

Radiation Protection and Management

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V. 4. Radiation Protection and Management

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(1) Unsealed radionuclides used in the center

The kinds and activities of unsealed radionuclides handled in the center in 1991 are shown in Table 1. The table includes the isotopes produced by the cyclotron, purchased from the Japan Isotope Association and took over from another RI institutes.

(2) Individual monitoring

The exposure doses of the workers in the center in 1991 is given in Table 2. They were less than the permissible doses.

(3) Monitoring of the workplace

Radiation dose rates inside and outside of the controlled areas were monitored periodically and as needed. They were below the legal permissible levels. Surface contamination levels of the floors inside the controlled areas were measured by smear method and with survey meters periodically and as needed. They also cleared the legal regulation levels.

(4) Wastes management

The radioactive wastes delivered to the Japan Radioisotope Association in 1991 are shown in Table 3. The concentration of radioisotopes in the air released after filtration from the stack was monitored with stack gas monitors. The levels were less than the legal regulation levels. The radioactive water was stored at the tanks at least for 3 days and then released to the sewerage after confirming that the concentration was less than permissible levels.

The treated volume of radioactive waste of organic scintillator was 633 l by the incinerator made by Fujikogyo Co., Ltd.

Table 1. Unsealed radionuclides used in the center in 1991.(kBq)

1. ⁹⁰Sr	4,590,900	3. ¹¹C	244,563,358,000	4. ³H	336,776,060
Total	4,590,900	¹³ N	10,582,000,000	¹⁴ C	1,609,406,500
		¹⁵ O	50,140,000,000	¹⁸ F	199,189,654,000
2. ⁴⁵ Ca	76,533,300	²⁸ Mg	3,082,100	⁵¹ Cr	378,533,730
⁵⁴ Mn	10,000	³² P	886,225,000	²⁰¹Tl	3,700,000
⁵⁷ Co	240,263	³⁵ S	308,400,000	Total	201,518,070,290
⁶⁸ Ge	408,432,000	⁴⁵ Ti	1,146,051,300		
⁸⁵ Sr	175,564,000	⁴⁸ V	1,108,617,400		
¹²⁵ I	824,303,880	⁵⁷ Ni	370,901		
¹³⁷ Cs	37,700	⁶⁴ Cu	12,307		
¹⁶⁰ Tb	24,326,300	⁸⁰ Br	100,000		
¹⁷⁰ Tm	26,199,000	⁹⁹ Mo	407,100,000		
²⁰⁷Bi	303,540	^{99m} Tc	340,400,000		
Total	1,535,949,983	¹¹¹ In	107,126,000		
		¹²⁶ I	185,239		
		¹³¹ I	925,896,120		
		¹⁴⁰ La	213,663,000		
		¹⁵³ Sm	160,167,800		
		¹⁷⁵ Yb	1,932,500		
		¹⁷⁷Lu	57,396,339		
		Total	310,952,084,006		

Table 2. Occupational radiation exposures at the center in 1991.

Dose range (mSv)	Number of individuals
No measurable exposure	33
Measurable exposure less than 1.0	4
1.0 to 2.5	2
2.5 to 5.0	3
Total persons monitored	42

Table 3. Radioactive wastes delivered to the Japan Radioisotope Association in 1991.

Wastes	Container	Number
solids		
combustibles	200 ℓ drum	14
incombustibles	50 ℓ drum	34
dried animals	50 ℓ drum	6
liquids		
inorganic substances	25 ℓ PE bottle	6
filters		
HEPA filters	610 × 610 × 292mm	14.5