

Approved: 9-9-2022

SUBJECT: SAFETY OF ACCELERATORS

1. PURPOSE. To establish accelerator-specific safety requirements for Department of Energy (DOE), including National Nuclear Security Administration (NNSA), accelerators and their operations¹ that, when supplemented by other applicable safety and health requirements, promote safe operations to ensure adequate protection of workers, the public, and the environment.
2. CANCELS/SUPERSEDES. DOE Order (O) 420.2C, *Safety of Accelerator Facilities*, dated 7-21-2011. Cancellation of a directive does not, by itself, modify or otherwise affect any contractual or regulatory obligation to comply with the directive. Contractor Requirements Documents (CRDs) that have been incorporated into a contract remain in effect throughout the term of the contract unless and until the contract or regulatory commitment is modified to either eliminate requirements that are no longer applicable or substitute a new set of requirements.
3. APPLICABILITY.
 - a. Departmental Applicability. Except for the exemptions/equivalencies in section 3.c., this Order applies to any DOE Element with programs involving accelerators, and their operations. The Administrator of the National Nuclear Security Administration (NNSA) must assure that NNSA employees comply with their responsibilities under this directive. Nothing in this directive will be construed to interfere with the NNSA Administrator's authority under section 3212(d) of Public Law (P.L.) 106-65 to establish Administration-specific policies, unless disapproved by the Secretary.
 - b. DOE Contractors. Except for the equivalencies/exemptions in section 3.c. the CRD, Attachment 1, sets forth requirements of this Order that apply to contracts that include the CRD.

The CRD, Attachment 1, must be included in site/facility management contracts that involve the management and operation of accelerators and accelerator facilities unless superseded by an alternative standard authorized through an exemption or equivalency process.
 - c. Exemptions/Equivalencies for DOE O 420.2D. Requests for exemptions and equivalencies to the requirements of this Order which are not addressed in section 3.c. must be processed in accordance with DOE O 251.1, *Departmental Directives Program*, current version.

¹ See definition of Accelerator Operations in Attachment 2, *Definitions*.

A periodic onsite validation process must be established to ensure accelerators and devices granted exemptions or equivalencies provided in section 3.c. continue to be operated under the conditions of the approved exemption or equivalency. Exemptions are also subject to requirements in Section 4.d. if an accelerator and its operations has the potential for inadvertent criticality.

- (1) Exemption. Devices operated in accordance with 10 Code of Federal Regulations (CFR) Part 34, *Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations*, are exempt from requirements in section 4 of this Order.
- (2) Exemption. NNSA nuclear weapons designed Neutron Generators are exempt from requirements in section 4.c. of this Order.
- (3) Equivalencies. The following equivalencies are approved for requirements in section 4.b.(1) and 4.b.(2) of this Order:
 - (a) Devices operated in accordance with American National Standards Institute/Health Physics Society (ANSI/HPS) N43.2-2021, *Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment*;
 - (b) Devices operated in accordance with ANSI/HPS N43.3-2008, *General Radiation Safety Standard for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV*;
 - (c) Devices operated in accordance with ANSI/HPS N43.5-2005, *Radiological Safety Standard for the Design of Radiographic and Radioscopic Non-Medical X-Ray Equipment Below 1 MeV* (Reaffirmed 2013);
 - (d) Neutron generators operated below 600 keV in accordance with National Council on Radiation Protection and Measurements (NCRP) Report 72-1983, *Radiation Protection and Measurement of Low-Voltage Neutron Generators*; and
 - (e) Devices operated at or below 10 MeV in accordance with NCRP Report 144-2003, *Radiation Protection for Particle Accelerator Facilities* and/or ANSI-HPS N43.1-2011, *Radiation Safety for the Design and Operation of Particle Accelerators*.

4. REQUIREMENTS.

- a. DOE Elements are required to have oversight, consistent with current DOE oversight policy, over contractors who design, build, and manage accelerators and their operations to be consistent with the DOE mission and operational objectives and to comply with accelerator safety program provisions as described in the

CRD. This includes oversight of all accelerators and their operations and all facilities that transition into operating accelerators. Also included is oversight of modifications to an accelerator and/or its equipment or program elements that have the potential to impact the risk, complexity, visibility, safety, and security of operating or maintaining the accelerator and their operation.

