U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE 1.8, REVISION 4

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QUALIFICATION AND TRAINING OF PERSONNEL FOR NUCLEAR POWER PLANTS

A. INTRODUCTION

Purpose

This regulatory guide (RG) describes methods acceptable to the staff of the U.S. Nuclear Regulatory Commission (NRC) for complying with those portions of the Commission's regulations associated with the selection, qualifications, and training for nuclear power plant personnel.

Applicability

This RG applies to applicants for and holders of an operating license subject to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities" (Ref. 1) or a combined license subject to 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants" (Ref. 2). Personnel of non-power production or utilization facilities are not covered by this RG.

Applicable Regulations

- 10 CFR 50.120, "Training and Qualification of Nuclear Power Plant Personnel," requires that each applicant for and each holder of an operating license issued under 10 CFR Part 50 and each holder of a combined license issued under 10 CFR Part 52 for a nuclear power plant establish, implement, and maintain a training program that is derived from a systems approach to training and provides for the training and qualification of specific categories of nuclear power plant personnel.

- 10 CFR 50.34(b)(6)(i) requires that each application for a license to operate a nuclear power plant include information concerning the applicant's organizational structure, allocations or responsibilities and authorities, and personnel qualifications requirements.

Written suggestions regarding this RG or development of new RGs may be submitted through the NRC's public Web site in the NRC Library at https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/, under Document Collections, Regulatory Guides, at https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/contactus.html.

Electronic copies of this RG, previous versions of RGs, and other recently issued RGs are also available through the NRC's public Web site in the NRC Library at https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/, under Document Collections, Regulatory Guides. This RG is also available through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under ADAMS Accession Number (No.) ML19101A395. The regulatory analysis may be found in ADAMS under Accession No. ML16091A271. The associated draft guide DG-1329 may be found in ADAMS under Accession No. ML16091A267, and the staff responses to the public comments on DG-1329 may be found in ADAMS under Accession No. ML19101A396.

- 10 CFR 52.79(a)(26) requires that each application for a combined license include information concerning the applicant's organizational structure, allocations or responsibilities and authorities, and personnel qualifications requirements for operation.

Related Guidance

- NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (Ref. 3), provides guidance for the staff's review of information describing the applicant's implementation of policy, organization, training, and design.

Purpose of Regulatory Guides

The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. RGs are not substitutes for regulations and compliance with them is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Paperwork Reduction Act

This RG provides voluntary guidance for implementing the mandatory information collections in 10 CFR Parts 50 and 52 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et. seq.). These information collections were approved by the Office of Management and Budget (OMB), approval numbers 3150-0011 and 3150-0151. Send comments regarding this information collection to the Information Services Branch (T6-A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0011 and 3150-0151), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street, NW Washington, DC20503; e- mail: oira_submission@omb.eop.gov.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

B. DISCUSSION

Reason for Revision

This revision (Revision 4) updates the RG with additional experience gained through inspections since Revision 3 was issued in 2000. It endorses American National Standards Institute/American Nuclear Society (ANSI/ANS)-3.1-2014, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants" (Ref. 4), with certain exceptions and clarifications that are listed in the Staff Regulatory Guidance section.

Background

The following is a chronology of industry and NRC actions regarding the qualification and training of personnel for nuclear power plants:

- Subcommittee ANS-3, Reactor Operations, American Nuclear Society Standards Committee, developed a standard that contained criteria for the qualifications and training of nuclear power plant personnel. This standard was approved by the ANSI Committee N18, Design Criteria for Nuclear Power Plants, and designated ANSI-N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel" (Ref. 5).

- RG 1.8, "Personnel Selection and Training" (Ref. 6), which endorsed ANSI-N18.1-1971, was issued in March 1971. RG 1.8, Revision 1 (Ref. 7), was issued in September 1975.

- In January 1978, a revision of ANSI-N18.1-1971 was approved by the ANSI Board of Standards Review and issued as ANSI/ANS-3.1-1978, "Selection and Training of Nuclear Power Plant Personnel" (Ref. 8).

