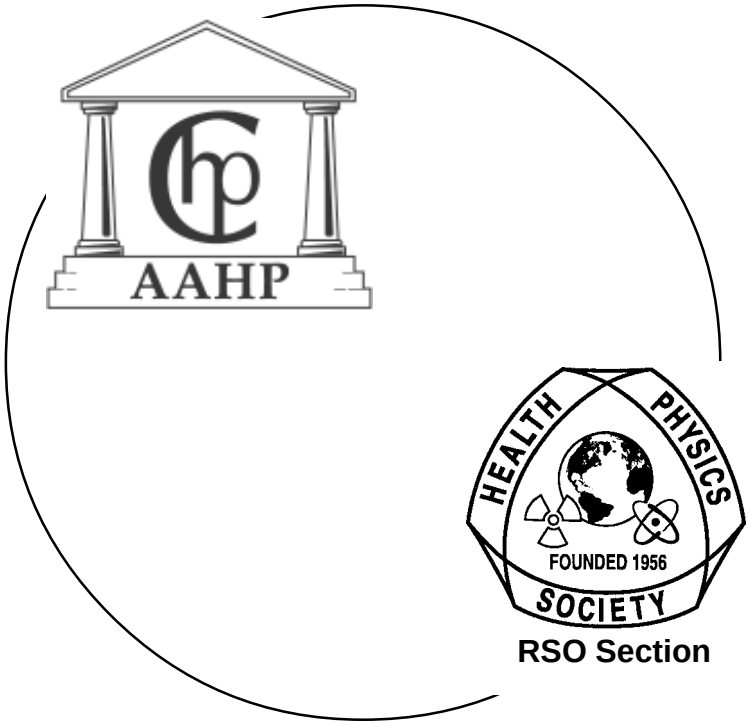
SQ/P-001

Standards of Qualification and Practice (SQ/P)

Qualifications for University Radiation Safety Officer



American Academy of Health Physics and
Radiation Safety Operations Section
of the Health Physics Society

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Attachments

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Preface

This document has been developed by the American Academy of Health Physics (AAHP) and the Radiation Safety Operations (RSO) Section of the Health Physics Society (HPS) to assist management with the proper selection of a Radiation Safety Officer for a university. This standard has been developed and reviewed by health physicists who have worked as Radiation Safety Officers in a university and have a strong familiarity with the skills and abilities needed to carry out successfully the duties of this position.

Since universities vary widely in their uses of radiation and radioactive materials, this standard is meant to be a guide rather than a mandatory checklist, with lists of skills and abilities that may apply to the position of Radiation Safety Officer depending upon the particular program's complexities. No one person may have all the skills or qualifications listed in this document, nor may any one facility require a person with all the skills and qualifications contained in this document.

The AAHP and the HPS RSO Section would like to thank the many people who provided useful comments during the writing of this report. The final version of this report may not reflect their individual opinions, but the writing committee appreciates their time and the thoughtfulness of their suggestions.

1. Introduction

Universities pose unique challenges to radiation safety professionals. For a university to function, researchers must have considerable freedom to pursue their areas of interest. New students and visiting faculty must have easy and rapid access to facilities. In spite of these needs, regulations require strict controls on both the use of radiation sources and the people who use them. University Radiation Safety Officers (RSOs, who may be referred to as radiation protection officers or other similar titles) are responsible for reconciling these two often-conflicting objectives to both the university and regulatory agencies issuing the university licenses.

These standards are offered to provide guidance to university management in establishing qualifications, credentials, and experience required for university RSOs.

Many universities, particularly those categorized as research universities, have radiation safety programs with extensive, diverse, and broad-in-scope requirements. Radiation safety staff at such institutions may include a large number of personnel, including health physicists at several professional levels supporting a manager (i.e., the RSO). An RSO may be a member of a research or instructional faculty, working extensively with peers among the research and instructional faculty who also utilize sources of ionizing and nonionizing radiation. In such a case, subordinate managers typically oversee the daily routines of the various subprograms constituting the overall radiation safety program.

