

The Status of the Radioactive Waste in HANARO in 2005

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1. Introduction

In order to confirm and to provide information on the radioactive wastes disposed from the HANARO reactor operations, it has been investigated every year. This paper describes the status of the radioactive wastes and they are compared with the ones in the previous year. In addition, considerations to reduce the amount of the radioactive waste are given.

2. The Status of Radioactive Waste in 2005

2.1 Gaseous-type Radioactive Waste

Gaseous radioactive isotopes are produced by an activation of air dissolved in the coolant, an escape of gaseous fission products in the primary coolant and activation in the experimental devices. 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 an air filtration system. The main radio-isotopes released into the atmosphere are Ar-41, I-131 and H-3. The amount of gaseous radioactive waste for the last 10 years is shown in Figure 2.1[1].

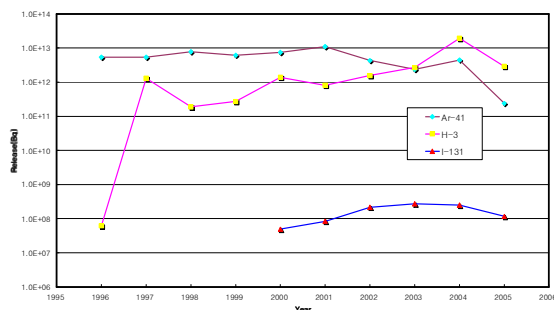


Figure 2.1 Status of the gaseous radioactive isotopes released for the last 10 years in HANARO.

Compared with the records in 2004, the gaseous radio-active isotopes released from HANARO in 2005 are apparently decreased. The activity of Ar-41 as a representative noble gaseous released from the reactor hall in 2005 was $2.25\text{E}+11$ Bq, and it was decreased by 17.9 times when compared with the previous year. In the case of RCI, which was $1.34\text{E}+10$ Bq in 2005, it was decreased as much as 32.7 times. The tritium disposed from the reactor hall in 2005 was $6.44\text{E}+11$ Bq, and it was decreased by 5.8 times when compared with the record in 2004. In the case of RCI, it was $2.24\text{E}+12$ Bq and decreased by 6.9 times. Especially, the amount of Ar-41 and tritium has been considerably

reduced due to the long-term shutdown period of the reactor of more than 6 months from the second half of 2005.

In order to reduce and control the amount of gaseous radioactive waste, it is essential to manage them in each facility of HANARO.

2.2 Liquid-type Radioactive Waste

Liquid radioactive wastes are mainly generated from the maintenance works, decontaminating of the NTD (Neutron Transmutation Doping) ingots, exchanging ion resin and so on. They are collected into the reactor sump or into the hot shower sump according to the level of radioactive concentration. If the amount of liquid waste in the sumps reaches a certain level, 80 %, the radioactive concentration in the waste is measured [2]. And then if it satisfies the value of the disposal management criteria, 4×10^7 Bq/m³, the wastes are transferred into the low level or low-low level liquid waste tanks in the RI(Radio-isotope) building of HANARO.

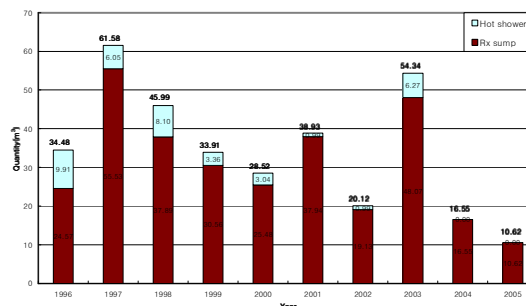


Figure 2.2 Status of the liquid radioactive wastes disposed for the last 10 years in HANARO.

The quantity of the liquid radioactive wastes in 2005 is shown in figure 2.2 and it was 10.62 liters from the reactor sump. It has decreased by 36 % when compared with the previous year. But there was no liquid waste in hot shower sump in 2005 like that of 2004. To decrease the liquid radioactive wastes, the following works have been carried out in 2005.

Firstly, it has been considered that the primary coolant is generated by maintenance works such as the heat exchanger, pumps, and valves which were returned to the primary coolant pool.

Secondly, it has been considered that the way for a reuse of the primary coolant when some works such as an ion exchangers or filters of the purification systems are carried out, should be investigated.

Thirdly, it has been considered that the used demineralized water after washing the NTD ingots should not drain a sump directly, thus a special device was developed.

2.3 Solid-type Radioactive Waste

Solid-type radioactive wastes in HANARO are categorized into inflammable waste, nonflammable ones, a used resin and used filter. These are mainly produced by using experimental facilities and maintenance works. And they are also collected separately and packed in drums, and they are moved to the temporary reservation facility of the radioactive waste in KAERI.

Table 2.1 Status of the solid radioactive waste for the last 10 years[3] unit: ℓ

Year	Inflammability	Non-Inflammability	Used Resin	Used Filter	Total
1996	2526	833	5383	2787	11530
1997	7143	280	1653	1546	10621
1998	5833	280	1027	1580	8720
1999	7582	307	585	2395	10870
2000	5190	387	968	2449	8995
2001	8551	495	1010	1726	11782
2002	3352	961	1201	1568	7081
2003	3693	717	2280	1529	8218
2004	5309	613	3272	1498	10692
2005	12700	10829	2221	221	25971

As it can be seen in Table 2.1, the total quantity of solid radioactive waste in 2005 was 25,971 liters and it has increased 2.4 times when compared to the records for 2004. Inflammable wastes such as contaminated cloths, shoe covers, gloves, vinyl, decontamination papers were produced by the maintenance works when the overhaul took place for more than 3 months. Another reason was that a waste drum has been filled to 90 % till now, but it has been filled to 70 % from 2005. In the case of non- inflammable wastes which were 10,829 ℓ it was as much as a 17.6 times increase when compared to 2004. This increase is mainly due to exchanging the doors connected to the reactor hall or the control room into a security door as a part of the physical protection activities. From these works the waste of the crushed wall pieces of a large volume were produced. We are planning to take care of the crushed wall pieces as a deregulation waste through a contamination inspection.

The efficient reductions of the solid-type radioactive wastes are given as follow. The contaminated clothes are required to be washed at a radioactive waste facility in KAERI and reused, since 2005. Decontamination papers were reused by being dried after the NTD works. Also half contaminated goods such as gloves and vinyl

are requested to be used many times. The bringing of unessential goods to the reactor hall must be prohibited. The general wastes from the operation and the experimental works that have no radioactive contamination, must be disposed of through the process of an exemption from a control.

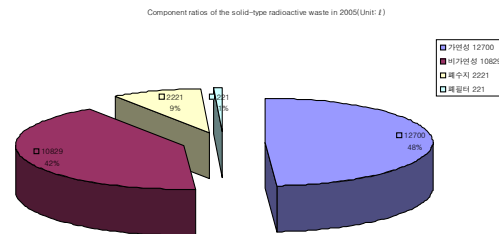


Figure 2.3 Component ratios of the solid radioactive wastes in 2005

3. Conclusion

- The cost for the waste disposal from this year would be increased. Therefore the cost for the waste disposal should be paid for each department of HANARO where they were generated.
- According to the related procedure, a quantitative analysis of radionuclide which is contained in used resin is required to have more quantitative data for a disposal[4].
- Radioactive wastes should be thoroughly, distinguished as contaminated ones and non-contaminated ones, and disposed of through a deregulation.

REFERENCES

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