UCRL-JC-118934
PREPRINT

Instructor Qualification for Radiation Safety Training at a National Laboratory

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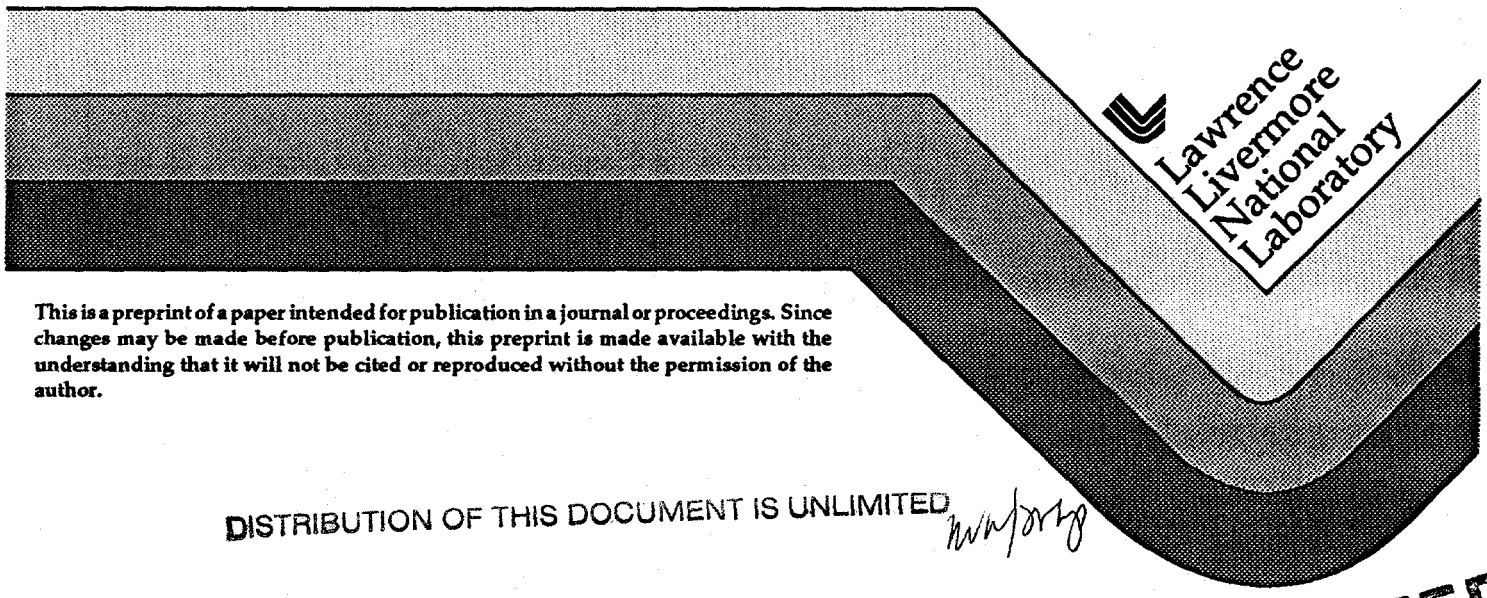
This paper was prepared for submittal to the
Twenty-eighth MidyearTopical Meeting
of the Health Physics Society
Charleston, SC
Jan 29 - Feb 1, 1995

October 1994



DISCLAIMER

INSTRUCTOR QUALIFICATION FOR RADIATION SAFETY TRAINING AT A NATIONAL LABORATORY

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INTRODUCTION

Prior 1993, Health Physics Training (HPT) was conducted by the Lawrence Livermore National Laboratory (LLNL) health physics group. The job requirements specified a Masters Degree and experience. In fact, the majority of Health Physicists in the group were certified by the American Board of Health Physics. Under those circumstances, it was assumed that individuals in the group were technically qualified and the HPT instructor qualification stated that. In late 1993, the Health Physics Group at the LLNL was restructured and the training function was assigned to the training group. Additional requirements for training were mandated by the Department of Energy (DOE), which would necessitate increasing the existing training staff. With the need to hire, and the policy of reassignment of employees during downsizing, it was imperative that formal qualification standards be developed for technical knowledge. Qualification standards were in place for instructional capability.

