U.S. Department of Energy
Washington, D.C.

PAGE CHANGE

DOE 5480.20 Chg 1

6-19-91

SUBJECT: PERSONNEL SELECTION, QUALIFICATION, TRAINING, AND STAFFING REQUIREMENTS AT DOE REACTOR AND NON-REACTOR NUCLEAR FACILITIES

1. PURPOSE. To transmit revised pages to DOE 5480.20, PERSONNEL SELECTION, QUALIFICATION, TRAINING, AND STAFFING REQUIREMENTS AT DOE REACTOR AND NON-REACTOR NUCLEAR FACILITIES, of 2-20-91.

2. EXPLANATION OF CHANGE. Paragraph 10a is being revised to change the required due date of the Training Implementation Matrix from 6 months after the issuance of the Order to November 8, 1991. This change is necessary to allow sufficient time for preparation and submittal of the Training Implementation Matrix.

3. FILING INSTRUCTIONS.

a.

Remove Page	Dated	Insert Page	Dated
9 and 10	2-20-91	9	2-20-91
		10	6-19-91

b. After filing the attached pages, this transmittal may be discarded.

BY ORDER OF THE SECRETARY OF ENERGY:

JOHN J. NETTLES, JR.
Director of Administration
and Human Resource Management

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INITIATED BY:
Assistant Secretary for
Nuclear Energy

f. Director, Naval Nuclear Propulsion Program. Executive Order 12344, statutorily prescribed by PL 98-525 (42 USC 7158 note) establishes the responsibilities and authority of the Director, Naval Nuclear Propulsion Program (who is also the Deputy Assistant Secretary for Naval Reactors within the Department) over all facilities and activities which comprise the Program, a joint Navy-DOE organization. These executive and legislative actions establish the responsibilities of the Director as including "... training, including training conducted at the naval prototype reactors of the Department of Energy, and assistance and concurrence in the selection, training, qualification, and assignment of personnel reporting to the Director and of personnel who supervise, operate, or maintain naval nuclear propulsion plants...." In view of these responsibilities, the provisions of this Order do not apply to the Naval Nuclear Propulsion Program.

g. Director, Office of Recruitment, Technical Training and Professional Staff Development shall establish and implement a training program for DOE personnel, consistent with the training needs identified for this order by PSOs and Heads of Field Organizations.

9. PROGRAM REQUIREMENTS. DOE objectives are to ensure the development and implementation of contractor-administered training programs that provide consistent and effective training for personnel at DOE reactor and non-reactor nuclear facilities. Performance-based training (PBT) methodology has proven to be effective, is required for selected facilities by DOE 5480.18, and is recommended by DOE for the design and development of training programs at all DOE reactor and non-reactor nuclear facilities. In addition to training resulting from PBT methodology, this Order contains minimum prescriptive requirements that must be included in qualification programs. The requirements contained in this Order are based on DOE, NRC, and related industry standards, and are applicable to all DOE nuclear facilities.

a. General Requirements. Chapter I contains requirements that apply to the selection, training, and qualification of personnel at all DOE reactor and non-reactor nuclear facilities. These requirements have broad applicability and provide the foundation for training and qualification of personnel at DOE nuclear facilities;

b. Requirements for Category A Reactor Personnel. Chapter II contains requirements for staffing, selection, training, and qualification of personnel at DOE Category A production, test, and research reactors;

c. Requirements for Category B Reactor Personnel. Chapter III contains requirements for staffing, selection, training, and qualification of personnel at DOE Category B reactors; and

d. Requirements for Non-Reactor Nuclear Facility Personnel. Chapter IV contains requirements for staffing, selection, training, and qualification of personnel at DOE non-reactor nuclear facilities.

10. IMPLEMENTATION SCHEDULE. The requirements of this Order shall be implemented in accordance with the following:

a. A Training Implementation Matrix shall be submitted to the cognizant field organization by November 8, 1991. The Training Implementation Matrix shall contain a schedule for implementing the requirements of this Order. The matrix should be based on the status of existing compliance and shall include the time-frame for incremental implementation and full implementation of the requirements;

b. From the issue date of this Order until the Training Implementation Matrix is approved, all DOE reactor and non-reactor nuclear facilities shall continue to comply with the requirements contained in DOE 5480.5 and DOE 5480.6, as appropriate to the facility;

c. Upon approval of the Training Implementation Matrix, personnel subsequently appointed to functional positions shall meet the education and experience requirements of this Order; and

d. For facilities for which DOE 5480.18 is applicable, implementation of the training program content requirements of this Order may, for positions requiring accreditation, coincide with the implementation of DOE 5480.18.

BY ORDER OF THE SECRETARY OF ENERGY:

JOHN J. NETTLES, JR.
Director of Administration
and Human Resource Management

Vertical line denotes change.

U.S. Department of Energy

Washington, D.C.

ORDER

DOE 5480.20

· 2-20-91

SUBJECT: PERSONNEL SELECTION, QUALIFICATION, TRAINING, AND STAFFING REQUIREMENTS AT DOE REACTOR AND NON-REACTOR NUCLEAR FACILITIES

1. PURPOSE. To establish the selection, qualification, training, and staffing requirements for personnel involved in the operation, maintenance, and technical support of Department of Energy-owned (DOE-owned) Category A and B reactors and non-reactor nuclear facilities to assure that:

   a. Qualification programs are developed and implemented in an effective and reliable manner consistent with the hazard involved and the risk associated with the operation;

   b. Qualification programs promote an awareness of the risks involved and a level of proficiency consistent with assigned tasks; and

   c. All persons are qualified to carry out their assigned responsibilities.

2. CANCELLATION. Paragraph 10, "Personnel Selection and Training," of DOE 5480.5, SAFETY OF NUCLEAR FACILITIES, of 9-23-86, and Paragraph 8e, "Reactor Personnel Training and Qualification Program," of DOE 5480.6, SAFETY OF DEPARTMENT OF ENERGY-OWNED REACTORS, of 9-23-86.

3. SCOPE. The provisions of this Order apply to all Departmental Elements and contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.

4. REFERENCES.

   a. DOE 1324.2A, RECORDS DISPOSITION, of 9-13-88, which contains procedures for the retention and disposition of records.

   b. DOE 5480.5, SAFETY OF NUCLEAR FACILITIES, of 9-23-86, which establishes DOE's non-reactor nuclear facility safety program.

   c. DOE 5480.6, SAFETY OF DEPARTMENT OF ENERGY-OWNED NUCLEAR REACTORS, of 9-23-86, which establishes DOE's nuclear reactor safety program.

   d. DOE 5480.18, ACCREDITATION OF PERFORMANCE-BASED TRAINING FOR CATEGORY A REACTORS AND NUCLEAR FACILITIES, of 11-2-89, which institutionalizes a performance-based training process for DOE Category A reactors and high- and selected moderate-hazard non-reactor nuclear facilities.

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e. DOE 5481.1B, SAFETY ANALYSIS AND REVIEW SYSTEM, of 9-23-86, which establishes uniform requirements for the preparation and review of safety analyses.

f. NUCLEAR REGULATORY COMMISSION (NRC) REGULATORY GUIDE 1.134, REV.2, Medical Evaluation of Nuclear Power Plant Personnel Requiring Operator Licenses, of 4-87, which contains medical certification guidance for operators at commercial nuclear power plants.

g. NUCLEAR REGULATORY COMMISSION (NRC) REGULATORY GUIDE 1.149, REV.1, Nuclear Power Plant Simulation Facilities for use in Operator Licensing Examinations, of 4-87, which contains guidance for simulator training at commercial nuclear power plants.

h. American National Standard, ANSI/ANS 3.4 - 1983, Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants, which contains requirements for medical examinations.

i. American National Standard, ANSI/ANS 3.5 - 1985, Nuclear Power Plant Simulators for Use in Operator Training, which contains minimum simulator performance and configuration criteria necessary for effective training.

j. American National Standard, ANSI/ANS 15.4 - 1988, Selection and Training of Personnel for Research Reactors, which contains the minimum requirements for the selection and training of personnel at research reactors.

5. BACKGROUND.

a. In the commercial nuclear industry, the Nuclear Regulatory Commission (NRC) has stipulated minimum prescriptive requirements for the training of senior reactor operators and reactor operators in Title 10 Code of Federal Regulations Part 55 (10 CFR 55) and has endorsed parts of ANSI/ANS 3.1-1981, "American National Standard Selection, Qualification and Training of Personnel for Nuclear Power Plants," and ANSI N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel," for the selection, qualification, and training of nuclear power plant personnel. In addition, the NRC has issued a policy statement which supports and endorses the Institute of Nuclear Power Operation's performance-based training accreditation program. In a similar fashion, this Order has been developed to update and consolidate DOE's existing prescriptive-type training requirements in a manner that is intended to be complementary and compatible with performance-based training. While the DOE training accreditation program (DOE 5480.18, ACCREDITATION OF PERFORMANCE-BASED TRAINING FOR CATEGORY A REACTORS AND NUCLEAR FACILITIES) establishes a systematic process for the analysis, design, development, implementation, and evaluation of a training program and

its content, this Order encompasses those prescriptive requirements (education and experience, examination and certification requirements, program frequency, requalification, etc.) contained in accepted industry standards where available (e.g., ANS N18.1-1971, ANS 3.1-1981, ANS 3.1-1987, ANS 15.4-1988, and 10 CFR 55).

b. This Order combines and updates the training requirements previously contained in DOE 5480.5, SAFETY OF NUCLEAR FACILITIES, and DOE 5480.6, SAFETY OF DOE-OWNED NUCLEAR REACTORS, into a single, stand-alone training directive. The approach taken in the development of this Order was to consolidate all training requirements common to both reactor and non-reactor nuclear facilities followed by requirements specific to Category A reactors, Category B reactors, and non-reactor nuclear facilities. In addition, training-related issues (i.e., minimum staffing) identified by the National Academy of Sciences and other internal and external reviews have been addressed.

6. DEFINITIONS.

a. Category A or B Reactor is as stated in DOE 5480.6.

b. Certification is the process by which contractor facility management provides written endorsement of the satisfactory achievement of qualification of a person for a position.

c. Controls, when used with respect to nuclear reactors, means apparatus and mechanisms that, when manipulated, directly affect the reactivity or power level of a reactor, or status of an engineered safety feature. When used with respect to any other facility, controls means apparatus and mechanisms, the manipulation of which could affect the chemical, physical, metallurgical, or nuclear process of the facility in such a manner as to affect the protection of health and safety against radiation.

d. Education is the successful completion of the requirements established by an accredited educational institution.

e. Exception is a release from the requirements of this Order. Exception also refers to release of an individual from portions of a training program through prior education, experience, and/or testing.

f. Hazard Classifications are as stated in DOE 5481.1B.

g. Fissionable Materials are nuclides capable of sustaining a neutron induced fission chain reaction (e.g., uranium-233, uranium-235, plutonium-238, plutonium-239, plutonium-241, neptunium-237, americium-241, and curium-244).

h. 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.

i. 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 room operating consoles are included. Such a simulator demonstrates expected facility response to normal and abnormal conditions.

j. Job Analysis is a systematic method used in obtaining a detailed listing of the tasks of a specific job.

k. Medical Examination is an examination performed by a licensed medical physician to determine the physical condition and general health of a person for duty.

l. Non-Reactor Nuclear Facility is as stated in DOE 5480.5.

m. Nuclear Experience when used in reference to:

(1) Category A and 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 is job-related may also be considered. Appropriate research, or teaching, or both may be includable as nuclear experience.

