Boeing - SSFL
EHS Manual

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SM-40.406, RADIOLOGICAL CONTROLS MANUAL: TRAINING AND QUALIFICATION, JULY 13, 2012, JAMES BARNES

DOCUMENT CHANGE SUMMARY - This document replaces issue dated August 3, 2005. The document implements changes to SOP C-401.

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APPLICABILITY

This procedure applies to radiological activities conducted at the Boeing Santa Susana Field Laboratory (SSFL) campus ("Boeing - SSFL").

The terms "shall," "should," "may," etc. indicate procedural requirements or suggestions for good practices. These terms are intended to convey meanings typically used in quality assurance or standards documents (e.g., ANSI).

- "Shall" in this procedure denotes a mandatory requirement.
- "Should" denotes a recommended practice, but which is not required. "Should" is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
- "May" denotes an option. "May" indicates a course of action permissible within the limits of the procedure.

This procedure implements the requirements of SOP C-401, *Radiation Safety Program*. This procedure is intended to provide additional guidance to the requirements of the SOP. Stipulations of this procedure are to be interpreted in light of the SOP C-401 requirements.

Note that DOE dosimetry terminology has been changed. This procedure utilizes the former terminology. SOP C-401, Table 8 describes terminology equivalency.

PART 1 General Requirements

611 Purpose

This chapter establishes the requirements to ensure that personnel have the training to work safely in and around radiological areas and to maintain their individual radiation exposure and the radiation exposures of others As-Low-As-Reasonably-Achievable (ALARA). Training requirements in this chapter apply to personnel entering Boeing--SSFL facilities.

Radiological training is required by the California Code of Regulations (CCR) Title 17.30280 *et al*; 10 CFR 19.12; and 10 CFR 835.901-903.

612 Standardization

To the extent practical, standardized core courses and training materials *should* be used to achieve consistency.

Boeing--SSFL will provide generic training to personnel working near radioactive materials or radiation producing equipment to familiarize personnel with the hazards of use. Specific training beyond generic considerations will be the responsibility of the Principal User of the materials or equipment.

In designing and conducting the training program, to the extent practical, subject specific modules **shall** be specified and utilized. Performance-based training techniques may be used in such development, but informal development strategies are also acceptable. Both classroom instruction and checklist activity demonstrations of competence are used. Notwithstanding the above, Radiation Safety may develop and provide specific training on a case basis without formal performance-based development and review.

Boeing--SSFL will accept DOE Standardized Core Courses as equivalent to internal courses as described below.

The Radiation Safety Officer **shall** review and concur in site-generated radiological training material. Additionally, the RSO **shall** review third-party vendor course for content and compliance to DOE specifications.

Training may be administered through the Computer Based Training System using modules approved by the Radiation Safety Officer.

613 Requirements

1. Personnel working with or in proximity to radioactive materials or radiation producing equipment **shall** be trained in the hazards and safety procedures to become qualified for such work.

2. Personnel **shall** periodically re-qualify for radiological work on a frequency stipulated by Radiation Safety.

3. Written examinations **shall** be successfully completed for training courses required for unescorted access to radiological areas.

    A. A standard test **shall** be administered. The test **shall** be reviewed on a bi-annual basis (i.e., nominally every two years). Test content *should* be revised based on these reviews.

    Questions **shall** be predominantly multiple choice or short answer style. Extensive use of True/False styles is not acceptable.

    Questions *should* be selected to test what the student is expected to remember months after the training rather than to test short-term memory of theoretical material.

B. A minimum passing score is established and announced to the students prior to taking the test. Courses leading to DOE Radiological Worker I or II require an 80% passing grade. Other courses require a 70% passing grade.

C. If an individual fails to successfully pass the test, remedial actions for failure to meet the minimum score will be determined on a case-by-case basis by the course instructor. An individual will be given at least one chance to restudy the materials of the course and pass a retesting exam. Retesting exams **shall** be of an equivalent difficulty as the original exam.

2. Training *should* address both normal and abnormal situations in radiological control.

3. Training and refresher training **shall** include changes in requirements and updates of lessons learned from operations and maintenance experience and occurrence reporting, both from Boeing--SSFL operations and from the operations of other licensees or DOE contractors.

4. Training records and course documentation **shall** meet the requirements of Article 725.

5. Course requirements for the various qualifications are listed in Exhibit 6-1.

614 [DELETED]
615 [DELETED]

616 Instructor Training and Qualifications

1. The Manager, Health, Safety and Radiation Services or the Radiation Safety Officer **shall** designate classroom instructors for Radiation Safety training. The basis of designation *should* be technical knowledge and experience in the subject to be taught, and adequate instructional skills to fulfill the assigned duties.

