

Radiation Protection and Management

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IX. 2. Radiation Protection and Management

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(1) Overview

During the fiscal year of 2003, research and education in the center were conducted as active as usual.

During the year, the new online radiation protection and management system of CYRIC was installed under the auspice of Monbu-kagakusho (the Ministry of Education and Culture, Sports, Science and Technology). The system performed reliably except for slowing down of the system response when the data transfer rate is so high and the response of the system becomes much quicker than old one. The radiation detectors were not replaced because of limited fund, but performed stably except for one failure of neutron monitor.

From the fiscal year of 2004, the organization of Tohoku University changes to from a national university to a university cooperation. Along with the change of organization, measurement of radioactivity concentration is required. To carry out the measurement, devices for radioactivity concentration measurement (samplers, $\alpha\beta$ automatic counters) were purchased and setup under the financial support by Tohoku University. These counters will be used commonly by radiation facilities in Tohoku University.

(2) Unsealed radio nuclides used in CYRIC

The species and amounts of unsealed radio nuclides handled in CYRIC during the fiscal year of 2003 are summarized in Table 1. The table includes the isotopes produced by the cyclotron as well as those purchased from the Japan Radio Isotope Association or taken over from other radioisotope institutes.

(3) Radiation exposure dose of individual worker

The exposure doses of the workers in CYRIC during 2003 are given in Table 2.

The doses were sufficiently lower than the legal dose limits.

(4) Radiation monitoring of the workplace

Radiation dose rates inside and outside of the controlled areas in CYRIC were monitored periodically and occasionally when needed. They were generally below the legal dose limits. Surface contamination levels of the floors inside the controlled areas were also measured with a smear method and a survey meter method. They were under the legal regulation levels.

(5) Wastes management

The radioactive wastes were delivered to the Japan Radio Isotope Association twice in the fiscal year of 2002. For the reason, no wastes were delivered in 2003.

The concentration of radioisotopes in the air released from the stack after filtration was monitored with stack gas monitors. The values on concentration were lower than the legal regulation levels. The radioactive water was stocked in the tanks at least for 3 days and then released to the sewerage after confirming that the concentration was lower than the legal regulation levels.

Radioactive organic scintillator waste of 800 liter was treated by incinerator provided by Fuji-kogyo Co.Ltd.

Table 1. Unsealed radioisotopes used in each building of CYRIC during 2003.

(a) Cyclotron Building (kBq)

Group1,2		Group3		Group4	
⁴² Ar	3.000	¹¹ C	311,832,800.000	¹⁸ F	900,417,400.000
				³ H	257,165.300
Total	0	Total	311,832,800.000	Total	900,674,565.300

(b) Radio-isotope Building (kBq)

Group1,2		Group3		Group4	
⁹⁰ Sr	180.000	¹¹ C	481,000.000	¹⁴ C	79,026.300
¹⁰⁹ Cd	4,200.000	⁹⁰ Mo	9,885,100.000	¹⁸ F	34,549,100.000
¹³⁷ Cs	1,001.000	²⁴ Na	1.000	³ H	300,266.120
⁵⁵ Fe	16,100.000	³² P	1,587,887.177		
⁶⁸ Ge	134,554.000	^{99m} Tc*	9,701,800.000		
¹²⁵ I	40,135.690				
Total	61,616.690	Total	21,655,788.177	Total	34,928,392.420

* Including the use in the “β -ray analysis” room

(c) Research Building (kBq)

Group1,2	Group3	Group4
	¹⁵ O 12,765,000.000	¹⁸ F 4,329,000.000
Total 0	Total 12,765,000.000	Total 4,329,000.000

Table 2. Occupational radiation exposures at CYRIC during the fiscal year of 2003.

Dose range (mSv)	Number of individuals
No measurable exposure	35
Less than 1.0	15
1.0 to 2.0	1
2.0 to 3.2	1
Total number of persons monitored	52