Other universities operate programs that are limited in scope and complexity. Such programs may have a single RSO, sometimes supported by part-time assistants with little-to-no technical training. Frequently, these assistants come and go with each graduation. An RSO may simply be a faculty member without administrative or programmatic support. Such an RSO would not only interact with a few faculty members using sources of ionizing and nonionizing radiation, but might also perform all the tasks of radiation safety technical personnel.

Thus, the skills required for a university RSO to effectively manage the radiation safety program at his or her institution will vary widely across the broad spectrum of university research and instructional uses of ionizing and nonionizing radiation. This SQ/P contains guidance for establishing the qualifications and credentials required for university RSOs in light of these varying programmatic demands. This standard has been designed for the most general case—one between the two extremes just described. The process of scaling upward or downward, toward either extreme, will generally entail site-specific revisions to the provisions of this standard.

A university RSO must possess at least the minimum qualifications pertinent to the radiation safety program he or she heads. In the most general sense, an RSO must be able to manage and keep current a comprehensive radiation safety program. An RSO must possess the broad range of scientific background and experience required to carry out such a program. The necessary scientific background can be obtained by completing a degree in engineering or physical, chemical, or biological sciences as described in Attachment 1. In addition, hands-on experience in radiation safety program development and implementation is necessary.

An RSO who is certified by the American Board of Health Physics may be highly desirable for the larger, more complex radiation safety programs. This certification identifies candidates with a nationally recognized minimum standard of relevant knowledge. The requirement for periodic renewal (every four years) of the certification helps to ensure that a certified individual remains current in recent radiation protection program developments.

Attachment 1 gives the “Recommended Combinations of Training and Minimum Experience for a University RSO.”

Although this standard contains the recommended qualifications and credentials for a university RSO in general terms, Attachment 2 is a specific list of topics that university management may find useful as a tool to select the best

candidate and assure that the minimum qualifications have been identified when hiring an RSO. Management should review this list against the needs of the specific institution to identify RSO candidates with the most appropriate levels of education, experience, and credentials for that institution. In addition, if a university's license includes medical uses of radiation or radioactive materials, other qualifications apply that are not addressed in this standard.

2. Standard

2.1 University Management

University management is responsible for establishing RSO qualifications and credentials based on the unique requirements of its facilities and programs considering, as a minimum:

- All requirements contained in the university's radioactive materials licenses.
- Special requirements associated with operating a nuclear reactor or critical pile.
- The use of ionizing radiation-producing equipment (e.g., x-ray machines and accelerators) at the university.
- The possession or use of naturally occurring and accelerator-produced radioactive materials (NARM).
- The use of nonionizing radiation sources (i.e., lasers, microwave generators, or electromagnetic radiation sources).

University management is also responsible for:

- Providing sufficient resources and management support to ensure a successful radiation safety program.
- Periodically reviewing the requirements for RSO qualifications and credentials based on anticipated changes in university facilities and programs.

2.2 The RSO

The RSO is responsible for regularly (no less than annually) evaluating her or his qualifications and credentials against the university's facilities and programs (current and anticipated), notifying university management when additional qualifications are necessary to fulfill her or his responsibilities, and obtaining the additional training. In notifying university management of the need for additional qualifications, the RSO should recommend the most appropriate means to achieve these qualifications, including the possibilities of:

- Training for herself or himself and staff.
- Acquiring additional knowledgeable staff in the needed subject areas.
- Using the services of experts on an as-needed basis from other university departments or outside consultants.

2.3 Recommended Qualifications/ Credentials

In developing qualifications and credentials for its RSO, university management shall consider:

- The requirements listed in the regulations (e.g., reference 2.1, §33.13 and §33.14) and regulatory guidance (e.g., reference 2.2, Section 7.3).
- Requirements established in any licenses held by the university.
- Guidance for similar programs (see Attachment 1).

In addition to technical qualifications and credentials, management shall ensure that the RSO has strong interpersonal and communication skills.

University management may also consider the desirability of an RSO with research experience, but should be aware that, in most cases, a large program requires a full-time RSO.

University management may wish to use the checklist in Attachment 2 to aid in establishing the breadth of experience required for a potential RSO.

3. References

U.S. Nuclear Regulatory Commission. Specific domestic licenses of broad scope for byproduct material. Code of Federal Regulations, Washington, DC: Government Printing Office; 10 CFR 33; 2002.