   For work conducted under a Use Authorization, the Principal User shall ensure that personnel authorized to work with radioactive materials are appropriately trained per the requirements of the Authorization.

2. Facility Health Physicists are authorized to assess and approve Qualification Standard items. Radiation Protection Technicians are qualified to sign and certify radiological worker on-the-job training checklists.

3. [DELETED]

4. [DELETED]

PART 2 General Employee Radiological Training

621 Site Personnel

1. The Boeing--SSFL complex contains a number of industrial hazards in addition to radiological areas. Boeing--SSFL maintains an industrial hazard communications program to alert workers to the presence of these hazards.

2. The Boeing--SSFL radiological work areas are clearly distinguished from those areas accessible to the general public. In addition to any specific radiological markings, additional instructions in non-technical language (e.g., "Keep Out" or "Authorized Personnel Only") are posted. In this scheme, radioactive materials and radiation are considered to be an industrial hazard. If personnel obey the hazard warnings posted, they will not encounter radiological hazards.

3. Site personnel are prohibited from entering Radioactive Materials areas without first completing the training described in this Chapter.

4. No specific radiological training for Boeing--SSFL personnel is required for routine access to Boeing--SSFL property.

622 Radiological Orientation for Escorted Personnel

1. Personnel who enter a Controlled Area, or who will be in close proximity to radioactive materials or radiation producing equipment, **shall** receive a radiological safety orientation that *should* include the information described in SOP C-401, Table 7, *Basic Training Topics to Be Covered for Access to Radiological Access*.

2. Information may be communicated by videotape, computer-based training or project-specific handout (Project Briefing Sheet) to personnel entering a site. An examination is not required.

   An individual gaining escorted access to a radiological area for the first time shall receive Visitor Orientation (one time only). On subsequent returns to Boeing--SSFL, escorted workers who have received the Visitor Orientation course shall review and sign a Briefing Sheet prior to access to radiological areas, i.e., a Briefing Sheet must be signed upon each return, but not prior to each individual radiological access during a visit.

3. DOE General Employee Radiological Training (GERT), Rad Worker I, or Rad Worker II meets the requirements for this training. The individual must present evidence of such training, such as a DOE training card.

4. Records of the orientation **shall** be maintained.

5. The detail level of the orientation for continuously escorted individuals or groups *should* be commensurate with the areas to be visited. Records of orientation for such individuals or groups *should* be retained.

6. Escorted personnel **shall** be escorted at all times by an Authorized User listed on the Use Authorization for the facility or activity. The escorting individual **shall**:

   A. Have completed radiation safety training to the level of required of an individual for unescorted access to the area being entered; and,

   B. Ensure that all escorted individuals comply with the requirements of the radiation safety program for that area.

7. Escorted personnel are limited to "member of the public" dose limits (See SOP C-401, Table 5).

8. Unless specifically authorized by the Radiation Safety Officer, escorted personnel may not manipulate radioactive materials nor operate radiation producing equipment.

9. Escorted personnel may NOT enter High Radiation Areas, Contaminated Areas, or Airborne Radioactivity Areas.

PART 3 Radiological Worker Training

631 Requirements

1. Personnel working with or in proximity to radioactive materials **shall** complete the appropriate qualifications listed in Exhibit 6-1.

   DOE Rad Worker 2 or Rad Worker 1 documented at a non-Boeing--SSFL site satisfies the Boeing--SSFL requirements for these qualifications (and for RMFW and RMW qualifications, as well). Boeing--SSFL Course #4027 **shall** be completed for familiarization with site requirements.

2. Personnel entering Airborne Radioactivity Areas **shall** qualify for respirator use as described by the Respiratory Protection Program. Requirements for respiratory protection training are included in the Boeing-SSFLRespiratory Protection Program.

3. The Radiation Safety Officer may designate specialized training requirements for specific activities. Such training shall be designated in the appropriate Use Authorization. Additionally, the RSO may amend the re-qualification requirements by discussion in the Use Authorization.

632 DOE Radiological Worker 1

1. Personnel requiring unescorted access to Controlled Areas in DOE facilities, or who will receive occupational exposure in DOE activities, **shall** complete DOE Radiological Worker 1 qualification prior to unescorted access into Controlled Areas or prior to unsupervised participation in activities.

