

## Appendix C

### Content Requirements for Accelerator Safety Assessment Documents

Descriptive information in the Safety Assessment Document must include the following elements:

- A statement of the accelerator type (e.g., linear induction traveling wave) and basic principle of operation, including the type(s) and maximum intensity of radiation that will be produced.
- The location of the accelerator and facility relative to co-located workers, LLNL facilities, the site boundary, and the public.
- Identification of radiation hazards created due to beam activation and/or material contamination.
- The application and use of the accelerator (e.g., radiography, particle physics research) and the facility function, if different.
- A description of the major facility features related to accelerator operation (e.g., dedicated accelerator bay, target areas, shielding, interlocks, normally manned and unmanned areas).
- A generalized description of the line management and support organization structure for operation of the accelerator.
- A generalized description of how accelerator operations are conducted.

The hazard analysis must meet the process and content requirements described in section 2.4, with the following additions:

- Hazards must include those with adverse impacts to workers in addition to co-located workers and the public.
- Control selection must consider consequences to workers in addition to co-located workers and the public.
- Consequences mitigated by the credited controls shall be used for assessing risk.

Consequences and probabilities from the hazard analysis related to the public and co-located workers shall be compared to the residual risk matrix (Figure 4) to ensure acceptable risk. The risk to workers shall be derived from the hazard analysis and qualitatively described.

While there is no specific requirement for accident analysis for accelerators, it is possible that accident analysis will be necessary to support probability estimates that are based on control effectiveness information.

### **Accelerator Safety Envelope**

The Accelerator Safety Envelope (ASE) should normally include a maximum allowable dose over time, or dose rate, for occupied areas while the accelerator is being operated. In addition, it should include credited controls and identifiable accelerator configurations or parameters that are controlled to ensure that the expected maximum radiation intensity is not exceeded. Violation of the ASE is equivalent to violation of an Operational Safety Requirement for other hazards.

All controls identified through the analysis process shall be summarized and identified as credited accelerator facility controls in the document. These controls are equivalent to the credited controls associated with other hazards in this document. These controls must be included and implemented for operations through the use of safety plans. Note that, by definition, accelerators are Class IV Radiation Generating Devices (RGDs) and require a safety plan per Document 20.3. The process of implementing accelerator controls through safety plans particular to the facility/activity involved should be described.

**Note:** All accelerator safety assessment documents currently require NNSA/LSO approval.

### **Suggested Format for Accelerator Safety Assessment Documents**

The following outline provides a format for organizing the content of a Safety Assessment Document if no other hazard types classified above LSI are present in the facility. If other hazard types do exceed LSI, then this assessment shall be addressed within the appropriate tier-level document as an appendix. (The accelerator is considered to have a Low hazard classification.)

#### Chapter 1 Summary

- 1.1 Purpose and Scope
- 1.2 Facility Mission
- 1.3 Accelerator Operations Summary
- 1.4 Summary of Results
- 1.5 Conclusion

#### Chapter 2 Descriptions

- 2.1 Site Description

- 2.2 Facility Description
  - 2.2.1 General Facility/ Accelerator Layout
  - 2.2.2 Accelerator Details
  - 2.2.3 Historical Activation and Contamination
- 2.3 Engineered Features
- 2.4 Management Structure
- 2.5 Description of Operations

### Chapter 3 Safety Analysis

- 3.1 Hazard Identification and Event Tables
- 3.2 Normal Operations
- 3.3 Accident Conditions
- 3.4 Risk Assessment
  - 3.4.1 Public and Collocated Workers
  - 3.4.2 Qualitative Worker Risk Description

### Chapter 4 Controls for Accelerator Safety

- 4.1 Accelerator Safety Envelope
- 4.2 Accelerator Facility Controls
  - 4.2.1 Engineered Controls
  - 4.2.2 Administrative Controls
- 4.3 Applicable Safety Programs
- 4.4 Implementation of Controls through Safety Plans