

Measurement of Alpha Radiation dose in PRIDE Facility\

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1. Introduction

There is a facility named PRIDE in KAERI for developing Pyroprocessing technology. In PRIDE depleted Uranium feed material and a depleted Uranium mixed with some surrogate material are used for performing engineering scale Pyroprocessing.

Therefore the facility is using uranium, users should be careful of radiation in order to conduct an experiment in PRIDE. This paper will explain the radiation protection of the PRIDE facility and will also explain how much alpha radiation comes out from the facility

2. Methods and Results

2.1 RMS Detector Model

The RMS (Radiation Monitoring System) detectors are made by CANBERRA and the model names are ICAM and G64. ICAM RMS is the detector which can detect Alpha Radiation by absorbing the air in the facility. G64 RMS is the detector which can detect gamma radiation by the gamma probe. These RMS detectors are installed in several spots to detect radiation leakage and radiation background for the safety of users. Fig 1 is the ICAM RMS and G64 RMS appearance. ICAM RMS has one pump and a filter to test the contamination. G64 RMS has just one probe to detect the gamma radiation. In this paper, ICAM RMS which is installed in PRIDE facility will be studied.

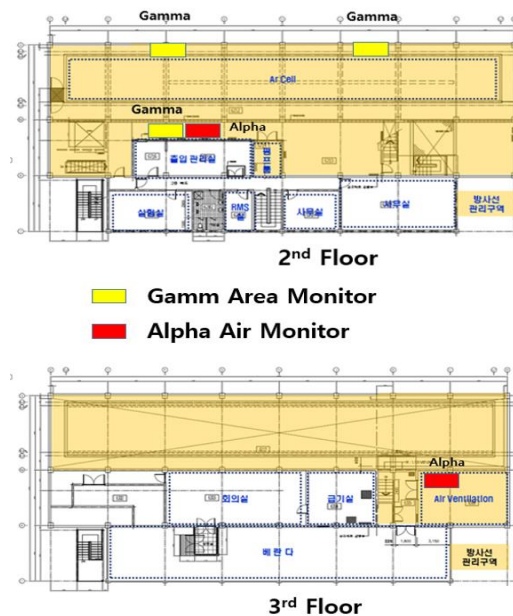
2.2 ICAM RMS physical characteristics

- Radiation detected : alpha, beta and gamma
- Detector : PIPS large area silicon
- Measurement range: in excess of 500 kBq
- Typical measurement ranges
- Alpha(1 hour averaging)
 $4.6E-3$ to $9E+3$ Bq/m³
 (at a concentration of 2 Bq/m³ of 222R)($1.24E-13$ μ Ci/cc to $2.4E-1$ μ Ci/cc)
- Detection efficiencies :
 Alpha : 24% for all alpha up to 5.7 MeV



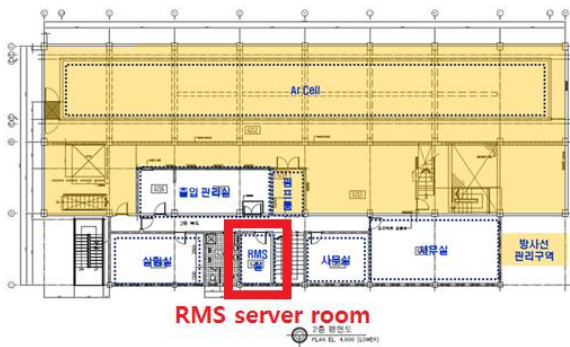
2.3 Installation location

The ICAM RMS detectors are installed in two places for the safety of the users. One ICAM RMS is on the Second floor which is the place where experiments are conducted with the largest number of people. And the other ICAM RMS is on the third floor connected to the air ventilation pipe for detecting Alpha radiation in the whole facility. Fig 2 is the installation schematic of RMSs in PRIDE.



2.4 Radiation Monitoring

All of the RMSs are connected to the main server to notify the manager about the radiation dose rate. The RMS server room is on the second floor and outside of the radiation zone in PRIDE. Fig 3 is the location of the RMS server room. The yellow place is the radiation zone in PRIDE



2.4 Experiment method and results

The Experiment was performed for two weeks and the air ventilation fan operated only during the daytime.



Fig 4 is the graph that shows the result of the experiment. From the graph results, the results are below the required value, indicating that the facility is safe in terms of radiation safety management.

3. Conclusions

Every place that uses nuclear material directly or areas of concern for radiation exposure are always monitored by the RMS. Where RMS is not installed we use the portable radiation detector when the nuclear material is moved or used. As you can see in this paper, PRIDE is a well-monitored facility for radiation protection.

REFERENCES

- [1] ANL-7959 Hot Fuel Examination Facility /North Facility Safety Report, February 1975, Argonne National Laboratory pp. 42-53.
- [2] The EBR-II Fuel Cycle Story, Charles E. Stevenson, American Nuclear Society pp. 16-25.