

**SUBJECT: PERSONNEL SELECTION, TRAINING, QUALIFICATION, AND
CERTIFICATION REQUIREMENTS FOR DOE NUCLEAR FACILITIES**

1. PURPOSE.

- a. This Order establishes selection, training, qualification, and certification requirements for all contractor personnel who, by action or inaction, can affect compliance with the safety basis of a Hazard Category 1, 2, or 3 nuclear facilities.
- b. This Order updates and consolidates DOE's training requirements to ensure a well-trained nuclear facility organization.
- c. Implementation of all requirements in this Order constitutes an acceptable method of complying with 10 CFR § 830.122, Criterion 2 – *Management/Personnel Training and Qualification*, for the performance of work activities described in this Order.

2. CANCELS/SUPERSEDES. This revision cancels DOE Order (O) 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, dated 4-21-2010.

Cancellation of a directive does not, by itself, modify or otherwise affect any contractual or regulatory obligation to comply with the directive. The 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contract unless and until the contract or regulatory commitment is modified to either eliminate requirements that are no longer applicable or substitute a new set of requirements.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. This Order applies to all departmental elements, including the National Nuclear Security Administration (NNSA), responsible for the operation of Hazard Category 1, 2, and 3 nuclear facilities. The NNSA Administrator will assure NNSA employees and contractors comply with the responsibilities under this directive. Nothing in this Order will be construed to interfere with the NNSA Administrator's authority under section 3212(d) of Public Law 106-65, *National Defense Authorization Act*, to establish Administration-specific policies, unless disapproved by the Secretary.
- b. DOE Contractors. The CRD for this Order (Attachment 1) must be inserted in all contracts for Hazard Category 1, 2, or 3 DOE nuclear facilities. Except for the equivalencies/exemptions in paragraph 3.c., the CRD sets forth requirements of this Order that will apply to contracts that include the CRD. The Officials

identified in paragraph 5 of this Order are responsible for notifying the Contracting Officer of the affected contracts. Once notified, the Contracting Officer is responsible for incorporating the CRD into each affected contract via the laws, regulations, and DOE directives clause of the contract, or via negotiation and modification, as appropriate.

- c. Equivalencies/Exemptions for DOE O 426.2A. Equivalencies and exemptions to this Order are processed in accordance with (IAW) DOE O 251.1, *Departmental Directives Program*, current version. Central Technical Authority concurrence is required for both exemptions and equivalencies to this Order.
- (1) Exemption. This Order does not apply to activities that exclusively involve transportation or offering transportation of hazardous materials (including radioactive materials), substances, and wastes.
 - (2) Equivalency. IAW the responsibilities and authorities assigned by Executive Order 12344, codified at 50 U.S.C. §§ 2406 and 2511, and to ensure consistency through the joint Navy/DOE Naval Nuclear Propulsion Program, the Deputy Administrator for Naval Reactors will implement and oversee requirements and practices pertaining to this Directive for activities under the Deputy Administrator's authority, as deemed appropriate.

4. REQUIREMENTS.

- a. A selection, training, qualification, and certification program (hereafter "training and qualification program"), as described in this Order, must be implemented at new and existing Hazard Category 1, 2, and 3 nuclear facilities.
- b. Heads of DOE field organizations and NNSA field element managers must review and approve (1) contractor implementation documentation showing compliance with this Order, including its CRD; and (2) contractor procedures for granting relief from any required aspect of a training and qualification program.
- c. Heads of DOE field organizations and NNSA field element managers are required to evaluate the overall effectiveness of the nuclear facility training and qualification program(s) (either through contractor or federal reviews) at least once in a three-year interval.

DOE-STD-1070-94 aids in developing an assessment program to provide oversight of the training and qualification program activities. The assessments must be scheduled and conducted IAW DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*, or its successor Order, and DOE G 226.1-2A, *Federal Line Management Oversight of Department of Energy Nuclear Facilities*.

- d. The following DOE regulations and directives provide requirements and procedures on how training records and information are to be handled and protected: 10 CFR Part 1008, *Records Maintained on Individuals (Privacy Act)*; DOE O 206.1, *Department of Energy Privacy Program*, current version; and DOE O 471.7, *Controlled Unclassified Information*, current version.

5. RESPONSIBILITIES.

a. Program Secretarial Officers/NNSA Administrator.

- (1) Exercise line management responsibility and accountability for nuclear facility training and qualification programs.
- (2) Ensure resources are provided for developing, implementing, and maintaining nuclear facility personnel training and qualification programs.
- (3) Review and approve the evaluation of the need for a simulator at Category A test and research reactors.

b. Director of the Office of Environment, Health, Safety and Security.

- (1) Develop and coordinate proposed new or revised policies, directives, requirements, guidance, and technical standards related to this Order and CRD.
- (2) Provide technical guidance on compliance with the provisions of this Order and CRD and provide policy implementation advice and assistance.
- (3) Provide input on technical guidance of DOE safety policy as set forth in this Order to the Central Technical Authorities.
- (4) Provide advice on requests for exemptions and equivalencies from the requirements of this Order.

c. Director, Office of Enterprise Assessments. Plan and conduct assessments to determine compliance with the requirements of this Order, IAW DOE O 227.1, *Independent Oversight Program*, current version.

d. DOE Heads of Field Organizations and NNSA Field Element Managers.

- (1) Ensure an adequate number of persons with responsibility for oversight of the contractor's nuclear facility training and qualification program. Identify and submit resource requests to the Program Secretarial Officers to provide adequate oversight of the implementation of personnel selection, training, qualification, and certification programs.
- (2) Provide Contracting Officers with necessary information and direction for procurements (existing or planned) requiring application of the CRD of this Order.

- (3) Evaluate and approve contractor implementation documentation, which includes the Training Implementation Document (TID) (Training Implementation Matrix (TIM) or succeeding Training Program Plan (TPP) or Training Program Description (TPD)) as described in the definitions.
- (4) Evaluate and approve the contractor procedures established to release an individual from portions of a training and qualification program based on the individual's prior education, experience, training, and/or qualification/certification.
- (5) Conduct oversight activities to evaluate the implementation of the requirements of the CRD and the overall effectiveness of the Nuclear Facility Training and Qualification program. An assessment of the program must be performed at least once every three years.
 - (a) The oversight activities must include: An evaluation of the contractor's implementation documentation to ensure DOE has reviewed and approved all major changes.
 - (b) Ensuring the entire scope of DOE-STD-1070-94, if applicable, is addressed through contractor assessments.
 - (c) Ensuring that the Training and Qualification Program is developed and implemented using the Systematic Approach to Training (SAT) process.
 - (d) Ensuring that each of the basic elements of the SAT process is assessed.
 - (e) This evaluation must include a verification of the implementation of the applicable requirements of this CRD and criteria from the DOE-STD-1070-94. Consistent with DOE O 226.1, the scope of this evaluation must be determined based on performance information from the contractor assurance system and federal oversight activities. Additionally, the basis for the scope of this evaluation must be documented.
 - (f) Evaluate the certification and recertification of shift supervisors, senior reactor operators (SROs), reactor operators, and fissionable material handlers at Category A reactors. The Field Element manager determines whether an evaluation of the certification and recertification of these positions at other nuclear facilities needs to be performed based on facility hazards and operational complexity.

This evaluation includes:

- 1 Periodic and random review of individual training records;
 - 1 Periodic observations of oral examinations, walkthroughs, and operational evaluations; and
 - 2 Periodic spot checks of initial and continuing training classes, performance of practical factors, administration of oral examinations and other training and qualification program materials.
- (6) Approve, on a case-by-case basis, contractor requests for extension of certification.
 - (7) Approve, on a case-by-case basis, assignment of individuals who do not meet the education and/or experience requirements for a position.
 - (8) Review and approve contractor assessments of the need for a simulator at Hazard Category 1/Category A test and research reactors.
- e. Contracting Officers.
- (1) Upon notification of its applicability, incorporate the CRD into applicable contracts that contain Department of Energy Acquisition Regulation (DEAR) clause 970.5204-2, *Laws, Regulations, and DOE Directives*, via the process set forth in DEAR clause 970.5204-2.
 - (2) Upon notification of its applicability, incorporate applicable CRD requirements in the contract terms and conditions of new and existing contracts not subject to DEAR clause 970.5204-2, as appropriate.
6. INVOKED TECHNICAL STANDARDS. IAW the applicability and conditions described within this Order, the following DOE technical standard is invoked as a required evaluation method in this Order. Any technical standard or industry standard mentioned in or referenced by this Order, but is not included in the paragraph below, is not invoked by this Order. Note: DOE O 251.1, current version, provides a definition for “invoked technical standard.” DOE-STD-1070-94, *Criteria for Evaluation of Nuclear Facility Training Programs*, is required to be used in performing oversight and systematic evaluations of training and qualification programs at DOE nuclear facilities. See Section 4.c. and CRD Chapter I, Section 3.c. for applicable requirements.
 7. REFERENCES. See Attachment 2.
 8. DEFINITIONS. See Attachment 3.

9. CONTACT. Questions concerning this Order may be addressed to the Office of Quality Assurance and Nuclear Safety Management Programs at nuclearsafety@hq.doe.gov.

BY ORDER OF THE SECRETARY OF ENERGY:



DAVID M. TURK
Deputy Secretary

ATTACHMENT 1
CONTRACTOR REQUIREMENTS DOCUMENT (CRD)
DOE O 426.2A, PERSONNEL SELECTION, QUALIFICATION,
AND TRAINING REQUIREMENTS FOR DOE NUCLEAR FACILITIES

Regardless of the performer of the work, the contractor is responsible for complying with the requirements of this CRD consistent with applicable federal laws. 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. The Order establishes selection, training, qualification, and certification requirements for all contractor personnel who, by action or inaction, can affect compliance with the safety basis of Hazard Category 1, 2, and 3 nuclear facilities.