The audience for radiation safety courses, while varied at LLNL, consists of many professional scientists. It is necessary that individuals conducting training at LLNL, even in the most basic class, be technically knowledgeable and credible. Instructors delivering the New Employee Orientation (General Employee Radiological Training) often field questions of considerable depth that are frequently related to new and controversial material. Because this is normally the first impression individuals get of the LLNL's Hazard Control Department, it is preferable to answer these questions accurately rather than say "I'll get back to you on that".

In drafting the new training qualifications for instructors, the requirements of a Certified Health Physicist had to be modified due to supply and demand. Additionally, for many of the performance-based training courses, registration by the National Registry of Radiation Protection Technologists is more desirable. Flexibility in qualification requirements has been incorporated to meet the reality of ongoing training and the compensation for desirable skills of individuals who may not meet all the criteria. The qualification requirements for an instructor rely on entry -level requirements and emphasis on goals (preferred) and continuing development of technical and instructional capabilities.

I would like to acknowledge the contributions of Dr. Gearld Cheek of Oak Ridge Institute of Science and Education (ORISE) and the University of Tennessee, and Gregory Steiner of Niagara Mohawk Power in establishing the qualification criteria for the LLNL HPT.

HPT INSTRUCTOR QUALIFICATIONS

Radiation safety instructors should thoroughly understand all aspects of the subject matter being taught and its relationship to overall environmental, health and safety issues in LLNL operations. In addition, the instructor should be able to employ performance-based training techniques that enhance employee learning and job performance.

The qualifications of radiation safety instructors involve qualification in four areas:

- instructional capability
- education
- certifications
- experience

Instructional Capability and Qualification

Qualifications of instructional capability is based on demonstrated performance of the instructional tasks for the specific course requirements and the instructor's position. Successful completion of instructor training and education programs, as well as an evaluation of on-the-job performance, is necessary for verification of instructional capability.

Through training or experience, HPT Instructors should be able to do the following:

- Review instructional materials and modify them to fully meet the needs of the training group
- Arrange the training facility (classroom/laboratory or other instructional setting) to meet the requirements for the training sessions
- Effectively communicate, verbally and nonverbally, lessons to enhance learning
- Invoke student interaction through questions and student activity
- Respond to student's questions
- Provide positive feedback to students
- Use appropriate instructional materials and visual aids to meet the lesson's objectives
- Administer performance and written tests
- Ensure evaluation materials and class rosters are maintained and forwarded to the appropriate administrative personnel
- Evaluate the training program's effectiveness
- Modify training materials based on evaluation of the training program

Radiation safety instructors are divided into seven positions which address instructor training and education to enhance instructional capability. Those seven positions are:

- Basic
- HPT Coordinator
- HPT Lead Instructor
- HPT Instructor
- HPT Performance (On-Job-Training(OJT))Trainer
- HPT Performance(OJT) Evaluator
- Radiation Safety Occasional Instructor

Basic HPT Instructor

The Basic HPT Instructor qualifications are the minimum qualifications for HPT Instructors not including additional qualifications for specific courses which is covered later.

Basic requirements in the four areas of qualifications are as follows:

Education: A.A./A.S. degree, Navy Nuclear Propulsion Training with special emphasis on radiological controls or equivalent education/training

Certification: DOE Radiological Control Technician Phase I training

Experience: At least three years of applied radiological protection experience in an operating nuclear facility or equivalent

Instructional: The following LLNL course: (Equivalent training and/or experience may be substitute for specific courses with approval of the HPTC).

- Presentation Delivery for Instructors and Trainers
- Presentation Design
- Basic Classroom Instruction
- On-the-Job Training

HPT Coordinator (HPTC)

An individual who has overall responsibility for the development, implementation, and evaluation of HPT.

