

ES&H manual

Environment, Safety, and Health

Volume V

Part 50: Personnel Training and Qualification

Document 50.1

Personnel Selection, Qualification, Training, and Staffing at LLNL Nuclear Facilities

Recommended for approval by the ES&H Working Group

Approved by: Glenn L. Mara
Deputy Director for Operations

New document or new requirements

Approval date: August 26, 2002

Editorial revision, no new requirements:

Approval date: April 19, 2004

DISCLAIMER

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor the University of California nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or the University of California, and shall not be used for advertising or product endorsement purposes.

This work performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.

50.1

Personnel Selection, Qualification, Training, and Staffing at LLNL Nuclear Facilities*

Contents

1.0 Introduction	1
2.0 Requirements.....	1
2.1 Personnel Selection	1
2.2 Training and Qualification	2
2.3 System Engineers	2
2.3.1 Education	3
2.3.2 Experience.....	4
2.3.3 Training	4
3.0 Responsibilities.....	5
3.1 Facility Associate Directors	5
3.2 Payroll Associate Directors.....	5
3.3 System Engineers	6
4.0 Work Smart Standards	7
5.0 Resources for More Information.....	7
5.1 LLNL Contacts	7
5.2 Other Sources.....	7
Appendix A Acronyms, Terms, and Definitions.....	8

Table

Table 1. Minimum education and experience required for nuclear facility workers.	3
---	---

* Editorial revision

50.1

Personnel Selection, Qualification, Training, and Staffing at LLNL Nuclear Facilities

1.0 Introduction

This document sets requirements for personnel selection, qualification, training, and staffing requirements established by the Department of Energy's National Nuclear Security Administration (DOE/NNSA) for nuclear facilities. Document 3.5, "Conduct of Operations for LLNL Facilities," in the *Environment, Safety, and Health (ES&H) Manual* briefly addresses the topic of managing workers in an on-the-job training program.

The requirements in DOE O 5480.20A (Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities) apply to personnel involved in the operation, maintenance, and technical support of LLNL nuclear facilities. Entry-level requirements, training, and qualification for LLNL personnel working in nuclear facilities are intended to provide reasonable assurance that these personnel have, or can acquire, the knowledge and skills to operate and maintain the facility in a safe and reliable manner under all conditions.

2.0 Requirements

2.1 Personnel Selection

Facility Associate Directors shall use the Laboratory's established process to ensure the selection and assignment of personnel to the facility and its technical support activities and to meet the requirements of this document and DOE O 5480.20A. This process should consider factors such as background, experience, and education and should be based on the ability of the person to meet job performance requirements. Selection of personnel may involve a selection test. Position descriptions and job postings for positions covered by this document shall conform to the training and qualifications required in the Work Smart Standards Set, applicable to nuclear facilities only, through this document.

If an individual does not meet the experience requirements contained in this document, consideration may be given to the collective experience of the facility. Individuals who do not meet the experience requirements for a position may be assigned to that position provided the overall operating organization is considered balanced and strong and that DOE/NNSA approval is obtained on a case-by-case basis.

2.2 Training and Qualification

Qualification is defined in terms of education, experience, training, examination, and any special requirements necessary for performance of assigned responsibilities. The requirements in this document are intended to provide reasonable assurance that personnel at DOE/NNSA nuclear facilities possess qualifications to operate and maintain the facility safely and reliably under all conditions. Training to support qualification and certification programs shall be based on a systematic approach to training. A graded approach shall be used to establish the systematic approach to training for operations personnel, maintenance personnel, technicians, and the technical staff. Specific requirements are contained in DOE O 5480.20A. Medical examination requirements are covered by the Personnel Security Assurance Program (PSAP) and the Personnel Assurance Program (PAP); see Document 50.3, "Personnel Security Assurance Program," and Document 50.2, "Personnel Assurance Program," in the *ES&H Manual*.

For each of its nuclear facilities, LLNL is required to:

- Implement the requirements in DOE O 5480.20A as applicable.
- Prepare and submit a Training Implementation Matrix (TIM) to the NNSA-OAK Operations Office Manager for review and approval.
- Prepare procedures that establish the requirements for granting exceptions to specific training or qualification criteria for an individual, as needed, and submit those procedures to the NNSA-OAK Operations Office Manager for review and approval.
- Provide written requests as needed for extensions of certified positions (as described in the TIM) to the NNSA-OAK Operations Office Manager for approval.
- Perform periodic, systematic evaluations of training and qualification programs. These evaluations shall be conducted in accordance with DOE-STD-1070-94, "Guidelines for the Evaluation of Nuclear Facility Training Programs."

