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SECOND PROPOSED REVISION 2* TO REGULATORY GUIDE 1.8
PERSONNEL QUALIFICATION AND TRAINING

A. INTRODUCTION

Paragraph 50.34(b)(6)(i) of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" (Ref. 1), requires that applications for a license to operate a nuclear power plant include information concerning organizational structure, personnel qualifications, and related matters. Paragraph 55.10 of 10 CFR Part 55, "Operators' Licenses" (Ref. 2), requires that operator license applications include information concerning an individual's education, experience, and related matters. This regulatory guide describes a method acceptable to the NRC staff for complying with these portions of the Commission's regulations with regard to the qualification and training of nuclear power plant personnel filling the various functional positions described in the December 6, 1979, draft version of American Nuclear Society (ANS) Standard ANS 3.1, "Qualification and Training of Personnel for Nuclear Power Plants"[1] (Ref. 3).

*The substantial number of changes from the first proposed Revision 2 to this guide (Task RS 807-5) dated February 1979 have made it impractical to indicate the changes in the margin. Since the issuance of the first proposed Revision 2 to Regulatory Guide 1.8 for public comment, much guidance concerning personnel qualification and training has been developed through assessment of the Three Mile Island Unit 2 accident by various organizations. In addition, ANSI/ANS 3.1-1978, which is endorsed by the regulatory guide, is undergoing extensive revision in an effort to provide upgraded requirements for personnel qualifications and training. As a result of the incorporation of additional guidance into the revisions of ANSI/ANS 3.1 and the regulatory guide, this second proposed Revision 2 to Regulatory Guide 1.8 endorsing the December 6, 1979, draft version of ANS 3.1 is being issued for public comment in order to obtain additional public input on the proposed regulatory guidance.

[1]Copies of Draft Standard ANS 3.1 and preceding versions of it, as well as other ANS standards cited in this guide, are available from the American Nuclear Society, 555 North Kensington Avenue, LaGrange Park, Illinois 60525.

B. DISCUSSION

1. DEVELOPMENT OF GUIDE

1.1 Impact of Events

In the aftermath of the Three Mile Island nuclear plant accident (TMI-2), the industry, the NRC, and others have conducted a number of studies and investigations, and, as a result of their findings, have recommended changes in the numbers of nuclear power plant personnel now employed, and their qualifications and organization. The principal studies have been conducted by the President's Commission on Three Mile Island (Ref. 4), the NRC Special Inquiry Group (Ref. 5), the Office of Inspection and Enforcement Special Review Group (Ref. 6), the Office of Nuclear Reactor Regulation's (NRR) Lessons Learned Task Force (Refs. 7 and 8), and NRR's Bulletins and Orders Task Force (Ref. 9).[2] Collectively, these studies have called for a general upgrading of utility capabilities for handling routine plant operations and for coping with unusual or unexpected conditions. As might be expected, the recommendations of these diverse groups are not completely compatible; what is clear, however, is that all of these groups have called for upgrading in at least two identifiable areas: management oversight and technical competence. Optimum qualification and training of nuclear power plant personnel is necessary to upgrade these areas.

1.2 Relationship to National Standards Effort

Revision continues to existing standards for qualification and training of nuclear power plant personnel. Based on existing knowledge and experience in 1971, Subcommittee ANS-3, Reactor Operations, of the American Nuclear Society Standards Committee developed a standard containing criteria for the qualification and training of nuclear power plant personnel. This standard was approved by the American National Standards Institute (ANSI) Committee N18, Design Criteria for Nuclear Power Plants, and designated ANSI N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel" (Ref. 10). Regulatory Guide 1.8, "Personnel Selection and Training," endorsing ANSI Standard N18.1-1971 was

[2]The recommendations of the investigating groups are collected in NUREG-0660, "NRC Action Plan Developed As A Result of the TMI-2 Accident." NUREG-0660, in Appendix E, discusses the availability of the individual investigatory reports (also see References).

issued in March 1971. A revision to this standard was subsequently approved by the ANSI Board of Standards Review and designated ANSI/ANS 3.1-1978, "Selection and Training of Nuclear Power Plant Personnel" (Ref. 11).

In February 1979, a draft Revision 2 of Regulatory Guide 1.8 (RS 80/-5) endorsing ANSI/ANS 3.1-1978 was issued for public comment. In May 1979, additional comments on the area of personnel qualifications were requested in light of experience gained from the TMI-2 accident. Copies of all comments received both on the February 1979 draft guide and as a result of the May 1979 request for comments were provided to the ANS-3 Subcommittee for their use during development of a revision to the 1978 standard. The draft revision incorporating upgraded requirements was approved by the ANS-3 Subcommittee on December 6, 1979. Draft Standard ANS 3.1 has been extensively revised in most areas of the standard on which comments were received. Public comments are now being solicited on this second proposed Revision 2 to Regulatory Guide 1.8 that endorses the revised standard.

The significant changes incorporated into the revised standard include (a) a reformulation of Section 4, "Qualification," to separate the topics of education, experience, and training in order to more clearly define personnel qualification requirements; (b) an upgrading of a number of specific qualification requirements, particularly in the area of education and experience requirements; (c) more definitive guidance on training and retraining programs including requirements for the use of position task analyses to define required training and for the use of simulators in training and retraining programs; (d) a listing of additional specific control manipulations to be performed during the retraining program; (e) requirements for corporate management certification of individuals prior to licensing examination by the NRC, and (f) qualification requirements for individuals directing preoperational and startup tests.

2. ONGOING EFFORTS AFFECTING GUIDE

2.1 NRC Philosophy and Objectives

NUREG-0660, "NRC Action Plan Developed As A Result of the TMI-2 Accident" (Ref. 12),[2] in Chapter I, "Operational Safety," describes actions intended to substantially improve and emphasize operational safety, an area that has not previously been given the same regulatory emphasis as nuclear power plant

design. The actions have two complementary objectives: (1) to reduce challenges to the safety of the plant and (2) to ensure proper reactions to challenges that do occur. Both of these objectives can only be achieved by requiring optimum qualification and training of nuclear power plant personnel. The reduction of challenges requires a highly qualified staff that devotes unflagging attention to the proper operation of the plant, continuous monitoring to verify that plant operations are correctly performed, and correcting and improving operations by the feedback of operating experience to appropriate personnel. The proper reaction to challenges to the safety of the plant requires a thorough understanding of plant design and plant response to unusual conditions, as well as training in the diagnosis of these conditions and reaction to them.

Changes needed in this regulatory guide are discussed in two items of the NRC Action Plan (NUREG-0660): Item I.A.2.6, "Long-Term Upgrading of Training and Qualifications," and Item I.B.1.1, "Organization and Management of Long-Term Improvements." Short-term actions related to personnel qualifications already taken by the NRC, as well as changes included in the December 6, 1979, draft version of ANS 3.1, "Qualification and Training of Nuclear Power Plant Personnel," are incorporated in this second proposed Revision 2 to Regulatory Guide 1.8.

2.2 Description of Efforts

As indicated in NUREG-0660, there are a number of efforts currently in progress to provide additional reviews and recommendations concerning the subject of personnel qualification and training that interface with this regulatory guide. The principal efforts in progress within the NRC on personnel qualification and training are described in Sections 2.2.1 through 2.2.8 below.

2.2.1 Upgrading Qualifications of Operators

The NRC staff provided recommendations in Commission Paper SECY 79-330E, "Qualifications of Reactor Operators" (Ref. 13), for upgrading the qualifications of licensed operators and senior operators through a program that includes increased training and testing in the areas of thermal-hydraulics and reactor transient response, increased use of simulator training and testing, higher passing grades on licensing examinations, increased experience requirements for operators and senior operators, and increased emphasis on retraining and examination. Based on Commission action on SECY 79-330E, the Office of Nuclear Reactor Regulation

by a letter of March 28, 1980, from H. R. Denton to all power reactor applicants and licensees (Ref. 14) set forth the revised criteria to be used by the staff in evaluating reactor operator training and licensing and established effective dates for their implementation. Licensees and applicants were also informed in the March 28, 1980, letter of other criteria under development that would require additional staff work to produce the necessary requirements that would eventually be established through rulemaking proceedings. Additionally, licensees and applicants were informed that Commission review in the area of operator training and qualification is continuing and may result in identification of additional criteria to be used in evaluation of operators for licensing and relicensing.

2.2.2 Recommended Revisions to Part 55 and Part 50

The NRC staff is preparing amendments to 10 CFR Part 55, "Operators' Licenses," and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," that incorporate applicable Commission-approved recommendations of SECY 79-330E and other proposed changes resulting from additional staff review of Part 55 and Part 50. The amendments focus on education and training for prospective operators, requirements for simulator training for operators and operator applicants, NRC participation in requalification examinations, operator understanding of the theory behind operation of a facility, limiting extension of license expiration dates, and maintenance of operator proficiency at operating the facility controls. The Regulatory Activities Subcommittee of the Advisory Committee on Reactor Safeguards (ACRS) has reviewed the proposed changes to Parts 55 and 50.[3] Both the March 28, 1980, H. R. Denton NRR letter and the proposed rulemaking impact this proposed regulatory guide. With respect to the March 28, 1980, letter, the short-term requirements are either incorporated in the December 6, 1979, Draft Standard ANS 3.1 or noted in the regulatory position of this regulatory guide. With respect to Part 55 and Part 50 revisions, certain positions now included in this regulatory guide will be codified in the regulations in place of the existing general provisions of the regulations. After publication of the

[3]A transcript of their review dated June 4, 1980, is available for inspection or copying for a fee in the NRC Public Document Room at 1717 H Street NW., Washington, D.C.

final rule changes, Regulatory Guide 1.8 will be revised to eliminate any duplication.