1. Chapter I of this CRD establishes general training and qualification program requirements for all personnel who can impact the safety basis through their involvement in the operation, maintenance, and technical support of Hazard Category 1, 2, and 3 nuclear facilities.
2. Chapter II of this CRD establishes additional training and qualification program requirements for all personnel who can impact the safety basis through their involvement in the operation, maintenance, and technical support of Hazard Category 2 and 3 nonreactor nuclear facilities.
3. Chapter III of this CRD establishes additional training and qualification program requirements for all personnel who can impact the safety basis through their involvement in the operation, maintenance, and technical support of Hazard Category 1/Category A and Hazard Category 2/Category B reactor nuclear facilities. The requirements of Chapter II are not applicable to these facilities, unless specifically cited in Chapter III.

ATTACHMENT 1, CHAPTER I GENERAL REQUIREMENTS

1. TRAINING ORGANIZATION. The contractor must establish one or more organizations responsible for the training of all contractor personnel subject to this Order. This organization will be expected to (a) provide support to Management to ensure personnel are qualified to perform assigned work safely and effectively, and (b) document the responsibilities, qualifications, and authority of training organization personnel.

2. IMPLEMENTATION DOCUMENTATION.
 - a. The contractor must prepare a Training Implementation Document (TID) (i.e., Training Implementation Matrix (TIM) or succeeding Training Program Plan (TPP) or Training Program Description (TPD)) that accomplishes the following objectives:
 - (1) Identifies which sections of this CRD are applicable to a particular facility;
 - (2) Defines and describes the application of requirements for personnel selection, qualification, certification, and training requirements;
 - (3) Defines the organization, planning, and administration of the program;
 - (4) Sets forth the responsibility, authority, and methods for conducting training; and
 - (5) Provides justification for not implementing certain CRD provisions.

Section 4.b. of this Order requires that DOE or NNSA review and approve this documentation.
 - b. Contractors having approved implementation documentation at the time this CRD is incorporated into their contracts are expected to make any needed revisions to comply with the requirements of this CRD within 90 days of the date this CRD is inserted into the contract. Contractors having approved implementation documentation are expected to make any needed revisions to comply with the requirements of this CRD and submit it to DOE for review and approval. If no revisions are needed, a letter to that effect may be submitted to DOE within 90 days of the date this CRD is inserted into the contract.

3. TRAINING PROCESS.
 - a. A training and qualification program must be established at a minimum for operations, maintenance, and technical personnel, and any others with the potential to impact the safe operation of the facility using the “systematic approach to training” (SAT) process. The basic elements of this process are:
 - (1) An analysis of the jobs to be performed (job/task analysis);

- (2) Design of learning objectives derived from the analysis of the job that describe desired performance after training;
- (3) Development of lesson plans and other training materials based on the learning objectives;
- (4) Implementation of the training;
- (5) Evaluation of trainee mastery of the objectives during training;
- (6) Evaluation and revision of the training as needed based on observance of trained personnel performing their duties; and
- (7) Monitoring of organizational performance to determine if any weaknesses in performance are linked to parallel weaknesses in the training and qualification program.

Guidance on the design and implementation of training and qualification programs is provided in DOE-HDBK-1078-94, *Training Program Handbook: A Systematic Approach to Training*.

- b. The training and qualification program must be developed using a graded approach. Use of the graded approach will ensure the level of detail and content of the training and qualification program will be appropriate to the hazards involved and risk associated with the operation of the facility or activity. Accordingly, the level of detail and content of the training and qualification program, and associated documents or procedures, must reflect the personnel selection, training, qualification, and certification that are required at these facilities.
- c. Every three years a contractor must perform a systematic evaluation of its training and qualification programs IAW DOE-STD-1070-94, *Criteria for Evaluation of Nuclear Facility Training Programs*. The evaluation must include a review of the training implementation documentation to ensure the document(s) reflect current facility conditions/operations and meets the requirements of this CRD. The evaluation may be conducted in phases over a three-year period. All sections must be evaluated over a three-year period.
- d. The contractor's change control processes must be integrated with training to ensure any changes to facility, processes, Documented Safety Analyses (DSAs), Technical Safety Requirements (TSRs), Justifications for Continued Operation (JCO), procedures, or regulatory changes are evaluated to determine their effect on the existing Training and Qualification Programs. Changes to the TID require DOE/NNSA approval. There are many conditions in a Training Implementation Document that, if changed, would require a revision to the training and qualification program documentation (e.g., facility system changes, changes to operator positions, etc.) in addition to changes to the safety basis documentation.
- e. Training personnel as a team, stressing team communications and interaction, may be used where job functions require team activities and solutions.

- f. Training and qualification programs must consist of a combination of classroom-type, on-the-job training, simulator, and laboratory training as it applies to the position. Classroom-type training may include lectures, seminars, table-top exercises, computer-based training, and structured self-study activities. Training and qualification programs may employ multiple methods to accommodate individual learning styles and training methods best suited for delivery of the content being provided. Qualification/certification programs may not be limited exclusively to self-study using computers or written materials.
- g. Personnel in the process of completing training on tasks and positions for which they are not yet fully qualified must work under the direct supervision of someone who is qualified; however, they may independently perform individual tasks or job assignments for which they are qualified. Contractor management must not place unqualified personnel in a position that requires them to make decisions or take actions when their work could affect facility safety.

4. PERSONNEL SELECTION.

- a. Selection Process. The contractor must establish a process for selection and assignment of “Functional Level” personnel as shown in Chapters II and III (Tables 1, 2, and 3). This process includes factors such as background, experience, education, and medical examination (as applicable), and may be based on the ability of the person to meet job performance requirements. Selection of personnel may involve a selection test.
- b. Education and Experience Requirements. Education and experience requirements for operating organization personnel are intended to ensure these persons have, or will acquire, the knowledge and skills needed to operate and maintain DOE nuclear facilities and related support systems under all conditions safely and reliably. Tables and supporting notes in Chapters II and III identify the minimum education and experience requirements for operating organization personnel and managers. Management level personnel must meet the requirements shown prior to assuming the duties of the assigned position. Except when noted otherwise, a baccalaureate degree is required to be in engineering or a related science or technology.
- c. Alternatives to Education. Education requirements may include a baccalaureate degree, or high school diploma. The type and level of degree/diploma required is a function of the job responsibilities of the position. Persons who do not possess the desired formal educational requirements may be qualified based on other factors such as experience or non-academic training. Qualification by alternative factors is a judgment decision made by the contractor in each case and must be fully documented. The following alternative qualification methods may be considered in making such decisions:
 - (1) High School Diploma: passing a General Education Development (GED) test.
 - (2) Baccalaureate Degree. Three optional paths:

- (a) Possession of a current Professional Engineer’s license relevant to the position being filled; or
- (b) Successful completion of 80 semester credit hours of the technical portions of an engineering, engineering technology, or related science program [i.e., calculus, engineering physics, chemistry (above the freshman level), and engineering or science] may be substituted for the baccalaureate degree. Successful completion must be determined by a transcript or certification by an institution or program accredited by an accrediting organization recognized by the Council for Higher Education Accreditation or the United States Department of Education. The courses must be in appropriate technical subjects relevant to the position being filled; or
- (c) Experience substitution for education:
 - 1 For reactor facilities or nonreactor nuclear facilities deemed to need a higher rigor due to the complexity/hazards associated with the facility: Related experience may be substituted for education at the rate of 6 semester credit hours for each year of experience up to a maximum of 60 hours of credit.
 - 2 For other nonreactor nuclear facilities: Related experience may be substituted for education at the rate of 2 years’ experience to the applicable position for one year of a baccalaureate degree (i.e., eight years’ related experience is equivalent to a baccalaureate degree).
- d. Alternatives to Experience. On a case-by-case basis, a contractor may accept experience in general engineering design, construction, and operations as qualifying nuclear experience. Acceptance of such experience must be documented by the contractor.

Limitations:

- (a) Formal education may not substitute for more than 50 percent of experience requirements.
 - (b) Job-related training may be claimed as the equivalent to no more than two years’ nuclear experience.
- e. Exemption from Experience/Education Requirements. If an individual does not meet the entry level experience requirements contained in the CRD tables and cannot satisfy the alternative education and/or experience provisions, individuals may still be assigned to that position based on consideration of the collective nuclear experience and the strength and balance of the overall operating organization. In such cases, the contractor must provide documented justification

to the DOE Head of Field Organization or the NNSA Field Element Manager for approval prior to the assignment.

5. GENERAL EMPLOYEE TRAINING.

- a. All personnel requiring unescorted access to Hazard Category 1, 2, or 3 nuclear facilities must be trained on the topics listed below, as applicable, or be continuously escorted by an employee already cleared for access. This training may be given for site-wide access or for separate facilities. Required topics:
 - (1) General description of facility.
 - (2) Access-related policies (to include escort duties), procedures and instructions.
 - (3) Radiological hazards.
 - (4) Site/facility emergency plans.
 - (5) Industrial hazards.
 - (6) Fire response protocol/fire protection program.
 - (7) Security requirements.
- b. Completion of access training requires satisfactory performance on an examination, which may be written, computer, or web based. The examination must be of sufficient scope and rigor to demonstrate the employee has adequate knowledge to independently access the facility safely.
- c. Changes to information provided in access training must be evaluated for potential revision to the training and for periodic refresher training.

