Safety

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1. The Government Advisary Committee

In order to get permission for the SPring-8 operation, radiation safety issues were carefully discussed by an advisary committee specially organized by the Science and Technology Agency (STA) of the Japanese Government.

After seven times of hearing by the STA and four meetings of the advisary committee, it was concluded to be adequate the system for radiation safety management, radiaiton shielding design for the accelerators of the Spring-8 (the linac, synchrotron and storage ring) and the synchrotron radiaiton (SR) beamlines, the interlock control system and other important safety related equipments.

2. Contract of Radiation Safety System

In parallel with the advisary committee, a radiation safety computer system (RSCS) was made contract. The system is composed of the following subsystems; i) a radiation monitoring system (RMS), ii) a radiation protection system (RPS), iii) an exposure dose measurement system, iv) a sequential interlock control system (SICS), and v) an off-line-computer system. An architecture of the present system is depicted in Fig.1.

All the data coming from the RMS and RPS are logged periodically by the RSRC to draw graphs and tables by using those data. The RPS can display on the cathode ray tube (CRT) terminals the status of safety keys, the SPring-8 operation, shielding doors and the number of persons working in the controlled area.

The RMS consists of a large number of radiation monitors for photons and neutrons which are to be distributed throughout the SPring-8. Some of them being set at cruicial points are linked to the SICS. An ionization chamber is utilized as a photon detector and a ^{3}He counter is used as a neutron detector. Each of them are classified into three categories according to radiation level to be measured; that is, for natural background, and low level and high level radiations.

The RPS consists of card-operated gates, safety keys, operation status lamps, shield doors and the SICS. The SPring-8 operation is controlled with a computer system which is linked with the RSCS. For radiation safety, the RPS has the highest priority in accelerator operation.

Personal medical examination and training data are stored into the off-line computer system which is linked with the RSCS.

3. Radiation Shielding Design

Two types of shielding design studies were carried out during the last year. One is for a new small-sized synchrotron radiation ring "New Subaru", which is directly connected to the linac of the SPring-8. The other one is for the fourteen SR beamlines including the JAERI and RIKEN beamlines to be fablicated in the following two years. As for the bulk shield for the "New Subaru", its storage ring will be shielded by a relatively thin shield of an ordinary concrete without roof shield except for the injection region. As for the shielding design for the beamlines of wiggler, undulator and bending magnet, widths were determined of the SR main beam shutter made of tungusten, the photon stopper made of lead, the down stream shutter made of lead and the shield walls of

both optical and experimental hutches made of lead plate sandwitched by iron plates, as well as a local lead shield around a monochromator.

4. Measurement of Natural Background

In order to get accurate evaluation of a radiation level due to operation of the SPring-8, natural radiation and radioactivity have been measured periodically (every three months) during the past two fiscal years

As for gamma-ray measurements, integrating dose equivalent has been measured with a glass dosimeter and dose equivalent dose rate has been measured with a high pressure ion chamber. Besides pulse height distributions have also been measured with a Ge detector.

On the other side, measurements of neutron dose have been carried out as follows; integrating dose equivalent has been measured using a etch-pit detector, while pulse height distributions have been obtained with ^{3}He counters with polyethylene cylindrical moderators of various thicknesses.

Measurement of radioactivities involved in dust in air and ground water or river water were carried out using a Ge detector and/or a liquid scintillator.

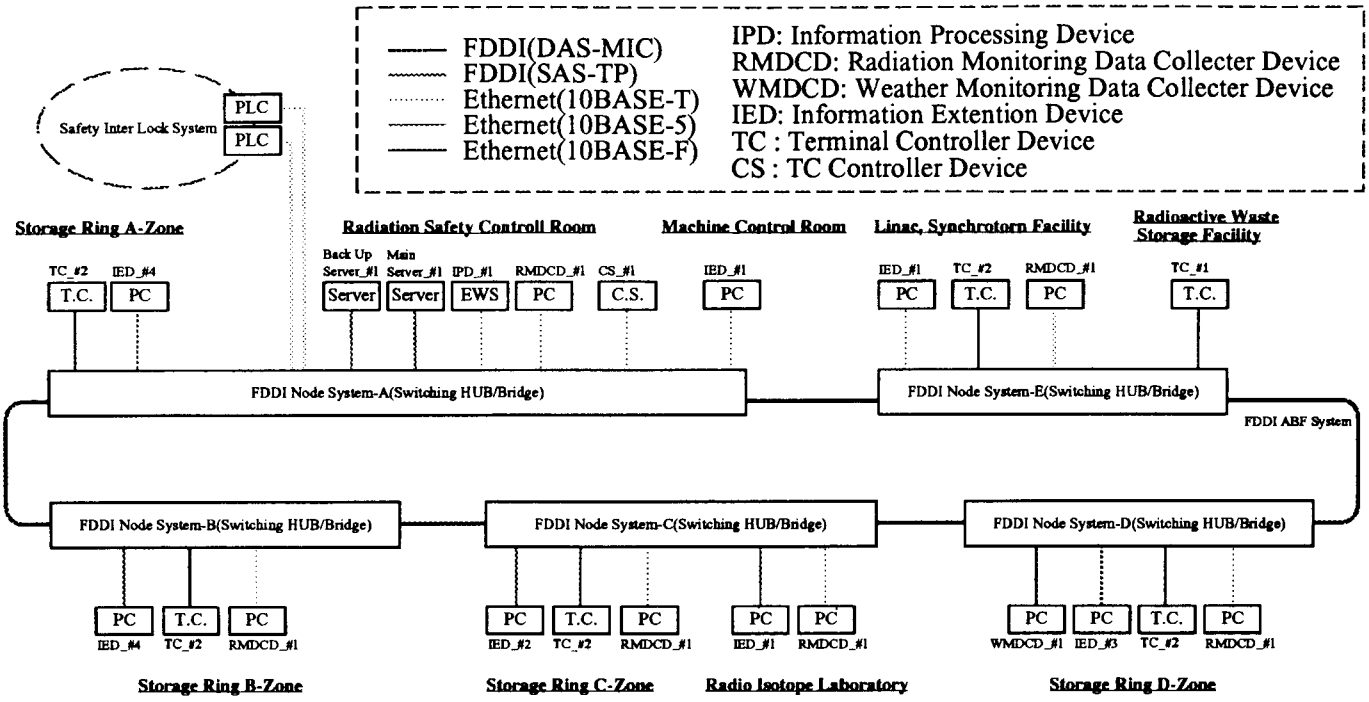

Fig.1 Radiation Safety Computer System Architecture