- In December 1981, ANSI/ANS-3.1-1978 was updated to factor in lessons learned from the Three Mile Island (TMI) -2 event and changing regulatory requirements. ANSI/ANS-3.1-1978 was reissued as ANSI/ANS-3.1-1981, "Selection, Qualification and Training of Personnel for Nuclear Power Plants" (Ref. 9).

- Revision 2 of RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants" (Ref. 10), was issued in April 1987. This revision endorsed Sections 4.3.1.1, "Shift Supervisor," 4.3.1.2, "Senior Operator," 4.5.1.2, "Licensed Operators," 4.4.8, "Shift Technical Advisor," and 4.4.4, "Radiation Protection," of ANSI/ANS-3.1-1981. Endorsement for all other positions remained with ANSI-N18.1-1971.

- A revision of ANSI/ANS-3.1-1981 was issued on May 19, 1987, and designated ANSI/ANS-3.1-1987, "Selection, Qualification and Training of Personnel for Nuclear Power Plants" (Ref. 11). The 1987 standard contained major revisions in content and format from the 1981 standard. These revisions resulted from actions taken by the NRC and industry since the 1981 standard in selection, qualification, and training practices, including the following.

    - On March 20, 1985, the NRC issued a "Commission Policy Statement on Training and Qualification of Nuclear Power Plant Personnel" (Ref. 12). The policy statement provided guidance on qualification programs and on a systems approach to training at commercial nuclear power plants. The policy statement also "endorses the Institute of Nuclear Power Operations (INPO)-managed Training Accreditation Program in that it encompasses the

elements of performance-based training and will provide the basis to ensure that personnel have qualifications commensurate with the performance requirements of their jobs."

  - On October 28, 1985, the NRC issued a "Commission Policy Statement on Engineering Expertise on Shift" (Ref. 13), which provided two options for meeting the requirements in 10 CFR 50.54(m)(2)(i) for nuclear power plant staffing and the requirement to have a shift technical advisor (STA) available to the shift (see Section I.A.1.1 of NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980 (Ref. 14)). One option in the Policy Statement allowed combining the functions of the STA with one of the required senior operators as long as specific training and education requirements were met. The other option allowed for continuation of an approved independent STA program.

- Following an April 17, 1990, decision of the U.S. Court of Appeals for the District of Columbia Circuit, the NRC issued 10 CFR 50.120, establishing mandatory requirements for the training and qualification of nuclear power plant personnel. Each licensee or applicant for a license was required to ensure that personnel listed in 10 CFR 50.120(b)(1), regardless of whether they are employees or contractor personnel, have qualifications commensurate with the performance requirements of the jobs to which they are assigned. The rule required that each licensee or applicant provide training using a systems approach to training. This rule superseded the "Commission Policy Statement on Training and Qualification of Nuclear Power Plant Personnel."

- On April 23, 1993, ANSI/ANS-3.1-1993, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants" (Ref. 15), was issued. This standard reflected actions of the NRC and industry since 1987, including the requirement to use the systems approach to training process to establish and maintain training programs for certain positions. In addition, this standard did not allow credit for simulator and classroom training to substitute for an operator's nuclear power plant experience.

- Revision 3 of RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants" (Ref. 16), reflected further modifications made as a result of staff regulatory positions and the resolution of public comments.

- On November 20, 2014, ANSI/ANS-3.1-2014 was issued. Revisions to the standard align the ANS, NRC, and INPO with industry selection, training, and qualification standards; provide for a common language across the industry; address supplemental personnel training and qualification; and update previous positions in light of new nuclear power plant construction, current position terminology, and evolving technology.

- NRC inspections observed that some plants have assigned unqualified Radiation Protection Managers (RPMs) and others have temporarily appointed unqualified RPMs for such lengths of time that it appeared that they were permanent appointees. The RPM is the management-level representative responsible for the adequacy of the plant's radiation protection program and for ensuring that the program is able to enforce appropriate prioritization of radiological safety issues. Therefore, to be considered adequately qualified, the RPM must be sufficiently experienced and knowledgeable of the plant-specific radiological conditions to judge whether the radiation protection program is able to achieve its purpose. In researching potential regulatory responses to these inspection observations, the staff realized that clarifications related to the RPM position were inadvertently deleted in Revision 3 to RG 1.8. As such, RG 1.8, Revision 4, endorses, with exceptions, ANSI/ANS-3.1-2014 and provides clarification with regard to the NRC's expectations pertaining to the selection, qualification, and training of the plant RPM.