(2) Non-Reactor Nuclear Facilities is experience acquired at any facility in which radioactive materials are routinely handled, stored, processed, or utilized.

n. Operating Organization is the onsite organization responsible for operation, maintenance, and technical support services related to operations. This organization may include offsite personnel who provide operational support.

o. Operational Evaluation is a documented evaluation of an individual's knowledge, skills, and abilities. The operational evaluation is a facility walkthrough that may include system and/or component operation, or simulation of operations, during which the candidate is observed and questioned regarding procedures, safety implications, and technical specifications or operational safety requirements as applicable.

p. Operational Safety Requirement is as stated in DOE 5480.5.

q. 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.

r. Power Plant Experience is experience acquired in the testing, operation, or maintenance of power generating facilities. Experience in design and construction may be considered applicable power plant experience and should be evaluated on a case-by-case basis.

s. Reactor Operator is a person certified by contractor facility management to operate (manipulate the controls of) a DOE-owned reactor. Substitute titles may be utilized for positions of equivalent functions.

t. Safety Analysis is as stated in DOE 5481.1B.

u. Senior Reactor Operator is a person certified by contractor facility management to operate and to direct the operation of a DOE-owned reactor. Substitute titles may be utilized for positions of equivalent functions.

v. Shift Supervisor is a certified person in the operating organization designated by contractor facility management to direct operations-related activities of personnel at a DOE-owned reactor or non-reactor nuclear facility. Substitute titles may be utilized for positions of equivalent functions.

w. Shift Technical Advisor (STA) is a person who has been assigned to provide on-shift advice and counsel to shift operating personnel to help determine cause and mitigation of facility accidents.

x. Shall, Should, and May: Shall is used to denote a requirement; should is used to denote a recommendation; and may is used to denote permission, neither a requirement nor a recommendation.

y. Significant Quantity of Fissionable Materials is as stated in DOE 5480.5.

z. Task Analysis is the systematic process of examining a task to identify skills, knowledge, and/or abilities required for successful task performance.

aa. 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.

bb. Technical Specification is as stated in DOE 5480.6.

cc. Training is instruction designed to develop or improve job performance.

dd. Training Implementation Matrix is a matrix prepared by the operating organization which defines and describes the application of the selection, qualification, and training requirements of this Order. This Matrix includes any exceptions taken for requirements which are not implemented.

ee. Training Program is a planned, organized sequence of activities designed to prepare persons to perform their jobs, meet a specific position or classification need, and to maintain or improve their job performance.

7. APPLICATION. This Order applies to operable DOE-owned Category A and B reactors and non-reactor nuclear facilities.

8. RESPONSIBILITIES AND AUTHORITIES.

a. Program Senior Officials (PSO) shall perform the following functions for reactor and non-reactor nuclear facilities under their program responsibility:

(1) Assume line management responsibility and accountability for reactor and non-reactor nuclear facility personnel qualification programs;

(2) Ensure that resources are provided for developing, implementing, and maintaining facility personnel qualification programs;

(3) Review and approve each Training Implementation Matrix for Category A and high-hazard non-reactor nuclear facilities submitted by Heads of Field Organizations;

(4) Perform appraisals and reviews to confirm implementation of this Order; and

(5) Assure that PSO personnel responsible for training are proficient in personnel training processes and requirements, and that they have diverse expertise so that important areas related to nuclear and occupational safety are covered.

b. Assistant Secretary for Nuclear Energy (NE-1) shall:

(1) Develop and maintain Department-wide selection, qualification, and training requirements and guidelines for operations, maintenance, and technical support personnel;

(2) Assure that NE personnel responsible for training are proficient in personnel training processes and requirements, and that they have diverse expertise so that important areas related to nuclear safety are covered; and

(3) Provide guidance and technical assistance to the cognizant PSO and the field organization.

c. Director, Office of Nuclear Safety (NS-1) acting as the independent element for nuclear safety oversight of line management performance for the Department, shall:

(1) Monitor and audit activities of the cognizant PSO and the field organization to assure the requirements of this Order are consistently applied;

(2) Review each Training Implementation Matrix for Category A reactors and high-hazard non-reactor nuclear facilities to assure their consistency in application of the requirements of this Order; and

(3) Assure that NS personnel responsible for training are proficient in personnel training processes and requirements, and that they have diverse expertise so that important areas related to nuclear safety are covered.

d. Assistant Secretary for Environment, Safety, and Health (EH-1) shall:

(1) Develop Department-wide training requirements for general employee/worker safety training which are consistent with the requirements promulgated by the Occupational Safety and Health Administration, the Nuclear Regulatory Commission, and the Environmental Protection Agency;

(2) Review each Training Implementation Matrix for Category A reactors and high-hazard non-reactor nuclear facilities to assure applicable radiological, environmental, and occupational safety training requirements to the extent specified in this Order are consistently applied; and

(3) Assure that EH personnel responsible for training are proficient in personnel training processes and requirements, and that they have expertise in important areas related to radiological, environmental, and occupational safety.

e. Heads of Field Organizations for facilities and operations under their jurisdiction shall:

(1) Identify and submit resource requests to the cognizant PSO to provide for adequate implementation of qualification programs;

(2) Review each Training Implementation Matrix for Category A reactors and high-hazard non-reactor nuclear facilities and forward them to the cognizant PSO for final approval;

(3) Review and approve each Training Implementation Matrix for Category B reactors and low- and moderate-hazard non-reactor nuclear facilities;

(4) Assure that field organization staffing includes an adequate number of persons having expertise in the area of personnel training;

(5) Assure that DOE contractors to whom this Order is applicable, implement the requirements in Chapters I through IV of this Order;

(6) Review the certification and recertification of shift supervisors, senior reactor operators, reactor operators, and fissionable materials handlers at Category A reactors and high-hazard non-reactor nuclear facilities. Review may vary from observations to ensure that examinations adequately sample a candidate's knowledge and are properly conducted, to and including actively participating as a co-evaluator in an examination to determine a candidate's suitability for certification. Review shall include:

(a) Periodic attendance at certification oral examinations;

(b) Periodic and random review of individual training records;

(c) Periodic monitoring and evaluation of annual oral examinations/walkthroughs;

(d) Periodic spot checks of oral examinations, initial and continuing training classes, performance of practical factors, operational evaluations, and other training program materials; and

(e) Review of certification records.

(7) Approve contractor procedures which are established to grant exceptions to specific training or qualification requirements for an individual;

(8) Approve, on a case by case basis, contractor requests for certification extensions;

(9) Approve any temporary deviation from facility Safety Analysis Reports, Technical Specifications, or Operational Safety Requirements regarding facility staffing requirements; and

(10) Approve contractor assessments of the need for a simulator at Category A test and research reactors.

f. Director, Naval Nuclear Propulsion Program. Executive Order 12344, statutorily prescribed by PL 98-525 (42 USC 7158 note) establishes the responsibilities and authority of the Director, Naval Nuclear Propulsion Program (who is also the Deputy Assistant Secretary for Naval Reactors within the Department) over all facilities and activities which comprise the Program, a joint Navy-DOE organization. These executive and legislative actions establish the responsibilities of the Director as including "... training, including training conducted at the naval prototype reactors of the Department of Energy, and assistance and concurrence in the selection, training, qualification, and assignment of personnel reporting to the Director and of personnel who supervise, operate, or maintain naval nuclear propulsion plants...." In view of these responsibilities, the provisions of this Order do not apply to the Naval Nuclear Propulsion Program.

g. Director, Office of Recruitment, Technical Training and Professional Staff Development shall establish and implement a training program for DOE personnel, consistent with the training needs identified for this order by PSOs and Heads of Field Organizations.

9. PROGRAM REQUIREMENTS. DOE objectives are to ensure the development and implementation of contractor-administered training programs that provide consistent and effective training for personnel at DOE reactor and non-reactor nuclear facilities. Performance-based training (PBT) methodology has proven to be effective, is required for selected facilities by DOE 5480.18, and is recommended by DOE for the design and development of training programs at all DOE reactor and non-reactor nuclear facilities. In addition to training resulting from PBT methodology, this Order contains minimum prescriptive requirements that must be included in qualification programs. The requirements contained in this Order are based on DOE, NRC, and related industry standards, and are applicable to all DOE nuclear facilities.

a. General Requirements. Chapter I contains requirements that apply to the selection, training, and qualification of personnel at all DOE reactor and non-reactor nuclear facilities. These requirements have broad applicability and provide the foundation for training and qualification of personnel at DOE nuclear facilities;

b. Requirements for Category A Reactor Personnel. Chapter II contains requirements for staffing, selection, training, and qualification of personnel at DOE Category A production, test, and research reactors;

c. Requirements for Category B Reactor Personnel. Chapter III contains requirements for staffing, selection, training, and qualification of personnel at DOE Category B reactors; and

d. Requirements for Non-Reactor Nuclear Facility Personnel. Chapter IV contains requirements for staffing, selection, training, and qualification of personnel at DOE non-reactor nuclear facilities.

10. IMPLEMENTATION SCHEDULE. The requirements of this Order shall be implemented in accordance with the following:

a. A Training Implementation Matrix shall be submitted to the cognizant field organization within 6 months after the issue date of this Order. The Training Implementation Matrix shall contain a schedule for implementing the requirements of this Order. The matrix should be based on the status of existing compliance and shall include the time-frame for incremental implementation and full implementation of the requirements;

b. From the issue date of this Order until the Training Implementation Matrix is approved, all DOE reactor and non-reactor nuclear facilities shall continue to comply with the requirements contained in DOE 5480.5 and DOE 5480.6, as appropriate to the facility;

c. Upon approval of the Training Implementation Matrix, personnel subsequently appointed to functional positions shall meet the education and experience requirements of this Order; and

d. For facilities for which DOE 5480.18 is applicable, implementation of the training program content requirements of this Order may, for positions requiring accreditation, coincide with the implementation of DOE 5480.18.

BY ORDER OF THE SECRETARY OF ENERGY:

JOHN J. NETTLES, JR.
Director of Administration
and Human Resource Management

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CHAPTER IV - NON-REACTOR NUCLEAR FACILITY PERSONNEL

CHAPTER I

GENERAL REQUIREMENTS

1. PURPOSE. The purpose of this Chapter is to establish general training program requirements for personnel involved in the operation, maintenance, and technical support of Department of Energy Category A and B reactors and non-reactor nuclear facilities. This Chapter also includes alternatives to education and experience requirements and limitations on working hours of operating organization personnel who perform safety-related functions.