- b. Accelerators and their operations managed under this Order must establish the following program elements prior to commissioning and routine operations:
- (1) A safety analysis or analysis of postulated worst-case accident for every accelerator.
 - (2) Clearly defined roles and responsibilities for accelerator activities including those for training and procedures.
 - (3) A current listing/inventory of accelerators managed under this Order and exemptions or equivalencies to this Order.

An approved Integrated Safety Management Program, in accordance with 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*, and DOE O 450.2, *Integrated Safety Management*, current version, may be used to satisfy requirements for 4.b.(1) and 4.b.(2) above. Accelerators operated at or below 10 MeV that involve only unmodified commercially available equipment, including electron microscopes and ion implant devices, may use manufacturer documentation appropriately addressing the safety analysis, training, and procedures to satisfy requirements for 4.b.(1) and 4.b.(2) above if the accelerator is maintained and operated according to the manufacturer recommendations.

- c. Accelerators that operate above 10 MeV must establish the following program elements, in addition to the elements listed in section 4.b.(2) and 4.b.(3), prior to commissioning and routine operations:
- (1) A Safety Assessment Document (SAD) in lieu of the analysis required in 4.b.(1) above;
 - (2) A DOE approved Accelerator Safety Envelope (ASE);
 - (3) A DOE approved Unreviewed Safety Issue (USI) Process; and
 - (4) An Accelerator Readiness Review (ARR) process.
- d. Accelerators and their operations with the potential for inadvertent criticality must implement a DOE approved criticality safety program in accordance with DOE O 420.1, *Facility Safety*, current version, in addition to the requirements of this Order. This requirement cannot be exempted under the provisions of section 3.c. of this Order.

5. RESPONSIBILITIES.

- a. DOE Program Secretarial Officer (PSO)/NNSA Cognizant Secretarial Officer (CSO) for Safety,² or designee.
- (1) Oversee the safe operation of accelerators and their operations through the implementation of this Order to ensure adequate protection of workers, the public, and the environment and to meet regulatory requirements.
 - (2) Approve or disapprove the ASE for accelerators and their operations where site boundary mitigated consequences for credible postulated accident scenarios potentially exceed 1 rem (0.01Sv) and/or values established under the Emergency Response Planning Guide-2 (ERPG-2).
- b. DOE Field Element Managers. For sites under their purview:³
- (1) Ensure the safe operation of accelerators and their operations through the implementation of this Order.
 - (2) Ensure the Contractor Assurance System includes processes for the review of contractor accelerator safety program elements as specified in the CRD.
 - (3) Ensure accelerators and devices granted exemptions or equivalencies provided in section 3.c. of this Order continue to be operated under the conditions of the approved exemption or equivalency.
 - (4) Ensure the contractor accelerator safety program elements are periodically (interval not to exceed five years) and independently reviewed and updated, as appropriate.
 - (5) Notify contracting officers of the applicability of the CRD and any alternate safety standards, requirements, regulations, or DOE directives made applicable pursuant to sections 3.c. and/or 4.d. of this Order.
 - (6) Review the listing/inventory of accelerators managed under this Order for appropriateness.
 - (7) Recommend to the DOE PSO (or NNSA CSO for Safety) approval or disapproval of the ASE for accelerators and their operations where site boundary mitigated consequences for credible postulated accident scenarios potentially exceed 1 rem (0.01Sv) and/or values established under the Emergency Response Planning Guide-2 (ERPG-2).

² The NNSA Cognizant Secretarial Officer (CSO) for Safety related matter functions and responsibilities are described in NNSA Supplemental Directive (SD) 450.2B, *Functions, Responsibilities, and Authorities (FRA) for Safety Management* (or successor document).

³ The responsibilities in section 5.b. cannot be delegated.