- By letter dated August 26, 1980 (Ref. 17), the NRC staff communicated a staff position applicable to converting working man-hours to years of experience for use in determining the qualification of contractor health physics technicians. This guidance recommended that 2,000 or more working hours accumulated during a total period of not less than 40 weeks would be acceptable as representing one year of experience. Section 1.5 of RG 1.8, Revision 4, revises this staff position to remove the expectation that the 2000 hours be accumulated during a period of not less than 40 weeks. No more than 2000 hours can be credited toward related experience in any one calendar year.

- NRC review of applications for operator licenses in accordance with 10 CFR Part 55, "Operators' Licenses," Subpart D, "Applications" (Ref. 18), and public comment on this RG 1.8 revision has revealed conflicts between ANSI/ANS-3.1, NUREG-1021, "Operator Licensing Examination Standards for Power Reactors" (Ref. 19), and National Academy for Nuclear Training (NANT) qualification standards. The NANT qualification standards, revised November 2016, and NUREG-1021 qualification standards meet or exceed ANSI/ANS-3.1-2014 for operator licensing in accordance with 10 CFR Part 55. In addition, the NANT qualification standards better align with facility licensee training programs that use a systems approach to training, as defined in 10 CFR Part 55. Following consideration of public comment and a public meeting on February 13, 2019, the NRC removed the applicability of 10 CFR Part 55 from this revision of RG 1.8 so that NRC guidance for operator license qualifications will be located solely in NUREG-1021, which references the NANT qualification standards.

Harmonization with International Standards

The International Atomic Energy Agency (IAEA) has established a series of safety guides and standards constituting a high level of safety for protecting people and the environment. IAEA safety guides present international good practices and increasingly reflect best practices to help users striving to achieve high levels of safety. The IAEA Technical Documents (IAEA-TECDOC) series reports on many aspects of the Agency's work. The NRC staff reviewed the following documents from the IAEA and found that this regulatory guide is consistent with guidance in those documents for the selection, qualification, and training of personnel for nuclear power plants:

- "Competency Assessments for Nuclear Industry Personnel," IAEA Publication 1236 (Ref. 20);

- "Recruitment, Qualification and Training of Personnel for Nuclear Power Plants," IAEA Safety Guide NS-G-2.8 (Ref. 21);

- "Selection, Competency Development, and Assessment of Nuclear Power Plant Managers," IAEA-TECDOC-1024 (Ref. 22);

- "Nuclear Power Plant Organization and Staffing for Improved Performance: Lessons Learned," IAEA-TECDOC-1052 (Ref. 23);

- "Experience in the Use of Systematic Approach to Training (SAT) for Nuclear Power Plant Personnel," IAEA-TECDOC-1057 (Ref. 24);

- "Analysis Phase of Systematic Approach to Training (SAT) for Nuclear Plant Personnel," IAEA-TECDOC-1170 (Ref. 25);

- "Assuring the Competence of Nuclear Power Plant Contractor Personnel," IAEA-TECDOC-1232 (Ref. 26);

- "Means of Evaluating and Improving the Effectiveness of Training of Nuclear Power Plant Personnel," IAEA-TECDOC-1358 (Ref. 27); and

- "Development of Instructors for Nuclear Power Plant Personnel Training," IAEA-TECDOC-1392 (Ref. 28).