6. QUALIFICATION AND CERTIFICATION.

- a. Qualification and certification have different requirements for management, documentation, and records. Not all qualifications require certifications. All certifications require qualification.
- b. Initial Qualification and Certification. The program leading to qualification/certification must be governed by written procedures that include requirements for documented assessment of the person's knowledge, skills, and abilities. The contractor must define qualification/certification requirements for personnel in each of the functional levels (Tables 1, 2, and 3) based on the criteria contained in Chapter II or III as applicable. The contractor must keep an accurate and up-to-date record indicating whether a person is qualified or certified and stating when the qualification/certification expires.
- c. Subcontractor Personnel. Job qualifications stated in this Order apply to both contractor and subcontractor personnel. It is the operating contractor's

responsibility to ensure subcontractor and temporary personnel performing specialized activities, such as radiation protection, radiography, welding, and in-service inspection, are qualified to perform the assigned tasks. Any one of the following methods may be used to confirm subcontractor qualification:

- (1) The satisfactory result of an audit of subcontractor qualification and training records.
- (2) The operating contractor's previous verification (within two years) of the subcontractor employee's ability to perform assigned tasks safely and efficiently.
- (3) The subcontractor employee's successful completion of those segments of the operating organization's qualification program is considered pertinent to accomplishing the tasks to be performed. This may include demonstrating proficiency.

As stated in other sections of this CRD, a worker that cannot be qualified using any of these options is required to work under the direct supervision of personnel qualified to perform the activity or task.

7. OPERATORS AND OPERATIONS SUPERVISORS.

- a. Operator training must cover all areas fundamental to the candidate's assigned tasks. The training and qualification program will include the following sections as applicable:
 - (1) A core of fundamental science and engineering subjects as determined by an analysis for the position(s). The subjects may be provided as independent courses or as part of facility systems training. Examples include, but are not limited to: Instrumentation and Controls, Mechanical Science, Electrical Science, Heat Transfer, Fluid Flow, Thermodynamics, Nuclear Science and Criticality Control, and Materials Science.
 - (2) Classroom, simulator (as applicable), and on-the-job training will cover:
 - (a) Facility or operation systems (normal, abnormal, and emergency systems), including principles of operation, components, functions, instrumentation, signals, interlocks, failure modes, system interfaces, and automatic and manual features;
 - (b) Principles of facility operation, including the process involved and technical terminology for the chemical, physical, and metallurgical reactions;
 - (c) Normal, abnormal, and emergency procedures;
 - (d) Emergency systems, including components, functions, and limitations;

- (e) Criticality safety principles, controls, and specifications;
 - (f) Radiation control practices;
 - (g) Safety basis documentation (DSA, hazard controls, including TSRs); and
 - (h) Conduct of operations.
 - b. The operations supervisor training and qualification program must cover in greater technical depth the same subject categories and on-the-job training specified for operators, to the extent appropriate.
 - c. Qualification of operators and operations supervisors is based on completion of a comprehensive written examination and operational evaluation. Certification of operators and operations supervisors is based on completion of qualification requirements and an oral examination.
 - d. Qualification or certification of operators and operations supervisors is valid for up to two years, but may be revoked earlier for cause, such as medical problems or performance deficiencies. Qualification may be granted only after determining all requirements have been met.
- 8. TECHNICIANS AND MAINTENANCE PERSONNEL.
 - a. Technicians and maintenance personnel must be qualified to perform the task or tasks associated with their specialty or work under the direct supervision of personnel qualified to perform the activity or task.
 - b. Technicians and maintenance personnel whose work involves engineered safety features must be trained on the importance of safety significant and safety class structures, systems, and components.
 - c. Technician and maintenance personnel qualification must include performance evaluations, such as Job Performance Measures. Written examinations may be administered to personnel in these positions as applicable.
 - d. Training and qualification program content for RCT must be IAW the requirements contained in 10 CFR Part 835, *Occupational Radiation Protection*; and DOE-STD-1098-2017, *Radiological Control*. Passing an oral examination may also be required for RCT positions (see Part 6 of DOE-STD-1098-2017).
- 9. OPERATIONS/ENGINEERING MANAGERS AND TECHNICAL PERSONNEL SUPPORTING NUCLEAR FACILITIES. Personnel are considered qualified by virtue of meeting the education and experience requirements for the position and by completing applicable position-specific training.
 - a. Required training topics for operations and engineering managers:
 - (1) Applicable facility safety basis documents;

- (2) Facility processes and systems;
 - (3) Additional topics listed in Section 7.a. as relevant to the position and;
 - (4) Nuclear Safety Culture.
- b. Required training topics for technical personnel as applicable:
- (1) Facility fundamentals: systems, components, and operations;
 - (2) Applicable DOE Orders and standards;
 - (3) Applicable consensus codes and standards;
 - (4) Safety basis documentation (DSA, hazard controls, including TSRs) and the Unreviewed Safety Question (USQ) process;
 - (5) Criticality safety program;
 - (6) Radiological protection program;
 - (7) Quality assurance program;
 - (8) Material, maintenance, and configuration management; and
 - (9) Nuclear safety culture.
- c. Continuing training and professional development programs may be established to meet the needs of the individual and the position. Satisfactory performance of their assigned duties and assessment of individual performance such as that which is typically included in personal performance appraisals may be used to document and inform the determination of continued satisfactory performance.

10. EXAMINATIONS.

- a. Written Examinations. Written examinations must contain a sampling of the knowledge identified in and derived from the learning objectives resulting from the SAT process.
- b. Operational Evaluation. The operational evaluation is a facility walkthrough that includes system and/or component operation. The evaluation may include a simulation of operations, during which the candidate is observed and questioned regarding procedures, safety implications, and TSRs. Operational evaluations must require the candidate to demonstrate the ability to perform a sampling of the following actions based on job-specific training requirements:
 - (1) Execute pre-startup procedures;
 - (2) Operate controls that could affect reactivity or criticality safety;

- (3) Operate controls to control the facility in all operating modes;
- (4) Identify annunciators and condition-indicating signals and perform appropriate remedial actions;
- (5) Identify instrumentation systems and the significance of associated instrument readings;
- (6) Operate heat removal systems and explain relationships between proper operation of these systems and the operation of the facility;
- (7) Operate auxiliary and emergency systems, including controls that could affect criticality safety or confinement of radioactive and hazardous materials;
- (8) Demonstrate or describe the use and function of radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring systems;
- (9) Demonstrate knowledge of significant radiation hazards, including permissible levels of personnel exposure; and
- (10) Respond to abnormal events.

c. Oral Examinations for Certified Positions.

- (1) Oral examinations may be conducted as a one-on-one walkthrough (potentially during the operational evaluation) or by an oral board empaneled by facility managers and knowledgeable and/or qualified personnel. For Category A Reactors the oral exam must be separate from the operational evaluation.
- (2) Oral examinations require the candidate to demonstrate operational knowledge. The oral examination must be tailored to evaluate the candidate's operational knowledge and organizational awareness as related to the normal operating environment and abnormal conditions. Topics may include operating philosophy, use of procedures, shift and relief turnovers, and verification of system and equipment status.

11. EXCEPTIONS TO TRAINING REQUIREMENTS.

- a. The operating contractor must establish a procedure for documenting and granting exceptions to initial training and qualification program requirements. This procedure requires the written approval of the DOE Head of Field Organization or the NNSA Field Element Manager, per section 5.d.(3).
- b. A request for an exception action includes:
 - (1) Name of the requester;

- (2) Specific subject for which the exception is requested, and;
 - (3) Justification.
- c. Successful completion of equivalent training and qualification programs comparable in content and performance standards by personnel placed in the training and qualification program may receive substitute equivalency credit for training on an individual case basis. Exceptions to training may be based in part on a review of previous training records.
 - d. Persons who believe they have comparable knowledge or skills may challenge the requirement to attend training. Challenge examinations (written or performance) may be administered and must be sufficiently comprehensive to adequately test the learning objectives stated in the training. The use of challenge tests is not considered an exception to the training.

12. CERTIFICATION PROCESS.

a. Certification:

- (1) The processes by which contractor management endorses and documents, in writing, the satisfactory completion of qualification requirements.
- (2) Follows the completion of the qualification program for those positions identified as requiring certification.
- (3) Differs from qualification in that it requires an oral examination and official contractor management endorsement.

b. Written procedures govern the certification process.

- (1) Fissionable material handlers and fissionable material handler supervisors must be certified. For all other operators and their immediate supervisors, the contractor must identify in the implementation documentation any additional positions that will be certified based on facility hazards and operational complexity.
- (2) The program leading to certification must be governed by written procedures that include requirements for qualifications through examinations and operational evaluations.
- (3) Certification must not be granted until all qualification requirements and other specified requirements (e.g., medical examination) have been satisfactorily completed and management has confirmed the candidate is capable of safely performing all functions of the position.
- (4) Satisfactory completion of qualifications for certification must be verified by a person other than the candidate's immediate supervisor.