U.S. Nuclear Regulatory Commission. Applications for Type A licenses of broad scope. Washington, DC: U.S. Nuclear Regulatory Commission; Regulatory Guide 10.5; 1980 (including proposed Revision 2, 1994).

U.S. Nuclear Regulatory Commission. Management of radioactive material safety programs at medical facilities. Washington, DC: U.S. Nuclear Regulatory Commission; NUREG-1516; 1994.

U.S. Nuclear Regulatory Commission. Consolidated guidance about materials licenses: Program-specific guidance about academic, research and development, and other licenses of limited scope. Washington, DC: U.S. Nuclear Regulatory Commission; NUREG-1556, Volume 7, D; 1999.

U.S. Nuclear Regulatory Commission. Consolidated guidance about materials licenses: Program-specific guidance about medical use licenses. Washington, DC: U.S. Nuclear Regulatory Commission; NUREG-1556, Volume 9, Revised Draft; 2002.

U.S. Nuclear Regulatory Commission. Consolidated guidance about materials licenses: Program-specific guidance about licenses of broad scope. Washington, DC: U.S. Nuclear Regulatory Commission; NUREG-1556, Volume 11; 1999.

Attachment 1

Recommended Combinations of Training and Minimum Experience for a University RSO*

Formal education and certification		Minimum experience [1,2]
A. Bachelor's degree in health physics or radiological health; or a bachelor's degree in a physical or biological science with a physical science minor and one year of graduate work in health physics	AND	A. Four to eight years of applied health physics experience in a program with a radiation safety environment similar to that of the program to be managed.
OR		
B. Master's or doctoral degree in health physics or radiological health	AND	B. Three to five years of applied health physics experience in a program with a radiation safety environment similar to that of the program to be managed.
OR		
C. Comprehensive certification by the American Board of Health Physics	AND	C. Two to four years of applied health physics experience in a program with a radiation safety environment similar to that of the program to be managed.

NOTES:

1. Up to one-half of this experience may be obtained in a related, although dissimilar, health physics program.
2. The experience range in the above table is intended to recognize that experience quality is somewhat program dependent. For example, four years in a large, complex program may be equivalent to six to eight years in programs of lesser complexity.

* This table is a modification of Appendix I within the U.S. Nuclear Regulatory Commission "Management of Radioactive Material Safety Programs at Medical Facilities," NUREG-1516, November 1994.

Attachment 2

Checklist for Evaluating RSO Candidate Experience

This checklist, which is based upon the guidance in Appendix J of NUREG-1516, will help university management evaluate a candidate's breadth of experience. If no member of management is knowledgeable about these topics, management should consider hiring an RSO from another institution with a similar program to assist in developing requirements and reviewing candidates. The technical reviewer, or team, should be sufficiently knowledgeable to prepare, ask, and grade specific questions on the relevant topics listed below.

If he or she comes from a large radiation protection organization, a candidate's experience in many areas may be superficial and not of a depth necessary to supervise all university programs. This may apply even to candidates with advanced degrees and certifications. Management should be aware that most nonuniversity radiation protection programs may not provide a candidate with experience in all areas required for university operations. However, management must decide what topics apply to its institution prior to interviewing candidates.

In establishing qualifications for the RSO, management must consider the requirements contained in radioactive materials licenses and license applications.

Practical demonstrations of skills are also recommended as a tool for determining the candidate's abilities. An example of an appropriate practical demonstration for a university RSO candidate would be to ask the candidate to review a radiation survey from a typical research laboratory and communicate these results to the principal investigator. Observing the candidate's ability to perform a routine program element expected in any radiation safety program will provide management with a quick assessment of the candidate's technical skills, knowledge of the issues, and ability to appropriately communicate these issues.