One aspect of changes recommended by JECY 79-330E and applicable only to NRC that is not addressed in proposed changes to 10 CFR Part 55 or this regulatory guide concerns NRC practices for administration of qualifying examinations for nuclear power plant personnel. These practices include the following items:

a. Time limits will be imposed for completion of the written operator and senior reactor operator examinations administered by the NRC. The operator examination will be limited to 9 hours and the senior operator portion of the examination will be limited to 7 hours.

b. The passing grade for the operator and senior operator examination will be 80% overall and 70% in each category.

c. The NRC staff will audit training programs more closely and administer all the certification exams conducted at the completion of the simulator training portion of an operator's training program.

d. The NRC staff will administer or direct the facility to administer annual examinations as part of the licensed operator and senior operator requalification programs that include a written, oral, and practical (performed on a simulator) portion.

e. As a condition of license application, applicants for operator and senior operator licenses will be required to grant permission to the NRC to inform their facility management of the results of their examinations.

2.2. Onsite and Offsite Managerial and Technical Organizations

The NRC staff has under development criteria for onsite and offsite managerial and technical organizations, including a radiological protection organization, that will provide assurance of the safe operation of the plant during normal and abnormal conditions and the capability necessary to respond to unusual or unexpected situations. A contractor, Teknekron Research, Inc., was selected to assist in the development of criteria listed above. Teknekron submitted its final report to the NRC in May 1980 (Ref. 15).

Task I.B.1.1, "Organization and Management of Long-Term Improvements," and Task I.B.1.2., "Evaluation of Organization and Management Improvements of Near-Term Operating License Applicants," of NUREG-0660 describe the criteria development effort for technical and managerial organizations. Task I.B.1.2 is a first step in the development of criteria described in Task I.B.1.1. As

described in Task I.B.1.2, near-term operating licensee applicants, as part of the license application review process, are being required to comply with the findings and requirements generated in an NRC interoffice review of licensee organization and management. The review is based, in part, on an NRC document entitled "Draft Criteria for Utility Management and Technical Competence" (Ref. 16). The first draft of this document was dated February 25, 1980, however, the document continues to change with use and experience in ongoing reviews. The document addresses the organization, resources, training, and qualifications of plant staff and management (both onsite and offsite) for routine operations and accident conditions. The criteria developed for use in evaluation of operator license applicants, as modified by experience from interoffice review of near-term operating license applicants, will form the basis for the final criteria to be developed in accordance with Task I.B.1.1 of NUREG-0660. The criteria reference Regulatory Guide 1.8 and ANS Standard 3.1 with regard to qualifications of nuclear plant personnel filling the various functional positions described in ANS Standard 3.1. Regulatory Guide 1.8 will be implemented in conjunction with the recommendations of Task I.B.1.1 of the NRC Action Plan (see Section D of this guide, Implementation).

2.2.4 Onsite "Independent Safety Engineering Group"

Each near-term operating license applicant as a part of ongoing license application review is being required to establish a group, commonly referred to as the "Independent Safety Engineering Group," that is independent of the plant staff, but is assigned onsite to perform independent reviews of plant operations activities and to evaluate operating experiences at nuclear power plants. Commission Information Paper SECY-80-242 (Ref. 17) describes the relationship of the proposed "Independent Safety Engineering Group" to other organizational entities such as the Plant Operations Review Committee. The "Draft Criteria for Utility Management and Technical Competence" (see Item 2.2.3 above) addresses the qualifications of the onsite independent safety engineering group by referencing Section 4.7 of the December 6, 1979, Draft Standard ANS 3.1.

2.2.5 Shift Technical Advisors

As described in Task I.A.1.1 of NUREG-0660, the NRC is requiring that a technical advisor to the shift supervisor be present on all shifts.[4] Although minimum training requirements have not yet been specified for shift technical advisors presently occupying such positions, shift technical advisors should enhance the accident-assessment function at the plant. By January 1, 1981, shift technical advisors will be required to have a technical education, which is of the quality of courses taught at the college level and includes about 60 semester hours in basic subjects of engineering and science; specific training in the design, function, arrangement, and operation of plant systems; and training in the expected response of the plant and instruments to normal operation, transients, and accidents, including multiple failures of equipment and operator errors. Commission Information Paper SECY 80-243 (Ref. 18) addresses the subject of shift technical advisors, including a summary of experience required, duties to be performed, and the number of shift technical advisors required onsite. The qualifications of shift technical advisors as addressed in this regulatory guide are the same as those specified in Commission Paper SECY 80-243 The Commission was informed in this paper that the Institute of Nuclear Power Operations (INPO) has recently forwarded to NRR for comment a copy of an INPO document, "Nuclear Power Plant Shift Technical Advisor--Recommendations for Position Description, Qualifications, Education and Training" (Enclosure to SECY 80-243), and that the NRC staff had the document under review. This review may lead to revision to this regulatory guide with regard to shift technical advisors.

2.2.6 Comparison of NRC, Commercial, and Naval Procedures for Qualification of Personnel

In early 1980, Basic Energy Technology Associates, Inc. (BETA), completed a study for the Office of Nuclear Reactor Regulation that outlined the results

[4]Requirements for the Shift Technical Advisor were contained in H. R. Denton and D. G. Eisenhut NRR letters to operating plant licensees on September 13 and October 30, 1979; applicants for pending operating licenses on September 27 and November 9, 1979; and applicants for pending construction permits and licensees of plants under construction on October 10 and November 9, 1979. Copies of these letters are available for inspection or copying for a fee in the NRC Public Document Room at 1717 H Street NW., Washington, D.C.

of a comparative review of current NRC requirements, commercial nuclear power plant practices, and the Naval Nuclear Propulsion Program procedures for the selection, training, and qualification of personnel involved in nuclear power plant operation and maintenance. The results of the BETA study entitled "Power Plant Staffing" are documented in NUREG/CR-1280, BETA-103 (Ref. 19). Public comments were requested on this study. The BETA study, when comparing the majority of practices, used the provisions outlined in ANSI N18.1-1971 and did not consider later versions of the standard. The BETA study will be considered when developing future revisions to this regulatory guide.

2.2.7 Requirements for Licensing of Operators

The NRC staff has awarded a contract to Analysis and Technology, Inc., for a study of requirements for operator licensing.[5] The scope of the work should result in recommendations for (a) the means to be employed for selection and training of nuclear power plant personnel and the degree to which the NRC should be involved in the process, (b) the means to be employed to evaluate the effectiveness of training programs, including who, by job description, should be licensed, (c) the methods to be employed to ensure continued competency of plant personnel and the degree to which the NRC should be involved in the methods, (d) the methods to be employed for maintaining a highly motivated and dedicated work force, and (e) the means to be employed for rapidly requalifying presently licensed operators to meet the proposed new requirements. Task I.A.2.6, "Long-Term Upgrading of Training and Qualifications," of NUREG-0660 provides a description of planned NRC actions related to this contract study. After staff review of the study has been completed, the staff will provide recommendations to the Commission and subsequently factor Commission decisions on the recommendations into a regulatory guide or a regulation.

2.2.8 Planned NRC Accreditation of Training Institutions

As described in Task I.A.2.7, "Accreditation of Training Institutions," of NUREG-0660, the NRC staff is conducting a study of procedures and requirements for NRC accreditation of training institutions. A Commission Information Paper on this subject should be completed by late 1980. The NRC staff will also

[5]Since the study is in progress, its recommendations are not yet available.

prepare a Commission paper examining various NRC approaches to accreditation of training institutions. Staff action on this later effort should be completed by January 1982.

3. ANTICIPATED REVISION TO GUIDE

With regard to the interface of this proposed regulatory guide and the other efforts described in Section 2.2 above, this version of the regulatory guide is a first step in a comprehensive process of upgrading the training and qualifications of operations personnel. Some of the regulatory positions may be eventually superseded by more comprehensive long-term changes (e.g., changes to NRC regulations) in the area of personnel qualification and training; however, these positions are expected to be consistent with the long-term changes.

This regulatory guide is being issued at this time in order to solicit public comment on changes thus far made. The draft standard, ANS 3.1, endorsed by this guide has not yet been approved as an American National Standard, but permission has been granted by the American Nuclear Society to use the December 6, 1979, draft revision of the standard with the proposed regulatory guide revision during the public review and comment period. Comments received on the draft standard will be transmitted to the ANS-3 Working Group that is developing the standard in addition to being given consideration by the staff for inclusion in the regulatory guide. Since the standard and the guide are being developed in parallel, comments can be resolved, as appropriate, by modification to either the standard or the guide or both.

C. REGULATORY POSITION

The requirements included in Draft Standard ANS 3.1 dated December 6, 1979, are acceptable to the NRC staff for complying with the pertinent requirements of the Commission's regulations for qualification and training of personnel in the operations organization subject to the following exceptions and supplements. (The discussions in Appendix A related to Regulatory Position 2.3.1 about Shift Supervisors and in Appendix B related to Regulatory Position 2.7 on Shift Technical Advisors should be considered with those positions.)