Documents Discussed in Staff Regulatory Guidance

This RG endorses, in part, one or more codes or standards developed by external organizations, and other third party guidance documents. These codes, standards and third party guidance documents may contain references to other codes, standards, or third party guidance documents ("secondary references"). If a secondary reference has itself been incorporated by reference into NRC regulations as a requirement, then licensees and applicants must comply with that standard as set forth in the regulation. If the secondary reference has been endorsed in a RG as an acceptable approach for meeting an NRC requirement, then the standard constitutes a method acceptable to the NRC staff for meeting that regulatory requirement as described in the specific RG. If the secondary reference has neither been incorporated by reference into NRC regulations nor endorsed in a RG, then the secondary reference is neither a legally-binding requirement nor a "generic" NRC approved acceptable approach for meeting an NRC requirement. However, licensees and applicants may consider and use the information in the secondary reference, if appropriately justified, consistent with current regulatory practice, and consistent with applicable NRC requirements.

C. STAFF REGULATORY GUIDANCE

ANSI/ANS-3.1-2014, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," provides criteria for the selection, qualification, and training of personnel for nuclear power plants for complying with the qualifications and training requirements of 10 CFR Parts 50 and 52. The NRC staff endorses ANSI/ANS-3.1-2014, with the following exceptions and clarifications.

1. QUALIFICATION

The qualification criteria described in Section 4 of ANSI/ANS-3.1-2014 are acceptable to the NRC staff with the following exceptions and clarifications. The minimum qualification requirements for positions as described in ANSI/ANS-3.1-2014, including the exceptions and clarifications in this RG, represent the minimum experiential, professional, and educational requirements necessary to ensure that assigned personnel can independently evaluate risks and safely execute the responsibilities associated with the positions. To conform to this guidance, an individual assigned to a specific position must meet the requirements for that position.

1.1 Section 4.3, Middle Manager Level

Temporary appointments of unqualified middle managers shall be limited to one year in duration. During the temporary appointment, an unqualified middle manager shall be provided a single, directly-reporting staff member who meets the middle manager qualification position requirements to assist in decision-making. The intention of this exception is to emphasize the importance of assigning qualified personnel to positions with specific requirements as described in ANSI/ANS-3.1-2014, while allowing licensees adequate flexibility to manage human resources. This flexibility is not intended to allow purposeful long-term assignment of unqualified personnel to middle manager positions or to allow multiple consecutive assignments of unqualified middle managers to a position.

At all times, an operations middle manager (Section 4.3.6) or a senior manager assigned responsibility for operations (Section 4.2) shall hold a senior operator's license. A shift manager (Section 4.3.7) shall hold an active senior operator's license while directly supervising plant operations.

1.2 Section 4.3.1, Training

Section 4.3.1 states, "The training middle manager is the individual responsible for management of the initial and continuing training programs, and shall meet the following requirements." This section is clarified as follows: "The training middle manager is the onsite member of the power plant staff responsible for management of the initial and continuing training programs, and shall meet the following requirements."

1.3 Section 4.3.3, Radiation Protection

The RPM is the onsite member of the power plant staff that is responsible for implementation of the radiological protection program and that meets the education, experience, and special requirements listed in section 4.3.3. In addition to the experience requirements listed in section 4.3.3, individuals with no prior RPM experience should have six months of time onsite before being assigned RPM duties. Licensees should evaluate required onsite time for experienced RPMs who are new to a site or a reactor technology (e.g., Pressurized Water Reactor (PWR) or

Boiling Water Reactor (BWR)). The purpose of the onsite time is to provide a newly assigned RPM sufficient opportunity to learn the location and performance characteristics of key equipment and other plant-specific information that is necessary to make informed decisions concerning radiological safety. As a modification to item (3) in the Special Requirements section of 4.3.3, a significant amount of the station RPM's experience should be relevant to supervising in-field radiation protection program activities (e.g., As Low As Reasonably Achievable (ALARA), radiation protection operations, and radioactive waste shipping). Personnel who are temporarily assigned to fill the RPM position as described in section 4.1 and who do not meet the requirements to serve as an RPM should have first line supervisor experience of in-field radiation protection program activities. Personnel who do not meet the requirements for this position should not be assigned to temporarily fill the position for periods exceeding one year (refer to Section 1.1 of this RG).

1.4 Section 4.5.2, Operator

Minimum qualifications, education, experience, and training are specified in the facility licensee's "systems approach to training" program. Non-licensed operators who complete an accredited initial training program (qualified for all power block and systems operational duties) may be considered to meet the minimum power plant experience and/or nuclear power plant experience requirement for power plant experience based on qualifying for the Operator position.

