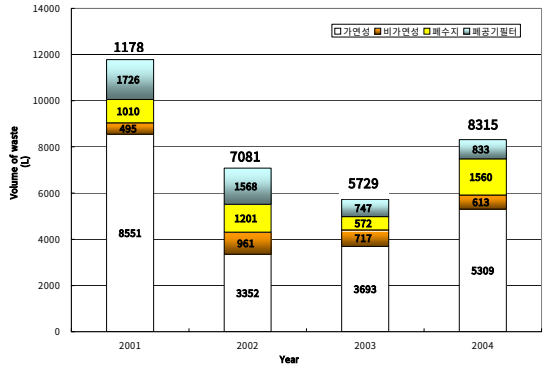

Figure 1. The statue of solid radioactive waste for the last few years.

2.2 Liquid-type Radioactive Waste

Liquid radioactive wastes in HANARO are generated from the process systems' maintenance work, washing of the NTD ingots, and the washing of experimental devices before the insertion of them into the reactor pools. They are collected into the RX(reactor) sump whose capacity is 12 ton or into the hot shower sump. If the amount of liquid waste in the sumps reaches a certain level, the concentration of the radioactive materials in the waste are measured and the wastes are transferred into the low level or low-low level liquid waste tanks in the RI(Radio-isotope) building of HANARO[3]. The liquid wastes from the reactor operation in 2004 decreased to 1/3 of that in 2003 [4].

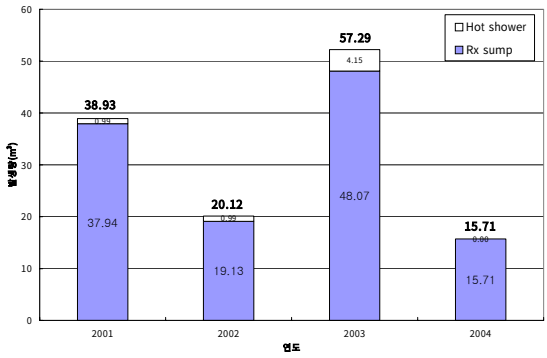

Figure 2. The statue of liquid radioactive waste for the last few years.

2.3 Gaseous Radioactive Waste

Gaseous radioactive isotopes are produced by the activation of air dissolved in the coolant, the escape of gaseous fission products in the primary coolant and the activation in the experimental devices such as the pneumatic transfer system. The air from the reactor hall or the RCI(Reactor Concrete Island) containing the gaseous radio-isotopes is released into the atmosphere through the stack via the HEPA filter or the charcoal filter. The main radio-isotopes released into the atmosphere are Ar-41, I-131 and H-3. The amount of gaseous radio-isotopes disposed of in 2004 is shown in Table 1[5].

The amount of tritium disposal has risen about 10 times compared to that in 2003 since 50 liter of heavy water was released due to a problem during the maintenance of the heavy water system.

Table 1. The amount of radioactive concentration released through stacks.

Unit: Bq

Dispose place / Nuclide	RX stack	RCI stack
Noble gas	4.04E+12	4.39 E+11
Tritium	3.72 E+12	1.55 E+13
Iodine	2.15 E+08	3.46 E+08

3. Considerations for reduction of waste

Two thirds of the solid waste generated in 2004 was inflammable waste as shown in Fig. 1. The bringing of unessential goods to the reactor hall must be prohibited. Also, the general wastes from the operation and the experimental works that have no radioactive contamination, must be disposed through the process of an exemption from a control. To decrease the amount of H-3 release to the atmosphere, the encapsulation of the heavy water system equipments is underway.

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