- (5) Certification will be valid for a period not to exceed two years unless revoked for cause (e.g., medical disqualification).
 - c. Certification is granted when:
 - (1) All qualification requirements and other specified requirements (e.g., medical examination) have been satisfactorily completed, and
 - (2) Management has confirmed the candidate is capable of safely performing all functions of the position.
13. MEDICAL EXAMINATION. Upon acceptance of a conditional offer of employment, an initial medical examination must be given to certified operator candidates to verify health and physical fitness to safely perform their assigned tasks. A reexamination must be given to certified persons at least every two years unless more frequent monitoring is determined appropriate by the examining physician. Certified persons must also be cleared by medical examination prior to returning to full duty following any illness or injury which prevents the person from performing full duties for a period exceeding one month. Medical examinations for other operating contractor personnel must be job-related and consistent with business necessity IAW 42 U.S.C. §12112(d).
14. CONTINUING TRAINING. Continuing training must be provided to all operations positions (e.g., shift managers, operations supervisors, shift technical engineers, operators). Continuing training and qualification programs maintain and enhance the knowledge and skills of operating personnel. DOE-HDBK-1118-99, *Best Practices for Continuing Training*, may be consulted when developing such programs.
 - a. Qualified and/or Certified Operators and Operations Supervisors.
 - (1) Continuing training courses may be structured commensurate with specific position needs and may be taken throughout a two-year period.
 - (2) Examinations may be used to ensure course material is understood and retained.
 - (3) If the contractor chooses to give periodic requalification examinations in place of a comprehensive biennial requalification examination, the periodic requalification exams must include material from the continuing training courses.
 - (4) Continuing training courses and exercises must cover:
 - (a) Significant facility system and component changes;
 - (b) Procedure changes;
 - (c) Recent industry operating experience;
 - (d) Reinforcement of seldom-used knowledge and skills;

- (e) Changes in the safety basis documentation;
 - (f) Other training as needed to correct identified performance problems;
 - (g) Normal, abnormal, and emergency procedures;
 - (h) Use of facility systems to control or mitigate accidents; and
 - (i) Topics identified in Section 7.a.
- (5) Operational Drills
- (a) The continuing training program for qualified/certified operators and operations supervisors must include operational drills conducted in the facility or on a simulator to enable facility operating personnel and operating teams to maintain their ability to respond to abnormal or accident situations. Drills are intended for the entire operating crew but can be run on portions of the crew as applicable.
 - (b) Operational drills may be conducted in the facility or on a simulator.
 - (c) The rigor and detail of a drill program will vary with facility complexity and hazard potential.
 - (d) Operational drills are NOT drills associated with “Operational Emergencies” as defined in DOE O 151.1D, *Comprehensive Emergency Management System*.
 - (e) The operational drill program must be included in the Training Implementation Document.
- (6) Personnel responsible for developing and delivering training may be excused from continuing training on the subjects they teach.
15. REQUALIFICATION/RECERTIFICATION. Completion of the continuing training and qualification program and requisite examinations is required for all operators and operations supervisors. Operators and supervisors cannot continue to function in qualified or certified positions if they have not completed all requalification or recertification program elements within the two-year continuing training cycle. The contractor must indicate that the person has successfully completed the requalification program and is requalified and/or recertified.

a. Requalification/Recertification Examinations.

- (1) Requalification/recertification includes requisite examinations (comprehensive examinations, operational evaluations, and oral examinations if required by the position). Acceptable alternative paths are: (i) a comprehensive biennial requalification examination, or (ii) periodic examinations (e.g., quarterly) during the continuing training cycle, provided the overall scope matches a biennial exam.
- (2) If personnel fail a requalification or recertification examination, show serious job performance deficiencies, or if any required training element lapses, the person must be removed from any activities or areas requiring the lapsed qualification or certification element. (See Section 15.c below on extensions for lapse of a required training element.)

Qualification or certification may be regained after completing remedial training designed to correct the deficiency and satisfactory completion of a reexamination, or completion of the needed training requirement. In addition, recertification must be based on: (i) review of an individual's operating performance during the past certification period by line management, and (ii) a current medical examination.

b. Absences.

- (1) When a qualified/certified individual (operator or operations supervisor) has been absent from duties (e.g., temporary reassignment, leave of absence, extended training, etc.) for more than three months, but less than 12 months, the individual must confirm proficiency by complying with the requirements of Chapter II.3 or Chapter III.5, as applicable. The qualification or certification base date remains the same as it was before the absence.
- (2) When a qualified or certified individual has been absent for more than 12 months, in addition to the above requirements, the individual is required to complete all the requisite examinations applicable to the position. Upon successful completion of the above requirements, a new qualification or certification date will be established.

c. Extensions.

- (1) An extension of qualification or certification may be granted on a case-by-case basis to support operational and mission commitments. An administrative procedure written by the contractor must be applied in these circumstances.
- (2) Documentation supporting the extension includes:
 - (a) Approver of the extension;

- (b) Length of the extension (not to exceed 12 months); and
 - (c) Explanation of the circumstances that prevented the person from completing the training requirements.
- (3) Extensions of certification for operators and operations supervisors can be approved only by the DOE Head of Field Organization or the NNSA Field Element Manager. Extensions of qualification for operators and operations supervisors may be approved by contractor facility management.

16. MANAGEMENT AND SUPERVISORY SKILLS TRAINING.

- a. Supervisory Skills Training. The supervisory skills training and qualification program must cover the following topics:
- (1) Leadership;
 - (2) Interpersonal communication;
 - (3) Roles, responsibilities, authority, and accountability;
 - (4) Motivation of personnel;
 - (5) Problem analysis and decision making;
 - (6) Fitness for duty procedures;
 - (7) Administrative policies and procedures;
 - (8) Conduct of Operations;
 - (9) Conduct of Maintenance as applicable, and the Work Control Process;
 - (10) Quality Assurance;
 - (11) Conduct of selection, training, qualification, and certification of personnel;
 - (12) Management of personnel performance issues; and
 - (13) Nuclear Safety Culture.
- b. Management Skills Training. The management training and qualification program must consider the supervisory skills listed above, plus:
- (1) Quality assurance and quality control;
 - (2) Facility security and emergency plans;
 - (3) Purchasing;
 - (4) Material storage;

- (5) Facility modifications and configuration control;
- (6) Nuclear, industrial, and radiation safety; and
- (7) Environmental compliance.

17. RECORDS.

- a. Administrative records procedures are needed to control and preserve training, qualification, and certification records in an easily auditable format. Guidance on constructing such procedures may be found in several documents published by the Nuclear Information and Records Management Association: TG-15, *Management of Electronic Records*; and TG-21, *Required Records Protection, Disaster Recovery and Business Continuation*.
- b. Training records are subject to a number of legal requirements, which can be found in: 10 CFR 835, subpart J; 10 CFR Section 851.25; 10 CFR Part 1008, *Records Maintained on Individuals (Privacy Act)*; and the current versions of DOE O 206.1, *Department of Energy Privacy Program*; DOE O 243.1, *Records Management Program*; DOE O 471.7, *Controlled Unclassified Information*.
- c. Some documents are sensitive due to their content (e.g., medical information) and must be protected. In such cases, the TID may identify the secured location and cybersecurity protections. Additionally, controlling access to physical and digital training records is needed to maintain examination security.
- d. Individual files include the following information:
 - (1) Education, experience, employment history, and most recent health evaluation summary;
 - (2) Training and qualification programs completed and qualification/certification achieved; latest completed checklists, graded written examinations (with answers corrected as necessary or examination keys), simulator examinations, and operational evaluations used for qualification/certification;
 - (3) Lists of questions asked and the examiner's overall evaluation of the responses on oral examinations;
 - (4) Correspondence relating to exceptions to training requirements and extensions of qualification/certification;
 - (5) Records of qualification for one-time-only special tests or operations;
 - (6) Attendance records for required training courses or sessions; and
 - (7) Proficiency records if required by site procedures.

ATTACHMENT 1, CHAPTER II NONREACTOR NUCLEAR FACILITIES

- PURPOSE.** The requirements in this CRD are intended to provide reasonable assurance that personnel who can impact the safety basis through their involvement in the operation, maintenance, and technical support at DOE Hazard Category 1, 2, and 3 nonreactor nuclear facilities possess qualifications to operate and maintain the facility safely and reliably under all conditions. This chapter contains specific training and qualification program requirements for nuclear facility operators, fissionable material handlers, and nuclear facility operations supervisors. The requirements of this chapter supplement those in Chapter I.

Table 1 below summarizes the education and experience requirements for nonreactor nuclear facilities. Except for the training manager and instructional technologist, all college degrees must be in engineering or related scientific majors.

**Table 1: Hazard Category 2 and 3 Nonreactor Nuclear Facilities
Personnel Education and Experience Requirements**

FUNCTIONAL LEVEL	EDUCATION	EXPERIENCE		SPECIAL RQMTS
	Degree or Diploma	Job Related	Nuclear	
Managers	Baccalaureate (1)		4 years (2)	(6)
Supervisors	HS		3 years (3)	
Operators/Fissionable Material Handlers	HS			
Technicians	HS			
Maintenance Personnel	HS			
Technical Support Personnel/Staff	Baccalaureate	2 years	1 year	
Instructional Technologist	Baccalaureate (4)	1 year		(4)
Training Instructors	HS	(5)		

Notes:

- The training manager must have a baccalaureate degree (does not have to be in Engineering or related science). The training manager must have courses in education or training that focus on instructional analysis, design, development, delivery, and testing as well as evaluation of training and qualification programs if not included in the baccalaureate course material.
- Job-related education or experience may be substituted on a case-by-case basis. The degree may be used to substitute up to 50 percent of the experience requirement per section I 4.e of this CRD.
- Full-time related academic training (e.g., degree programs, trade schools, and vocational programs) may be substituted on a one-for-one basis for up to two years of nuclear experience.
- Instructional technologists should have a degree in training/education. Training or education for instructional technologists must include courses on the SAT process including analysis, design, development, implementation, and evaluation. Additionally, instructional technologist training may include evaluation of training materials, instructor evaluation, and training and qualification program assessment.

- (5) Experience must be consistent with the material being presented. Instructors must have demonstrated knowledge of instructional techniques through training or experience and be qualified by the training manager (or equivalent) for the material being presented. Instructors responsible for instruction on subjects such as TSRs are required to complete training on facility operating characteristics and principles, and operating limits such as Safety Limits, Limiting Control Settings, and Limiting Conditions for Operation. Significant involvement in the writing of TSRs is desirable but not required.
- (6) Managers must receive facility-specific training based upon a comparison of the individual's background and abilities with the responsibilities and duties of the position.

2. SPECIFIC REQUIREMENTS FOR CERTIFIED POSITIONS.

- a. Certified Operators and Fuel Handling Operators. Learning objectives developed from the Job/Task analysis must include information in the DSA, TSRs, system description manuals and operating procedures, lessons learned from Occurrence Reports, and other applicable sources. System process control operations may be included as appropriate for the facility. Certified supervisors need only supervise or direct the performance of system operations to satisfy this requirement.
- b. Certified Supervisors and Fuel Handling Supervisors. Job/Task analysis may generate learning objectives for certified supervisors similar to operators with increased emphasis on theory and basis for procedures. In addition, the following topics may be considered:
 - (1) Procedures and limitations involved in initial equipment loading, alterations in fissionable material configuration, and determination of various internal and external effects on criticality safety;
 - (2) Procedures, equipment, and facilities available for handling and disposing of radioactive materials and effluent;
 - (3) Functions, assignments, and responsibilities of the maintenance and technical support organizations as related to nuclear facility safety; and
 - (4) Applicable portions of the facility DSA and TSRs.
- c. Comprehensive written examinations must be used and must contain a representative selection of questions on the knowledge identified in the learning objectives.