1.5 Section 4.5.3.2, Radiation Protection

In regard to "related experience" for radiation protection technicians, 2000 working hours is acceptable as representing one year of experience. There is no expectation of a minimum timeframe for accumulating these 2000 hours (e.g., not less than 40 weeks), nor is there is limit applied to the amount of hours that can be credited in a week. However, no more than 2000 hours can be credited toward related experience for radiation protection technicians in any one calendar year.

D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees[1] may use this RG and information regarding the NRC's plans for using this RG. In addition, it describes how the NRC staff complies with 10 CFR 50.109, "Backfitting," and any applicable finality provisions in 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

Use by Applicants and Licensees

Applicants and licensees may voluntarily[2] use the guidance in this RG to demonstrate compliance with the underlying NRC regulations. Methods or solutions that differ from those described in this RG may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations. Current licensees may continue to use guidance the NRC found acceptable for complying with the identified regulations as long as their current licensing basis remains unchanged.

Licensees may use the information in this RG for actions which do not require NRC review and approval such as changes to a facility design under 10 CFR 50.59, "Changes, Tests, and Experiments." Licensees may use the information in this RG or applicable parts to resolve regulatory or inspection issues.

Use by NRC Staff

The NRC staff does not intend or approve any imposition or backfitting of the guidance in this RG. The NRC staff does not expect any existing licensee to use or commit to using the guidance in this RG, unless the licensee makes a change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this RG to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action which would require the use of this RG. Examples of such unplanned NRC regulatory actions include issuance of an order requiring the use of this RG, requests for information under 10 CFR 50.54(f) as to whether a licensee intends to commit to the use of this RG, generic communication, or promulgation of a rule requiring the use of this RG without further backfit consideration.

During regulatory discussions on plant specific operational issues, the staff may discuss with licensees various actions consistent with staff positions in this RG, as one acceptable means of meeting the underlying NRC regulatory requirement. Such discussions would not ordinarily be considered backfitting even if prior versions of this RG are part of the licensing basis of the facility. However, unless this RG is part of the licensing basis for a facility, the staff may not represent to the licensee that the licensee's failure to comply with the positions in this RG constitutes a violation.

If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this new or revised RG and (2) the specific subject matter of this RG is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the

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[1] In this section, "licensees" refers to licensees of nuclear power plants under 10 CFR Parts 50 and 52; and the term "applicants" refers to applicants for licenses and permits for (or relating to) nuclear power plants under 10 CFR Parts 50 and 52, and applicants for standard design approvals and standard design certifications under 10 CFR Part 52.

[2] In this section, "voluntary" and "voluntarily" means that the licensee is seeking the action of its own accord, without the force of a legally binding requirement or an NRC representation of further licensing or enforcement action.

guidance in this RG or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 50.109(a)(1) or a violation of any of the issue finality provisions in 10 CFR Part 52.

Additionally, an existing applicant may be required to comply with new rules, orders, or guidance if 10 CFR 50.109(a)(3) applies.

If a licensee believes that the NRC is either using this RG or requesting or requiring the licensee to implement the methods or processes in this RG in a manner inconsistent with the discussion in this Implementation section, then the licensee may file a backfit appeal with the NRC in accordance with the guidance in NRC Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection" (Ref. 29), and in NUREG-1409, "Backfitting Guidelines" (Ref. 30).

REFERENCES[3]

1. *U.S. Code of Federal Regulations* (CFR), "Domestic Licensing of Production and Utilization Facilities," Part 50, Chapter I, Title 10, "Energy."