- (8) Subject to the provisions of section 5.a.(2), approve or disapprove the following prior to their initiation/use, as applicable in section 4.c.:
 - (a) The ASE and any updates or amendments to the approved ASE.
 - (b) The site or facility USI Process.
 - (c) The restart of an accelerator, accelerator facility or activity after a DOE-mandated shutdown because of an ASE violation or discovery of conditions that introduce accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE.
 - (d) The start of commissioning activities after ensuring that an appropriately comprehensive and independent ARR has been conducted and identified pre-start issues have been resolved.
 - (e) The start of routine operations after ensuring that an appropriately comprehensive and independent ARR has been conducted, commissioning activities required for safe operations have been completed, and identified pre-start issues have been resolved.
 - (f) Implementation or start of activities associated with a Reviewed Safety Issue that introduce accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE.
 - (g) Decommissioning activities.
 - (9) Notify the contractor of any approved or denied requests for exemptions or equivalencies and any conditions of approval.
- c. Cognizant Contracting Officer. Upon notification of applicability by the DOE Field Element Manager, the contracting officer is responsible for incorporating the CRD, and any alternate safety standards, requirements, regulations, or DOE directives made applicable pursuant to sections 3.c. and/or 4.d. of this Order, into the contracts of affected contractors.
6. INVOKED STANDARDS. This Order does not invoke any DOE technical standards or industry standards as required methods. Any technical standard or industry standard that is mentioned in or referenced by this Order is not invoked by this Order. Note: DOE O 251.1D, Appendix J provides a definition for “invoked technical standard.”

Accelerators with the potential for inadvertent criticality must implement a DOE approved criticality safety program in accordance with DOE O 420.1, current version, and any applicable invoked standards.

7. REFERENCES.

- a. P.L. 106-65, *National Defense Authorization Act for Fiscal Year 2000*, as amended.
- b. 10 CFR Part 34, *Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations*.
- c. 10 CFR Part 835, *Occupational Radiation Protection*.
- d. 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*.
- e. American National Standards Institute/Health Physics Society (ANSI/HPS) N43.2-2021, *Radiation Safety for X-ray Diffraction and Fluorescence Analysis Equipment*.
- f. American National Standards Institute/Health Physics Society (ANSI/HPS) N43.3-2008, *General Radiation Safety Standard for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies Up to 10 MeV*.
- g. American National Standards Institute/Health Physics Society (ANSI/HPS) N43.5-2005, *Radiological Safety Standard for the Design of Radiographic and Radioscopic Non-Medical X-Ray Equipment Below 1 MeV* (Reaffirmed 2013).
- h. American National Standards Institute/Health Physics Society (ANSI/HPS) N43.1-2011, *Radiation Safety for the Design and Operation of Particle Accelerators*.
- i. National Council on Radiation Protection and Measurements (NCRP) Report No 72-1983, *Radiation Protection and Measurement of Low-Voltage Neutron Generators*.
- j. National Council on Radiation Protection and Measurements (NCRP) Report No 144-2003, *Radiation Protection for Particle Accelerator Facilities*.
- k. American Industrial Hygiene Association (AIHA) 2020 Emergency Response Planning Guidelines (ERPG) and Workplace Environmental Exposure Levels (WEEL) Handbook.
- l. DOE O 251.1, *Departmental Directives Program*, current version.
- m. DOE O 420.1, *Facility Safety*, current version.
- n. DOE O 450.2, *Integrated Safety Management*, current version

8. DEFINITIONS. See Attachment 2.

9. CONTACT. Questions concerning this Order should be addressed to the Office of Science, Office of the Deputy Director for Field Operations at 202-586-5434.

BY ORDER OF THE SECRETARY OF ENERGY:



DAVID M. TURK
Deputy Secretary

ATTACHMENT 1
CONTRACTOR REQUIREMENTS DOCUMENT
DOE O 420.2D, SAFETY OF ACCELERATORS

This Contractor Requirements Document (CRD) sets forth requirements that apply to contractors whose contracts include this CRD. Regardless of who performs the work, the contractor is responsible for complying with the requirements of this CRD. The contractor is responsible for flowing down the requirements of this CRD to subcontractors at any tier to the extent necessary to ensure the contractor's compliance with the requirements and the safe performance of work.

In addition to the requirements set forth in this CRD, Attachment 2, *Definitions*, to DOE O 420.2D, *Safety of Accelerators*, is referenced in and made a part of this CRD and provides definitions and information applicable to contracts in which this CRD is inserted. The requirements in this CRD apply to all accelerators and their operations¹ and all facilities that transition into operating accelerators.

