Radiation Safety for the Design and Operation of Particle Accelerators*

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The upcoming ANSI N43.1 Standard: "Radiation Safety for the Design and Operation of Particle Accelerators" sets the design and operational requirements for accelerator facilities that have to be met in order to provide adequate protection for person and environment from the hazard of ionizing radiation produced during and from accelerator operation. The Standard also sets forth good practices that, if followed, the level of protection would be consistent with those established in the accelerator community.

The existing N43.1 Standard was published in 1979, and applies only to accelerators < 100 MeV. To cope with the increasing application of accelerators and wide variety of accelerator facilities, the new N43.1 Standard has been under development since 1995. The new Standard can be applied to all non-medical accelerators, ranging from small table-top accelerators to accelerator facilities with complex R&D and operation hazards. The N43.1 Committee membership consists of 13 members from large national accelerator laboratories in U.S. and Canada, as well as from regulatory bodies and private industries. Even though an ANSI standard does not preclude other means of conformance, the new N43.1 Standard is developed as a consensus standard with goal of being referenced as best management practice and the understanding that it is likely to be also endorsed as legal requirements.

Emphasizing the life cycle concept, the N43.1 Standard applies to the design, installation, operation, maintenance, upgrades and decommissioning of accelerator facilities. In the Standard, Chapter 1 defines the purposes and scope of the Standard. Chapter 2 gives the definitions of the terms used. Chapter 3 describes the radiation safety programs for the accelerator facilities, which emphasize the integrated safety management program, graded approach to hazard analysis and control, self-assessment of the program, and peer-review of critical processes. Chapter 4 provides details of the requirements and recommendations for the Radiation Safety Systems (RSS) that are used to control the prompt radiation hazards. The RSS includes two complementary systems: the Access Control System (ACS), which keep people away from radiation hazard, and Radiation Control System (RCS), which keep radiation hazard away from people. Chapter 5 describes the detail of ACS (e.g., beam inhibiting devices, access control module, etc.), while Chapter 6 describes the detail of RCS (passing elements like shielding and barriers, and active elements like beam monitors and radiation monitors). The graded approach isagain emphasized in the design and implementation of ACS and RCS, with the most complicated engineered interlocked system used for the most hazardous facilities. The aspects of accelerator operation, e.g., operation safety responsibilities, readiness review, interlock bypass, etc., are covered in Chapter 7. The operational radiation safety program, which includes survey, area and personnel

dosimetry, environmental protection, management of radioactive material and waste, decommissioning, etc., is described in Chapter 8. Finally, Chapter 9 will cover the personnel training and qualification requirements.

In addition to the main chapters, four appendixes provide detail guidance to assist the accelerator facilities to address several key issues: 1) development of Safety Assessment Document, 2) guidance for interlocked ACS, 3) decommissioning, and 4) measurements of radiation and radioactivity.

The presentation will give an overview of the Standard and its main emphasis.

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