2. TRAINING ORGANIZATION REQUIREMENTS. The operating contractor shall establish an organization(s) within the line management organization that is responsible for the training of operating organization personnel. In some cases (e.g. Category B reactors, low-hazard non-reactor nuclear facilities, or less complex, small facilities) this may be integrated into the operating organization and may not necessarily be officially designated as a training organization. The duties, responsibilities, qualifications, and authority of training organization personnel shall be documented, and managerial responsibilities and authority clearly defined. This organization may include subcontracted personnel who conduct training activities.

3. SUBCONTRACTOR PERSONNEL QUALIFICATION REQUIREMENTS. The operating organization shall establish qualification criteria for subcontractor personnel who replace personnel in the operating organization. Subcontractor personnel shall meet the qualification requirements for the job function to be performed prior to active involvement in facility activities. For subcontractor personnel who do not meet the requirements, work activities on safety-related structures, systems, and components identified in the facility Safety Analysis Report shall be supervised by a person who meets the qualification criteria established by the operating organization for conduct of such activities. In addition, the operating organization shall ensure that subcontractor and temporary personnel who perform specialized activities such as radiation protection, maintenance, in-service inspection, radiography, and welding are qualified to perform their assigned tasks. This assurance shall be considered adequate with proper documentation of at least one of the following:

   a. The satisfactory result of an audit of subcontractor records which relate to qualification of the subcontractor personnel being considered for assignment by the operating organization; or

   b. Operating organization's previous verification (within 2 years) of the ability of the subcontractor employee to perform assigned tasks safely and efficiently; or

c. Successful completion by the subcontractor employee of those segments of the operating organization's qualification program which are considered pertinent to accomplishment of the task to be performed.

4. PERSONNEL SELECTION REQUIREMENTS.

a. The operating contractor shall have a process for selection and assignment of personnel into the operating organization. This process should consider factors such as background, experience, and education and may involve a selection test. Selection should be based on the ability to meet job performance requirements.

b. Education and experience requirements for Category A reactor facility personnel are contained in Chapter II. Requirements for Category B reactor facility personnel are contained in Chapter III. Requirements for non-reactor nuclear facility personnel are contained in Chapter IV. In those cases where an individual does not meet the literal experience requirements, consideration may be given to the collective experience of the operating organization. Individuals who do not meet the experience requirements for a position may be assigned to that position providing the overall operating organization is considered balanced and strong and that DOE approval is obtained on a case-by-case basis.

c. Education and experience requirements may be met by development and implementation of accreditable performance-based training programs for applicable positions.

5. QUALIFICATION PROCESS REQUIREMENTS. Qualification is defined in terms of education, experience, training, and any special requirements necessary for performance of assigned responsibilities. Personnel at DOE reactor and non-reactor nuclear facilities shall possess qualifications which provide reasonable assurance that their decisions and actions will ensure that assigned responsibilities are conducted properly and safely.

a. Operating organizations shall establish written procedures which clearly define qualification requirements for personnel in each functional level based on the criteria contained in this Order. The shift in relative importance of managerial and technical competence shall be considered by management in establishing these requirements. The need for specific knowledge, skills, and abilities differ for each level in the organization. At the higher functional level, managerial competence is the dominant need, whereas technical competence is the dominant need at other functional levels.

b. Qualification may be granted only after assuring that all requirements (including training and examinations as required) and other specified requirements (e.g., medical examination) have been satisfactorily completed.

c. Qualification shall be valid for a maximum of two years (unless revoked for cause) at which time the person shall be requalified in accordance with paragraph 10 of this Chapter.

6. CERTIFICATION PROCESS REQUIREMENTS. Certification is the process by which contractor facility management endorses and documents, in writing, the satisfactory achievement of qualification of a person for a position.

a. The program leading to certification shall be governed by written procedures which include requirements for documented assessment of the person's qualifications through examinations and operational evaluations.

b. Certification may be granted only after assuring that all qualification requirements (including written and oral examinations and operational evaluations) and other specified requirements (e.g., medical examination) have been satisfactorily completed, and management has assured that the person is capable of safely performing all functions of the position. Satisfactory completion of qualifications which result in certification shall be verified by a person or group other than the person or group that provided the training or the candidate's immediate supervisor. Certification shall be valid for a maximum of two years (unless revoked for cause) at which time the person shall be recertified in accordance with paragraph 10 of this Chapter.

c. Reactor operators, senior reactor operators, and shift supervisors at DOE Category A and B reactors and fissionable material handlers and fissionable material handler supervisors at DOE non-reactor nuclear facilities shall be certified. For all other operators and their immediate supervisors, the operating organization shall identify in the Training Implementation Matrix any additional positions that will be subject to certification (i.e., tritium facility operators, enrichment facility operators, tank farm operators, and their supervisors).

7. TRAINING REQUIREMENTS.

a. General. Training for operations and maintenance personnel should be based on analyzed needs such as would result from a needs analysis or job analysis. Training for technical support personnel should be based on the results of an assessment of position responsibilities. Training programs shall consist of a combination of classroom-type and on-the-job training, and include simulator and laboratory training as it applies to the position. Classroom-type training includes lectures, seminars, computer-based, and structured self-study training activities.

(1) Qualification programs shall be reviewed by contractor facility management and kept up to date to reflect changes to the facility, procedures, regulations, and quality assurance requirements as well

as applicable industry operating experience. The concept of training personnel as a team, stressing team communications and interaction, shall be used where job functions require team solutions and activities.

(2) A Training Implementation Matrix which defines and describes the application of the selection, qualification, and training requirements of this Order shall be prepared by the operating organization. The Matrix shall clearly define the organization, planning, and administration of the qualification program and set forth the responsibility, authority, and methods for conducting training. Suitable justification for exceptions shall be included in the Matrix for any requirement not implemented. This Matrix shall be submitted to the Head of the Field Organization for approval. At some sites with several facilities, a combined Training Implementation Matrix may be submitted.

(3) The selection, qualification, and training program for low-hazard, non-reactor nuclear facilities should be developed based on the hazards involved and risk associated with the operation or activity. Accordingly, the level of detail and content of the Training Implementation Matrix should reflect the selection, qualification, and training needs associated with such facilities to assure personnel are qualified to carry out their assigned responsibilities.

b. Training Process. Initial and continuing training programs shall be implemented to ensure that operating organization personnel are qualified to perform job requirements. This should be achieved by using a systematic approach to training such as performance-based training. The basic elements of a performance-based training program include the following:

(1) Establishment of prerequisite standards of education, skills, and knowledge required for entry into the training program;

(2) A systematic analysis of the job to be performed. A job or task analysis should be conducted by the operating organization to identify training which provides the necessary skills and knowledge so that assigned tasks can be effectively performed. Initial and continuing training programs should be based on, and traceable to, the analysis. The analysis should include normal and emergency duties, and place emphasis on the role played by each member of the operating organization (and maintenance and technical support organizations as required) in assuring safe operation. Because of varied complexity and scope of job functions, the degree of analysis necessary to determine skill and knowledge requirements may vary. For example, a job analysis should be conducted for operations and maintenance personnel, whereas a less formal assessment of training needs may be appropriate for technical support personnel;

(3) Design and development of training programs based on job performance requirements and standards;

(4) Implementation of training programs which contain instruction appropriate to job performance; and

(5) Evaluation of trainees' ability to meet job performance requirements, and evaluation and revision of training programs.

c. Initial Training Requirements. An initial training program shall be established for operating organization personnel to develop or enhance their knowledge, skills, and ability to perform job assignments. Personnel in training shall not independently make decisions or take actions that could affect facility safety, nor shall personnel in training be placed in such positions. However, they may independently perform specific tasks or job assignments for which they are qualified.

d. Continuing Training Requirements. Continuing training programs shall be designed and implemented to maintain and enhance the proficiency of operating organization personnel who perform functions associated with safety-related structures, systems, and components identified in the facility Safety Analysis Report.

(1) These programs shall be structured commensurate with specific position needs, and shall be administered on a biennial cycle.

(2) Periodic written and oral examinations and/or operational evaluations shall be administered and documented throughout the cycle on material included in the training programs.

(3) Training and examination covering abnormal facility procedures and emergencies shall be required at least annually for certified operations personnel.

(4) Continuing training programs for certified operations personnel shall consist of preplanned classroom-type training, on-the-job training, and operational evaluations on a regular and continuing basis, and shall include, as a minimum, the following as related to job performance:

(a) Training in significant facility system and component changes, applicable procedure changes, applicable industry operating experience, selected fundamentals with emphasis on seldom used knowledge and skills necessary to assure safety, and other training as needed to correct identified performance problems;

(b) Drills shall be conducted in the facility to enable personnel and operating teams to maintain proficiency in their ability to respond to abnormal or accident situations;

(c) Instruction in the use of facility systems to control or mitigate accidents. Such training shall include both classroom-type training and training conducted in the facility;

(d) Training, as applicable to the position, in the following subjects where examinations and experience (industry and facility-specific) or other evidence indicates emphasis in scope and depth of coverage is needed:

1 Theory and principles of facility operation;

2 General and specific facility operating characteristics;

3 Facility instrumentation and control;

4 Facility protection systems;

5 Engineered Safety Features;

6 Normal, abnormal, and emergency procedures;

7 Radiation control and safety; and

8 Technical Specifications/Operational Safety Requirements.

(5) Training personnel are exempt from the provisions of 7d for the area of primary administrative responsibility. For example, an individual who prepares, administers, and grades a written examination need not take the examination.

e. General Employee Training (GET) Requirements.

(1) All persons employed either full- or part-time in DOE reactor and non-reactor nuclear facilities shall be trained in the following areas commensurate with their job duties:

(a) General description of facilities;

(b) Job related policies, procedures, and instructions;

(c) Radiological health and safety program;

(d) Facility emergency plans;

(e) Industrial safety/hygiene program;

(f) Fire protection program;

(g) Security program; and

(h) Quality assurance program.

(2) Visitors, contracted personnel, and temporary personnel shall be under continuous escort while at the facility unless they have been trained in appropriate areas from the above list to the extent necessary to ensure safe execution of their duties. For example, short-term visitors should be given instruction in items (a),(c), (d), (e), and (g), while contracted and temporarily assigned personnel may need training in additional topics as related to their assignments.

(3) For persons requiring long-term (i.e., more than 1-2 weeks) access, understanding of the information provided by the GET program shall be evaluated by administering a written examination. The examination should cover areas selected for training and should be of sufficient difficulty to ensure the person has adequate knowledge to work independently at the facility. Persons who do not pass this examination shall not be permitted access without a continuous escort.