Technical Qualification: Certification by the American Board of Health Physics is preferred.

Instructional Qualification: Meet the requirements for HPT Lead Instructor and formal training on training program evaluations.

HPT Lead Instructor

An individual who has responsibility for a specific course. This individual coordinates with the HPTC for the development and revision to the course and is responsible for the delivery of that course.

Technical Qualifications: Basic HPT technical qualifications and course technical qualifications.

Instructional Qualifications: Basic HPT Instructor requirements and the following courses, or equivalent:

- Analysis
- Design
- Testing
- On-The-Job-Training

HPT Instructor-Assigned

An individual who meets the Basic HPT Instructor requirements. HPT Instructors may be "Full" or "Limited" depending on course-specific requirements. "Limited" HPT Instructors may deliver courses with the approval of the HPTC and under the supervision of the HPT Lead Instructor.

Technical Qualifications: In addition to the basic requirements, the HPT Instructor should meet or be striving for specific course technical qualifications. An individual may be a HPT Lead Instructor for several courses and a HPT Instructor for others.

Instructional Qualifications: Basic HPT Instructional requirements.

HPT Performance Trainer (On-Job-Training)

An individual who trains others to perform a specific task These Trainers may or may not be in the HPT group.

Technical Qualifications: HPT performance Trainers must have the necessary experience to provide training on a specific task.

Instructional Qualifications: Trainers should have completed OJT for Trainers.

HPT Performance Evaluator (On-Job-Evaluator)

An individual who evaluates the performance of trainees. Evaluators may or may not be in the HPT group.

Technical Qualifications: Evaluators must have experience commensurate with the performance to be evaluated.

Instructional Qualifications: Evaluators should have OJT for Evaluators.

Radiation Safety Occasional Instructor

This individual is not in the formal HPT group and is not assumed to have training responsibilities but may occasionally make presentations. Individuals giving informal (non-credit) presentations are excluded from this group.

Technical Qualifications: These Instructors must be familiar with the course material, and should meet the minimum technical requirements for special training (i.e. plutonium facility).

Instructional Qualifications: None required, but basic HPT Instructor requirements preferred.

HPT INSTRUCTOR TECHNICAL QUALIFICATIONS FOR DOE RADIOLOGICAL CONTROL MANUAL TRAINING

General Employee Radiological Training

LLNL Technical Qualifications

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility, including experience managing radiological workers and nuclear projects preferred. Instructors must have experience commensurate with the instructional material to be taught.

Radiological Worker Training

LLNL Technical Qualifications

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by American Board of Health Physics (ABHP) or National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility, including experience managing Radiological Workers and nuclear projects preferred. Instructors must have experience commensurate with the course material to be taught.

Radiological Control Technician Training - Phase I Academics

LLNL Technical Qualifications

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility Instructors must have experience commensurate with the course material to be taught.

Radiological Control Technician Training - Phase I, Site-Specifics

LLNL Technical Qualifications

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with the course material to be taught.

Radiological Control Technician Training - Phase II

LLNL Technical Qualifications

Education: HPT instructor qualification.

Certification: Registration by the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least three years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with the task to be taught.

DOE RADIOLOGICAL CONTROL MANUAL PART 5 OTHER TRAINING

Article 651 (1.1) Radiological Control Manual Training for Managers

DOE Technical Qualifications 9/94

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility, including experience managing Radiological Workers and nuclear projects preferred. Instructors must have experience commensurate with the course material to be taught. The areas of experience should include the following:

- Dose reduction (ALARA) principles and practices
- Radiological surveys and posting
- Personnel and area dosimetry
- External and internal dose control
- Contamination control
- Nuclear instrumentation
- Radiological Work Permits (RWPs)
- Airborne radioactivity measurement and control
- Radiological goals and improvement programs
- Radiological records
- Radiological Control Program assessments

Knowledge of current Federal regulations and guidance, including best nuclear industry practices, pertaining to radiological protection.