3. PROFICIENCY.

- a. The operating organization must establish procedures which define requirements and frequency (e.g., 8 hours per month, 10 hours per quarter, etc.) necessary to maintain proficiency. An individual normally maintains proficiency by having a position on a shift crew and being responsible for the day-to-day duties of that position. Personnel not assigned full-time to operating shifts may remain proficient by participating in a defined number of shift hours or operating activities. Both qualified and certified positions are required to maintain proficiency.

- b. If proficiency has not been maintained, qualification/certification must be suspended, and the person must not be assigned duties. Prior to reassigning an employee to duty following loss of active status, the contractor must evaluate and document the following factors:
 - (1) Continuing training topics missed (if any);
 - (2) Required reading applicable to the position;
 - (3) Changes in facility systems/processes;
 - (4) Performance of duties under the direct supervision of a person qualified in that position for a prescribed period; and
 - (5) Written and oral examinations and performance evaluations if applicable.

- c. If the facility or specific activities are not operated frequently enough to meet established requirements, qualification/certification must be reinstated prior to operation. One or more of the following qualification methods may be used:
 - (1) Written and/or oral examination;
 - (2) Operational evaluation (including practical factors and performance demonstrations);
 - (3) Facility or tabletop walkthrough; and
 - (4) Simulated operations.

**ATTACHMENT 1, CHAPTER III
REACTOR NUCLEAR FACILITIES**

- PURPOSE.** This chapter contains specific training requirements for positions unique to Hazard Category 1 and 2/Category A and B Reactor Nuclear Facilities, such as the specialized training and certification requirements for reactor operators. The requirements of this chapter supplement those in Chapter I.
- REACTOR TRAINING SUMMARY.** Tables 2 and 3 below summarize the training requirements for two types of reactors. Except for the training manager, all college degrees must be in engineering or related scientific majors.

**Table 2: Hazard Category 1/Category A Reactor Facility
Personnel Education and Experience Requirements**

FUNCTIONAL LEVEL	EDUCATION		EXPERIENCE		SPECIAL RQMTS
	Degree/Diploma	Other	Job Related	Nuclear	
Managers					
Plant/Facility Manager	Baccalaureate		(1)	6 years (2)(3)	(5)
Operations Manager	Baccalaureate		(15)	4 years (3)(6)	(13)
Maintenance	Baccalaureate		(15)	4 years (3)(6)	(8)
Technical Manager	Baccalaureate		(15)	4 years (3)(7)	
Supervisors					
Shift Supervisor	HS			4 years (6)	(19)
Senior Reactor Operator	HS		4 years	2 years (3)	(10)
Qualified Supervisor	HS		4 years	1 year (4)	
Technical Support					
Technical Personnel	Baccalaureate		2 years	1 year	
Shift Technical Advisor	Baccalaureate			1 year (3)	(18)
Training Organization					
Training Manager	Baccalaureate (17)		4 years (16)	2 years	(9)
Instructional Technologist	Baccalaureate (14)		2 years	(3)	
Training Instructor	HS		2 years (11)		(12)
Operators, Technicians, & Maintenance					
Auxiliary Operator	HS			1 year (7)(3)	
Reactor Operator	HS			3 years (3)(6)	
Technician	HS		3 years		
Maintenance Personnel	HS		1 year		

Notes:

- (1) Minimum of four years of supervisory or management experience.
- (2) Three years of nuclear experience may be power plant experience.
- (3) Minimum of six months onsite.
- (4) Minimum of three months onsite.

- (5) Hold, or have held, a senior reactor operator (SRO) certification/NRC License for similar Hazard Category 1/ Category A reactor plant (or equivalent) or have been certified at an appropriate simulator. Plant managers who have an assistant holding an SRO certification need not meet this special standard.
- (6) Two years of nuclear experience may be nuclear/non-nuclear power plant experience.
- (7) One year of nuclear experience may be power plant experience.
- (8) Includes familiarity with nondestructive testing and understanding of electrical, pressure vessel, and piping codes and standards.
- (9) Training manager holds, or has held, an SRO certification/NRC License for similar Hazard Category 1/ Category A reactor plant (or equivalent) or have been certified at an appropriate simulator. If the training manager does not hold, or has not held, an SRO certification, someone who holds or has held an SRO certification must be responsible for the content and conduct of training for certified operators.
- (10) Special requirements for the SRO:
 - (a) One year of nuclear power plant experience as an active reactor operator of the same vendor and vintage; or
 - (b) One and a half years as an active reactor operator at a comparable [boiling water reactor (BWR)/pressurized water reactor (PWR)] facility or a noncomparable commercial power reactor facility; or
- (11) Four years as a senior operator level certified instructor at the current or a commercial power reactor facility. Experience must be consistent with the material being presented. Instructors must have demonstrated knowledge of instructional techniques through training or experience and be qualified by the training manager (or equivalent) for the material being presented.
- (12) Instructors providing instruction on the reactor plant simulator to certified personnel are required to hold, or have held, an SRO certification for a similar Hazard Category 1/Category A reactor plant (or equivalent), or have been certified on the reactor plant simulator. Persons responsible for instruction of subjects such as TSRs, reactor operating principles and characteristics, and control manipulations are required to have received SRO (or equivalent) training.
- (13) The operations manager must hold an SRO certification at the time of appointment to the position.
- (14) Instructional technologists should have a degree in training/education. Training or education for instructional technologists must include courses on the SAT process including analysis, design, development, implementation, and evaluation. Additionally, instructional technologist training may include evaluation of training materials, instructor evaluation, and training and qualification program assessment.
- (15) Minimum of three years of supervisory or management experience.
- (16) Minimum of one year of supervisory or management experience.
- (17) The training manager must have a baccalaureate degree (does not have to be in Engineering or related science). The training manager must have courses in education or training that focus on instructional analysis, design, development, delivery and testing as well as evaluation of training and qualification programs if not included in the baccalaureate course material.
- (18) The shift technical advisor (STA) must have a thorough understanding of facility instrumentation and control.
- (19) The shift supervisor must be certified SRO.

**Table 3: Hazard Category 2/Category B Reactor Facility
Personnel Education and Experience Requirements**

FUNCTIONAL LEVEL	EDUCATION	EXPERIENCE		SPECIAL RQMTS
	Degree or Diploma	Job Related	Nuclear	
Managers				
Plant/Facility Manager	Baccalaureate		6 years (1)(2)	
Operations Manager	Baccalaureate		4 years (2)	(5)
Maintenance	Baccalaureate		4 years (2)	
Technical Manager	Baccalaureate		4 years (2)	
Supervisors				
Shift Supervisor	HS		3 years (2)	(8)
Senior Reactor Operator	HS		3 years (2)	
Training Organization				
Training Manager	Baccalaureate (6)	4 years	2 years	
Instructional Technologist	Baccalaureate (7)	2 years		
Training Instructor	HS	(3)		(4)
Technical Support				
Technical Personnel	Baccalaureate	2 years	1 year	
Reactor Operator	HS			
Technician	HS	1 year		
Maintenance Personnel	HS	1 year		

Notes:

- (1) Job-related education or experience may be substituted on a case-by-case basis. The degree may fulfill four of the six years of nuclear experience.
- (2) Experience acquired at nuclear power, test, research, or production reactors or at a critical facility counts towards nuclear experience for purposes of this Order.
- (3) Experience must be consistent with the material being presented. Instructors must have demonstrated knowledge of instructional techniques through training or experience and be qualified by the training manager (or equivalent) for the material being presented.
- (4) Persons responsible for instruction of subjects such as TSRs, reactor operating principles and characteristics, and control manipulations are required to have received SRO (or equivalent) training.
- (5) The operations manager must hold an SRO certification at the time of appointment to the position.
- (6) The training manager must have a baccalaureate degree (does not have to be in Engineering or related science). The training manager must have courses in education or training that focus on instructional analysis, design, development, delivery and testing as well as evaluation of training and qualification programs if not included in the baccalaureate course material.
- (7) Instructional technologists should have a degree in training/education. Training or education for instructional technologists must include courses on the SAT process including analysis, design, development, implementation, and evaluation. Additionally, instructional technologist training may include evaluation of training materials, instructor evaluation, and training and qualification program assessment.
- (8) The shift supervisor must be certified SRO.

3. SPECIFIC REQUIREMENTS: HAZARD CATEGORY 1/CATEGORY A REACTOR.

This section provides additional position-specific training requirements for Hazard Category 1/Category A reactor personnel.