2. [DELETED]

3. Radiological Worker 1 qualification **shall** encompass, at a minimum, the topics listed in Exhibit 6-2 and the following additional site-specific practical factors:

A. Entering and exiting Radiological Buffer Areas and Radiation Areas

B. Performance of frisking for personnel contamination, as applicable

C. Verification of instrument response and source check

D. Anticipated response to alarm situations.

4. Expected time to complete the standardized core course and site-specific Radiological Worker 1 training is approximately two hours.

5. DOE 1 personnel are not permitted access to certain posted areas. See Exhibit 6-1 for guidance.

633 DOE Radiological Worker 2

Workers whose job assignments involve entry to High and Very High Radiation Areas, Contamination Areas, High Contamination Areas and Airborne Radioactivity Areas in DOE facilities **shall** complete Radiological Worker 2 qualification, in lieu of Radiological Worker 1.

Further, workers who have potential contact with hot particles or use of gloveboxes with high contamination levels **shall** complete Radiological Worker 2 training.

Escorted access of untrained personnel to these areas is **NOT** permitted except when specifically authorized by the Radiation Safety Officer.

1. [DELETED]

2. Radiological Worker 2 training **shall** encompass, at a minimum, the topics listed in Exhibit 6-2, and the following additional site-specific practical factors:

A. Donning of protective clothing

B. Demonstration of ability to enter a Radiological Buffer Area, Contamination Area and High Radiation Area to perform a task

C. Anticipated response to abnormal situations

D. Anticipated response to alarms or faulty radiological control equipment

E. Removing protective clothing and equipment and subsequently exiting the area

F. Performance of frisking for personnel contamination

G. Verification of instrument response and source check.

3. Expected time to complete Radiological Worker 2 qualification is approximately three hours.

634 Specialized Radiological Worker Training

When specified in the User Authorization, Controlled Work Permit, Technical Work Documents, etc., specialized Radiological Worker training **shall** be completed. Such training is appropriate for non-routine operations or work in areas with rapidly changing radiological conditions.

This training may be in addition to standardized training and is required for personnel planning, preparing and performing jobs that have the potential for high radiological consequences.

Such jobs may involve special containment devices, the use of mockups and ALARA considerations.

Such training is specified by Radiation Safety on a case basis.

635 Emergency Training

Each individual authorized to perform emergency actions likely to result in occupational doses exceeding the values of the occupational limits listed in SM-40.402, Table 2-1:

- Shall be qualified as DOE Radiological Worker II; and,
- Shall be briefed beforehand on the known or anticipated hazards to which the individual will be subjected.

PART 4 Radiation Protection Technician Qualification

Future D&D activities at SSFL will utilize subcontractors who will be required to provide their own HP technicians that meet the DOE RCT qualifications.

641 [DELETED]

642 Qualification Standards for Experienced Radiation Protection Technicians

1. Boeing will only hire employee (or contracted) HP technicians who have the requisite experience and training to meet the DOE RCT qualifications. Experienced Radiation Safety Technicians **shall** be considered to be qualified Radiation Protection Technicians if they satisfy the following requirements:

    A. The individual has received training equivalent to the academic core materials through a college, military, or industrial training program curriculum; and,

    B. The individual has worked for a cumulative period of at least 36 months in a technician position that required the individual to perform a significant number of the tasks listed in DOE-STD-1098-2008,

    C. The individual has reviewed basic Boeing--SSFL radiation safety procedures, and has successfully demonstrated knowledge of these procedures.

2. Verification of the qualifications A) and B) may be accomplished by a review of the individual's work history. The Manager, Radiation Safety (or designee) **shall** determine the applicability and extent of work experience and academic background. Academic degrees may be substituted for work experience; ANSI 3.1-1993 *should* serve as the guidance document for these determinations.

3. It is expected that subcontracted Radiation Protection Technicians have the same knowledge and qualifications required of facility technicians performing the same duties.

4. Upon acceptance using the above criteria, the training and qualification program for the technician **shall** address the following:

   A. Identification of the duties a technician will be authorized to perform

   B. Facility procedures and equipment associated with the authorized duties

   C. Recent operating experience

   D. Observation of on-the-job performances by the Facility Health Physicist or other knowledgeable Radiation Safety personnel.

643 Continuing Training

1. Following qualification, the Radiation Protection Technician *should* participate in continuing training.

2. Continuing Training *should* provide continued improvement in the knowledge and skills of the Radiation Protection Technician.