LLNL Additional Technical Qualifications

Intimate knowledge of LLNL Radiation Protection Program and *LLNL Radiological Control Manual.*

Article 651 (1.2) Higher Level Training for Supervisors

DOE Technical Qualifications 9/94

Education: Minimum of B.S. degree in Education or related discipline preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with he instructional material to be taught. The areas of experience should include the following:

- Radiological control policies
- RadCon Manual
- Interpersonal communications
- 10 CFR 835
- Risk communication
- Maslow's theory

Knowledge of current Federal regulations and guidance, including best nuclear industry practices, pertaining to radiological protection.

Article 652/653 Technical Support Personnel (ALARA)

DOE Technical Qualifications

The DOE has not yet issued this training.

LLNL Technical Qualifications

The LLNL has not implemented this training. The qualification standard is being developed.

Article 654 Radiological Control Personnel

DOE Technical Qualifications

The DOE has not yet issued the training guide.

LLNL Technical Qualifications

The LLNL has not implemented this training. The qualification standard is being developed.

Article 655 Radiographers and Radiation Generating Device Operators

DOE Technical Qualifications

The DOE has not yet issued this training guide.

LLNL Technical Qualifications for X-Ray Safety Training

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility, including experience with radiation-generating devices preferred. Instructors must have experience commensurate with the instructional material to be taught. The areas of experience should include the following:

- Conduct of x-ray surveys
- LLNL Health & Safety Manual Supplement 33.47
- Interlock checks

Article 656 Emergency Response Personnel

DOE Technical Qualifications

The DOE has not yet issued the training guide.

LLNL Technical Qualifications

The LLNL has not implemented this training. The qualification standard is being developed.

Article 657 Specialized Visitor Training for Tour Groups and Visiting Dignitaries, Scientists and Specialists

DOE Technical Qualifications

The DOE has not yet issued the training guide.

LLNL Technical Qualifications

The LLNL has not implemented this training. The qualification standard is being developed.

Article 661 Plutonium Facilities

DOE Technical Qualifications

Education: Minimum of B.S. degree in Health Physics or related discipline preferred.

Certification: Certification by American Board of Health Physics (ABHP) or National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with the instructional material to be taught. The areas of experience should include the following:

- Nuclides/isotopes of plutonium
- Properties of plutonium
- Plutonium hazards
- Radiological control policies
- Conducting surveys and monitoring for plutonium

Intimate knowledge of current Federal regulations and guidance, and best nuclear industry practices, pertaining to radiological protection.

LLNL Additional Technical Qualifications

Current Certification as Limited Plutonium Handler

Article 662 Uranium Facilities

DOE Technical Qualifications

The DOE has not yet issued this training.

LLNL Technical Qualifications for LLNL Uranium Facilities Training

Education: Education: Minimum of B.S. degree in Health Physics or related discipline preferred and the DOE Assessors Training for Uranium Facilities (in development) or equivalent.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with the instructional material to be taught. The areas of experience should include the following:

- Radiological controls associated with uranium
- Conducting surveys and monitoring for uranium
- Response to uranium incidents
- Decontamination

Article 663 Tritium Facilities

DOE Technical Qualifications

The DOE has not yet issued this training.

LLNL Technical Qualifications for LLNL Tritium Facilities Training

Education: Education: Minimum of B.S. degree in Health Physics or related discipline preferred and the Mound Basic Tritium Training course or equivalent.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with the instructional material to be taught. The areas of experience should include the following:

- Radiological controls associated with tritium
- Monitoring for tritium
- Response to tritium incidents
- Decontamination

Article 664 Accelerator Facilities

DOE Technical Qualifications

The DOE has not yet issued this training.

LLNL Technical Qualifications for LLNL Accelerator Facilities Training

Education: Education: Minimum of B.S. degree in Health Physics or related discipline preferred and the DOE Assessors Training for Accelerator Facilities (in development) or equivalent.