(4) GET shall be included in continuing training programs for all facility personnel, and examinations administered at least every two years.

f. Probabilistic Risk Assessment (PRA) Training Requirements. For those facilities for which a PRA has been performed, initial and continuing training programs for operations and technical support personnel shall include training on the principal results of the PRA. This training shall address the following:

(1) The importance of facility systems in preventing damage or severe accidents;

(2) Locations of all significant amounts of radioactive and other hazardous materials, and measures to prevent its release; and

(3) The importance of maintaining operational limits and conditions, and the consequences of violating those limits.

g. Technician and Maintenance Personnel Training Requirements. Training should develop and/or improve the knowledge and skills of technicians and maintenance personnel. Technicians typically perform specific maintenance or analytical laboratory work (e.g., equipment maintenance, troubleshooting, repair, testing, instrument calibration, inspections, and data surveys), while maintenance personnel perform maintenance and repair on mechanical and electrical equipment.

(1) All technicians and maintenance personnel shall be qualified to perform the tasks associated with their specialty, or work under the direct supervision of personnel qualified to perform the activity or task.

(2) Training on safety-related systems identified in the facility Safety Analysis Report shall be conducted for personnel who perform work on those systems/components. Included in this category are systems having a direct impact on the safe operation of the facility. Examples of safety-related systems include emergency core cooling systems, instrumentation systems that provide protective functions, emergency electrical power distribution systems, and other systems whose failure could have an adverse affect to the environment or the health and safety of the public. System training shall, at a minimum, include the following elements:

(a) Purpose of the system;

(b) General description of the system including major components, relationship to other systems, and all safety implications associated with working on the system; and

(c) Related industry and facility-specific experience.

h. Technical Support Personnel Training Requirements. Technical support personnel are typically involved in surveillance, testing, analyzing facility data, planning modifications, program review, and technical problem resolution in their area of expertise (e.g., electrical, mechanical, instrumentation and control, chemistry, health physics, safety, quality assurance, facility engineering).

(1) Training shall be provided to entry-level personnel who provide technical support to the operating organization.

(2) The contractor shall develop a list of specific technical support personnel positions that may have direct impact on employee, facility, or public safety. Training in the following facility-specific subject areas shall be included as appropriate to the position:

(a) Facility organization;

(b) Facility fundamentals;

1 Heat transfer, fluid flow, and thermodynamics

2 Electrical science

3 Nuclear physics

4 Chemistry/chemistry controls

5 Process controls

(c) Facility systems, components, and operations;

(d) Simulator training;

(e) Environment, Safety, and Health Orders;

(f) Codes and standards overview;

(g) Facility document system;

(h) Safety Analysis Reports and Technical Specifications/Operational Safety Requirements;

(i) Nuclear criticality control;

(j) Material, maintenance, and modification control;

(k) ALARA and radwaste reduction program; and

(l) QA/QC practices.

i. Management and Supervisory Training Requirements. In addition to the training specified in paragraph 7h, managers and first line supervisors shall receive training in the following as appropriate to their job responsibilities. Supervisory skills and management training need not be subject to examination as part of initial training, nor categorically repeated in their continuing training programs.

(1) Supervisory Skills Training. The supervisory skills training program shall include:

(a) Leadership;

(b) Interpersonal communication;

(c) Command responsibilities and limits;

(d) Motivation of personnel;

(e) Problem analysis and decision making;

(f) Fitness for duty procedures; and

(g) Administrative policies and procedures.

(2) Management Training. The management training program should include:

(a) Supervisory skills training;

(b) Quality assurance and quality control;

(c) Facility security and emergency plans;

(d) Purchasing;

(e) Material storage;

(f) Facility modifications;

(g) Nuclear, industrial, and radiation safety;

(h) Environmental issues; and

(i) Budgeting.

8. OPERATOR AND SUPERVISOR EXAMINATION REQUIREMENTS. Written and oral examinations and operational evaluations shall be prepared and administered to demonstrate that certified operators and supervisors possess the required knowledge and skills. Written examinations and operational evaluations shall be prepared and administered for the qualification of other operators and supervisors. For certified Category A reactor facility personnel, the oral examination shall be separate from the operational evaluation. Operational evaluations and oral examinations may be combined for certified Category B reactor and non-reactor nuclear facility personnel.

a. Written procedures shall be established for written and oral examinations and operational evaluations (as required). These procedures shall address examination/evaluation development, approval, security, administration, and maintenance of examination question banks.

b. Oral examinations may be conducted as a one-on-one walkthrough or by an oral board or committee consisting of personnel identified by contractor facility management. The oral examination content shall be tailored to evaluate the candidate's operational knowledge (initial/continuing training program subjects) and organizational awareness to determine how the individual will function in an operating environment. Oral examination questions, the candidate's response, and the evaluation by the examiner(s) of that response shall be documented.

9. OPERATOR AND SUPERVISOR REEXAMINATION REQUIREMENTS. Reexaminations for certified and qualified operators and supervisors shall include subjects in which the person is expected to be proficient and emphasize those subjects covered by the continuing training program. The contractor shall administer biennial written and oral examinations and operational evaluations, or

administer periodic examinations throughout the cycle that cover all continuing training program subjects/elements. Operational evaluations and oral examinations may be combined for Category B reactor and non-reactor nuclear facility personnel.

10. REQUALIFICATION REQUIREMENTS. Employees shall not be allowed to function as qualified/certified operators and supervisors if they have not completed all of the requalification program elements within two years. If an operator or supervisor fails a requalification examination, or shows serious job performance deficiencies which indicate that he or she may perform in an unsafe manner, the person shall be removed from activities requiring qualification.

    a. Requalification may be regained after completing remedial training designed to correct the deficiency(s) and a reexamination is administered. In addition, recertification of operators and supervisors shall be based on the following:

        (1) A review of individual operating performance during the past certification period by either line management, by a committee, or by a person designated by management; and

        (2) A current medical examination as required by Chapter II paragraph 3, Chapter III paragraph 3, or Chapter IV paragraph 3.

    b. When a certified operator or supervisor has been absent from certification duties for greater than 3 months, but less than 12 months, selected retraining (including written and oral examinations and operational evaluations) shall be given as deemed necessary prior to reassignment to certification duties. The certification base date remains the same as it was before the absence. However, if the absence is greater than 12 months, comprehensive written and oral examinations and operational evaluations (as required of initial candidates) shall be given to determine weak areas. Retraining and reexamination shall be required in areas of weakness, and upon successful completion, a new certification date may be established.

11. EXCEPTIONS TO TRAINING REQUIREMENTS. Initial training programs are developed for persons with entry-level knowledge and skills. Some candidates may already possess the necessary knowledge and skills for their job, and may be excepted from areas of the training program on the basis of prior education, experience, and training. Proficiency testing is the preferred method of excepting persons from specific areas of training. In all cases, the requisite examinations to establish qualification shall be completed.

    a. The operating organization shall establish procedures and criteria to administer and document exceptions to initial and continuing training program requirements. The name of the person and the specific subject for which the exception is requested, along with justification for the

exception, shall be included as part of the documentation. In all cases, the operating organization shall ensure that sufficient facility-specific instruction is provided to enable the candidate to perform job requirements. The operating organization shall submit the procedure(s) which detail the criteria for granting an exception to the field organization for approval.

b. Any exception from certification or qualification requirements shall be approved by contractor management.

12. EXTENSION REQUIREMENTS. An extension of certification or qualification may be granted to persons on a case-by-case basis in order to support operational and schedular commitments.

a. The operating organization shall establish an administrative procedure which addresses extensions to ensure timely completion of requirements associated with certification or qualification. This procedure should include as a minimum:

(1) Responsibility for approval of the extension;

(2) Length of extension;

(3) Explanation of circumstances that prevented the person from completing the requirements; and

(4) Description of the operational and/or schedular situation which necessitated the extension.

b. Extensions of certification of operators and supervisors shall be approved by the field organization. Extensions of qualification of other personnel shall be approved by contractor facility management.

13. ALTERNATIVES TO EDUCATIONAL REQUIREMENTS. Educational criteria are described as either baccalaureate, associate degree, or high school diploma. In each case, the type of degree (diploma) required is a function of the person's responsibilities. Persons who do not possess the formal educational requirements specified shall not be automatically eliminated where other factors provide sufficient assurance of their abilities to fulfill the duties of a specific position. These factors shall be evaluated on a case-by-case basis and approved and documented by the operating organization. The following are examples that may be considered in making the evaluation of an acceptable alternative to the educational requirements:

a. General Education Development (GED) test for a high school diploma;

b. Professional engineers license or completion of Engineer in Training (EIT) examination for a baccalaureate or associate degree requirement;

c. Completion of technical portions of an engineering, engineering technology, or related science program may substitute for the baccalaureate or associate degree program. Successful completion shall be determined by a transcript or other certification by an accredited institution. For example, completion of 80 semester credit hours may be substituted for the baccalaureate requirement and 43 semester credit hours for the associate degree. The courses shall be in appropriate technical subjects relevant to the position to be filled; and

d. Related experience may substitute for education at the rate of six semester credit hours for each year of experience up to a maximum of 60 credit hours.

14. ALTERNATIVES TO EXPERIENCE REQUIREMENTS. Experience in design, construction, and operational training may be considered applicable nuclear experience and should be evaluated on a case-by-case basis.

a. Where course work is related to job assignments, post-secondary education may be substituted. Formal education shall not be allowed to substitute for more than 50 percent of the experience requirement unless otherwise stated in Chapters II, III, or IV.

b. Job-related training in the position sought may qualify as equivalent to nuclear experience on a one-for-one basis for up to a maximum of two years.

15. LIMITATIONS FOR OVERTIME WORKED. Administrative procedures shall be developed and implemented to limit the working hours of operating organization personnel who perform safety-related functions (e.g., certified operators and supervisors, non-certified supervisors, radiation protection technicians, chemistry technicians, qualified operators, and maintenance craftpersons and supervisors, both facility force and construction).

a. Adequate shift coverage shall be maintained without heavy use of overtime. However, in the event that unforeseen problems require substantial amounts of overtime to be used (such as during extended shutdown periods for refueling, major maintenance, major facility modifications, technical problems, or weather related occurrences), the following requirements shall be applied on a temporary basis:

(1) A person shall not be permitted to work more than 16 consecutive hours, excluding shift turnover time;

(2) A person shall not be permitted to work more than 24 hours in any 48 hour period, excluding shift turnover time;

(3) A person shall not be permitted to work more than 72 hours in any 7-day period, excluding shift turnover time;

(4) A person shall not be permitted to work more than 14 consecutive days without having two consecutive days off; and

(5) Except during extended shutdown periods, brief pre- or post-shift training sessions, or weather-related occurrences, the use of overtime shall be considered on an individual basis and not for the entire shift crew.

b. Any deviation from the overtime requirements shall be authorized on a case-by-case basis in advance by the Plant/Facility Manager or his or her designee in accordance with established procedures and with documentation of the basis for granting the deviation. Individual overtime shall be reviewed monthly by the Plant/Facility Manager or his or her designee to assure that excessive hours have not been worked.

c. If a person is required to work in excess of 12 continuous hours, his or her duties should be carefully selected. It is preferable that this person not be assigned any task that could possibly endanger the safe operation of the facility.