1. GENERAL: EXCEPTIONS AND SUPPLEMENTS

1.1 Pertinent Standards and Endorsing Guides

Throughout the draft standard, other documents required to be included as part of this standard are identified at the point of reference. The specific applicability of these standards listed in the draft standard has been addressed in the latest revision of the following regulatory guides:

Regulatory Guide	ANSI Standard[1]
1.17	N18.17
1.33	N18.7
1.134	N546

In addition, the NRC has issued for comment Draft Guide RS 110-5, "Nuclear Power Plant Simulators for Use in Operator Training," dated July 1980, endorsing the March 24, 1980, draft version of American Nuclear Society Standard ANS 3.5, "Nuclear Power Plant Simulators for Use in Operator Training."[1]

1.2 Temporary Personnel Replacements

1.2.1 Field-Specific Experience

Section 3.1 of Draft Standard ANS 3.1 discusses the use of personnel who may not meet the requirements of the standard to fill positions as temporary replacements. Temporary personnel should not be used as replacements for periods exceeding 1 month. Additionally, temporary personnel replacements should have experience in the field of the individual for whom they are serving as replacements.

1.2.2 Training

When an individual is hired to temporarily function as a plant employee, such as for contracted services, evidence of previous education, experience, and training should be provided and reviewed by the appropriate professional-technical group leaders. The appropriate group leaders should then determine the content for that individual's training, including plant-specific training. As a minimum, each individual should receive "General Employee Training" (see Section 5.4 of ANS 3.1).

1.3 Definition of "College-Level Education"

Throughout the standard, the term "college-level education" is used to describe the quality of the education to be completed; i.e., courses completed should be as demanding as those offered at the college level. This term should be construed to mean course work satisfactorily completed (e.g., finished with a grade at the 70% level) at or conducted by a college or university with curricula accredited by a nationally recognized agency such as the Accreditation Board for Engineering and Technology (ABET/ECPD).[6] Additional guidance on accreditation of training institutions[7] will be developed by the NRC. The NRC intends to establish alternative means of accreditation of training programs, after which, course work completed under such programs may be acceptable.

1.4 Interim Regulatory Positions Related to Anticipated Rules

Section 1 of Draft Standard ANS 3.1 states that the NRC and other regulatory agencies promulgate regulations applying to many aspects of the design, construction, and operation of nuclear power reactors and that ANS 3.1 shall not take precedence over any such regulation. As indicated in the Section B "Discussion" of this guide, the NRC staff is preparing amendments to 10 CFR Part 55 and 10 CFR Part 50 that relate to subjects addressed by ANS 3.1. Listed below are exceptions taken to the standard to provide for consistency with the anticipated amendments. The proposed amendments to 10 CFR Part 55 and 10 CFR Part 50 are undergoing review prior to publication for public comment. The positions listed below should be regarded as interim regulatory positions pending issuance of final amendments to 10 CFR Part 55 and 10 CFR Part 50.

a. Section 4.3.1 of Draft Standard ANS 3.1 requires as part of the experience requirements that a senior operator have 6 months of experience as a licensed operator. Except in cases where personnel are taking cold NRC senior operator examinations, a senior operator should have 1 year of experience as a licensed operator at the plant for which the senior operator license is requested.

[6]The Manual of Evaluation Procedure of the Engineering Accreditation Commission may be obtained from the Accreditation Board for Engineering and Technology (ABET/ECPD), 345 East 47th Street, New York, New York 10017.

[7]The term "training institutions" includes colleges, universities, other named four-year schools of higher learning, and technical schools that offer courses of the quality and at the level of comprehension usually taught in colleges.

b. Sections 4.3.1.2 and 4.5.1.2 require that the competency of license applicants for senior operator and operator licenses be certified by corporate management prior to endorsing the applicant for licensing by the NRC. This certification should be performed by the highest level of corporate management responsible for plant operations (for example, the Vice-President for Operations). Additionally, documented evidence of this certification should be submitted with the license application and this documentation retained for at least as long as that individual is employed at the plant or by the organization that operates the plant.

c. Section 4.3.1.2, in discussing education requirements, states that a senior operator shall have a high school diploma plus the equivalence of thirty (30) semester hours of college-level education (450 classroom or instructor-conducted hours) in mathematics, reactor physics, chemistry, materials, reactor thermodynamics, fluid mechanics, heat transfer, electrical and reactor control theory. In lieu of this provision, a senior operator should hold a high school diploma or general education development certificate and have had a minimum of 60 semester hours of college-level education in technical subjects such as mathematics, reactor physics, chemistry, materials, reactor thermodynamics, fluid mechanics, heat transfer, and electrical and reactor control theory.

d. Section 5.2.1.3.1 requires that, as part of the operator training program, candidates shall observe operating practices in the control room.

As a minimum, an operator license applicant should have received 3 months of shift training with no other concurrent duties at the facility for which the applicant seeks a license. During this training, the applicant, under the observation and control of a licensed operator, should have manipulated the facility controls and performed duties that would be performed by a licensed operator.

As a minimum, a senior operator applicant should have received 3 months of shift training with no other concurrent duties at the facility for which the applicant seeks a license. During this training, the applicant, under the observation and control of a licensed senior operator, should have supervised the manipulation of the facility controls and performed duties that would be performed as a licensed senior operator.

e. Section 5.5.1, in discussing retraining of licensed personnel, states that a simulator shall be used to fulfill portions of the retraining

program for those evolutions where the simulator is capable of simulating continuously and in real time plant operations of the referenced facility. Proposed amendments to Part 55 are expected to contain requirements for mandatory simulator training for both new license applicants and requalification of operators and senior operators. Licensees should provide, to the extent possible, for simulator training.

2. QUALIFICATIONS: EXCEPTIONS AND SUPPLEMENTS

2.1 Limited Number of Exceptions to Required Qualifications

Section 4.1 discusses a case-by-case evaluation of an individual's qualifications when the individual does not meet those stated in the standard. Acceptance of an individual's qualifications based on this type of evaluation should be reserved for exceptional cases. Exceptions for individual qualifications should not exceed 5 percent of all the positions covered by this standard on a per unit basis without prior NRC staff approval. Exceptions should not be used for the positions of plant manager, operations manager, radiation protection manager,[8] or shift supervisor. In those cases where exceptions to requirements of the standard are used, the evaluation that justifies any such exceptions should be documented and that documentation retained for at least as long as that individual is employed at the plant or by the organization that operates the plant.

2.2 Managers

2.2.1 Plant and Technical: NRC Certification

Sections 4.2.1 and .2.4 discuss certification at the plant or at an appropriate simulator as a qualification requirement for the positions of plant manager and technical manager. This certification should either be conducted or approved by the NRC staff.

[8]The title "radiation protection manager" is used by many licensees to describe the person responsible for the radiation protection program; other titles are equally acceptable.

2.2.2 Maintenance: Educatic. Requirements

Section 4.2.3 discusses the education requirements for the maintenance manager. The recommendation for the maintenance manager to have nondestructive testing familiarity, craft knowledge, and an understanding of electrical, pressure vessel, and piping codes and standards should be construed as a requirement.

2.2.3 Radiation Protection: Training and Experience

2.2.3.1 Minimum Formal Training. Section 4.4.4a. requires that the Radiation Protection Manager have some formal training in radiation protection. Topics to be included in this training should include as a minimum, personnel dosimetry, air sampling, shielding, radiological biology, and radiation protection instrumentation.

2.2.3.2 Certification and Experience. In general, an individual who is certified by the American Board of Health Physics in accordance with the "Power Reactor Health Physics Certification Program" dated November 1978 is considered as having met the requirements specified in Section 4.4.4 of the draft standard for the Radiation Protection Manager[8] provided that the individual has spent a minimum of 2 of the 6 years immediately preceding application for certification in a position of supervisory capacity in a health physics program for an operating nuclear power plant.

2.2.3.3 Experience Requirement. Section 4.4.4 states that the Radiation Protection Manager shall have 4 years of experience in applied radiation protection and that at least 3 years shall be in applied radiation protection work in a nuclear facility dealing with radiological problems similar to those encountered in nuclear power plants. Additionally, the 4 years of experience in applied radiation protection required by the draft standard should be professional-level experience and the 3 years of experience at a nuclear facility should include supervision of the activities of radiation protection technicians.

2.3 Shift Supervisors

2.3.1 Education Requirements

Section 4.3.1.1 discusses the requirements for qualification of shift supervisors (person in charge of shift operations). In lieu of the education

requirements of the standard, the shift supervisor should have at least a Bachelor of Science degree that includes at least 60 semester hours in mathematics, reactor physics, chemistry, materials, thermodynamics, fluid mechanics, heat transfer, and electrical and reactor control theory. (A discussion of the education requirements for shift supervisor is included as Appendix A to this regulatory guide in an additional effort to obtain public input in developing this position. Specific comments on Appendix A are invited.)

2.3.2 Corporate Certification of Candidates

In order to ensure greater management involvement in the selection of shift supervisors, certification of the competency of shift supervisor candidates should be performed by the highest level of corporate management responsible for plant operations (for example, the Vice President for Operations). This certification should be documented and the documentation retained for at least as long as the individual is employed at the plant or by the organization that operates the plant.

2.4 Professional-Technical Group Leaders

2.4.1 Instrumentation and Control and Chemistry and Radiochemistry: Experience Requirements

Sections 4.4.2 and 4.4.3 contain experience requirements for the leaders of the instrumentation and control professional-technical group and chemistry and radiochemistry professional-technical group. Consistent with the experience requirements of the standard for the leader of the reactor engineering group, the experience for those individuals discussed in Sections 4.4.2 and 4.4.3 should be 4 years of professional-level experience, 2 years of which should be in instrumentation and control or chemistry and radiochemistry, respectively. Included in this experience should be 1 year of nuclear power plant experience as required by the draft standard for these positions.

2.4.2 Chemistry and Radiochemistry: Credit of Training Toward Experience

Section 4.4.3 allows 1 year of credit toward nuclear power plant experience for a chemistry and radiochemistry training program. In order to ensure that any such training program cannot be used to fulfill the requirement of the standard for the chemistry and radiochemistry group leader to have 1 year of nuclear

licensing prior to initial fuel loading may require special additional considerations, particularly with respect to experience.