Certification: Certification by the American Board of Health Physics (ABHP) or the National Registry of Radiation Protection Technologists (NRRPT) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Instructors must have experience commensurate with the instructional material to be taught. The areas of experience should include the following:

- Radiological controls associated with accelerators
- Surveys and radiation area monitoring of accelerators
- Interlock checks
- Familiarity with a minimum of three accelerator facilities

Contamination Control for Biomedical Researchers

DOE Technical Qualifications

The DOE has not yet issued this training.

LLNL Technical Qualifications for LLNL Contamination Control for BRRP Training

Education: Education: Minimum of M.S. degree in Health Physics or related discipline preferred.

Certification: Certification by the American Board of Health Physics (ABHP) preferred.

Experience: At least five years of applied radiological protection experience in an operating nuclear facility. Minimum of 16 hours of experience in LLNL BRRP Facilities. Instructors must have experience commensurate with the instructional material to be taught. The areas of experience should include the following:

- Contamination control of biomedical facilities
- Conducting surveys and monitoring at biomedical facilities
- Response to spills
- Decontamination

Other LLNL Radiation Safety Training

LLNL has a number of other radiation safety courses which are offered or in development. The HPT Instructor qualifications closely parallel those which have been established for DOE mandated training.

QUALIFICATION OF HPT INSTRUCTORS

Approval of HPT Instructors

Authority

Approval of HPT Instructors is recommended by the HPTC to the Group Leader, Education, Training, and Safety Analysis and the LLNL Radiological Control Manager or his designee.

Equivalency

Substitution of equivalent courses/training/experience may be used with documentation and approval of the HPTC for both instructional capability qualifications and technical qualifications. Individuals who are principle developers of a course are considered technically qualified to be HPT Lead Instructors for that course.

HPT Instructor Qualification in Progress

Individuals who have not met all the qualifications but are in the process of becoming qualified, may perform on a limited basis as instructors with approval from the HPTC.

Unqualified Instructors

It is recognized that occasionally a subject matter expert without instructional qualifications may be called upon to provide instruction. An unqualified instructor may give OJT or classroom instruction as a team instructor under the guidance of a qualified instructor.

Continuing Training

Education

Participate in technical meetings/seminars/courses approved by the HPTC for a minimum of 10 hours per year.

Experience Qualifications

It is important that Instructors maintain an understanding of the needs of the trainees through structured LLNL activities for at least 80 hours a year. The following are examples of specific suggested activities:

- Performance in a drill as a player, evaluator, or controller
- Performance of LLNL activities to enhance instructor knowledge and ability
- Work as a member of the Safety Team
- Observe a LLNL process or procedure
- Walkdown a facility to support training design/development
- Participate in internal audits/assessments
- Requalifications such as Limited Plutonium Handler
- Other LLNL activities as approved by the HPTC

Communication Skills

The ability to provide effective training is directly influenced by the interpersonal skills of the instructor. Communication skills are among the interpersonal skills that can significantly impact instructional effectiveness. Other skills include the ability to listen to questions, to phrase questions that stimulate learning, and to deal effectively with conflict. Various courses are available at LLNL to enhance and improve one's interpersonal relationship skills. Instructors are encouraged to participate in these courses.

Instructional Capabilities Qualifications

Participation in a course/seminar on instructional design or delivery is encouraged.

Core Course Development and Maintenance

HPT Instructors are encouraged to participate on professional committees for the development and maintenance of radiation safety training.

REFERENCES

U.S. Department of Energy, Radiological Control Manual Training for Managers Program Management Manual, DOE/EH-0423, Oak Ridge Institute of Science and Education, Oak Ridge, TN, September 1994.

U.S. Department of Energy, Higher Level Training for Supervisors Program Management Manual, DOE/EH-0424, Oak Ridge Institute of Science and Education, Oak Ridge, TN, September 1994.

U.S. Department of Energy, Plutonium Facilities Training Program Management Manual, DOE/EH-0425, Oak Ridge Institute of Science and Education, Oak Ridge, TN, September 1994.

*This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.