2. CFR, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Part 52, Chapter I, Title 10, "Energy."

3. U.S. Nuclear Regulatory Commission (NRC), NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition."

4. American National Standards Institute/American Nuclear Society (ANSI/ANS), "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," ANSI/ANS-3.1-2014, LaGrange Park, IL.[4]

5. ANSI, "Selection and Training of Nuclear Power Plant Personnel," ANSI N18.1-1971, LaGrange Park, IL.

6. NRC, Regulatory Guide (RG) 1.8, "Personnel Selection and Training," Revision 0, Washington D.C.

7. NRC, RG 1.8, "Personnel Selection and Training," Revision 1, Washington D.C.

8. ANSI/ANS, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," ANSI/ANS-3.1-1978, LaGrange Park, IL.

9. ANSI/ANS, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," ANSI/ANS-3.1-1981, LaGrange Park, IL.

10. NRC, RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 2, Washington D.C.

11. ANSI/ANS, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," ANSI/ANS-3.1-1987, LaGrange Park, IL.

12. NRC, "Commission Policy Statement on Training and Qualification of Nuclear Power Plant Personnel" March 20, 1985, Washington D.C. (50 FR 11147).[5]

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[3] Publicly available NRC published documents are available electronically through the NRC Library under Document Collections on the NRC's public Web site at http://www.nrc.gov/reading-rm/doc-collections/ and through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html. The documents can also be viewed online or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD. For problems with ADAMS, contact the PDR staff at 301-415-4737 or 800-397-4209; fax 301-415-3548; or e-mail pdr.resource@nrc.gov.

[4] Copies of American Nuclear Society (ANS) standards may be purchased from the ANS Web site (http://www.new.ans.org/store/) or by writing to: American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60526, U.S.A., Telephone 800-323-3044.

[5] Copies of the Federal Register Notices are available electronically through the U.S. Government Printing Office web site at http://www.gpo.gov/fdsys.

13. NRC, "Commission Policy Statement on Engineering Expertise on Shift," October 28, 1985, Washington D.C. (50 FR 43621).

14. NRC, NUREG-0737, "Clarification of TMI Action Plan Requirements," Washington D.C.

15. ANSI/ANS-3.1 1993, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," LaGrange Park, IL.

16. NRC, RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 3, Washington D.C.

17. NRC, Letter dated August 26, 1980, "Qualification (Experience) of Contractor Health Physicist," Washington D.C., ADAMS Accession No. ML103420204.

18. CFR, "Operators' Licenses," Part 55, Chapter I, Title 10, "Energy."

19. NRC, NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Washington D.C.

20. International Atomic Energy Agency (IAEA) Publication 1236, "Competency Assessments For Nuclear Industry Personnel," IAEA, Vienna, Austria, 2006.[6]

21. IAEA NS-G-2.8, "Recruitment, Qualification and Training of Personnel for Nuclear Power Plants," IAEA, Vienna, Austria, 2002.

22. IAEA TECDOC-1024, "Selection, Competency Development and Assessment of Nuclear Power Plant Managers," IAEA, Vienna, Austria, 1998.

23. IAEA TECDOC-1052, "Nuclear Power Plant Organization and Staffing for Improved Performance: Lessons Learned," IAEA, Vienna, Austria, 1998.

24. IAEA TECDOC-1057, "Experience in the Use of Systematic Approach to Training (SAT) for Nuclear Power Plant Personnel," IAEA, Vienna, Austria, 1999.

25. IAEA TECDOC-1170, "Analysis Phase of Systematic Approach to Training (SAT) for Nuclear Plant Personnel," IAEA, Vienna, Austria, 2000.

26. IAEA TECDOC-1232, "Assuring the Competence of Nuclear Power Plant Contractor Personnel," IAEA, Vienna, Austria, 2001.

27. IAEA TECDOC 1358, "Means of Evaluating and Improving the Effectiveness of Training of Nuclear Power Plant Personnel," IAEA, Vienna, Austria, 2003.

28. IAEA TECDOC 1392, "Development of Instructors for Nuclear Power Plant Personnel Training," IAEA, Vienna, Austria, 2018.

[6] Copies of International Atomic Energy Agency (IAEA) documents may be obtained through their Web site: www.IAEA.org/ or by writing the International Atomic Energy Agency, P.O. Box 100 Wagramer Strasse 5, A-1400 Vienna, Austria.

29. NRC Management Directive 8.4, “Management of Facility-Specific Backfitting and Information Collection,” Washington, D.C.

30. NRC, NUREG-1409, “Backfitting Guidelines,” Washington, D.C.