- a. Engineering Expertise On-Shift Requirements. Safe operation demands the operating shift possess adequate operational and accident management expertise. This demand may be satisfied by designating a Shift Technical Advisor (STA) for each shift, or by combining the STA position with the shift supervisor or an on-shift SRO. If the combined approach is utilized, the designated STA must have the following qualifications:
 - (1) Currently certified as an SRO;
 - (2) Successful completion of STA training requirements in paragraph 3.c.; and
 - (3) One of the following educational requirements:
 - (a) Baccalaureate in Engineering;
 - (b) Professional Engineer's license;
 - (c) Baccalaureate in Engineering Technology, with course work in the physical, mathematical, or engineering sciences; or
 - (d) Baccalaureate in a physical, mathematical, or engineering science, with course work in engineering technology.
- b. Simulator Requirements. The need for a full-scope or part-task simulator for DOE test and research reactors may be based on an evaluation conducted by the operating organization. The evaluation may consider whether adequate training may be achieved by actual facility maneuvers, drills, part-task simulators, or a combination of these. The evaluation may also consider the ability to adequately provide in-facility training covering all operator actions needed to achieve and maintain safe shutdown. The operating contractor may evaluate the ability to provide adequate training in normal operations, anticipated transients, and accident conditions. The assessment of the need for a simulator must be reviewed by the DOE Head of Field Organization or the NNSA Field Element Manager and the Program Secretarial Officer or the NNSA Deputy Administrator.
- c. Shift Technical Advisor. STA training must include:
 - (1) The duties, responsibilities, and authorities of the STA;
 - (2) Postulated accidents analyzed in the facility DSA and the potential consequences of these accidents;
 - (3) Thermodynamics/fluid flow, reactor physics, system engineering, nuclear instrumentation, use of a process computer, and facility response to normal and abnormal conditions;

- (4) Performance of control manipulations, either on a simulator, in the facility during maneuvers and drills, or a combination of these;
 - (5) Response to and analysis of facility transients and accidents; and
 - (6) The relationship of accident conditions to offsite consequences and protective action strategies.
- d. Fuel Handling Operations [to include Special Nuclear Material (SNM) Handling and Fissionable Material Handling].
- (1) Fuel handling operations must always be performed by or under the direct supervision of a person certified to perform the required functions.
 - (2) A specific training and qualification program that comprises initial and continuing training may be established to certify fuel handling operators and supervisors.
 - (3) Training and examination may be limited to fuel handling safety and actions to be taken during abnormal and emergency conditions.
 - (4) Written examinations must be given to gauge the qualification of fuel handling operators.

NOTE: The training requirements listed above are not necessary if fuel handling is performed by persons trained for such as part of reactor operator and SRO certification programs.

- e. Reactor Operators. Training must include information from the following as applicable:
- (1) Fundamentals of reactor theory, heat transfer, thermodynamics, and fluid mechanics;
 - (2) General design features of the core;
 - (3) Components and design features of major systems;
 - (4) Facility operating characteristics during steady state and transient conditions;
 - (5) Procedures and TSRs including normal, abnormal, emergency, and administrative procedures; and operational limitations;
 - (6) An understanding of the DSA, TSRs, system description manuals and operating procedures;
 - (7) Radiological safety principles and procedures; and
 - (8) Use of installed facility systems for the control and mitigation of an accident in which the core may be severely damaged.

Written examinations containing a selection of questions from the learning objectives developed from the analysis of the job must be administered to reactor operator candidates.

- f. Senior Reactor Operators. Training must include information from the following as applicable:
- (1) Conditions and limitations for facility operations;
 - (2) Operating limitations in the TSRs and their bases;
 - (3) Procedures required to obtain authority for design and operating changes in the facility;
 - (4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions;
 - (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations;
 - (6) Procedures and limitations for initial core loading, alterations in core configuration, control rod programming, and determination of various internal and external effects on core reactivity; and
 - (7) Fuel handling facilities and procedures.

Written examinations containing questions on the learning objectives listed above must be administered to SRO candidates.

- g. Operating Crew/Shift Training.
- (1) Reactor operator candidates must: (i) be assigned to an operating crew full-time for a minimum of three months' shift training, with no concurrent duties unrelated to facility operations, and (ii) during this period, under the observation and control of a certified reactor operator, manipulate the facility controls and perform the same duties as a certified reactor operator.
 - (2) SRO candidates must: (i) be assigned to an operating crew full-time for a minimum of three months' shift training with no concurrent duties unrelated to facility operations, and (ii) during this period, under the observation and control of a certified SRO, supervise the manipulation of the facility controls and perform the same duties as a certified SRO.
- h. Control Manipulation Requirements for Certified Positions.
- (1) The list of control manipulations for certified positions is based on the SAT analysis for these positions. This list (i) specifies which manipulations are to be performed annually and which are to be performed biennially, and (ii) identifies any control manipulations that may affect reactivity.

- (2) A minimum of five reactivity manipulations must be performed by reactor operator and SRO candidates prior to initial certification. Additional control manipulations may be based on the job analysis.
 - (3) Control manipulations are performed by candidates for certification prior to initial certification and thereafter on a biennial basis for reactor operators and SROs as part of the continuing training and qualification program.
 - (4) Certified supervisors need only supervise or direct the performance of control manipulations to satisfy these criteria.
- i. Medical Examination Requirements. For Hazard Category 1/Category A reactors, the contractor must comply with 10 CFR 851, Appendix A, Section 8, *Occupational Medicine*. Medical personnel are encouraged to use medical examination criteria and procedures in ANSI/ANS 3.4-2013, *Medical Certification and Monitoring of Licensed Personnel at Nuclear Power Plants*, and NRC Regulatory Guide 1.134, *Medical Assessment of Licensed Personnel at Nuclear Power Plants*, Rev. 4, September 2014.

4. SPECIFIC REQUIREMENTS: HAZARD CATEGORY 2/CATEGORY B REACTOR.

- a. Fuel Handling Operations. All fuel handling operations must be performed by or under the direct supervision of a person certified to perform such operations. Supporting requirements: (1) establish a specific training and qualification program (initial and continued) to certify fuel handling operators and supervisors for their assigned tasks, and (2) administer written examinations. Training and examination may be limited to that needed for fuel handling safety, the impact of fuel handling on safety, and actions to be taken during abnormal and emergency conditions.

The requirements above do not apply if fuel handling is performed by reactor operators and SROs trained for fuel handling.

- b. Reactor Operators. Training for reactor operators may consider the previous experience, training, and level of responsibility of the candidate. The qualification program may include both classroom-type and on-the-job training to assure familiarity with all required aspects of reactor operation, including anticipated transients and accident conditions. Where construction precludes on-the-job training, practical experience at similar reactors, training on simulators, and other appropriate training may be accepted. Training must include information from the following as applicable:
- (1) Facility design and operating characteristics, including facility design features, design and operating characteristics and limitations, safety and emergency systems, experiment and test facilities, engineered safety features, and shielding;

- (2) An understanding of the DSA, TSRs, system description manuals and operating procedures;
- (3) Principles of facility operation, including principles of reactor operation, radiological protection, effects of experiments, basic reactor theory, heat transfer, fluid flow, and thermodynamics, as necessary, for the specific design of the reactor;
- (4) Instrumentation and control, including nuclear instruments, process instruments, control systems, radiation monitoring systems and survey equipment, experiment and test facility instrumentation, and manipulation of reactivity controls; and
- (5) Procedures and TSRs, including normal, abnormal, emergency, radiological and hazardous materials control and administrative procedures, and operational limitations.

Written examinations based on the above learning objectives and developed from an analysis of the job must be administered to reactor operator candidates.

- c. Senior Reactor Operators. Training for SROs may consider the previous experience, training, and level of responsibility of the candidate. Training must include information from the following as applicable: Radioactive materials handling, including SNM and radioactive materials hazards, handling, disposal, and safe practices;

- (1) Information in the DSA, TSRs, system description manuals and operating procedures, and lessons learned from Occurrence Reports; and
- (2) Advanced theory and operation, including reactivity effects during experimental and maintenance activities, fuel handling, fuel burnup and reactivity worth; alterations in core configuration; TSRs and their technical bases; and administrative responsibilities for an SRO's level of responsibility.

Written examinations based on the above learning objectives developed from an analysis of the job must be administered to SRO candidates.

- d. Control Manipulation Requirements for Certified Positions. (See Chapter III, Section 3.)

- e. Medical Examination Requirements. For Hazard Category 2/Category B reactors, the contractor must comply with 10 CFR 851, Appendix A, Section 8, *Occupational Medicine*. Medical personnel are encouraged to use the medical examination criteria and procedures in ANSI/ANS 15.4-2016, *Selection and Training of Personnel for Research Reactors*.

5. PROFICIENCY. General proficiency requirements are provided in Chapter II, Section 4. The following are the minimum duty times to maintain proficiency for reactor operators and SROs:
- a. Hazard Category 1/Category A Reactors: 36 hours per quarter, in blocks of time no less than four hours.
 - b. Hazard Category 2/Category B Reactors: To maintain active status, perform certification duties for at least four hours per quarter.
 - c. For other operators, operations supervisors, and on-shift technical personnel, specific activities or duty hours per quarter required to maintain active status are defined by the operating contractor.
 - d. If proficiency is not maintained, the person may not be assigned duties. Prior to restoring an employee to duty following loss of active status, the contractor may evaluate and document the following factors:
 - (1) Continuing training topics missed (if any);
 - (2) Required reading applicable to the position;
 - (3) Changes in facility systems/processes;
 - (4) Performance of duties under the direct supervision of a person qualified in that position for a prescribed period IAW Section e below; and
 - (5) Written and oral examinations and performance evaluations as deemed necessary.
 - e. If proficiency is not maintained, Certified Reactor Operators and SROs must:
 - (1) perform certification duties under the direct supervision of a person certified in that position for a minimum period of time, as stated below; (2) tour the facility; and (3) review shift turnover procedures. The minimum required performance times for certified duties are:
 - (1) Hazard Category 1/Category A reactor certified reactor operators and SROs: 24 hours (in blocks of no less than four hours).
 - (2) Hazard Category 2/Category B reactor certified reactor operators and SROs: six hours.

ATTACHMENT 2. REFERENCES

This Attachment provides information associated with DOE O 426.2A as well as information applicable to contracts in which the associated CRD (Attachment 1 to DOE O 426.2A) is inserted.