Table 1 summarizes the education and experience requirements for nuclear facility workers.

2.3 System Engineers

The position of system engineer has been formalized for LLNL and other DOE/NNSA nuclear facilities. A purpose of the system engineer position is to apply technical expertise to maintain the design basis, control configuration, and trend performance of systems essential for safe operations of a facility (also referred to as vital safety systems).

Table 1. Minimum education and experience required for nuclear facility workers.

	Education	Experience (in years)	
		Job related	In a nuclear facility
Managers	Bachelor of Science degree ^a	—	4 ^b
Supervisors	High school diploma	—	3
Operators	High school diploma	—	—
Technicians	—	1	—
Maintenance Personnel	—	1	—
Technical Staff	Bachelor of Science degree	2	1
System Engineer	Bachelor of Science degree ^{c,d}	2	1
Training Coordinators	High school diploma	—	2
Training Instructors	High school diploma	— ^e	— ^{f,g}

^a Degree does not need to be in engineering or a related science. The training manager also shall have taken courses in education and technical subjects.

^b Education or job-related experience may be substituted on a case-by-case basis. The degree may fulfill three of four years of nuclear facility experience required on a one-for-one time basis.

^c In engineering or related science.

^d May be substituted for either of the following: (1) Professional engineer's license [or completion of the Engineer in Training (EIT) examination]. (2) Completion of 80 semester credit hours in an appropriate, relevant technical subject (includes a combination of related experience and semester credit hours).

^e Experience consistent with the material being presented.

^f Instructors who are responsible for instruction on subjects such as Technical Safety Requirements shall have received training on facility operating characteristics and principles, and operating limits (safety limits, limiting control settings, and limiting conditions for operation) and their bases.

^g Instructors shall have demonstrated knowledge of instructional techniques through training or experience and be qualified by the training manager (or equivalent) for the material being presented.

Qualification requirements for system engineers have been defined to be consistent with those for senior engineering positions as described in DOE O 5480.20A and are summarized in the following sections. To assure that fully qualified system engineers are obtained efficiently, evaluation of an individual's qualification for assignment as a system engineer should give appropriate consideration to formal education and prior training and work experience.

2.3.1 Education

The education requirement for a system engineer is met by any of the following:

- A Bachelor of Science degree in engineering or related science.

- A professional engineer's license (or completion of the Engineer in Training examination).
- Completion of 80 semester credit hours in an appropriate, relevant technical subject. (Related work experience may also be applied at a rate of eight semester credit hours for each year of experience.)

2.3.2 Experience

System engineers shall have both of the following:

- At least 2 years of job-related experience.
- At least 1 year of nuclear experience (i.e., experience at a facility where radioactive materials are routinely handled, stored, processed, or utilized).

However, the experience requirement is met with 2 years of job-related experience at a nuclear facility.

2.3.3 Training

System engineers shall receive:

- General employee training in the following areas (as related to an individual's job).
 - General description of facilities.
 - Job-related policies, procedures, and instructions.
 - Radiological health and safety program.
 - Facility emergency plans.
 - Industrial safety and hygiene program.
 - Security program.
 - Quality assurance program.
 - Criticality safety.
- Initial and continuing training on the principal results of a probabilistic risk assessment (PRA). This training, which applies only if a PRA has been conducted, shall address the
 - Importance of facility systems in preventing damage or severe accidents.
 - Location of all significant amounts of radioactive and other hazardous materials, as well as measures to prevent the release of such materials.
 - Importance of maintaining operational limits and conditions, as well as the consequences of violating such limits and conditions.

- Technical staff training in the following areas (as relevant to each individual's job).
 - Facility organization.
 - Facility fundamentals (e.g., heat transfer, fluid flow, and thermodynamics; electrical science; nuclear physics; chemistry and chemistry controls; and process controls).
 - Facility systems, components, and operations.
 - ES&H orders.
 - Codes and standards.
 - Facility document system.
 - Documented Safety Analyses (DSAs) and technical safety requirements (TSRs).
 - Nuclear criticality control.
 - Material, maintenance, and modification control.
 - As low as reasonably achievable (ALARA) and radiation waste reduction programs.
 - Quality assurance and quality control practices.

3.0 Responsibilities

All workers and organizations shall refer to Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual* for a list of general responsibilities. This section describes specific responsibilities of LLNL organizations and workers who have key safety roles.