"(1) Shift Supervisor (person in charge of operations on shift at the station) - Shift Supervisors should have at least a Bachelor of Science degree or equivalent training and experience in engineering or the related physical sciences. The Shift Supervisor should also hold a senior reactor operator's license (issued under new proposed requirements defined below) and have served as a reactor operator for one year or senior reactor operator for six months. In establishing equivalency with a Bachelor of Science degree, consideration should be given not only to formal courses in engineering and related sciences, but also to education in the liberal arts. It is recommended that the use of the equivalency to a Bachelor of Science degree be exercised to only a limited degree and that most shift supervisors hold degrees. It is also recommended that shift supervisor qualifications include leadership training and experience.

"(2) Senior Reactor Operator (e.g., shift foreman in a multi-unit station) - Senior Reactor Operators should have at least the same general technical education and specific training in transient and accident response characteristics of nuclear power plants as recently articulated for the shift technical advisor. Additional recommendations for upgrading senior reactor operator qualifications are identified in the Commission Paper SECY 79-330E on Qualification of Reactor Operators."

In comparing proposed Regulatory Position 2.3.1 and the recommendations of the Lessons Learned Task Force it should be noted that the Lessons Learned Task Force recommended (1) that shift supervisors have at least a Bachelor of Science degree or equivalent training and experience in engineering or the related physical sciences and (2) that the shift supervisor also hold a senior reactor operator's license issued under new requirements proposed by the Lessons Learned Task Force (senior reactor operators should have at least the same general technical education and specific training in transient and accident response characteristics of nuclear power plants as recently articulated for

the shift technical advisor). The provision of this regulatory position for 60 semester hours of technical education is derived from the general technical education requirements for shift technical advisors (see Appendix B to this guide).

Proposed Regulatory Position 2.3.1 is more stringent than the position the Advisory Committee on Reactor Safeguards (ACRS) may deem necessary. The Advisory Committee on Reactor Safeguards in its report of December 13, 1979,* to Chairman Ahearne on the Lessons Learned Task Force Final Report (NUREG-0585) stated that it gave general support to the recommendations related to personnel qualification and training; however, the ACRS also provided the following comment concerning qualifications of shift supervisors.

"The ACRS believes that, although a broader technical background should be required of Shift Supervisors, it may be neither necessary nor practical to require that all Shift Supervisors have a Bachelor of Science Degree. The Committee recommends that the NRC define its criteria for 'equivalent training and experience in engineering or the related physical sciences.' The ACRS believes that a training program tailored to the requirements of reactor operation, possibly of less than four years duration, may provide a practical alternative to a formal degree program. The Committee believes that the NRC should define the scope and duration of a training program that may be considered as an acceptable alternative to a degree curriculum."

The differences between the comment of the ACRS and proposed Regulatory Position 2.3.1 will be discussed in Section 3 of this appendix when addressing the alternative education requirements for shift supervisor that could be considered. Prior to that discussion, recommendations or comments of other groups on qualification requirements for shift supervisors are presented.

2. RECOMMENDATIONS AND COMMENTS FROM OTHER GROUPS

The Report of the NRC Special Inquiry Group (NUREG/CR-1250) recommended that the NRC should require every licensee to hire a cadre of graduate engineers knowledgeable in reactor engineering and physics and that each

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engineer be provided with training in specific characteristics of the plant, with special emphasis on integrated plant response and transient behavior. The Special Inquiry Group further recommended that the utility should be required to deploy on every shift at least one such engineer as supervisor whose qualifications as shift manager, not as an "advisor," have been examined by the NRC.

Basic Energy Technology Associates, Inc. (BETA), in its report to the NRC on power plant staffing (NUREG/CR-1280) discusses the differences in NRC, commercial, and Naval practice for shift supervisors. Attachment 1 to this appendix is an excerpt from the BETA report concerning shift supervisor qualifications. The BETA report recommends that a new position entitled "Shift Engineer" be created. The "Shift Engineer" would be a degreed engineer who would normally function within the technical organization but is assigned to the Operations Manager to provide shift engineering coverage. The BETA report also indicates that the "Shift Engineer" should have the power and responsibility to direct the shift supervisor in the event of an emergency.

If the "Shift Engineer" has the power and responsibility to direct the shift supervisor and is licensed as a senior reactor operator with extensive operating experience, then the difference between the BETA recommendation and the proposed regulatory position is more related to organizational requirements than to qualification requirements of the "person in charge of operations on shift."

Teknekron Research, Inc., in its report to the NRC on utility management and technical resources recommended the shift supervisor have a bachelor's degree in engineering. Attachment 2 to this appendix is an excerpt from the Teknekron report concerning shift supervisor qualifications.

While the above recommendations, for the most part, have been supportive of proposed Regulatory Position 2.3.1, the Atomic Industrial Forum (AIF) had reservations about such an approach. In the February 1980 Report to the AIF Policy Committee on Follow-Up to the Three Mile Island Accident by the AIF Working Group on Action Plan Priorities and Resources, it was stated: "The requirements for a B.S. degree could have adverse effects on plant safety in that it probably would result in a higher turnover rate for these positions, thus reducing experience in this position at most plants industry wide. The turnover is expected because the person is likely to consider himself over qualified for the usual daily operations; he would not be gaining professional

satisfaction. There would be no risk reduction attributable to the degree per se because it is assumed that he has sufficient fundamental education in the proper engineering disciplines. If this requirement is implemented, risks from plant operation will increase due to personnel turnover. It is suggested this item be reviewed with a consideration toward increasing requirements for fundamental education, but not requiring a degree."

Proposed qualification requirements for the shift supervisor are also included in the December 6, 1979, Draft Standard ANS 3.1, "Standard for Qualification and Training of Personnel for Nuclear Power Plants." This draft revision of ANS 3.1 states, in Section 4.3.1, that the educational requirements for this position are a high school diploma plus the equivalence of 60 semester hours of college-level education in specified technical topics.

3. ALTERNATIVE EDUCATION REQUIREMENTS

A wide variety of opinion exists concerning education requirements for shift supervisors. A discussion of proposals for education requirements for shift supervisors is provided below in an attempt to define the issues involved and to foster public comment on these issues. While the requirements related to nuclear power plant experience are not addressed in the following discussion, the importance of extensive in-plant experience for shift supervisors cannot be over emphasized.

Alternative education requirements for shift supervisors include the following:

Alternative 1: Require as a minimum a high school education.

Alternative 2: Require a high school education plus a specified number of college-level technical courses.

Alternative 3: Require a high school education plus a specified number of college-level courses in technical subjects as well as courses in humanities and social studies such as written and oral communication, applied psychology, political science, and economics.

Alternative 4: Require a Bachelor of Science degree in engineering or a related physical science.

Alternative 5: Require a Bachelor of Science degree in engineering or a related physical science that includes a specified number of courses in technical subjects as well as courses in humanities and social studies such as written and oral communication, applied psychology, political science, and economics.

The following discussion explains why Alternatives 1, 2, and 4 are deemed unacceptable and compares the acceptability of Alternatives 3 and 5.

Alternative 1 (high school diploma) is unacceptable. In particular, the technical complexity of supervising the operation of a nuclear power plant requires an education exceeding that demonstrated by a high school diploma. The demands of present practice for operator and senior operator training exceed this requirement (i.e., while a shift supervisor may have only a high school diploma, completion of the senior operator training program requires education beyond the high school level.)

Alternative 2 (high school diploma plus completion of a specified number of college-level technical courses) is also unacceptable. While this alternative qualifies a supervisor to deal with technical areas, it does not provide a broad-based education in nontechnical subjects such as management, leadership, and written communication that is necessary to deal with many of the nontechnical responsibilities of the shift supervisor, particularly, supervision of plant personnel.

Alternative 4 (Bachelor of Science degree in engineering or a related physical science) is also unacceptable. There are some Bachelor of Science (B.S.) degree programs that do not meet the education requirements for a shift supervisor. Although an engineer holding a B.S. degree would have completed many of the subjects considered necessary to qualify as a shift supervisor, having successfully earned a degree in engineering does not ensure knowledge of such specific areas as fluid mechanics and reactor control theory that is necessary to the shift supervisor.

The remaining discussion will be limited to a discussion of Alternatives 3 and 5. Proposed Regulatory Position 2.3.1 (Alternative 5) is selected as the

optimum choice because it quantifies the required technical courses as 60 semester hours in mathematics, reactor physics, chemistry, materials, thermodynamics, fluid mechanics, heat transfer, and electrical and reactor control theory. Alternative 3 does not quantify the number of technical courses required.

When considering technical courses, two questions are readily identifiable. First, is the number of courses and the area of their coverage sufficient? Since the number of technical courses required for a Shift Supervisor in Alternative 5 is the same as that required for a shift technical advisor (Regulatory Position 2.7), the course requirement appears to be acceptable. Second, should the requirement stipulate that the courses be taught at an accredited college or university? The level of instruction of the courses is required to be beyond the high school level. Therefore, the only practical way, pending accreditation of technical training institutions other than 2- or 4-year accredited colleges or universities, to specify the required level of instruction is to provide that such instruction be satisfactorily completed at or conducted by an accredited college or university.