1. EXEMPTIONS/EQUIVALENCIES. Requests for exemptions and equivalencies not listed below must be processed in accordance with DOE O 251.1, *Departmental Directives Program*, current version. The contractor must establish a periodic onsite validation process to ensure accelerators and devices granted exemptions or equivalencies provided in section 1 of this CRD continue to be operated under the conditions of the approved exemption or equivalency.
 - a. Exemption. Devices operated in accordance with 10 Code of Federal Regulations (CFR) Part 34, *Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations*, are exempt from requirements in section 2 of this CRD.
 - b. Exemption. NNSA nuclear weapons designed Neutron Generators are exempt from requirements in section 2.b of this CRD.
 - c. Equivalency. The following equivalencies are approved for requirements in section 2.a.(1) and 2.a.(2) of this CRD.
 - (1) Devices operated in accordance with American National Standards Institute/Health Physics Society (ANSI/HPS) N43.2-2021, *Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment*;
 - (2) Devices operated in accordance with ANSI/HPS N43.3-2008, *General Radiation Safety Standard for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV*;
 - (3) Devices operated in accordance with ANSI/HPS N43.5-2005, *Radiological Safety Standard for the Design of Radiographic and Radioscopic Non-Medical X-Ray Equipment Below 1 MeV* (Reaffirmed 2013);

¹ See definition of Accelerator Operations in Attachment 2, *Definitions*.

- (4) Neutron generators operated below 600 keV in accordance with National Council on Radiation Protection and Measurements (NCRP) Report 72-1983, *Radiation Protection and Measurement of Low-Voltage Neutron Generators*; and
 - (5) Devices operated at or below 10 MeV in accordance with NCRP Report 144-2003, *Radiation Protection for Particle Accelerator Facilities*, and/or ANSI- HPS N43.1-2011, *Radiation Safety for the Design and Operation of Particle Accelerators*.
- d. Contractors who manage accelerators and their operations with the potential for inadvertent criticality must implement a DOE-approved criticality safety program in accordance with DOE O 420.1, *Facility Safety*, current version, in addition to the requirements of this CRD. This requirement cannot be exempted under the provisions of section 3.c. of DOE O 420.2D, *Safety of Accelerators*, or this CRD.

2. PROGRAM ELEMENTS.

- a. Contractors that manage accelerators and their operations under this CRD must establish the following program elements prior to commissioning and routine operations:
- (1) A safety analysis or analysis of postulated worst-case accident for every accelerator managed under this CRD;
 - (2) Clearly defined roles and responsibilities for accelerator activities including those for training and procedures; and
 - (3) A current listing/inventory of accelerators managed under this Order and exemptions or equivalencies to this Order.

An approved Integrated Safety Management Program, in accordance with 48 CFR 970.5223–1, *Integration of Environment, Safety, and Health into Work Planning and Execution*, may be used to satisfy requirements for 2.a.(1) and 2.a.(2) above. Accelerators operated at or below 10 MeV that involve only unmodified commercially available equipment, including electron microscopes and ion implant devices, may use manufacturer documentation appropriately addressing the safety analysis, training, and procedures to satisfy requirements for 2.a.(1) and 2.a.(2), above, if the accelerator is maintained and operated according to the manufacturer recommendations.

- b. Contractors that manage accelerators that operate above 10 MeV must establish the following program elements, in addition to the elements listed in section 2.a.(2) and 2.a.(3) of this CRD, prior to commissioning and routine operations:
- (1) A Safety Assessment Document (SAD) in lieu of the analysis required in 2.a.(1) above;

- (2) A DOE approved Accelerator Safety Envelope (ASE);
 - (3) A DOE approved Unreviewed Safety Issue (USI) Process; and
 - (4) An Accelerator Readiness Review (ARR) process.
- c. Program elements must be periodically (interval not to exceed five years) reviewed and updated, as appropriate. The contractor must ensure the Contractor Assurance System includes processes to review the contractor accelerator safety program elements listed in this CRD.
- d. Accelerator Safety Envelope (ASE).
- (1) The ASE, and any updates or amendment to the approved ASE, must be submitted to the DOE Field Element Manager for approval.
 - (2) Any activity violating the ASE must be terminated immediately and be put in a safe and stable configuration. Affected operations must be terminated immediately and put in a safe and stable configuration for discovered conditions that create or reveal an ASE violation. The DOE Field Element Manager must approve the restart of any activity or affected operations after a DOE-mandated shutdown because of an ASE violation.
- e. Safety Assessment Document (SAD). The purpose of the SAD is to provide a description of the facility, an analysis of accelerator specific safety hazards, and necessary controls to eliminate or mitigate those hazards such that associated risks are clearly understood. All hazards at an accelerator fall within two categories: 1) hazards that are safely managed by other DOE approved applicable safety and health programs and/or processes; or 2) accelerator specific hazards that are analyzed and safely managed by the SAD and provisions of the ASE. The amount of detail provided, and the depth of analysis must be tailored to be commensurate with the magnitude and types of hazards present and the complexity of the facility. The SAD, which represents the technical basis for the bounding conditions and controls in the ASE, must be maintained so it reflects current hazards and controls. The contractor must notify the DOE Field Element Manager, or designee, when the SAD is revised and approved. The SAD must:
- (1) Identify and analyze accelerator specific hazards and identify necessary controls to eliminate or mitigate hazards to workers, the public, and the environment. Identify and analyze non-accelerator specific hazards which could serve as initiators or contributors to other evaluated accelerator accidents. Hazards from radiation and residual radioactivity associated with beam operations must be evaluated for onsite and offsite impacts from routine operations and credible accidents as appropriate. Analysis of radioactive material must consider direct radiation, contamination, and airborne dispersion as appropriate;