3.1 Facility Associate Directors

Facility Associate Directors of nuclear facilities are responsible for ensuring personnel assigned to operate, maintain, or provide technical staff to their facility meet the requirements in DOE O 5480.20A and this document.

3.2 Payroll Associate Directors

Payroll Associate Directors who provide institutional support services (e.g., training, maintenance, and technical analysis) necessary to assure safe operations of nuclear facilities are responsible for providing employees with base skills, knowledge, and abilities to perform their assigned tasks.

3.3 System Engineers

System engineers are responsible for ensuring that their assigned safety systems remain reliable and receive the care and maintenance necessary to support the facility mission. In general, these responsibilities encompass the following three areas:

- Configuration management. (See Document 41.2, “LLNL Configuration Management Program Description,” in the *ES&H Manual*.) Related responsibilities include
 - Identifying documents (e.g., drawings and vendor manuals) that define the design basis for a system important to facility safety, as well as any other necessary documents.
 - Ensuring that system documentation is kept up to date with formal work control and change control processes.
 - Identifying system requirements, performance criteria, and documents considered essential to system operation in cases in which a facility’s design basis has not been clearly defined.
- Assessment of system status and performance. This includes
 - Remaining apprised of a system’s operational status and ongoing modification activities.
 - Assisting the review of key system parameters.
 - Evaluating system performance.
 - Initiating actions to correct problems.
 - Periodically reviewing the system material condition during facility condition inspections required by DOE O 433.1, “Maintenance Management Program for DOE Nuclear Facilities, Contractors Requirements Document.”
- Technical support for operations and maintenance activity. Responsibilities include
 - Being cognizant of a system’s maintenance and operations history and industry operating experience.
 - Being actively involved in day-to-day activities to identify emerging trends.
 - Providing technical assistance to determine operability, correct out-of-specification conditions, or evaluate questionable data.
 - Conducting or supporting analysis to determine operability when a safety system is suspected to be inoperable or degraded.
 - Reviewing and concurring with design changes.
 - Providing input in the development of special operating or test procedures.

4.0 Work Smart Standards

DOE O 433.1, "Maintenance Management Program for DOE Nuclear Facilities, Contractors Requirements Document," 6/1/01.

DOE O 5480.20A, "Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities."

5.0 Resources for More Information

5.1 LLNL Contacts

For additional information, contact the following as necessary:

- Directorate Assurance Manager
- ES&H Teams
- Price Anderson Act Amendments (PAAA) Project Office (ext. 3-7540)

5.2 Other Sources

DOE-STD-1070-94, "Guidelines for the Evaluation of Nuclear Facility Training Programs."

Appendix A

Acronyms, Terms, and Definitions

Certification	The process by which nuclear facility management provides written endorsement of the satisfactory qualifications of a person for a position.
Education	The successful completion of requirements established by an accredited educational institution.
Fissionable materials handler	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.
Job analysis	A systematic method used to obtain a detailed list of the tasks for a specific job.
Managers	A person whose assigned responsibilities include <ul style="list-style-type: none"> • Ensuring that a plant or facility is safely and reliably operated, and that supporting operational and administrative activities are properly controlled. • Ensuring 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.
Medical examination	A procedure performed by a licensed medical physician or a physician's assistant to determine the physical condition and general health of a person for duty. If the examination is conducted by a physician's assistant, the results are subject to the review and approval of a licensed physician.
Nuclear experience	Skills acquired at any facility in which radioactive materials are routinely handled, stored, processed, or utilized.

Operators	Persons responsible for performing operations associated with engineered safety features, as identified in the DSAs; operating support systems that could affect engineered safety features, 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.
Qualification	Education, experience, training, examination, and any special requirements necessary for performance of assigned responsibilities.
Supervisors	For purposes of this document, these individuals are responsible for the quantity and quality of work performed and for directing the actions of operators, technicians, or maintenance personnel.
System engineer	A person with the qualifications and technical expertise to maintain the design basis, control configuration, and trend performance of systems essential for the safe operation of a nonreactor nuclear facility at LLNL.
Technical staff	Personnel responsible for supervision and performance of technical support functions for the operating organization. Personnel involved in surveillance, testing, analyzing facility 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, safety, quality assurance/independent assessment, or reactor engineering.
Technicians	For purposes of this document, these individuals are principally involved in calibration, inspection, troubleshooting, testing, maintenance, and radiation protection activities at the facility.
Training	Instructions designed to develop or improve job performance.

Training
implementation matrix

A plan prepared by each nuclear facility that describes the selection, qualification, and training requirements of this document and DOE Order 5480.20A. It includes any exceptions to requirements that are not implemented.