   Infrequently performed tasks, such as those for emergency response, may require annual training. Other tasks, such as handling Special Nuclear Material wastes, may require retraining prior to initiation of a task. The Radiation Safety Officer **shall** assess the requirement for and content of such training on a case-by-case basis, as required for implementation of safe practices.

3. Continuing training *should* include site-specific and industry-wide changes in requirements and updates of lessons learned from operating experience and industry events.

4. Continuing training is not to be construed as formal classroom training. Continuing training may include informal briefings, periodic review of procedures, informal discussions, one-on-one knowledge transfers, written or oral examinations, completion of required reading lists, review of professional or scientific journals, or any similar activity. The intent is to ensure that qualified technicians have adequate knowledge of the work environment and radiation safety procedures to ensure that they are effectively administering the radiation safety program in the field.

5. Personnel who maintain qualifications as a Radiation Protection Technicians satisfy the requirements of Radiological Worker II training.

6. Subcontracted technicians who work at the facility for extended time periods (more than 6 months) *should* participate in continuing training activities commensurate with their assigned duties.

644 Facility Health Physicist

1. Facility Health Physicists **shall** maintain qualifications as Radiation Protection Technicians and *should* participate in continuing radiological training programs.

2. Facility Health Physicists *should* have supervisory and leadership capabilities to direct the work of technicians; effectively interact with crafts, line supervisors, professional staff and other managers; and be able to respond and direct others in emergency and abnormal situations. The Facility Health Physicist's depth of knowledge *should* exceed that expected of a Radiation Protection Technician, particularly regarding the radiological conditions and specific work evolutions of the facility he is responsible for.

3. [DELETED]

4. [DELETED]

PART 5 Other Radiological Training

651 Management Training

1. Managers, team leaders, and supervisors of personnel involved in radiological work **shall** be familiar with the requirements for such work.

2. Managers, team leaders, or supervisors directly overseeing personnel involved in radiological work *should* **maintain** levels of radiological training qualifications equivalent to the personnel working under them.

3. [DELETED]

4. Managers, team leaders, or supervisors of groups who are involved in radiological activities, but who do not routinely direct radiological work, *should* complete radiation safety training and qualifications equivalent to that of the workers that they manage. This may be done on a one-time-only basis.

652 Technical Support Personnel

1. Appropriate technical support personnel (engineers, schedulers, procedure writers) *should* be trained in the principles of ALARA, basic ALARA techniques and dose reduction techniques.

   Qualification as a Radiological Worker satisfies this requirement.

2. They *should* also participate in selected portions of job-specific and specialized training, particularly in situations using mock-ups.

653 DOE Planners

Planners who develop detailed work plans involving or associated with radioactivity or radioactive materials *should* have Radiological Worker training to the level required by the workers using the work plans. It is desirable that Decontamination and Decommissioning planners have DOE Radiological Worker 2 training.

654 Radiological Technical and Support Personnel

1. Radiological Control technical staff and management *should* have:

   A. A combination of education and experience commensurate with their job responsibilities

   B. Continuing training based on an assessment of job responsibilities to maintain and enhance proficiency

   C. Continuing training to remain cognizant of changes to the facility, operating experience, procedures, regulations and quality assurance requirements.

2. Radiological support personnel include but are not limited to: dosimetry technicians, instrument technicians, medical personnel, records clerks, whole body counter technicians and laboratory personnel.

3. Radiological support personnel *should* have:

   A. Qualification as a Radiological Worker (in the appropriate category)

   B. Additional training on job-specific topics, as applicable

   C. Training appropriate to the tasks to be performed

   D. Continuing training to provide continued improvement in knowledge and skills.

4. Radiological support personnel who are responsible for implementing the site ALARA program **shall** receive ALARA training. Radiological Worker training satisfies this requirement.

5. Certification and involvement with professional industry organizations *should* be encouraged.

655 [DELETED]

656 Emergency Response Personnel

1. Emergency response personnel, from both on-site and off-site, may be required to work in radiological areas. On-Site personnel *should* be trained to DOE Radiation Worker 1 standards, as a minimum. SSFL personnel *should* be trained to DOE Radiation Worker 2, if entry into Contamination, Airborne Radioactivity, or High Radiation Areas is potentially required.

2. If a Security & Fire Services worker is not trained, trained escorts *should* be assigned.

3. Training *should* make it clear that lifesaving has priority over radiological controls.

4. Records of this training *should* be maintained by Security & Fire Services.

657 Training for Tour Groups and Visiting Dignitaries, Scientists and Specialists

1. To the extent practical, Radiological control training for tour groups and visiting dignitaries, scientists and specialists **shall** be commensurate with the areas they are to enter.