- (2) Provide a description of uncontrolled risk (i.e., without mitigation) and risk with controls in place associated with accelerators and their operations;
 - (3) Provide detailed descriptions of engineered controls (e.g., interlocks and physical barriers) and administrative measures (e.g., training, procedures) taken to eliminate or mitigate hazards to workers, the public, and the environment from accelerators and their operations; and
 - (4) Include or reference a description of the accelerator and accelerator facility function, location, and management organization in addition to details of major accelerator and accelerator facility components and their operation.
- f. Unreviewed Safety Issue (USI) Process. The contractor must document how the USI Process is implemented and must identify how the requirements listed below are addressed. The site or facility USI Process must be submitted to the DOE Field Element Manager for approval.
- (1) The USI Process must evaluate proposed activities or discovered conditions that introduce new or previously unreviewed accelerator-specific hazards to ensure controls are in place to prevent or mitigate hazards as appropriate. The term “activities” includes modifications, temporary changes, permanent changes, and new activities.
 - (2) The USI Process must evaluate USIs to determine if accelerator specific hazards associated with a proposed activity or discovered condition are adequately addressed by the current SAD and approved ASE. Any activity expected to exceed the bounding conditions of the ASE must be evaluated using the USI process. Once an USI has been appropriately reviewed, the issue becomes a Reviewed Safety Issue and may be considered as an addendum to the SAD.
 - (3) DOE approval is required if the USI Process determines that a Reviewed Safety Issue introduces accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE prior to implementation of the proposed activity.
 - (4) DOE must be promptly notified upon discovery of conditions with the credible potential to introduce accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE.
 - (5) If conditions are discovered that introduce accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE, impacted/affected operations must be suspended immediately and put in a safe and stable configuration. Discovered conditions must be addressed using DOE approved measures, as appropriate. DOE must provide written approval for resumption of impacted/affected operations.

g. Accelerator Readiness Reviews (ARRs). ARR must be performed before DOE approval for commissioning and/or routine operation and as directed by the DOE Program Secretarial Officer, NNSA CSO¹ for Safety, or a DOE Field Element Manager. A single ARR may be conducted prior to commissioning that addresses both commissioning and routine operations, with agreement of the DOE Field Element Manager. As part of the ARR process, the contractor must demonstrate to the satisfaction of the DOE Field Element Manager that an appropriately comprehensive and independent ARR has been conducted, identified pre-start issues have been resolved, commissioning activities required for safe operations have been completed as appropriate, and the following processes are in place:

- (1) A Contractor Assurance System that maintains an internal assessment process;
- (2) A Configuration Management Program that addresses accelerator safety; and
- (3) Credited controls and appropriate administrative processes related to accelerator safety (e.g., training, procedures, etc.).

The contractor must receive DOE Field Element Manager approval for:

- (4) The start of commissioning activities; and
- (5) The start of routine operations.

h. Decommissioning Activities. Contractors who manage accelerators and their operations under this CRD must receive DOE Field Element Manager approval prior to the start of accelerator decommissioning activities.

¹ The NNSA Cognizant Secretarial Officer (CSO) for safety related matter functions and responsibilities are described in NNSA Supplemental Directive (SD) 450.2B, *Functions, Responsibilities, and Authorities (FRA) for Safety Management* (or successor document).

ATTACHMENT 2: DEFINITIONS

This Attachment provides definitions of terms used in DOE O 420.2D, *Safety of Accelerators*, as well as information applicable to contracts in which the associated CRD (Attachment 1 to DOE O 420.2D, *Safety of Accelerators*) is inserted.