The technical education requirements of Alternatives 3 and 5 are consistent, but the nontechnical education requirements of Alternatives 3 and 5 differ. It is expected that the nontechnical liberal arts curriculum requirement of Alternative 3 would consist of a minimum of 20 semester hours conducted at or by an accredited college or university in such courses as psychology, management, leadership, sociology, and other liberal arts courses thereby providing a broad-based education. This broad-based education would equip a shift supervisor to deal with many of the nontechnical responsibilities of the position such as communicating with shift personnel and providing leadership for shift activities. Completion of the required 60 hours of technical courses and estimated 20 hours of nontechnical courses amounts to 80 semester hours or approximately 75% of the work necessary to obtain a degree. Completion of only an additional 40 to 50 semester hours would be required to obtain a college degree. It is expected that an individual who completes 75% of the work necessary to obtain a degree would likely complete the remainder. Therefore, realistically, there may be little difference between Alternatives 3 and 5.

A college degree indicates a level of accomplishment and self-discipline that helps produce self-confidence in an individual and helps establish leadership qualities necessary to a shift supervisor. The wide exposure of

the individual to both technical and liberal arts courses provides a more well-rounded education than exposure to only technical courses that could improve a shift supervisor's ability to direct shift operations activities.

A degree is based on a well-thought-out curriculum with required courses integrated and dovetailed to complement one another in a consistent manner in order to equip a person to consider problems and make decisions in a constructive way in a particular field. Without such planning, 60 hours, or any other required number of courses, is meaningless--it could be a hopeless hodgepodge of unintegrated and only vaguely related information. Therefore, Alternative 5 with its degree requirement is probably the best choice.

4. IMPLEMENTATION

The Lessons Learned Task Force in its final report (NUREG-0585) recommended a phased program to take place within the next 5 years for upgrading the qualifications of shift supervisors and senior reactor operators. Whether training of present personnel is upgraded or degreed engineers are introduced into the training program, it is expected that it would take a minimum of 5 years to fully respond to the upgraded requirements stated in Alternatives 3 or 5.

A program of upgrading the qualifications of individuals now employed as shift supervisors at operating plants should be initiated by the utilities to ensure that these individuals possess the necessary technical competence and management skills to adequately perform their jobs. Due credit should be given shift supervisors for demonstrated ability to perform their duties. The qualifications of current shift supervisors and the utility's program for upgrading qualifications for shift supervisors should be reviewed on a case-by-case basis by the Office of Nuclear Reactor Regulation at the time of renewal of the shift supervisor's senior operator license.

In implementation of the regulatory position on shift supervisors, consideration will need to be given to the AIF concern that such a position may cause a high turnover rate and thereby adversely affect plant safety.

EXCERPT FROM NUREG/CR-1280, "POWER PLANT STAFFING"

VI. SHIFT SUPERVISORS

A. Definitions

In the context of this review, shift supervisors will be considered licensed senior reactor operators (SRO's) and will be compared with Engineering Officers of the Watch (EOOW's).

An Engineering Officer of the Watch (EOOW), insofar as a nuclear ship is concerned, is an officer who has been selected, trained, qualified, and designated as a nuclear trained officer. He has been qualified as an EOOW in his ship by his Commanding Officer. He is the senior officer on watch in the engineering plant of the ship. All persons on watch in the engineering plant report to him. He is responsible for the operation of the plant, its safety, emergency action and anything going on in the plant. He directs all operations.

B. NRC Requirements for Shift Supervisors

NRC requirements for eligibility, training, qualification and requalification of shift supervisors are contained in ANSI N18.1-1971 and NUREG-0094. These requirements are summarized in Table 1 of this report.

C. Industry Practices for Shift Supervisors

As in the case of operators, civilian industry practices generally follow the NRC requirements. However, as previously indicated, ANS 3.1-1978 and proposed Revision 2 to Regulatory Guide 1.8 are used even though not required. All of the comments made in Section V.B of this report concerning industry problems with operators equally apply to the case of shift supervisors.

D. Navy Practices

Before a naval officer can qualify as an Engineering Officer of the Watch (first-line operating supervisor) on a nuclear ship he will have met the following requirements:

licensing prior to initial fuel loading may require special additional considerations, particularly with respect to experience.

"(1) Shift Supervisor (person in charge of operations on shift at the station) - Shift Supervisors should have at least a Bachelor of Science degree or equivalent training and experience in engineering or the related physical sciences. The Shift Supervisor should also hold a senior reactor operator's license (issued under new proposed requirements defined below) and have served as a reactor operator for one year or senior reactor operator for six months. In establishing equivalency with a Bachelor of Science degree, consideration should be given not only to formal courses in engineering and related sciences, but also to education in the liberal arts. It is recommended that the use of the equivalency to a Bachelor of Science degree be exercised to only a limited degree and that most shift supervisors hold degrees. It is also recommended that shift supervisor qualifications include leadership training and experience.

"(2) Senior Reactor Operator (e.g., shift foreman in a multi-unit station) - Senior Reactor Operators should have at least the same general technical education and specific training in transient and accident response characteristics of nuclear power plants as recently articulated for the shift technical advisor. Additional recommendations for upgrading senior reactor operator qualifications are identified in the Commission Paper SECY 79-330E on Qualification of Reactor Operators."

In comparing proposed Regulatory Position 2.3.1 and the recommendations of the Lessons Learned Task Force it should be noted that the Lessons Learned Task Force recommended (1) that shift supervisors have at least a Bachelor of Science degree or equivalent training and experience in engineering or the related physical sciences and (2) that the shift supervisor also hold a senior reactor operator's license issued under new requirements proposed by the Lessons Learned Task Force (senior reactor operators should have at least the same general technical education and specific training in transient and accident response characteristics of nuclear power plants as recently articulated for

the shift technical advisor). The provision of this regulatory position for 60 semester hours of technical education is derived from the general technical education requirements for shift technical advisors (see Appendix B to this guide).

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B. NRC Requirements for Shift Supervisors

NRC requirements for eligibility, training, qualification and requalification of shift supervisors are contained in ANSI N18.1-1971 and NUREG-0094. These requirements are summarized in Table 1 of this report.

C. Industry Practices for Shift Supervisors

As in the case of operators, civilian industry practices generally follow the NRC requirements. However, as previously indicated, ANS 3.1-1978 and proposed Revision 2 to Regulatory Guide 1.8 are used even though not required. All of the comments made in Section V.B of this report concerning industry problems with operators equally apply to the case of shift supervisors.

D. Navy Practices

Before a naval officer can qualify as an Engineering Officer of the Watch (first-line operating supervisor) on a nuclear ship he will have met the following requirements:

1. He will have entered into the Navy's nuclear power program by applying (volunteering) and meeting the following requirements:

a. Age requirements: no older than 27 years of age.

b. College graduate (4 year curriculum) having successfully completed one year of calculus through differential and integral calculus, and one year of calculus-based physics.

c. Physically qualified.

d. Meet requirements of moral turpitude sufficient to be granted an appropriate security clearance.

e. Have been interviewed in Washington, D.C. headquarters of the Department of Energy's Deputy Assistant Secretary for Naval Reactors. These interviews consist of at least three individual interviews by senior technical staff personnel and the Deputy Assistant Secretary himself. In about two-thirds of the cases, written examinations in math and physics are administered during this interview period.

2. The Navy acquires its officers for the nuclear program through three sources: U.S. Naval Academy, NROTC colleges, Nuclear Power Officer Candidate (NUPOC) program. Officers selected for the nuclear program from the NUPOC program must attend the Navy's Officer Candidate School (OCS) for 16 weeks.

3. Successful completion of the Navy's 6 months Nuclear Power School (NPS). This course teaches basic theory relating to nuclear power at a higher level than that taught to enlisted personnel. All instruction is conducted in the classroom.

4. Successful completion of a 6 months practical course of instruction at one of the Navy's 8 nuclear prototype plants. Students will have actually "qualified" on the plant. During this phase, the officer will qualify on all enlisted watch stations in addition to qualifying as an EOOW.

5. Will have been assigned to a nuclear powered ship and will have "qualified" on that ship's plant. This takes about 9 months and involves the following:

a. A basic engineering qualification (BEQ) course which, in addition to being a review of course material covered at NPS, covers basic reactor plant theory and application to the specific plant installed on his ship.

b. A watch qualification program involving standing watches under instruction throughout the plant.

c. The watch qualification program also involves completion of each item of a watch qualification guide by obtaining signatures, usually several hundred, that he has demonstrated, through discussion, actual practice, or written tests his knowledge and ability.

d. He will be given a final comprehensive written examination and a series of oral examinations. He must be given his final oral examination by the ship's Commanding Officer.

6. This entire program, from the time he enters the Navy as an officer until he stands his first EOOW as a qualified watch stander is about 2 years.

E. Differences and Recommendations for Shift Supervisors

1. Difference:

EOOW's are naval officers selected into the program through a tough but well-defined system. Quality input is maintained even to the sacrifice of quantity. High standards of performance are instilled from the first moment of selection and are emphasized throughout the training program. Each candidate knows he has a 5 year commitment. He may fail, but he can not quit. The training program is structured so that all students must work hard to succeed. No one, regardless of his background or intelligence, can just breeze through. Standards for passing or failing the courses are clearly defined and enforced without waivers. There is every incentive to finish the courses and finish them well. There is no incentive to "drift along". He is constantly examined as to his understanding and retention of knowledge. His examinations are orals or essay written. There are not true or false or multiple choice examinations. There is no self-pace teaching. His training is competitive and he knows it. The higher his relative standing, the better chance he has of selecting his duty station. His prototype instructors are qualified and experienced operators, many of whom are sea-returnees. His rewards are ample:

a. Recognition in the form of special bonuses which are substantial.

b. Pride in being part of a small, elite group of officers who have successfully passed through the most difficult program the Navy has to offer.

c. A sure path to future, better-than-average promotion if he continues satisfactory performance.

d. The prospect of a select civilian career if he elects to resign at the end of his commitment.

e. Knowledge that he is an integral part of the nation's number one major deterrent to war.