16. RECORD REQUIREMENTS. Contractors shall develop and implement administrative procedures that specify requirements for the maintenance of training, qualification, and certification records for operating organization personnel.

a. Qualification and certification of personnel shall be documented in an easily auditable format. Individual record documentation shall include:

(1) Education, experience, and employment history and most recent health evaluation summary (e.g., NRC Form 396);

(2) Training programs completed and qualification/certification achieved;

(3) Latest completed checklists, graded written examinations (with answers corrected as necessary or examination keys), simulator examinations (where applicable), and operational evaluations used for qualification/certification. The record should include an evaluation of the knowledge and performance of the operator/supervisor during operational evaluations;

(4) Lists of questions asked and the examiner's overall evaluation of the operator/supervisor's responses on oral examinations;

(5) Correspondence relating to exceptions to training requirements and extensions of qualification/certification;

(6) Records of qualification for one-time-only special tests or operations; and

(7) Attendance records for required training courses or sessions.

b. A historical record that documents initial qualification or certification, and applicable information from the above list that verifies the most recent qualification or certification shall be retained in individual records. Superseded information should be handled in accordance with the procedures contained in DOE 1324.2A, RECORDS DISPOSITION.

CHAPTER II

CATEGORY A REACTOR PERSONNEL

1. PURPOSE. This Chapter provides specific requirements in addition to the general requirements of Chapter I for personnel at DOE Category A reactor facilities.

2. ENTRY-LEVEL REQUIREMENTS. Entry-level requirements for operating organization personnel are intended to assure that these personnel have the knowledge, skills, and abilities to operate and maintain the reactor and related support systems in a safe and reliable manner under all conditions. Attachment II-1 summarizes the education and experience requirements for positions in this Chapter.

   a. Managers. The term "Manager" refers to a person whose assigned responsibilities include ensuring that a plant or facility is safely and reliably operated, and that supporting operational and administrative activities are properly controlled. Managers are responsible for 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. Administrative responsibilities include maintenance of a qualified staff, budgets, maintaining employee performance, administering disciplinary actions consistent with company policies, public information, and coordination with corporate offices. This functional level typically includes the Plant/Facility Manager or Director, the Operations Manager, the Maintenance Manager, the Training Manager, and the Technical Manager.

      (1) Plant Manager.

         (a) Education: Baccalaureate in engineering or related science

         (b) Experience:

Nuclear	6 years
Supervisory or Management	4 years
Onsite	6 months

         (c) Special Requirements:

            1 Three years of the required nuclear experience may be power plant experience; and

2 The Plant Manager shall hold, or have held, a senior reactor operator certification for a similar Category A reactor plant (or equivalent) or have been certified at an appropriate simulator. Plant Managers who have an assistant holding a senior reactor operator certification need not meet this special requirement.

(2) Operations Manager.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Nuclear	4 years
Onsite	6 months

(c) Special Requirements:

1 One year of the required nuclear experience may be power plant experience; and

2 The Operations Manager shall hold a senior reactor operator certification at the time of appointment to the position.

(3) Maintenance Manager.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Nuclear	4 years
Onsite	6 months

(c) Special Requirements:

1 Two years of the required nuclear experience may be power plant experience; and

2 The Maintenance Manager shall be familiar with nondestructive testing and have an understanding of electrical, pressure vessel, and piping codes and standards.

(4) Technical Manager.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Nuclear	4 years
Onsite	6 months

(c) Special Requirements:

1 One year of the required nuclear experience may be power plant experience; and

2 The Technical Manager shall hold, or have held, a senior reactor operator certification for a similar Category A reactor plant (or equivalent) or have been certified at an appropriate simulator.

(5) Training Manager.

(a) Education: Baccalaureate including courses in education and technical subjects

(b) Experience:

Job related	4 years
which shall include,	
Nuclear	2 years

(c) Special Requirements:

1 The Training Manager shall have training in educational techniques if not included in baccalaureate course material; and

2 If the Training Manager does not hold a senior reactor operator certification, another person who holds a senior reactor operator certification shall be responsible to the Training Manager for the content and conduct of the certified operator training program.

b. Supervisors. This functional level describes those persons who are responsible for the quantity and quality of work and who direct the actions of operators, technicians, or maintenance personnel. Their duties include ensuring that work is performed in compliance with procedures, policies, and industrial safety practices.

(1) Shift Supervisor.

(a) Education: High School Diploma

(b) Experience:

Nuclear	4 years

(c) Special Requirements:

1 Two years of the required nuclear experience may be power plant experience; and

2 The shift supervisor shall hold and maintain senior reactor operator certification.

(2) Senior Reactor Operator.

(a) Education: High School Diploma

(b) Experience:

Power Plant	4 years
Nuclear	2 years
Onsite	6 months

(c) Special Requirements:

1 Two years of the power plant experience may be fulfilled by academic or related technical training;

2 If the candidate for senior reactor operator does not possess a baccalaureate in engineering or equivalent, the candidate shall have one year experience as a reactor operator at the reactor for which certification is sought;

3 Candidates for senior reactor operator with a baccalaureate in engineering or equivalent shall participate in reactor plant operations at power levels of at least 20 percent for at least six weeks, while assigned in the control room as a reactor operator candidate; and

4 Candidates for senior reactor operator with a baccalaureate in engineering or equivalent shall perform all control manipulations that a reactor operator candidate would perform.

(3) Qualified Supervisor.

(a) Education: High School Diploma

(b) Experience:

Job related	4 years
Nuclear	1 year
Onsite	3 months

c. Technical Support Personnel. Personnel in these positions are responsible for supervision and performance of technical support functions for the operating organization. Personnel involved in surveillance, testing, analyzing plant data, planning modifications, program review, and technical problem resolution in their area of expertise are also included. They have expertise in mechanical, electrical, instrumentation and control, chemistry, radiation protection, training, safety, quality assurance, or reactor engineering. Unless otherwise stated, the basic education requirement is a baccalaureate in engineering or related science; the experience requirement is 2 years job-related, of which 1 year shall be nuclear experience. Education and experience requirements are intended to apply to supervisory positions or positions with authority to review and concur, and not to entry-level positions.

(1) Reactor Engineering.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Job related	4 years
which shall include,	
Nuclear	2 years
Onsite	6 months

(c) Special Requirement: Nuclear experience shall be in such areas as reactor physics, core measurements, core heat transfer, and core physics testing programs.

(2) Instrumentation and Control.

(a) Education: Associate Degree in engineering or related science

(b) Experience:

Job related	2 years
which shall include,	
Nuclear	1 year
Onsite	6 months

(3) Chemistry and Radiochemistry.

(a) Education: Baccalaureate in chemistry or related science

(b) Experience:

Job related	2 years
which shall include,	
Nuclear	1 year
Onsite	6 months

(c) Special Requirement: One year of nuclear experience shall be in radiochemistry.

(4) Radiation Protection.

(a) Education: Baccalaureate in a science or engineering subject, including formal training in radiation protection.

(b) Experience:

Job related	4 years
which shall include,	
Nuclear	3 years
Onsite	6 months

(c) Special Requirement: The three years nuclear experience shall be professional-level.

(5) Preoperational Testing Engineer.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Nuclear	1 year

(c) Special Requirements:

1 The required nuclear experience may be power plant experience; and

2 These persons shall be knowledgeable of test program administration and the design and operational performance requirements of the system and equipment being tested and its interaction with other systems.

(6) Startup Testing Engineer.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Nuclear	2 years

(c) Special Requirements:

1 One year of the required nuclear experience may be power plant experience; and

2 This person shall be knowledgeable of test program administration, the system design and operational requirements, and expected plant operational characteristics during the test.

(7) Training Coordinator.

(a) Education: High School Diploma

(b) Experience:

Nuclear	2 years
Onsite	6 months

(c) Special Requirement: The required nuclear experience may be power plant experience.

(8) Training Instructor.

(a) Education: High School Diploma

(b) Experience: Consistent with the material being presented.

(c) Special Requirements:

1 Instructors who provide instruction on the reactor plant simulator to certified personnel shall hold, or have held, a senior reactor operator certification for a similar Category A reactor plant (or equivalent) or have been certified on the reactor plant simulator;

2 Instructors who are responsible for instruction of subjects such as technical specifications, operating practice, and control manipulations shall have received senior reactor operator (or equivalent) training; and

3 Instructors shall have demonstrated knowledge of instructional techniques through training or experience and be qualified by the Training Manager for the material being presented.

(9) Shift Technical Advisor.

(a) Education: Baccalaureate in engineering or related science

(b) Experience:

Nuclear	1 year
Onsite	6 months

(c) Special Requirement: This person shall be knowledgeable of control room instruments and controls and be assigned to advise the responsible shift supervisor concerning abnormal plant operating conditions.

d. Operators, Technicians, and Maintenance Personnel. Operators, technicians, and maintenance personnel are responsible for the manipulation of facility controls, monitoring of instrumentation, conduct of radiation surveys, control of plant chemistry, maintenance of facility equipment and systems, or for the operation of equipment, as related to the position. Examples include auxiliary operator, reactor operator, electrician, mechanic, electronics technician, or laboratory technician. Persons in training or apprentice positions shall not be considered operators, technicians, or maintenance personnel, but may perform work in the specific tasks for which qualification has been achieved. Persons in training or apprentice positions may perform tasks under the immediate supervision of a person qualified to perform that specific task.

(1) Qualified Auxiliary Operators.

(a) Education: High School Diploma

(b) Experience: Qualified auxiliary operators whose actions could affect the quality of structures, systems, and components important to safety shall have 1 year of nuclear experience.

(c) Special Requirement: The required nuclear experience may be power plant experience.

(2) Reactor Operators.

(a) Education: High School Diploma

(b) Experience:
Nuclear 3 years

(c) Special Requirements:

1 Two years of the required nuclear experience may be power plant experience; and

2 Six months of the required experience shall be experience as a qualified auxiliary operator at the reactor for which certification is sought.

(3) Technicians.

(a) Education: High School Diploma

(b) Experience:
Job related experience 3 years

(4) Maintenance Personnel.

(a) Education: Journeyman level

(b) Experience:
Related maintenance experience 3 years

3. MEDICAL EXAMINATION REQUIREMENTS. A medical examination shall be given to prospective employees and a reexamination shall be given at least every two years to certified operators and supervisors to verify health and physical fitness to safely perform their assigned tasks. Certified operators and supervisors must also be cleared by medical examination prior to returning to work following any serious illness or injury which keeps the person from performing their duties for a period exceeding one month. Medical examination requirements shall be in accordance with ANSI/ANS 3.4-1983, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants," and NRC Regulatory Guide 1.134, Rev. 2, 4-87, "Medical Evaluation of Nuclear Power Plant Personnel Requiring Operator Licenses." Medical examination requirements for other operating organization personnel shall be in accordance with the procedures of the operating contractor.