   In most situations, if visiting scientists or specialists are to do hands-on radiological work, the individual(s) will be expected to complete appropriate qualifications as a Radiological Worker.

   Notwithstanding the above expectations, the Radiation Safety Officer may modify this requirement if the individual is to perform only limited, repetitive tasks. If limited training is provided for these limited tasks, the Principal User sponsoring the escorted person's work **shall** be informed of the special restrictions, and, in a timely manner, the User Authorization **shall** be amended to delineate the restrictions.

2. Records of this training **shall** be maintained.

3. Where large numbers of people are touring as a group, a specially prepared briefing sheet may be used in lieu of the Visitor Orientation. The Radiation Safety Officer shall approve such briefing sheets on a case basis. Each escorted person is to sign a record indicating that they were provided with the briefing sheet and that they were given an opportunity to ask questions regarding conditions in the tour area.

PART 6 Training For Special Applications

661 Use Authorization Training

Personnel permitted by User Authorization to perform a specific task using radioactive materials or radiation-generating devices **shall** complete training to ensure that they are familiar with the radiation safety requirements of the task(s). Content of these courses will be determine on a case-by-case basis by the Radiation Safety Officer, and will be described in the User Authorization.

662 Plutonium Facilities

Boeing--SSFL no longer operates plutonium processing facilities. Plutonium may be present as a constituent of certain categories of waste. When plutonium is present as an isotope of concern in significant quantities, specific project procedures **shall** be developed for the conduct of activities.

663 Uranium Facilities

Boeing--SSFL no longer operates uranium processing facilities. Uranium may be present as a constituent of certain categories of waste. When uranium is present as an isotope of concern in significant quantities, specific project procedures **shall** be developed for the conduct of activities.

664 Tritium Facilities

Boeing--SSFL no longer operates tritium processing facilities.

665 Beam Accelerator Facilities

Boeing--SSFL no longer operates accelerator facilities.

EXHIBIT 6-1
Training Requirements for Radiological Access

The following courses are provided for instruction in radiation safety. Except for checklists that are used on-the-job (OJT), the courses require classroom instruction:

Boeing--SSFL Course Number	Course Description	Renew every ____
1S00038A	Radiation Protection – Basic Safety Principles	36 months[1]
9CC4027	Visitor Orientation	One Time Only[2]
9CC4071	Radiological Worker Dressout Checklist (OJT)	24 months[1]
9CC5078	Frisker Use Checklist (OJT)	24 months[1]

1) The training expiration date will be the last day of the 24th month following the month of training (current Training Server process).
2) Visitors shall read and sign a safety briefing sheet on subsequent visits. The orientation video does NOT need to be repeated.

Qualification requirements are listed below:

Qualification	Course Requirements
DOE Radiological Worker II	Course 1S00038A Course 9CC4071 Course 9CC5078
DOE Radiological Worker I	Course 1S00038A Course 9CC5078
Radioactive Materials Facility Worker	Course 1S00038A Course 9CC4071 Course 9CC5078
Radioactive Materials Worker	Course 1S00038A
Course 9CC4027 or Briefing Sheet	[No entry into Contaminated, Airborne Radioactivity, or High Radiation Areas]

[The following table is repeated from SM-40.403 for convenience.]

Radiological Area	**Unescorted Access**		**Escorted Access**
	DOE	**Canoga Park**	
X-ray Area	[See Use Authorization]		
Special Operations	[See Use Authorization]		
Controlled Area	DOE Rad Worker I	Radioactive Material Worker	Orientation and Escort
Radioactive Materials Area	DOE Rad Worker I	Radioactive Material Worker	Orientation and Escort
Radiation Area	DOE Rad Worker I	Radioactive Material Worker	Orientation and Escort
High Radiation Area	DOE Rad Worker II	Radioactive Material Facility Worker	**NO ACCESS**
Very High Radiation Area	DOE Rad Worker II	Radioactive Material Facility Worker	**NO ACCESS**
Contamination Area	DOE Rad Worker II	Radioactive Material Facility Worker	**NO ACCESS**
High Contamination Area	DOE Rad Worker II with RPD Qualifications	Radioactive Material Facility Worker with RPD Qualifications	**NO ACCESS**
Airborne Radioactivity Area	DOE Rad Worker II with RPD Qualifications	Radioactive Material Facility Worker with RPD Qualifications	**NO ACCESS**