In the civilian nuclear industry a shift supervisor comes from two sources. He can either be promoted up from the ranks of an operator, or he can be brought in directly from outside and made a shift supervisor without passing through the job as an operator. In either case, his selection, training and qualification generally follow that of an operator but with greater experience required. All of the comments provided in Section V of this report relating to differences and recommendations have direct applicability to shift supervisors.

However, there are two additional differences that should be highlighted which are unique to the shift supervisor and the EOOW.

The one difference has been discussed in the various reports and studies emanating from the Three Mile Island accident and has to do with the proper manning of the control room. NRC has already issued interim requirements on the stationing of a Shift Technical Advisor in the Control Room.

Recommendations:

Our recommendation is to create a new position entitled "Shift Engineer". He would be a degreed engineer who would normally function within the technical organization but is assigned to the Operations Manager to provide shift engineering coverage. This position is created for the following purposes and reasons:

a. If it is assumed that the requirements for becoming a shift supervisor (senior reactor operator) remain such that he need not be an experienced engineer (college graduate type), then there exists the need for such a person on shift who can make engineering judgments. This would be the function of the Shift Engineer.

b. The possibility exists to change the requirements for a shift supervisor such that he must be a college graduate engineer. This alternative was not selected because it would close off an advancement path for reactor operators. While some may consider this to be a minor issue, the reviewers, based on their Navy experience, do not. The civilian nuclear power industry must be able to provide an attractive career path for reactor operators or else face the prospect of heavy turnover or lower quality applicants.

c. There is also the suggestion that the position of Shift Engineer be filled only when a shift supervisor is not an engineer, or that the Shift Engineer position be an interim measure until such time as all shift supervisors meet the engineer eligibility requirements or their equivalent. We do not agree with this approach. Regardless of whether or not a shift supervisor is an engineer, there should always be present in the control room an engineer whose primary interest, background and experience is technical in nature.

d. The functions of the Shift Engineer would be as follows:

(1) He acts as a technically qualified observer to plant operations.

(2) He has the power to order the plant put into a safe condition in the event of an emergency.

(3) He does not report to the Shift Supervisor--he is an independent observer similar to the NRC inspector on shift. However, he has the power and responsibility to direct the Shift Supervisor in the event of an emergency or accident.

(4) He has the wherewithal to contact appropriate technical personnel to obtain technical assistance, thus allowing the Shift Supervisor to focus his attention on plant operation.

(5) If, during the course of normal operations, it is discovered that a given procedure requires modification, the Shift Engineer has the responsibility to resolve the problem, correct the procedures in accordance with approved methods, and to provide the results to the Shift Supervisor for his accomplishment.

e. The Shift Engineer would be a licensed Senior Reactor Operator and will have had operating experience as outlined in Table 2 of this report.

EXCERPT FROM VOLUME I, "UTILITY MANAGEMENT AND TECHNICAL RESOURCES," OF THE TEKNEKRON RESEARCH, INC., REPORT

1.5 ONSITE MANAGEMENT RESOURCES

One man must be in charge of the plant at all times. Since in the normal work-week, the Plant Manager can be expected to be onsite less than 25% of the time, the Shift Supervisor has short-term onsite management responsibility (in the absence of the Assistant Plant Manager). (The accession of management responsibility by the Plant Manager or his designee in the event that the long-term resources should be called upon is discussed in Section 2.3.)

The Shift Supervisor is the single most important resource in the event of an accident. Not only is he solely responsible for any hands-on operations performed on the system, but he must also be the "intellectual leader" of the team. He must be able to evaluate and act upon the technical input supplied by individuals on his onsite team and by his offsite resources. He must also be able to communicate essential information to the long-term resources if and when they arrive onsite. It is essential that he be thoroughly familiar with the plant, that he be exceedingly well trained (and retrained), and that he command the respect of his colleagues. Although this is a stringent requirement, it is not possible to overemphasize the importance of this individual in an accident situation.

With the foregoing in mind, and recognizing that the Shift Supervisor is equivalent to the Plant Manager when the latter is absent, we recommend the following minimum qualifications for the Shift Supervisor:

1. A bachelor's degree in engineering
2. Two years of operating experience at a nuclear power plant
3. One year of experience at the specific nuclear plant to be operated (which can be satisfied by pre-operational testing)
4. An NRC Senior Operator's License
5. Four years of supervisory experience

The nuclear plant experience satisfies one of the criteria under the collective technical qualifications given in Table 3. We feel strongly that Shift

Supervisors should have this operating experience "under their belt." Additionally, the Shift Supervisor should have some leadership experience. A quantification of this experience is judgmental. We have adopted the four years of supervisory experience qualification from the recommendations of the ANSI Committee (ANS-3.1) for Plant Manager.

The degree requirement (B.S. in Engineering) is a deviation from the collective qualifications of the onsite technical resources given in Table 3. Although we are committed to the recommended collective technical resources presented earlier, we also support this requirement in the category of management resources. In our judgment, the degree will provide the Shift Supervisor with additional depth, maturity, problem solving abilities, and respect that cannot be equated to simple technical requirements.

The degree will also provide the Shift Supervisor with the basic equivalent course work in many of the areas of expertise cited earlier, as well as the foundation to master most of the others. As a final note, we strongly recommend that the Shift Supervisor possess the Transient Analysis experience discussed earlier and in Chapter 4.

APPENDIX B

CRITERIA FOR SHIFT TECHNICAL ADVISOR (AN EXCERPT FROM NRR SEPTEMBER 13, 1979, LETTER TO ALL OPERATING POWER PLANTS)

In developing the recommendations for the Shift Technical Advisor, the Lessons Learned Task Force concentrated on the two functions that needed to be provided, namely, an accident assessment function and an operating experience assessment function.[1] The proper performance of these functions requires the provision of certain characteristics described in the following paragraphs.

A. Accident Assessment Function

1. General Technical Education

The technical education of at least one person in the control room under off normal conditions should include basic subjects in engineering and science. The purpose of this education is to aid the operator in assessing unusual situations not explicitly covered in the current operator training. The following is a tentative list of areas of knowledge that are considered to be desirable:

Mathematics, including elementary calculus
Reactor physics, chemistry and materials
Reactor thermodynamics, fluid mechanics, and heat transfer
Electrical engineering, including reactor control theory

These areas of knowledge should be taught at the college level and would be equivalent to about 60 semester hours. Although a college graduate engineer would have many of these subjects and more that would not be essential, some engineers might be deficient in a few of these specific areas, e.g., reactor physics. Although the time to teach these subjects to a licensed senior reactor operator could be as short as two years, depending on the scope and content of the subjects, the selection of a graduate engineer would likely be a more rapid means of fulfilling this characteristic.

[1]The staff has accepted the assignment of these two functions to two separate groups at the prerogative of individual licensees.

2. Reactor Operations Training

All persons assigned to duties in the control room should be trained in the details of the design, function, arrangement and operation of the plant systems. This training is necessary to assure that the meaning and significance of instrument readings and the effect of control actions are known. A licensed operator or supervisor of an operator would not be required to have further training in order to fulfill this characteristic. A graduate engineer not previously licensed or trained as an operator or senior operator would require additional training in order to fulfill this characteristic.

3. Transient and Accident Response Training

In addition to the training in normal operations, anticipated transients, and accidents presently required of operators and senior operators, one person in the control room under off normal conditions should be trained to recognize and react to a wide range of unusual situations including multiple equipment failures and operator errors. This training should not be limited to written procedures or specific accident scenarios, but should include the recognition of symptoms of accident conditions such as complex transient responses or inadequate core cooling and possible corrective actions. The purpose of this training is to broaden the ability for prompt recognition of and response to unusual events, not to modify the instinctive, rapid procedural response to transients and accidents provided by reactor operators. The training is required in recognition of the fact that real accidents inherently are initiated and accompanied by unusual and unexpected events. The training is also to emphasize need to focus on the essential parameters that indicate the status of the core and the primary coolant boundary. This additional training would take up to a year to accomplish for a person not already experienced in nuclear plant transient and accident analysis or evaluation. Both inexperienced graduate engineers and currently licensed operators would require additional training to fulfill this characteristic.

4. Detachment from Operations

The plant response assessment function requires a measure of detachment from the manipulation of controls or immediate supervision of operators. This is intended to provide the perspective and the time for assessing plant conditions and advising on appropriate operator actions. It has been called a safety monitor characteristic. Currently only three operators would normally be in the control room at the time an unusual event occurred, and it is allowed that at

1. He will have entered into the Navy's nuclear power program by applying (volunteering) and meeting the following requirements:

a. Age requirements: no older than 27 years of age.

b. College graduate (4 year curriculum) having successfully completed one year of calculus through differential and integral calculus, and one year of calculus-based physics.

c. Physically qualified.

d. Meet requirements of moral turpitude sufficient to be granted an appropriate security clearance.

e. Have been interviewed in Washington, D.C. headquarters of the Department of Energy s Deputy Assistant Secretary for Naval Reactors. These interviews consist of at least three individual interviews by senior technical staff personnel and the Deputy Assistant Secretary himself. In about two-thirds of the cases, written examinations in math and physics are administered during this interview period.

2. The Navy acquires its officers for the nuclear program through three sources: U.S. Naval Academy, NROTC colleges, Nuclear Power Officer Candidate (NUPOC) program. Officers selected for the nuclear program from the NUPOC program must attend the Navy's Officer Candidate School (OCS) for 16 weeks.