4. ENGINEERING EXPERTISE ON SHIFT REQUIREMENTS. The operating organization shall ensure that the operating shift possesses adequate engineering and accident assessment expertise. This may be accomplished by designating a Shift Technical Advisor (STA) for each shift, or by combining the shift supervisor or an on-shift senior reactor operator with the STA position. If the combined approach is utilized, the designated STA shall meet the following qualifications:

a. Currently certified as a senior reactor operator; and

b. Successful completion of the STA training requirements in subparagraph 7a, and one of the following educational requirements:

(1) Baccalaureate in engineering;

(2) Professional engineer's license;

(3) Baccalaureate in engineering technology including course work in the physical, mathematical, or engineering sciences; or

(4) Baccalaureate in a physical science including course work in the physical, mathematical, or engineering sciences.

5. STAFFING REQUIREMENTS. The operating organization shall ensure that minimum staffing requirements are met for safe and reliable operations. Any temporary deviation from these requirements must be justified by a facility-specific analysis and approved by the Head of the Field Organization.

a. Facility Staffing.

(1) Overall staffing shall be based on the facility Safety Analysis Report and Technical Specifications. Facility operation shall be contingent upon meeting the criteria contained in these documents.

(2) A list of facility personnel by name, title, and work and home telephone numbers shall be readily available in the control room for use by the operating crew. The list shall include:

(a) Management personnel;

(b) Radiation safety personnel; and

(c) Technical support personnel.

b. Control Room Staffing.

(1) A certified reactor operator or senior reactor operator shall be at the controls in the control room at all times when the reactor is fueled.

(2) A certified senior reactor operator shall be in the control room at all times when the reactor is operating or in an operational mode other than cold shutdown or refueling as defined by the Technical Specifications.

(3) A certified senior reactor operator, or senior reactor operator limited to fuel handling, shall be present at the facility to directly supervise any alteration of the core including fuel loading or transfer. This person shall have no other concurrent duties.

(4) The operator at the controls of a Category A reactor should have an unobstructed view of, and access to, the operational control panels, including instrumentation displays and alarms, to be able to initiate prompt corrective action when necessary on receipt of indication (instrument response or alarm) of a changing condition.

(5) Administrative procedures shall be established that define and outline, preferably with sketches, the specific areas where the senior reactor operator and reactor operator must remain to be considered "in the control room" and "at the controls," respectively. These procedures should require the senior reactor operator in the control room to be in sight of, or in audible range of, the reactor operator at the controls or in audible range of the control room annunciators.

6. SIMULATOR REQUIREMENTS. DOE production reactors shall have a full-scope simulator that meets the requirements contained in ANSI/ANS 3.5-1985, "Nuclear Power Plant Simulators for use in Operator Training," and Regulatory Guide Positions C.5 and C.6 contained in Nuclear Regulatory Commission Regulatory Guide 1.149, Revision 1, of April 1987, "Nuclear Power Plant Simulation Facilities for Use in Operator Licensing Examinations," for reactor operator and senior reactor operator training.

   a. If a full-scope simulator is to be utilized for more than one production reactor, the differences between the simulator and reactor shall be identified and documented by the operating organization and shall be approved by the Head of the Field Organization. These differences should not be so significant that they have an adverse impact on the ability of the simulator to meet the requirements and guidance of ANSI/ANS 3.5-1985.

   b. The need for a full-scope or partial-task simulator for DOE Category A test and research reactors shall be based on evaluations conducted by the operating organization. These evaluations shall include determination of the ability to adequately provide training in the facility covering all operator actions, where timely operator action must be taken to bring the reactor to, or maintain it in a safe state. The evaluation should also assess the ability to provide adequate training in normal operations, anticipated transients, and accident conditions. Adequate training may, however, be achieved by actual plant maneuvers, drills, partial-task simulators, or combinations of these. Training conducted in the facility shall not lead to or have the potential for safety concerns. The determination of the need for a simulator, for other than production reactors, shall be approved by the Head of the Field Organization and the cognizant PSO.

7. SPECIFIC TRAINING REQUIREMENTS. This section provides additional position-specific training requirements.

   a. Shift Technical Advisor (STA). STA training shall include:

      (1) Accidents analyzed in the facility Safety Analysis Report (SAR) and the consequences of these accidents;

      (2) Thermodynamics/fluid flow, reactor physics, system engineering, nuclear instrumentation, process computer, and facility response;

      (3) The duties, responsibilities, and authorities of the STA;

      (4) Performance of control manipulations on the simulator (for those facilities having simulators), by actual facility maneuvers or drills, or combinations 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.

b. Fuel Handling Operations. All fuel handling operations shall be performed by or under the direct supervision of a person certified to perform the required functions. The requirements below are not necessary if fuel handling is performed by persons qualified for such under regular reactor operator and senior reactor operator certification programs:

(1) A specific qualification program shall be established for fuel handling operators and supervisors. The program shall include training for their assigned tasks; and

(2) The qualification program for fuel handling operators and supervisors shall consist of initial and continuing training. 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.

c. Control Manipulations. Reactor operator and senior reactor operator candidates shall perform a minimum of five significant reactivity manipulations (e.g., reactor startup, reactor shutdown, >10% change in reactor power) for initial reactor operator and senior reactor operator qualification. Additional control manipulations shall be based on the job analysis. The control manipulations list shall specify which control manipulations are to be performed annually and which are to be performed biennially as determined by the analysis. Following initial qualification, the senior reactor operator need only direct control manipulations to satisfy this requirement.

d. Reactor Operator Written Examinations. Reactor operator written examinations shall contain a representative selection of questions on knowledge, skills, and abilities identified from learning objectives developed from the job analysis and from information in facility Safety Analysis Reports (SAR), system description manuals, operating procedures, Technical Specifications, and Unusual Occurrence Reports (UOR). The written examination shall be consistent with the job analysis, and include representative sampling from:

(1) Fundamentals of reactor theory, including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects;

(2) General design features of the core, including core structure, fuel elements, control rods, core instrumentation, and coolant flow;

(3) Mechanical components and design features of the primary system;

(4) Secondary coolant and auxiliary systems that affect the facility;

(5) Facility operating characteristics and reasons for these characteristics during steady state and transient conditions, including chemistry, cause and effects of temperature, pressure and reactivity changes, effects of load changes (if applicable), and operating limits;

(6) Reactivity control mechanisms and instrumentation, including design, components, and functions;

(7) Control and safety systems, including design, components, functions, instrumentation, signals, interlocks, failure modes, and automatic and manual features;

(8) Emergency systems, including components, capacity, and functions;

(9) Shielding, isolation, and containment/confinement design features, including access limitations;

(10) Operating procedures, including administrative, normal, abnormal, and emergency;

(11) Radiation monitoring systems, including purpose, operation, alarms, and survey equipment;

(12) Radiological safety principles and procedures;

(13) Radioactive materials and effluents, including procedures and equipment available for handling and disposal;

(14) Principles of heat transfer, thermodynamics and fluid mechanics; and

(15) Use of installed plant systems for the control and mitigation of an accident in which the core may be severely damaged.

e. Senior Reactor Operator Written Examinations. The senior reactor operator written examination shall contain, consistent with the job analysis, the following topics in addition to those required for reactor operators:

(1) Conditions and limitations for facility operations;

(2) Operating limitations in the Technical Specifications 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 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.

f. Operational Evaluations. Operational evaluations shall include a facility walkthrough or a combination walkthrough and simulator examination (for those DOE facilities having simulators), and may include system and/or component operation. Operational evaluations, to the extent possible and consistent with the job analysis, shall require the candidate to demonstrate an understanding of, and the ability to perform the actions necessary to:

(1) Perform prestartup procedures including operation of controls associated with equipment which could affect reactivity;

(2) Manipulate the console controls as required to operate between shutdown and designated power levels;

(3) Identify annunciators and condition-indicating signals and perform appropriate remedial actions;

(4) Identify instrumentation systems and the significance of the instrument readings;

(5) Observe and safely control the operating behavior characteristics of the facility;

(6) Perform control manipulations to obtain desired operating results during normal, abnormal, and emergency situations;

(7) Safely operate heat removal systems, including the primary coolant, emergency coolant, and decay heat removal systems and explain relationships between proper operation of these systems to the operation of the facility;

(8) Safely operate auxiliary and emergency systems including controls of facility equipment that could affect reactivity or release radioactive or other hazardous materials to the environment;

(9) Demonstrate or describe the use and function of radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment;

(10) Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and the ability to perform other procedures to reduce excessive radiation levels and to guard against personnel exposure;

(11) Demonstrate knowledge of the emergency plan, including, as appropriate, reactor operator or senior reactor operator responsibility to decide whether the plan should be executed and assigned duties under the plan;

(12) Demonstrate knowledge and ability, as appropriate to the assigned position, to assume the responsibilities associated with safe operation of the facility; and

(13) Demonstrate the ability to function within the control room team in such a way that procedures are adhered to and Technical Specifications are not violated.

g. Operating Crew/Shift Training.

(1) Reactor Operators. Reactor operator trainees shall be assigned to an operating crew full-time for a minimum of 3 months shift training with no concurrent duties that are not related to the operation of the facility. During this period, under the observation and control of a certified reactor operator, the trainee shall manipulate the facility controls and perform the same duties as a certified reactor operator.

(2) Senior Reactor Operator. Senior reactor operator trainees shall be assigned to an operating crew full-time for a minimum of 3 months shift training with no concurrent duties that are not related to the operation of the facility. During this period, under the observation and control of a certified senior reactor operator, the trainee shall supervise the manipulation of the facility controls and perform the same duties as a certified senior reactor operator.

8. OPERATOR PROFICIENCY REQUIREMENTS. In order to maintain proficiency, all certified reactor operators and senior reactor operators must actively perform job functions associated with their certification.

a. To maintain proficiency, operators shall perform certification duties:

(1) During 5 eight-hour shifts per calendar quarter; or

(2) During 3 twelve-hour shifts per calendar quarter.

b. If the proficiency requirement above is not met, certification shall be suspended and the person shall not be assigned certification duties until certification is regained. Certification may be regained by performing certified operator duties under the direct supervision of a certified operator for a minimum period of 24 hours and must include a complete tour of the facility and all shift turnover procedures.