1. Accelerator: A device and its components employing electrostatic or electromagnetic fields to impart kinetic energy to molecular, atomic, or sub-atomic particles and capable of creating a radiological area as defined by 10 CFR Part 835, *Occupational Radiation Protection*. Accelerator components include injectors, targets, beam dumps, detectors, experimental enclosures, accelerator enclosures, experimental areas, and experimental apparatus utilizing the accelerator. The accelerator also includes associated support and test facilities, equipment, systems, and utilities necessary to operate the accelerator or utilize the accelerated beam.
2. Accelerator Facility: The accelerator, plant, buildings, structures, and equipment supporting the accelerator and its operations that are under the direct control of the contractor.
3. Accelerator Operations: Activities within the accelerator facility that, over the lifecycle of the facility, support 1) production or utilization of accelerator beams; 2) research and experimental activities utilizing accelerator beams; 3) handling, storage and analysis of accelerator induced radioactive components and materials within the accelerator facility boundary; 4) receipt, preparation, assembly, inspection, and installation of samples into the accelerator beam; or 5) removal, disassembly, handling, analysis, and storage for radioactive dose minimization to meet the definition of ALARA in 10 CFR Part 835, *Occupational Radiation Protection*, or transportation requirements, and packaging of samples after use in the accelerator beam. Accelerator Operations excludes radioisotope processing activities that are not required to operate or maintain the accelerator.
4. Accelerator Readiness Review (ARR): A structured method for verifying that hardware, personnel, and procedures associated with commissioning or routine operations are ready to permit the activity to be undertaken safely.
5. Accelerator Safety Envelope (ASE): A documented set of verifiable physical and administrative requirements, bounding conditions, and credited controls that ensure safe operation and address accelerator specific hazards and risks.
6. Commissioning: A phase of an accelerator facility operation that is typically used to conduct initial beam testing and/or verify design specifications. Commissioning periods may be tailored to the needs of each facility and there may be great variations in their duration, breadth, and formality, but in all cases, the activities will be bounded by an ASE and preceded by an ARR and DOE approval.
7. Credited Controls: Controls determined through Safety Analysis to be essential for safe operation directly related to the protection of workers, the public, and the environment.

8. DOE Element: First-tier organizations at DOE/NNSA HQ and in the field as listed in the Correspondence Style Guide, Office of the Executive Secretariat.
9. DOE Field Element Manager: The manager having overall responsibility for a DOE field element including execution of oversight policy implementation. The Field Element Manager directs activities of DOE/NNSA field or site offices and has line accountability for all site program, project execution, and contract management.
10. DOE Program Secretarial Officer (PSO): An Assistant Secretary, Office Director, Head of Program Element, or NNSA Deputy Administrator to whom designated field offices directly report and who has overall landlord responsibilities for the assigned direct reporting elements.
11. Radiation: Ionizing radiation, including the accelerated particle beam and the radiation produced when the beam interacts with matter or changes direction. Radiation includes alpha particles, beta particles, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions.
12. Radioisotope Processing: Chemical, thermal, or physical actions taken to separate, isolate, refine, or enrich specific isotopes of a chemical element.
13. Residual Radioactivity: Radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from the accelerator or accelerator operations.
14. Reviewed Safety Issue: The outcome of the evaluation and determination phase of the USI Process.
15. Risk: A quantitative or qualitative expression of possible harm, which considers both the probability that a hazard will cause harm and the amount of harm; or, alternatively, an estimate of the probability of occurrence of a hazard-related incident and the severity of the consequence associated with the incident.
16. Safety Analysis: A documented process to systematically identify the hazards of a given operation; including a description and analyses of the adequacy of measures taken to eliminate, control, or mitigate the hazards and risks of normal operation; and identification and analyses of potential accidents and their associated risks.
17. Safety Assessment Document (SAD): A document containing the results of a Safety Analysis for an accelerator or accelerator facility pertinent to understanding the risks to workers, the public, and the environment of operating the accelerator.
18. Unreviewed Safety Issue (USI): An activity or discovered condition with accelerator specific hazards that have yet to be evaluated to determine if the activity or discovered condition introduces accelerator specific hazards that are not adequately addressed by the current SAD and approved ASE.

19. USI Process: The process or methodology used to evaluate/review USIs to determine if the activity or discovered condition is adequately addressed by the current SAD and approved ASE.