3. Successful completion of the Navy's 6 months Nuclear Power School (NPS). This course teaches basic theory relating to nuclear power at a higher level than that taught to enlisted personnel. All instruction is conducted in the classroom.

4. Successful completion of a 6 months practical course of instruction at one of the Navy's 8 nuclear prototype plants. Students will have - ually "qualified" on the plant. During this phase, the officer will qualify on all enlisted watch stations in addition to qualifying as an EOOW.

5. Will have been assigned to a nuclear powered ship and will have "qualified" on that ship's plant. This takes about 9 months and involves the following:

a. A basic engineering qualification (BEQ) course which, in addition to being a review of course material covered at NPS, covers basic reactor plant theory and application to the specific plant installed on his ship.

b. A watch qualification program involving standing watches under instruction throughout the plant.

c. The watch qualification program also involves completion of each item of a watch qualification guide by obtaining signatures, usually al hundred, that he has demonstrated, through discussion, actual practice, or written tests his knowledge and ability.

d. He will be given a final comprehensive written examination and a series of oral examinations. He must be given his final oral examination by the ship's Commanding Officer.

6. This entire program, from the time he enters the Navy as an officer until he stands his first EOOW as a qualified watch stander is about 2 years.

E. Differences and Recommendations for Shift Supervisors

1. Difference:

EOOW's are naval officers selected into the program through a tough but well-defined system. Quality input is maintained even to the sacrifice of quantity. High standards of performance are instilled from the first moment of selection and are emphasized throughout the training program. Each candidate knows he has a 5 year commitment. He may fail, but he can not quit. The training program is structured so that all students must work hard to succeed. No one, regardless of his background or intelligence, can just breeze through. Standards for passing or failing the courses are clearly defined and enforced without waivers. There is every incentive to finish the courses and finish them well. There is no incentive to "drift along". He is constantly examined as to his understanding and retention of knowledge. His examinations are orals or essay written. There are not true or false or multiple choice examinations. There is no self-pace teaching. His training is competitive and he knows it. The higher his relative standing, the better chance he has of selecting his duty station. His prototype instructors are qualified and experienced operators, many of whom are sea-returnees. His rewards are ample:

a. Recognition in the form of special bonuses which are substantial.

b. Pride in being part of a small, elite group of officers who have successfully passed through the most difficult program the Navy has to offer.

c. A sure path to future, better-than-average promotion if he continues satisfactory performance.

d. The prospect of a select civilian career if he elects to resign at the end of his commitment.

e. Knowledge that he is an integral part of the nation's number one major deterrent to war.

In the civilian nuclear industry a shift supervisor comes from two sources. He can either be promoted up from the ranks of an operator, or he can be brought in directly from outside and made a shift supervisor without passing through the job as an operator. In either case, his selection, training and qualification generally follow that of an operator but with greater experience required. All of the comments provided in Section V of this report relating to differences and recommendations have direct applicability to shift supervisors.

However, there are two additional differences that should be highlighted which are unique to the shift supervisor and the EOOW.

The one difference has been discussed in the various reports and studies emanating from the Three Mile Island accident and has to do with the proper manning of the control room. NRC has already issued interim requirements on the stationing of a Shift Technical Advisor in the Control Room.

Recommendations:

Our recommendation is to create a new position entitled "Shift Engineer". He would be a degreed engineer who would normally function within the technical organization but is assigned to the Operations Manager to provide shift engineering coverage. This position is created for the following purposes and reasons:

a. If it is assumed that the requirements for becoming a shift supervisor (senior reactor operator) remain such that he need not be an experienced engineer (college graduate type), then there exists the need for such a person on shift who can make engineering judgments. This would be the function of the Shift Engineer.

b. The possibility exists to change the requirements for a shift supervisor such that he must be a college graduate engineer. This alternative was not selected because it would close off an advancement path for reactor operators. While some may consider this to be a minor issue, the reviewers, based on their Navy experience, do not. The civilian nuclear power industry must be able to provide an attractive career path for reactor operators or else face the prospect of heavy turnover or lower quality applicants.

c. There is also the suggestion that the position of Shift Engineer be filled only when a shift supervisor is not an engineer, or that the Shift Engineer position be an interim measure until such time as all shift supervisors meet the engineer eligibility requirements or their equivalent. We do not agree with this approach. Regardless of whether or not a shift supervisor is an engineer, there should always be present in the control room an engineer whose primary interest, background and experience is technical in nature.

d. The functions of the Shift Engineer would be as follows:

(1) He acts as a technically qualified observer to plant operations.

(2) He has the power to order the plant put into a safe condition in the event of an emergency.

(3) He does not report to the Shift Supervisor--he is an independent observer similar to the NRC inspector on shift. However, he has the power and responsibility to direct the Shift Supervisor in the event of an emergency or accident.

(4) He has the wherewithal to contact appropriate technical personnel to obtain technical assistance, thus allowing the Shift Supervisor to focus his attention on plant operation.

(5) If, during the course of normal operations, it is discovered that a given procedure requires modification, the Shift Engineer has the responsibility to resolve the problem, correct the procedures in accordance with approved methods, and to provide the results to the Shift Supervisor for his accomplishment.

e. The Shift Engineer would be a licensed Senior Reactor Operator and will have had operating experience as outlined in Table 2 of this report.

EXCERPT FROM VOLUME I, "UTILITY MANAGEMENT AND TECHNICAL RESOURCES," OF THE TEKNEKRON RESEARCH, INC., REPORT

1.5 ONSITE MANAGEMENT RESOURCES

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5.2 Upgrading Qualifications of Operators

The NRC staff is preparing amendments to 10 CFR Part 55, "Operators' Licenses," and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," that incorporate applicable Commission-approved recommendations of SECY 79-330E and other proposed changes resulting from additional staff review of Part 55 and Part 50. The Regulatory Activities Subcommittee of the Advisory Committee on Reactor Safeguards has reviewed the proposed changes to Part 55 and Part 50. Both the March 28, 1980, H. R. Denton, NRR letter and the proposed rulemaking impact this proposed regulatory guide. With respect to the March 28, 1980, letter, the short-term requirements are either incorporated in the December 6, 1979, Draft Standard ANS 3.1 or noted in the regulatory position of this regulatory guide. With respect to Part 55 and Part 50 revisions, certain positions now included (see Regulatory Positions 1.4a-e) in this regulatory guide will be codified in the regulations in place of the existing general provisions of the regulations. After publication of the final rule changes, Regulatory Guide 1.8 will be revised to eliminate any duplication.

5.3 Onsite and Offsite Managerial and Technical Organizations

The NRC staff has under development criteria for onsite and offsite managerial and technical organizations, including a radiological protection organization, that will provide assurance of the safe operation of a plant during normal and abnormal conditions and the capability necessary to respond to unusual conditions. A contractor was selected (Teknekron Research, Inc.) to assist in the development of criteria listed above. Teknekron Research, Inc., submitted its final report to the NRC in May 1980.

Task I.B.1.1, "Organization and Management of Long-Term Improvements," and Task I.B.1.2., "Evaluation of Organization and Management Improvements of Near-Term Operating License Applicants," of NUREG-0660 describe the criteria development effort for technical and managerial organization. Task I.B.1.2 is a first step in the development of criteria described in Task I.B.1.1. As described in Task I.B.1.2 of NUREG-0660, near-term operating license applicants, as part of the license application review process, are being required to comply with the findings and requirements generated in an NRC interoffice review of

licensee organization and management. The review is based, in part, on an NRC document entitled "Draft Criteria for Utility Management and Technical Competence." The first draft of this document was dated February 25, 1980, however, the document continues to change with use and experience in ongoing reviews. The document addresses the organization, resources, training, and qualifications of plant staff and management (both onsite and offsite) for routine operations and accident conditions. The criteria developed for use in evaluation of operator license applicants, as modified by experience from interoffice review of near-term operating license applicants, will form the basis for the final criteria to be developed in accordance with Task I.B.1.1 of NUREG-0660. The criteria reference Regulatory Guide 1.8 and ANS Standard 3.1 with regard to qualifications of nuclear power plant personnel filling the various functional positions described in ANS Standard 3.1. Regulatory Guide 1.8 will be implemented in conjunction with the recommendations of Task I.B.1.1.

5.4 Onsite "Independent Safety Engineering Group"

Each near-term operating license applicant as part of ongoing license application review is being required to establish a group, commonly referred to as the "Independent Safety Engineering Group," that is independent of the plant staff, but is assigned onsite to perform independent reviews of plant operations activities and to evaluate operating experiences at nuclear power plants. Commission Information Paper SECY-80-242 describes the relationship of the proposed "Independent Safety Engineering Group" to other organizational entities such as the Plant Operations Review Committee. The "Draft Criteria for Utility Management and Technical Competence" (see Item 5.3 above) addresses the qualifications of the onsite independent safety engineering group by referencing Section 4.7 of the December 6, 1979, Draft Standard ANS 3.1.

5.5 Shift Technical Advisors

As described in Task I.A.1.1 of NUREG-0660, the NRC is requiring that a technical advisor to the shift supervisor be present on all shifts. Although minimum training requirements have not yet been specified for shift technical advisors presently occupying such positions, shift technical advisors should enhance the accident-assessment function at the plant. By January 1, 1981,

shift technical advisors will be required to have a technical education, which is of the quality of courses taught at the college level and includes about 60 semesters hours in basic subjects of engineering and science; specific training in the design, function, arrangement, and operation of plant systems; and training in the expected response of the plant and instruments to normal operation, transients, and accidents, including multiple failures of equipment and operator errors. Commission Information Paper SECY 80-243 addresses the subject of shift technical advisors, including a summary of experience required, duties to be performed, and the number of shift technical advisors required onsite. The qualifications of shift technical advisors as addressed in this regulatory guide are the same as those specified in Commission Paper SECY 80-243. The Commission was also informed in this paper that the Institute of Nuclear Power Operations (INPO) has recently forwarded to NRR for comment a copy of an INPO document, "Nuclear Power Plant Shift Techical Advisor - Recommendations for Position Description, Qualifications, Education and Training" (Enclosure to SECY 80-243), and that the NRC staff had the document under review. Further discussion with INPO may lead to revision of this regulatory guide with regard to shift technical advisors.