CATEGORY A REACTOR
MINIMUM EDUCATION AND EXPERIENCE

	EDUCATION		EXPERIENCE		SPECIAL REQMTS
	Degree or Diploma	Other	Job Related	Nuclear	RO/SRO CERT
MANAGERS					
Plant	BS		(1)	6 Yr.(2)(3)	SRO (5)
Operations	BS			4 Yr.(3)(8)	SRO (15)
Maintenance	BS	(9)		4 Yr.(3)(7)	
Technical	BS			4 Yr.(3)(8)	SRO (6)
Training	BS		4 Yr.	2 Yr.	SRO (10)
SUPERVISORS					
Shift Supervisor	HS			4 Yr. (7)	SRO
Senior Reactor Operator	HS		4 Yr.(14)	2 Yr. (3)	SRO (11)
Qualified Supervisor	HS		4 Yr.	1 Yr. (4)	
TECHNICAL SUPPORT PERSONNEL					
Reactor Engineering	BS		4 Yr.	2 Yr. (3)	
Instrumentation and Control	AS		2 Yr.	1 Yr. (3)	
Chemistry/Radiochemistry	BS		2 Yr.	1 Yr. (3)	
Radiation Protection	BS		4 Yr.	3 Yr. (3)	
Preoperational Testing	BS			1 Yr. (8)	
Startup Testing	BS			2 Yr. (8)	
Training Coordinator	HS			2 Yr.(3)(7)	
Instructor	HS		(12)		(13)
Shift Technical Advisor	BS			1 Yr. (3)	

	EDUCATION		EXPERIENCE		SPECIAL REQMTS
	Degree or Diploma	Other	Job Related	Nuclear	RO/SRO CERT
OPERATORS, TECHNICIANS AND MAINTENANCE PERSONNEL					
Auxiliary Operators	HS			1 Yr. (8)	
Reactor Operator	HS			3 Yr.(3)(7)	RO
Technicians	HS		3 Yr.		
Maintenance Personnel	Journey-man		3 Yr.		

(1) Minimum of 4 years supervisory or management experience.
(2) 3 years of nuclear experience may be power plant experience.
(3) Minimum of 6 months onsite.
(4) Minimum of 3 months onsite.
(5) Hold, or have held, a senior reactor operator certification for similar 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 requirement.
(6) Hold, or have held, a senior reactor operator certification for similar Category A reactor plant (or equivalent)
(7) 2 years of nuclear experience may be power plant experience.
(8) 1 year nuclear experience may be power plant experience.
(9) Shall be familiar with nondestructive testing and have an understanding of electrical, pressure vessel, and piping codes and standards.
(10) If the Training Manager does not hold a senior reactor operator certification, another person who holds a senior reactor operator certification shall be responsible to the Training Manager for the content and conduct of training for certified operators.
(11) If the candidate for senior reactor operator does not possess a baccalaureate in engineering or equivalent, this person shall have 1 year experience as a reactor operator at the reactor for which certification is sought.

(12) Experience shall be consistent with the material being presented.
(13) Instructors who provide instruction on the reactor plant simulator to certified personnel shall hold, or have held, a senior reactor operator certification for a similar Category A reactor plant (or equivalent), or have been certified on the reactor plant simulator. Persons who are responsible for instruction of subjects such as technical specifications, operating practice, and control manipulations shall have received senior reactor operator (or equivalent) training.
(14) Job related experience shall be power plant experience.
(15) The Operations Manager shall hold a senior reactor operator certification at the time of appointment to the position.

CHAPTER III

CATEGORY B REACTOR PERSONNEL

1. PURPOSE. This Chapter provides specific requirements in addition to the general requirements of Chapter I for personnel at DOE Category B reactor facilities.

2. ENTRY-LEVEL REQUIREMENTS. Entry-level requirements for operating organization personnel are intended to assure that these personnel have the knowledge, skills, and abilities to operate and maintain the reactor and related support systems in a safe and reliable manner under all conditions. Attachment III-1 summarizes the education and experience requirements for positions in this Chapter.

   a. Managers. The term "Manager" refers to a person whose assigned responsibilities include ensuring that a plant or facility is safely and reliably operated, and that supporting operational and administrative activities are properly controlled. Managers are responsible for 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. Administrative responsibilities include maintenance of a qualified staff, budgets, maintaining employee performance, administering disciplinary actions consistent with company policies, public information, and coordination with corporate offices. This functional level typically includes the Plant/Facility Manager or Director, the Operations Manager, the Maintenance Manager, the Training Manager, and the Technical Manager. Prior to assuming the duties of the assigned position, persons at the manager level shall meet the following requirements:

      (1) Education: Baccalaureate in engineering or related science

      (2) Experience:
      Nuclear 6 years

      (3) Special Requirements:

         (a) Education or experience that is job-related may be substituted for a degree on a case-by-case basis. The degree may fulfill 4 of the 6 years of nuclear experience required on a one-for-one time basis. Experience acquired at a nuclear power, test, research, or production reactor, or a critical facility counts on a one-for-one time basis;

(b) Managers shall receive facility-specific training based upon a comparison of the individual's background and abilities with the responsibilities and duties of the position; and

(c) The Training Manager shall have a baccalaureate including courses in education and technical subjects (baccalaureate need not be in engineering or related science).

b. Supervisors. This functional level describes those persons who are responsible for the quantity and quality of work and who direct the actions of operators, technicians, or maintenance personnel. Their duties include ensuring that work is performed in compliance with procedures, policies, and industrial safety practices. This functional level typically includes the reactor or shift supervisor and may be combined with the senior reactor operator position at smaller facilities. Prior to assuming the duties of the assigned position, supervisors shall meet the following requirements:

(1) Education: High School Diploma

(2) Experience:
Nuclear 3 years

(a) Experience acquired at critical facilities counts on a one-for-one time basis; and

(b) Full-time academic training may be substituted on a one-for-one basis for 2 of the 3 years of required nuclear experience.

(3) Special Requirement: The reactor or shift supervisor shall be certified as a senior reactor operator.

c. Operators. Operators are persons responsible for manipulating plant controls, monitoring plant parameters, and operating plant equipment. At Category B reactor facilities this position includes the reactor operator and senior reactor operator.

(1) Education: High School Diploma

d. Technicians. Technicians are principally involved in calibration, inspection, troubleshooting, testing, maintenance, and radiation protection activities at the facility. Examples are laboratory technicians, instrument technicians, and health physics technicians.

(1) Experience:
Job related 1 year

e. Maintenance Personnel. Maintenance personnel typically perform maintenance and repair of electrical and mechanical equipment.

(1) Experience:
Maintenance related 1 year

f. Technical Support Personnel. Personnel in these positions are responsible for supervision and performance of technical support functions for the operating organization. Personnel involved in surveillance, testing, analyzing plant data, planning modifications, program review, and technical problem resolution in their area of expertise are also included. They have expertise in mechanical, electrical, instrumentation and control, chemistry, radiation protection, training, safety, quality assurance, or reactor engineering. For personnel assigned to equivalent positions, Category B reactor facilities should use the education and experience requirements contained in Chapter II, Category A Reactor Personnel, subparagraph 2c. For positions for which there is no equivalent, the education and experience requirements are as listed below. Education and experience requirements are intended to apply to supervisory positions or positions with authority to review and concur, and not to entry-level positions.

(1) Education: Baccalaureate in engineering or related science

(2) Experience:
Job related 2 years
Nuclear 1 year

3. MEDICAL EXAMINATION REQUIREMENTS. A medical examination shall be given to prospective employees and a reexamination shall be given at least every two years to certified operators and supervisors to verify health and physical fitness to safely perform their assigned tasks. Certified operators and supervisors must also be cleared by medical examination prior to returning to work following any serious illness or injury which keeps the person from performing their duties for a period exceeding one month. Medical examinations shall be in accordance with requirements contained in ANSI/ANS 15.4-1988. Medical examination requirements for other operating organization personnel shall be in accordance with the procedures of the operating contractor.

4. STAFFING REQUIREMENTS. The operating organization shall ensure that minimum staffing requirements are met for safe and reliable operations. Any temporary deviation from these requirements must be justified by facility-specific analysis and approved by the Head of the Field Organization.

a. Facility Staffing.

(1) Overall staffing shall be based on the facility Safety Analysis Report and Technical Specifications. Facility operation shall be contingent upon meeting the criteria contained in these documents.

(2) A list of facility personnel by name, title, and work and home telephone numbers shall be readily available in the control room for use by the operating crew. The list shall include:

(a) Management personnel;

(b) Radiation safety personnel; and

(c) Technical support personnel.

b. Control Room Staffing.

(1) A certified reactor operator or senior reactor operator shall be at the controls at all times during the operation of the reactor.

(2) A certified senior reactor operator shall be present at the reactor facility or readily available on call at all times during operation and refueling, and shall be present in the control room during start-up and approach to power, recovery from an unplanned or unscheduled shutdown or significant reduction in power, or as otherwise prescribed by the Technical Specifications.

5. SPECIFIC TRAINING REQUIREMENTS. The qualification program shall include 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 is acceptable.

a. Senior Reactor Operator Training.

(1) Senior reactor operator training shall be sufficiently comprehensive to develop the knowledge and skills commensurate with the position and cover areas which are fundamental to the candidate's job duties.

(2) Initial and continuing training shall include topics from the following categories as applicable to the facility and the requirements of the job:

(a) Reactor facility design and operating characteristics, including features of facility design, design and operating characteristics and limitations, safety and emergency systems, experiment and test facilities, engineered safety features, and shielding;

(b) Principles of reactor facility operation, including principles of reactor operation, radiological protection, effects of experiments, basic reactor theory, and heat transfer, fluid flow, and thermodynamics, as necessary, for the specific design of the reactor;

(c) 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;

(d) Procedures and Technical Specifications, including normal, abnormal, emergency, radiological control, and administrative procedures, and operational limitations;

(e) Radioactive materials handling, including Special Nuclear Material and radioactive materials hazards, handling, disposal, and safe practices; and

(f) Advanced theory and operation, including reactivity effects during experimental and maintenance activities, fuel handling, fuel burnup and reactivity worth, alterations in core configuration, Technical Specification bases, and administrative responsibilities associated with the facility and appropriate for the senior reactor operator's level of responsibility.

b. Reactor Operator Training. Training for reactor operators should take into account the previous experience, training, and level of responsibility of the candidate. Initial and continuing training shall include the categories contained in subparagraphs 5a(2)(a) through (d) and other categories and topics which are applicable to the facility and to the requirements of the job.

c. Fuel Handling Operations. All fuel handling operations shall be performed by or under the direct supervision of a person certified to perform the required functions. The requirements below are not necessary if fuel handling is performed by persons qualified for such under regular reactor operator and senior reactor operator certification programs.

(1) A specific qualification program shall be established for fuel handling operators and supervisors. The program shall include training for their assigned tasks.

(2) The qualification program for operators and supervisors shall consist of initial and continuing training. 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.

d. Control Manipulations. Reactor operator and senior reactor operator candidates shall perform control manipulations for initial qualification and on a biennial basis. The list of control manipulations should be derived from a systematic analysis of the position and include reactivity manipulations in any combination of reactor startups, reactor shutdowns, or significant reactivity changes (e.g., >10% change in reactor power). Additional control manipulations important to the safe operation of the reactor should be included based on the results of the analysis. Following initial qualification, the senior reactor operator need only direct control manipulations to satisfy this requirement.