Checklist for Reviewing Training and Experience for a University RSO

A. Name of RSO candidate

B. Education (degree, major, location, year)

C. Certification (specialty, category, month and year certified)

D. All practical experience obtained to meet the experience requirements described below (list dates, locations, and employers)

E. Training received in basic radioactive material handling technique:
   1. Radiation physics and instruments
   2. Radiation protection
   3. Mathematics pertaining to the use and measurement of radioactivity
   4. Radiation biology

F. Experience using radioactive materials:
   1. Radionuclides
   2. Amount used at any one time
   3. Location of use
   4. Clock hours (i.e., "hands on" time with radioactive material)
   5. Types of use

G. Experience supervising use of radioactive materials:
   1. Radionuclides
   2. Maximum activity
   3. Location of use
   4. Types of use

H. Experience implementing a radiation safety program:
   1. Familiarity with regulatory requirements and standards
   2. Performed safety evaluations of facilities and equipment for proposed uses
   3. Evaluated qualifications of proposed users and individuals working under the supervision of authorized users for proposed uses
   4. Conducted a laboratory audit program
      a. Research and development laboratories
      b. Analytical laboratories
   5. Maintained a personnel monitoring program for measuring external exposure
      a. Selected appropriate devices
      b. Recorded and reported exposures
      c. Established investigational levels
      d. Investigated abnormal exposures; calculated and assigned doses for lost or missing dosimeters
      e. Investigated nonuniform exposures
   6. Maintained a bioassay program for quantifying internal exposure
      a. Selected method—in vivo, in vitro, or both
      b. Established action levels
      c. Investigated uptakes of radioactive materials
      d. Performed dose assessments
      e. Planned emergency and follow-up actions
   7. Calculated internal and external radiation doses
   8. Monitored and maintained absolute and other special filter systems associated with the storage, use, and disposal of radioactive material
   9. Evaluated, selected, designed, and supervised maintenance of process-control and confinement systems (e.g., glove boxes, hoods)
   10. Performed shielding calculations, including determination of type and amount needed
   11. Calculated radioactive decay, buildup, and secular and transient equilibrium
   12. Maintained a contamination-control program
      a. Contamination surveys
      b. Air sampling programs
      c. Sealed-source leak testing
      d. Sample analysis

13. Conducted investigations
    a. Overexposures
    b. Accidents, spills, losses, thefts
    c. Unauthorized receipts, uses, transfers, disposals
    d. Loss of control
14. Conducted radiation protection training for university personnel
15. Developed and maintained radiation safety manuals
16. Selected instrumentation associated with radiation measurements
    a. Survey instruments (e.g., G-M, ion chamber, scintillation, gamma spectrometer)
    b. Counting room equipment
    c. Special equipment (e.g., dose calibrators, direct reading dosimeters, air samplers)
17. Performed instrument calibrations (e.g., G-M, ion chamber, scintillation, gamma spectrometer)
18. Performed radiation surveys/exposure-rate measurements with commonly used instruments such as G-M detectors or ion chambers; familiar with the limitations of each type
19. Coordinated material inventory/accountability programs
    a. Receipt
    b. Use
    c. Decay
    d. Transfer
    e. Disposal
20. Coordinated waste-management programs
    a. Effluent monitoring
    b. Collection
    c. Treatment (e.g., decay-in-storage, incineration, compaction)
    d. Packaging
    e. Disposal
    f. Hazardous-waste regulations
21. Prepared packages containing radioactive materials for transportation
22. Developed and maintained a facility emergency plan for responding to releases of radioactive material
23. Coordinated a waste-minimization program
24. Calculated criticality controls
25. Surveyed radiation-producing machines
    a. Analytical x-ray
    b. Highly collimated x-ray sources (XRF units)
    c. Accelerators or cyclotrons

I. Experience implementing nonionizing radiation protection programs:
   1. Laser
      a. Laboratory design
      b. Safety analysis
      c. Standard verification
      d. Survey and inspection
      e. Accident investigations
   2. Microwave radiation surveys/investigations
   3. EMF measurements

J. Training courses in DOT shipments of radioactive waste and packages containing radioactive materials and HAZMAT emergency response (if applicable to your institution)

K. Budget experience

L. Computer experience (e.g., word processing, maintaining databases, using spreadsheets, Internet access, or email)

M. Experience with regulators and writing license applications for use of radioactive materials

N. Public-speaking abilities

O. Personnel management

P. Interaction with faculty on a professional or collegial basis

Q. Affiliations with professional organizations

R. Appointments

S. Awards, scientific presentations, and publications