1. Code of Federal Regulations (CFR).
 - a. 10 CFR Part 55, *Operators' Licenses*
 - b. 10 CFR Part 830, *Nuclear Safety Management*
 - c. 10 CFR Part 835, *Occupational Radiation Protection*
 - d. 10 CFR Part 850, *Chronic Beryllium Disease Prevention Program*
 - e. 10 CFR Part 851, *DOE Worker Safety and Health Program*
 - f. 10 CFR 1008, *Records Maintained on Individuals (Privacy Act)*
2. Nuclear Information and Records Management Association.
 - a. Nuclear Information and Records Management Association, *Management of Electronic Records*, TG-15-1998
 - b. Nuclear Information and Records Management Association, *Electronic Records Protection and Restoration*, TG-21-2011
3. Nuclear Regulatory Commission.
 - a. Regulatory Guide 1.134, *Medical Assessment of Licensed Operators or Applicants for Operator Licenses at Nuclear Power Plants*
 - b. Regulatory Guide 1.149, *Nuclear Power Plant Simulation Facilities for Use in Operator Training, License Examinations, and Applicant Experience Requirements*, Rev. 4 (2011)
 - c. Regulatory Guide 1.8, *Qualification and Training of Personnel for Nuclear Power Plants*, Rev. 3 (2000)
4. American National Standards Institute (ANSI)/American Nuclear Society (ANS) STD.
 - a. ANSI/ANS 3.1-2014, *Selection, Qualification, and Training of Personnel for Nuclear Power Plants*
 - b. ANSI/ANS 3.4-2013, *Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants*
 - c. ANSI/ANS 3.5-2009, *Nuclear Power Plant Simulators for Use in Operator Training and Examination*

- d. ANSI/ANS 8.1-2014, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors*
 - e. ANSI/ANS 8.15-2014, *Nuclear Criticality Control of Special Actinide Nuclides*
 - f. ANSI/ANS 8.20-1991, *Nuclear Criticality Safety Training (Reaffirmed 2015)*
 - g. ANSI/ANS 15.4-2016, *Selection and Training of Personnel for Research Reactors*
5. DOE Orders (O) and Manuals (M).
- a. DOE O 151.1, *Comprehensive Emergency Management System*, current version
 - b. DOE O 206.1, *Department of Energy Privacy Program*, current version
 - c. DOE O 226.1, *Implementation of Department of Energy Oversight Policy*, current version
 - d. DOE O 227.1, *Independent Oversight Program*, current version
 - e. DOE O 243.1, *Records Management Program*, current version
 - f. DOE O 251.1, *Departmental Directives Program*, current version
 - g. DOE O 414.1, *Quality Assurance*, current version
 - h. DOE O 420.1, *Facility Safety*, current version
 - i. DOE O 425.1, *Verification of Readiness to Startup or Restart Nuclear Facilities*, current version
 - j. DOE O 440.1, *Worker Protection Program for DOE (including the National Nuclear Security Administration) Federal Employees*, current version
 - k. DOE O 460.1, *Hazardous Material Packaging and Transportation Safety*, current version
 - l. DOE O 471.7, *Controlled Unclassified Information*, current version
6. DOE Handbooks (HDBK) and Technical Standards (STD).
- a. DOE-STD-1070-94, *Criteria for Evaluation of Nuclear Facility Training Programs (R: 2014)*
 - b. DOE-HDBK-1078-94, *Training Program Handbook: A Systematic Approach to Training (R: 2014)*
 - c. DOE-HDBK-1211-2014, *Activity-Level Work Planning and Control Implementation*

- d. DOE-STD-1098-2017, *Radiological Control*
7. Other.
- a. Department of Energy Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2011-1, December 27, 2011
 - b. Other training resources are available at the National Training Center Training Library (<https://sites.ntc.doe.gov/partners/tr/SitePages/Home.aspx>) and in DOE's Technical Standards archives. Examples of archived documents:
 - (1) DOE-HDBK-1204-97, *Guide to Good Practices for the Development of Test Items*
 - (2) DOE-HDBK-1205-97, *Guide to Good Practices for the Design, Development, and Implementation of Examinations*
 - (3) DOE-HDBK-1206-98, *Guide to Good Practices for On-The-Job Training*
 - (4) DOE-HDBK-1078-94, *Training Program Handbook: A Systematic Approach to Training*
 - (5) DOE-HDBK-1118-99, *Guide to Good Practices for Continuing Training*

ATTACHMENT 3. DEFINITIONS

This Attachment provides information associated with DOE O 426.2A as well as information applicable to contracts in which the associated CRD (Attachment 1 to DOE O 426.2A) is inserted.

1. Auxiliary Operator is an operator whose duties and responsibilities involve balance of plant operations typically outside the control area.
2. Category A Reactor Facilities means those production, test, and research reactors designated by DOE based on power level, potential fission product inventory, and experimental capability. Category A reactors are Hazard Category 1 nuclear facilities.
3. Category B Reactor Facilities means those test and research reactors designated by DOE based on power level, potential fission product inventory, and experimental capability. Category B reactors are Hazard Category 2 nuclear facilities.
4. Certification is the process by which contractor management endorses and documents, in writing, the satisfactory achievement of qualification by a person for a position designated for certification. Certification follows the completion of the qualification program for those positions identified as requiring certification. The notable differences between initial certification and qualification are: (a) requirements for an oral examination or board, and (b) certification requires official contractor management endorsement, outside of the individual's direct supervisor, of their qualification to ensure senior management involvement in the qualification of designated operations positions (i.e., operators and supervisors).
5. Certified Person is a person who has current certification in accordance with this Order.
6. Controls means when used with respect to nuclear reactors, apparatus, and mechanisms that, when manipulated, directly affect the reactivity or power level of a reactor or the status of an engineered safety feature.
7. Critical Assembly means special nuclear devices designed and used to sustain nuclear reactions, which may be subject to frequent core and lattice configuration changes and may frequently be used as mockups of reactor configurations (10 CFR Part 830). For purposes of this Order, critical assemblies are considered Hazard Category 2 nuclear facilities or Category B reactors.
8. Direct Supervision occurs when the qualified watchstander's sole responsibility is the supervision of the trainee and the watchstander is continuously capable of physically preventing any adverse actions of the trainee by direct intervention of the trainee's actions.
9. Documented Safety Analysis (DSA) means a documented analysis of the extent to which a nuclear facility can be operated safely with respect to workers, the public, and the environment, including a description of the conditions, safe boundaries, and hazard controls that provide the basis for ensuring safety. (10 CFR Part 830)

10. Education is the successful completion of the requirements established by an accredited educational institution.
11. Engineered Safety Features mean structures, systems, or components that prevent and/or mitigate the consequences of potential accidents described in the Documented Safety Analysis (DSA).
12. Exception as used in this Order, refers to a release of an individual from portions of a training and qualification program through prior education, experience, testing, evaluation of work products, and training determined by using a DOE approved procedure.
13. Exemption is a formal and final release from a provision in a DOE Order, Notice, or Manual included in the contract; or from one or more requirements in a Regulation. (See DOE O 410.1, *Central Technical Authority Responsibilities Regarding Nuclear Safety Requirements*, current version.)
14. Fissionable Materials mean a nuclide capable of sustaining a neutron-induced fission chain reaction. These nuclides are uranium-233, uranium-235, plutonium-238, plutonium-239, plutonium-241, neptunium-237, americium-241, and curium-244.
15. Fissionable Materials Handler is a person certified by contractor facility management to manipulate or handle significant quantities of fissionable materials; or manipulate the controls of equipment used to produce, process, transfer, store, or package significant quantities of such materials.
16. Full-Scope Simulator is a simulator incorporating detailed modeling of systems of the reference facility with which the operator interfaces in the control room environment. The control area operating consoles are included. Such a simulator demonstrates expected facility response to normal and abnormal conditions.
17. Functional Level refers to level in an organization such as manager, supervisor, or the various degrees of operator and personnel.
18. General Employee Training (GET) for the purpose of this Order, is the training required to allow persons to have unescorted access to Hazard Category 1, 2, or 3 nuclear facilities.
19. Graded Approach means the process of ensuring the level of analysis, documentation, and actions used to comply with a requirement are commensurate with: (a) the relative importance to safety, safeguards, and security; (b) the magnitude of any hazard involved; (c) the life-cycle stage of a facility; (d) the programmatic mission of the facility; (e) the particular characteristics of a facility; (f) the relative importance of radiological and nonradiological hazards; and (g) any other relevant factors (10 CFR Part 830). Proper use of the systematic approach to training (SAT) ensures the application of the graded approach.

20. Hazard Categories are the calculated consequences of postulated unmitigated releases of radioactive and/or hazardous material evaluated as required by 10 CFR Part 830 and classified by the following hazard categories:
 - a. Category 1. The hazard analysis shows the potential for significant offsite consequences.
 - b. Category 2. The hazard analysis shows the potential for significant onsite consequences.
 - c. Category 3. The hazard analysis shows the potential for only significant localized consequences.
21. Implementation Documentation (see Training Implementation Document)
22. Instructional Technologist is the individual primarily involved in the analysis, design, development, and implementation of training for job positions/activities in nuclear facilities. This individual works under the direction of the training manager and in coordination with the training instructors to: (a) conduct needs and job analysis to identify training requirements (valid task list, training requirements matrix); (b) design training, including determination of training setting and development of learning objectives, evaluation standards, and examination test items; (c) develop training materials, including lesson plans and trainee support materials; (d) conduct classroom, on-the-job, simulator, distance, or laboratory training; and (e) assist line management in the evaluation of training and qualification program.
23. Job Analysis is a systematic method used in obtaining a detailed listing of the tasks of a specific job.
24. Maintenance Personnel are persons responsible for performing maintenance on engineered safety features and support systems as identified in the Documented Safety Analysis (DSA) (this would include personnel responsible for planning and preparing the work packages associated with maintenance).
25. Manager refers to a person whose assigned responsibilities include one or more of the following: nuclear safety, operational efficiency and reliability, control of onsite emergencies, and any other activities necessary to safeguard the health and safety of the workforce, the general public, and the environment. Operational responsibilities include prioritizing and assessing facility activities including modifications and overseeing the operating organization. This functional level typically includes the plant/facility manager or Director, the operations manager, the maintenance manager, the training manager, and the technical/engineering manager.
26. Medical Examination means an examination performed by a licensed physician, or an examination performed by physician's assistant that is subsequently reviewed and approved by a licensed physician, to determine the physical condition and general health of a person for duty.