6. OPERATOR PROFICIENCY REQUIREMENTS. In order to maintain proficiency, all certified reactor operators and senior reactor operators must actively perform job functions associated with their certification for at least four hours per calendar quarter.

   a. If this requirement is not met, certification shall be suspended and the person shall not be assigned certification duties until certification is regained. Certification may be regained by performing certified operator duties under the direct supervision of a certified operator for a minimum period of six hours.

   b. If the reactor is not operated frequently enough to meet these requirements, certification shall be reinstated prior to reactor operation by administering written and oral examinations to ensure adequate operational knowledge.

CATEGORY B REACTOR
MINIMUM EDUCATION AND EXPERIENCE

	EDUCATION	EXPERIENCE		SPECIAL REQMTS
	Degree	Job Related	Nuclear	RO/SRO CERT
Managers	BS (1)		6 Yr.(2,3)	
Reactor Supervisor	HS		3 Yr. (3)	SRO
Senior Reactor Operator	HS		3 Yr. (3)	SRO
Reactor Operator	HS			RO
Technicians		1 Yr.		
Maintenance Personnel		1 Yr.		
Technical Support Personnel	BS	2 Yr.	1 Yr.	

(1) The Training Manager shall have a baccalaureate including courses in education and technical subjects (baccalaureate need not be in engineering or related science).

(2) Education or experience that is job related may be substituted on a case-by-case basis. The degree may fulfill 4 of the 6 years of nuclear experience required on a one-for-one time basis.

(3) Experience acquired at nuclear power, test, research, or production reactors or a critical facility counts on a one-for-one time basis.

CHAPTER IV

NON-REACTOR NUCLEAR FACILITY PERSONNEL

1. PURPOSE. This Chapter provides specific requirements in addition to the general requirements of Chapter I for personnel at DOE non-reactor nuclear facilities.

2. ENTRY-LEVEL REQUIREMENTS. Entry-level requirements for operating organization personnel are intended to assure that these personnel have the knowledge, skills, and abilities to operate and maintain the facility in a safe and reliable manner under all conditions. Attachment IV-1 summarizes the education and experience requirements for positions in this Chapter.

   a. Managers. The term "Manager" refers to a person whose assigned responsibilities include ensuring that a plant or facility is safely and reliably operated, and that supporting operational and administrative activities are properly controlled. Managers are responsible for 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. Administrative responsibilities include maintenance of a qualified staff, budgets, maintaining employee performance, administering disciplinary actions consistent with company policies, public information, and coordination with corporate offices. This functional level typically includes the Plant/Facility Manager or Director, the Operations Manager, the Maintenance Manager, the Training Manager, and the Technical Manager. Prior to assuming the duties of the assigned position, persons at the manager level shall meet the following requirements:

      (1) Education: Baccalaureate in engineering or related science

      (2) Experience:
      Nuclear 4 years

      (3) Special Requirements:

         (a) Education or experience that is job-related may be substituted for a degree on a case-by-case basis. The degree may fulfill 3 of the 4 years of nuclear experience required on a one-for-one time basis;

(b) Managers shall receive facility-specific training based upon a comparison of the individual's background and abilities with the responsibilities and duties of the position; and

(c) The Training Manager shall have a baccalaureate including courses in education and technical subjects (baccalaureate need not be in engineering or related science).

b. Supervisors. This functional level describes those persons who are responsible for the quantity and quality of work and who direct the actions of operators, technicians, or maintenance personnel. Their duties include ensuring that work is performed in compliance with procedures, policies, and industrial safety practices. Prior to assuming the duties of the assigned position, supervisors shall meet the following requirements:

(1) Education: High School Diploma

(2) Experience:
Nuclear 3 years

(3) Special Requirement: Full-time academic training may be substituted on a one-for-one basis for 2 of the 3 years of required nuclear experience.

c. Operators. Operators are persons responsible for performing operations associated with safety systems, operating support systems which could affect safety systems, or conducting activities with radioactive materials. Duties may include manipulating facility controls, monitoring parameters, and operating equipment in facility safety systems. Operators include fissionable material handlers, tritium facility operators, chemical process operators, waste tank operators, and enrichment facility operators.

(1) Education: High School Diploma

d. Technicians. Technicians are persons responsible for specific maintenance activities or analytical laboratory work. Their tasks include equipment maintenance, troubleshooting, repair, testing, instrument calibration, inspections, and data surveys. Technicians interpret and verify field data accumulated from tests such as radiation surveys, instrumentation systems tests, liquid and gaseous analysis, and calibration of electronic circuits.

(1) Experience:
Job related 1 year

e. Maintenance Personnel. Maintenance personnel are responsible for the maintenance and repair of mechanical and electrical equipment.

(1) Experience:
Maintenance related 1 year

f. Technical Support Personnel. Personnel in these positions are responsible for supervision and performance of technical support functions for the operating organization. Personnel involved in surveillance, testing, analyzing plant data, planning modifications, program review, and technical problem resolution in their area of expertise are also included. They have expertise in mechanical, electrical, instrumentation and control, chemistry, radiation protection, training, safety, or quality assurance. For personnel assigned to equivalent positions, non-reactor nuclear facilities should use the education and experience requirements contained in Chapter II, Category A Reactor Personnel, subparagraph 2c. For positions for which there is no equivalent, the education and experience requirements are as listed below. Education and experience requirements are intended to apply to supervisory positions or positions with authority to review and concur, and not to entry-level positions.

(1) Education: Baccalaureate in engineering or related science

(2) Experience:
Job related 2 years
Nuclear 1 year

3. MEDICAL EXAMINATION REQUIREMENTS. For each type of operation, the operating organization shall determine the physical demands imposed upon certified personnel by the job tasks that are required to perform both routine and emergency functions. A medical examination shall be given to prospective employees and a reexamination shall be given at least every two years to certified operators, fissionable material handlers, and supervisors to verify health and physical fitness to safely perform their assigned tasks. Certified operators, fissionable material handlers, and supervisors must also be cleared by medical examination prior to returning to work following any serious illness or injury which keeps the person from performing their duties for a period exceeding one month. Medical examination requirements for other operating organization personnel shall be in accordance with the procedures of the operating contractor.

4. STAFFING REQUIREMENTS. The operating organization shall ensure that minimum staffing requirements are met for safe and reliable operations. Any temporary deviation from these requirements must be justified by facility-specific analysis and approved by the Head of the Field Organization.

a. Overall staffing shall be based on the facility Safety Analysis Report and Operational Safety Requirements. Facility operation shall be contingent upon meeting the criteria contained in these documents.

b. A list of facility personnel by name, title, and work and home telephone numbers shall be readily available in the control room or other appropriate central location within the facility for use by the operating crew. The list shall include:

(1) Management personnel;

(2) Radiation safety personnel; and

(3) Technical support personnel.

5. SPECIFIC TRAINING REQUIREMENTS. This section provides specific training requirements for operators, fissionable material handlers, and supervisors.

a. Operators. Individual operator training shall be sufficiently comprehensive to cover areas which are fundamental to the candidate's assigned tasks.

(1) A core of subjects such as industrial safety, instrumentation and control, basic physics, chemistry, industry operating experience, and major facility systems shall be established. The topics within these subject areas should be selected based on the results of a systematic evaluation of training needs such as would result from a job analysis.

(2) On-the-job and classroom-type training shall be included to assure that personnel are familiar with all aspects of their positions. Such training shall include but not be limited to:

(a) Normal procedures;

(b) Emergency actions;

(c) Radiation control practices;

(d) Location and functions of pertinent safety systems and equipment;

(e) Configuration control procedures;

(f) Procedures for making changes or alterations in operations; and

(g) Operational Safety Requirements.

b. Fissionable Materials Handlers. Fissionable materials handler candidates shall be trained in the following subject areas in addition to that required in subparagraph 5a above to the extent applicable to the position:

(1) Instrumentation and control, including types of instruments and control systems, principles of operation, and consequences of malfunctions;

(2) Facility operating characteristics, including principal features, operating parameters, and operating limits of the facility (to include auxiliary systems); and

(3) Principles of nuclear facility operation, including the processes involved and technical terminology for the chemical, physical, and metallurgical reactions and criticality safety principles, controls, and specifications.

c. Supervisors. The supervisor training program shall include the categories and on-the-job training specified for operators and fissionable material handlers to the extent to which they are applicable. This training shall be of increased depth to reflect the added responsibility of the supervisor position. In addition, the supervisor training program shall include the following to the extent that it is applicable to job requirements:

(1) Design, control, and operating limitations for the facility, including instrumentation characteristics and adjustment, facility operation, facility console control mechanisms, and control room manipulations;

(2) Procedures for making design and operating changes, including changes in operating procedures;

(3) Radiation hazards which may arise during the performance of experiments;

(4) Nuclear and radiation theory, including details of the fission process, neutron multiplication, source effects, and neutron poison effects;

(5) Specific operating characteristics of the facility, such as causes and effects of temperature and pressure changes;

(6) Procedures and limitations involved in initial equipment loading, alterations in fissionable material configuration, and determination of various internal and external effects on criticality safety;

(7) Procedures, equipment, and facilities available for handling and disposing of radioactive materials and effluents;

(8) Functions, assignments, and responsibilities of the maintenance organization as related to facility safety; and

(9) Applicable portions of the facility Safety Analysis Report.

6. OPERATOR, FISSIONABLE MATERIALS HANDLER, AND SUPERVISOR PROFICIENCY REQUIREMENTS. In order to maintain proficiency, fissionable material handlers, fissionable material handler supervisors, and any other operators and/or supervisors identified by the operating organization to be certified, must actively participate in the job functions associated with their certification. The operating organization shall establish procedures which define requirements and frequency (i.e., 8 hours per month) necessary to maintain an active status. If established proficiency requirements are not met, certification shall be suspended and the person shall not be assigned certification duties until certification is regained. Certification may be regained by performing their duties under the direct supervision of a certified person in accordance with established procedures. If the facility is infrequently operated, certification shall be reinstated prior to facility operation by administering written and oral examinations to ensure adequate operational knowledge.

NON-REACTOR NUCLEAR FACILITY
MINIMUM EDUCATION AND EXPERIENCE

	EDUCATION	EXPERIENCE	
	Degree	Job Related	Nuclear Facility
Managers	BS (1)		4 Yr. (2)
Supervisors	HS		3 Yr.
Operators	HS		
Technicians		1 Yr.	
Maintenance Personnel		1 Yr.	
Technical Support Personnel	BS	2 Yr.	1 Yr.

(1) The Training Manager shall have a baccalaureate including courses in education and technical subjects (baccalaureate need not be in engineering or related science).

(2) Education or experience that is job related may be substituted on a case-by-case basis. The degree may fulfill 3 of the 4 years of nuclear experience required on a one-for-one time basis.