Safety

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1. Safety Inspection of Radiation Facility for the commission

Before entering into the commission of SPring-8 facility, licencee of the facility must receive the governmental safety inspection and get the permission of beam operation.

Linear Accelerator (1.2Gev), Synchrotron and Storage Ring got the permission of commission on July 31, 1996, Dec. 6, 1996 and Mar.11, 1997 respectively.

2. Office of Safety and Control (OSC) of JASRI (Japan Synchrotron Radiation Research Institute)

OSC facilitates and maintains safety environment with the cooperation of relevant organization to achieve the safety of the workers in SPring-8 facility.

Radiation monitorings such as exposure of workers, radiation dose rates, concentration of radioactivity in air and water and surface contamination in the control area have been routinely conducted. To confirm that the radiation levels at the specific points were well below the legally defined value for the provision of governmental inspection, special radiation monitoring of the linear accelerator and synchrotron were conducted at the working environment and outside controlled area.

Radiation safety computer system which controls continuous radiation monitoring system, interlock system and inlet and outlet control system (N. SASAMOTO SPring-8 Annual Report p80 (1995): ISSN 1342-3053) have also been operated.

To prevent the undue exposure at the time of beam operation of accelerators, interlock system is installed. Interlock system is triggered by the signal from door limit switch, personal key, emergency button, radiation monitor and bending magnet.

Inlet and outlet control system is equipped at the entrance of every control area to record the workers going in and out the controlled area.

3. Radiation Monitoring

Since the beginning of the commissioning of the Linear Accelerator on Aug.1, 1996, dose monitoring for personal exposure and radiation monitoring in and around the radiation control area have been continued.

3.1 Dose monitoring for personal exposure

For the personal monitoring of radiation workers in SPring-8, glass dosimeters (silver activated phosphate glass) are used. Two types of glass dosimeter are utilized for various radiation fields as shown in Table 1.

Supplemental semiconductor dosimeter which can indicate accumulated dose of as low as 1 μSv is also used to manage the special radiation work.

Exposure of each radiation worker in SPring-8 is evaluated every month by glass dosimeter whose detection limit is defined as 0.1mSv.

One hundred and twenty five persons were registered as radiation workers and glass dosimeters were served from August to November 1996. During this term 2 persons were exposed above detection limit of 0.1mSv (Sep. 0.2mSv, Oct. 0.1mSv). Two hundreds and five persons were additionally registered as radiation workers from December 1996 to March 1997. During this term, no radiation workers (total 330 persons) were exposed over detection limit.

Table 1 Personal dosimeter used at SPring-8

Classification	Type	Application
Glass dosimeter	GD402	γ (X) (20keV ～ 3MeV) 10 μSv～10Sv Nth(0.025eV～0.5eV) 10 μSv～10Sv
Glass dosimeter	GD403	γ (X) (10keV ～ 3MeV) 10 μSv～10Sv ß (0.5MeV～3MeV) 100 μSv～10Sv
Pocket dosimeter	Semi-conductor	γ (X) (50keV ～ 3MeV) 1 μSv～9999 μSv

3.2 Radiation monitoring in and around the radiation control area

From the beginning of the beam commissioning on Aug. 1996, radiation monitoring in and around the radiation control area was planned and carried out. Routine monitoring and special monitoring for the governmental inspection already mentioned were enforced. Table 2 shows the routine radiation monitoring programme in fiscal year of 1996.

In addition to the routine monitoring shown in Table 2, occasional monitoring was carried out such as dose rate, surface contamination and radioactivity in air at the specific working place, the residual radioactivity due to activation during the beam operation, radioactivity of materials taken out from control area. Advice on the planning of specific radiation workers, attendance to the radiation works were also carried out according to the request from the radiation workers.

1) Monitoring of working place

If dose rates due to residual radioactivity in the accelerator room after the beam operation of accelerators were more than 20 μSv/h, access to the accelerator room was restricted to avoid the undue exposure. This restriction was easily attained by cooling relatively short-lived nuclides in the accelerator room. These measures resulted in the personal exposure shown in 3.1.

2) Monitoring around the controlled area

Exposure dose at the boundary of controlled area and site boundary were well below the regulatory value.

Table 2 Radiation monitoring program in 1996 (fiscal year)

Radiation monitoring		Items	Frequency points/term		
Routine monitoring			Li	Sy	SR
	Radiation dose rate in CA (Controlled Area)	n, γ	50 pts/w	50 pts/w	170 pts/w
	Radiation dose rate at the boundary of CA	n, γ	20 pts/w	40 pts/w	150 pts/w
	Surface contamination monitoring	β, γ	20 pts/m	25 pts/m	400 pts/m
	Radioactivity in room dust	dust	1 pt/w	1 pts/w	on occasion
	Radioactivity in room gas	gas	1 pt/w	1 pt/w	on occasion
	Radioactivity in exhaust dust	dust	2 pts/w	1 pt/w	1 pt/w
	Radioactivity in exhaust gas	gas	2 pts/w	1 pt/w	1 pt/w
	Data and status confirmation of continuous monitoring system(CA)	γ, X	7 pts/d	6 pts/d	21 pts/d
		n	4 pts/d	2 pts/d	13 pts/d
		gas	3 pts/d	2 pts/d	1 pts/d
		dust	3 pts/d	2 pts/d	1 pts/d
	Data and status confirmation of continuous monitoring system (environment)	γ	3 pts/d		
		n	3 pts/d		
	Accumulated dose by GD (boundary of (CA)	γ, X	22 pts/d	16 pts/d	41 pts/d
	Accumulated dose by GD (environment)	γ, X	10 pts/d		
	Measurement of environmental samples	water	1 pt/3m		
		dust in air	1 pt/3m		
		soil, plant	1 pt/3m		