27. Must and May: (a) Must is used to denote a requirement; (b) May is used to denote permission or recommendation.
28. Nonreactor Nuclear Facility means those facilities, activities, or operations that involve, or will involve, radioactive and/or fissionable materials in such form and quantity that a nuclear or a nuclear explosive hazard potentially exists to workers, the public, or the environment, but does not include accelerators and their operations and does not include activities involving only incidental use and generation of radioactive materials or radiation, such as check and calibration sources; use of radioactive sources in research, experimental, and analytical laboratory activities; electron microscopes; and X-ray machines. (10 CFR Part 830)
29. Nuclear Experience when used in reference to Hazard Category 1/Category A and Hazard Category 2/Category B Reactors, is experience acquired at commercial, production, training, test, military, or research reactors and includes experience acquired in reactor facility startup activities or operation. Experience in design, construction, maintenance, or related technical services that are job-related may also be considered. Appropriate research, teaching, or both may be counted as nuclear experience. When used in reference to nonreactor nuclear facilities, also includes experience acquired at any facility in which radioactive materials are routinely handled, stored, processed, or utilized.
30. Nuclear Facility means a reactor or a nonreactor nuclear facility where an activity is conducted for or on behalf of DOE and includes any related area, structure, facility, or activity to the extent necessary to ensure proper implementation of the requirements established in 10 CFR Part 830.
31. Nuclear Safety Culture is defined as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.
32. Operators are persons responsible for performing operations associated with engineered safety features as identified in the Documented Safety Analysis (DSA), operating support systems which could affect engineered safety features, or conducting activities with special nuclear materials (SNMs) and/or radioactive materials. Duties may include manipulating facility controls, monitoring parameters, and operating facility equipment. Operators include reactor operators, fissionable material handlers, tritium facility operators, chemical process operators, waste tank operators, and enrichment facility operators.
33. Operating Organization is the contractor organization responsible for facility operation, maintenance, and technical support services related to DOE nuclear facility operations.
34. Operational Drill is a drill conducted in the facility that exercises process/facility equipment, procedures, and level of knowledge for qualified/certified positions. These activities are also intended to demonstrate knowledge of operational procedures during abnormal conditions.

35. Operational Evaluation is a documented evaluation of an individual's knowledge and skills for a position requiring qualification/certification. The operational evaluation is a facility walkthrough evaluation conducted for qualification/certification that may include system and/or component operation or simulation of operations, during which the candidate is observed and questioned regarding procedures, safety implications, system knowledge, and operational safety requirements, as applicable.
36. Operations Manager is the individual responsible for maintaining the safety envelope of the facility/operation; managing operators and their supervisors; and achieving operational goals within budget and schedule.
37. Participation is taking an active role in the duties and responsibilities relative to the function for which the candidate/trainee is being considered. Simple observation is not considered participation.
38. Performance Demonstration is a documented evaluation of an individual's knowledge and skills for a position requiring only qualification. The intent of the process is similar to that of an Operational Evaluation but tailored to more limited job requirements. (See Operational Evaluation definition.)
39. Performance Evaluation is a generic term used to describe when one's performance is being evaluated to determine if they possess the knowledge and skills required to perform identified jobs, tasks, or processes.
40. Power Plant Experience is experience acquired in the testing, operation, or maintenance of nuclear or other power generating facilities. Experience in design and construction may be considered applicable power plant experience and may be evaluated on a case-by-case basis.
41. Practical Factors (Prac-Facs) are discrete tasks identified in the design phase and are performed using approved procedures/administrative guides/common practices while under the instruction (U/I) of a qualified operator/supervisor/manager. May also be accomplished performing the duties of the qualified position.
42. Proficiency means actively participating in job functions associated with the position/watchstation (whether qualified and/or certified) for a specified amount of hours per month/quarter as specified in facility procedures.
43. Qualification is the process for attaining, demonstrating, and documenting the knowledge, skills, and abilities identified for a position by the systematic approach to training (SAT) process. It includes education, experience, classroom and on-the-job training, examination, and any special requirements necessary to perform assigned responsibilities for a given position.
44. Reactor is a device used to initiate and control a sustained nuclear chain reaction.
45. Reactor Operator means a person certified by contractor nuclear facility line or program management to operate (manipulate the controls of) a DOE-owned reactor.

46. Safety Analysis means a documented process: (a) to provide systematic identification of hazards within a given DOE operation; (b) to describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and (c) to analyze and evaluate potential accidents and their associated risks.
47. Safety Basis means the documented safety analysis (DSA) and hazard controls that provide reasonable assurance the DOE nuclear facility can be operated safely in a manner that adequately protects workers, the public, and the environment. (10 CFR Part 830)
48. Senior Reactor Operator (SRO) means a person certified by contractor nuclear facility line or program management to operate and direct the operation of a DOE-owned reactor.
49. Shift Supervisor is a qualified or certified person in the operating organization designated by contractor facility management to directly supervise operations, operational activities, and operations-related activities of personnel at DOE-owned Hazard Category 1, 2, and 3 nuclear facilities. Substitute titles may be used for positions of equivalent functions.
50. Shift Technical Advisor (STA) is a person who has been assigned to provide on-shift advice and counsel to shift operating personnel during shift activities and to help determine cause and mitigation of facility accidents.
51. Significant Quantity of Fissionable Materials is the minimum quantity of fissionable material in designated form for which control is required to maintain subcriticality under all normal and credible abnormal conditions. The single parameter limits for fissionable materials are listed in ANSI/ANS-8.1-2014, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors*, and ANSI/ANS-8.15-2014, *Nuclear Criticality Control of Special Actinide Elements*. These standards require that limits be adjusted where process conditions could credibly involve moderators or reflectors that are more effective than light water.
52. Supervisors are individuals who are responsible for the quantity and quality of work performed and who direct the actions of operators, fissionable material handlers, technicians, or maintenance personnel. Supervisory positions typically include shift operations manager (or shift manager), reactor supervisors, fissionable material handler supervisors, tritium operator supervisors, chemical process operator supervisors, waste tank operator supervisors, maintenance supervisors, technician supervisors, and technical support supervisors. Their duties include ensuring work is performed in compliance with procedures, policies, and industrial safety practices.
53. Systematic Approach to Training (SAT) is a logical process for identifying and acquiring the knowledge, skills, and abilities required to safely perform the duties of a specific position. It includes the following elements:
 - a. An analysis of the jobs to be performed;
 - b. Design of learning objectives derived from the analysis of the job that describe desired performance after training;
 - c. Development of lesson plans and other training materials;

- d. Implementation of the developed training;
 - e. Evaluation of trainee mastery of the objectives during training; and
 - f. Evaluation and revision of the training based on the performance of trained personnel in the job setting.
54. Task is a well-defined unit of work having an identifiable beginning and end, which is a measurable component of the duties and responsibilities of a specific job.
55. Technical Personnel are persons responsible for supervision, design, evaluation, modification, testing, and performance of technical support functions for the operating organization. Technical personnel typically have expertise in mechanical, electrical, instrumentation and control, chemistry, radiation protection, safety, quality assurance/independent assessment, software quality assurance, facility engineering, system/process engineering, safety basis engineering, criticality safety, or nuclear safety. (Examples of technical personnel responsibilities include: surveillance and testing related to normal facility operation and operation of safety-related systems; analyzing routine operational/facility data; planning modifications to facility safety systems; providing technical assistance during normal, abnormal, and emergency facility conditions to offer technical problem resolution to operations in their area of expertise; providing engineering/technical assistance in support functions to the facility such as radiological, quality assurance, and for initial design or modifications that impact nuclear safety.)
56. Technical Safety Requirements (TSRs) mean the limits, controls, and related actions that establish the specific parameters and requisite actions for the safe operation of a nuclear facility and include, as appropriate for the work and hazards identified in the documented safety analysis (DSA) for the facility: safety limits, operating limits, surveillance requirements, administrative and management controls, use and application provisions, and design features, as well as a bases appendix. (10 CFR Part 830)
57. Technicians are principally involved in calibration, inspection, troubleshooting, testing, maintenance, and radiation protection activities. Examples are laboratory technicians, instrument technicians, industrial hygiene, environmental, quality control, decontamination and decommissioning technicians, and radiological control technicians.
58. Training is instruction designed for acquisition of knowledge, skills, and abilities to develop or improve job performance.
59. Training Implementation Document (TID) (also referred to Implementation Document in this Order) is a document (e.g., Training Implementation Matrix (TIM), Training Program Plan (TPP), or Training Program Description (TPD), etc.), prepared by the contractor, to identify those sections of this CRD that are applicable to a particular facility. The document defines and describes the application of personnel selection, qualification, certification, and training requirements identified in this CRD. It must clearly define the organization, planning, and administration of the program and set forth the responsibility, authority, and methods for conducting training. Suitable justification must be included in the document for CRD provisions that are not implemented. At sites

with several facilities, a combined training document may be submitted. The document and any revisions must be approved by DOE.

60. Training Implementation Matrix (TIM) is a term used at some sites for the Training Implementation Document (TID).
61. Training Instructor is an individual with duties and responsibilities for instructing personnel or developing training materials.
62. Training Organization is responsible for supporting the line organization to identify, meet, and monitor training needs in support of the facility mission. The training organization assists line organizations in performing the systematic approach to training (SAT). The training organization may include a training manager, instructional technologists, and instructors.
63. Training and Qualification Program is a planned, organized sequence of activities designed to prepare individuals to perform their jobs, to meet a specific position or classification need, and to maintain or improve their performance on the job.