5.6 Comparison of NRC, Commercial, and Naval Procedures for Qualification of Personnel

In early 1980, Basic Energy Technology Associates, Inc. (BETA), completed a study for the Office of Nuclear Reactor Regulation that outlined the results of a comparative review of existing NRC requirements, commercial nuclear power plant practices, and the Naval Nuclear Propulsion Program procedures for the selection, training, and qualification of personnel involved in nuclear power plant operation and maintenance. The results of the BETA study entitled "Power Plant Staffing" are documented in NUREG/CR-1280, BETA-103. Public comments were requested on this study. The BETA study, when comparing the majority of practices, used the provisions outlined in ANSI N18.1-1971 and did not consider later versions of the standard. The BETA study will be considered when developing future revisions to this regulatory guide.

5.7 Requirements for Licensing of Operators

The NRC staff has awarded a contract to Analysis and Technology, Inc., for a study of requirements for operator licensing. The scope of the work should result in recommendations for (a) the means to be employed for selection and training of nuclear power plant personnel and the degree to which NRC should be involved in the process, (b) the means to be employed to evaluate the effectiveness of training programs, including who, by job description, should be licensed, (c) the methods to be employed to ensure continued competency of plant personnel and the degree to which the NRC should be involved in establishing the methods, (d) the methods to be employed for maintaining a highly motivated and dedicated work force, and (e) the means to be employed for rapidly requalifying presently licensed operators to meet the proposed new requirements. Task I.A.2.6, "Long-Term Upgrading of Training and Qualifications," of NUREG-0660 provides a description of planned NRC actions related to this contract study. After staff review of the study has been completed, the staff will provide recommendations to the Commission and subsequently factor Commission decisions on the recommendations into a regulatory guide or a regulation.

5.8 Planned NRC Accreditation of Training Institutions

As described in Task I.A.2.7 of NUREG-0660, the NRC staff is conducting a study of procedures and requirements for NRC accreditation of training institutions. A Commission Information Paper on this subject should be completed by late 1980. The NRC staff will also prepare a Commission paper examining various NRC approaches to accreditation of training institutions. Staff action on this later effort should be completed by January 1982.

5.9 Operator Emergency Response and Organization of Personnel

Two other efforts interface with this Regulatory Guide to a lesser extent than the efforts described above. In February 1980, the staff issued for interim use and comment, NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear

Power Plants."* NUREG-0654 was designed to provide a common reference and interim guidance for State and local governments and nuclear facility operators in the development of emergency response plans and preparedness in support of nuclear power plants, as well as to provide guidance to Federal agency personnel. In effect, the thrust of NUREG-0654 is to ensure adequate preparedness planning for protection of the population around nuclear power plants. As a part of this emergency preparedness planning, however, NUREG-0654 necessarily addresses the emergency response capability of the nuclear plant operators. In particular, Section II.B of NUREG-0654 sets forth proposed criteria for the onsite emergency organization of the nuclear plant considered to be necessary to adequately support the plans for offsite response in the event of an accident at the plant.

Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," which endorses, with exceptions, ANSI Standard N18.7/ANS-3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants" (see Regulatory Position 1.1), is being revised to update quality assurance program requirements for the operational phase of nuclear power plants. Regulatory Guide 1.33, while not addressing qualification requirements for plant personnel, addresses organizational requirements.

Both of these efforts, NUREG-0654 and Regulatory Guide 1.33, by addressing staffing and organizational considerations have a potential for impacting Regulatory Guide 1.8.

With regard to the interface of this proposed regulatory guide and the other efforts described above, this version of the regulatory guide is a first step in a comprehensive process of upgrading the training and qualifications of operations personnel. Some of the regulatory guide positions may be eventually displaced by more comprehensive long-term changes (e.g., changes to NRC regulations) in the area of personnel qualification; however, these positions are expected to be consistent with the long-term changes.

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* NUREG-0654 (FEMA-REP-1) is available at current rates through the Government Printing Office Sales Program, Distribution Services Section, Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 or from the National Technical Information Service, Springfield, Virginia 22161.

6. SUMMARY AND CONCLUSIONS

A draft revision to Regulatory Guide 1.8, "Selection and Training of Personnel," should be prepared. The draft revision should endorse, with certain exceptions and supplements, the December 6, 1979, Draft Standard ANS 3.1. (A discussion of proposed regulatory positions in second proposed Revision 2 to Regulatory Guide 1.8 is provided in the attachment to this value/impact statement.)

RATIONALE FOR REGULATORY POSITIONS

1. Regulatory Position 1.1 addresses the applicability of documents referenced in Draft Standard ANS 3.1. Regulatory Position 1.1 also provides information on a regulatory guide being prepared on nuclear power plant simulators for use in operator training.

This position has been provided, as is customary in many regulatory guides, to assist the user of the guide in determining the applicability of referenced documents.

2. Regulatory Position 1.2.1 takes exception to Section 3.1 of the draft version of ANS 3.1 concerning personnel temporarily filling positions owing to absences of the principal. The standard permits the use of temporary personnel replacements for a period not to exceed 3 months. The regulatory position states that temporary personnel should not be used as replacements for periods exceeding 1 month.

The 3-month period allowed by the standard is too long to be considered temporary. If the principal is replaced for a period greater than 1 month, the replacement should not be considered temporary and qualifications of the replacement should be subject to the provisions of Section 4 of the standard.

Since temporary absences normally do not exceed one month, the position should not result in impact on licensees. The provision exists in the standard to recognize that a principal may be temporarily absent. The regulatory position should result in maintaining a consistent level of staff qualifications.

3. Regulatory Position 1.2.2 is intended to provide practical guidance on how the standard should be applied to contractor personnel. The proposed regulatory position does not take exception to ANS 3.1. While Section 1, "Scope," of the standard states that the standard is limited to personnel within the owner organization, the definition of owner organization states that contracted personnel are included in the owner organization. Thus contracted personnel are within the scope of Draft Standard ANS 3.1.

4. Regulatory Position 1.3 defines the term "college-level education" that is used throughout the standard. It states that "college-level education" is construed to mean course work satisfactorily completed (i.e., finished with a grade at the 70% level) at or conducted by a college or university with curricula accredited by a nationally recognized agency such as the Accreditation Board for Engineering and Technology. The regulatory position is provided to establish a norm for the provisions of ANS 3.1 dealing with "college-level education" requirements and is intended to describe the quality of the education to be completed.

Case-by-case reviews of educational programs conducted at nonaccredited training institutions pending additional guidance on accreditation will require additional regulatory staff review. The regulatory position indicates that the NRC intends to establish alternative means of accreditation of training programs and that course work completed under such programs may become acceptable.

College-level education is specified in terms of semester hours of college-level subjects. To ensure that there is no misunderstanding as to the meaning of a college credit hour, the following example is repeated from Dr. Miller's letter of May 21, 1980, to Mr. H. Denton on this subject. Dr. Miller, Chairman, Nuclear Engineering Program of Ohio State University, states: "There appears to be some misunderstanding as to the meaning of a college credit hour. Specifically the 60 semester hours of college level subjects specified for senior operators in fact implies approximately 900 classroom hours. However, college instructors normally assume they will be assigning approximately 2 hours of work outside the classroom for every hour in the classroom. As a consequence, 60 semester hours implies approximately 2700 hours of work for the average student. Obviously, students of superior ability will complete them in fewer hours and vice versa." The NRC staff agrees with Dr. Miller's comments concerning the meaning of a college credit hour. Therefore, 60 semester hours (representing approximately 2700 hours of work for the average student) was selected as the established norm for judging education requirements.

5. Regulatory Position 1.4 lists exceptions taken to ANS 3.1 to provide for consistency with the anticipated amendments to 10 CFR Part 55 and 10 CFR

Part 50, which are presently undergoing NRC review prior to publication for public comment.

6. Regulatory Position 2.1 provides guidance on use of the provisions of Section 4.1 of ANS 3.1 for conducting case-by-case evaluation of an individual's qualifications when the individual does not meet those qualifications stated in the standard. Although it was recognized in the development and review of the draft version of ANS 3.1 that there may exist situations where individuals could become qualified for a position based on factors other than those included in the standard (i.e., education, experience), this position recognizes this situation should be the exception rather than the rule. This position will result in fewer deviations from the requirements of the standard. Additionally, this position helps ensure that such deviations are not used for a number of specific plant positions that are responsible for overall plant safety.

This regulatory position, if not initially applied with caution, could have a significant impact on licensees. A phased implementation of the standard and the regulatory guide is necessary so that a high turnover rate of personnel does not ensue that might adversely affect the safe operation of a plant. The position most significantly affected by upgraded qualifications is that of shift supervisor. Appendix A to this regulatory guide provides a detailed discussion of shift supervisor qualifications including recommendations for implementation.

As indicated in the implementation section of the regulatory guide, the regulatory guide will be applied in conjunction with Task I.B.1.1, "Organization and Management of Long-Term Improvements," of NUREG-0660. Task I.B.1.1 provides for licensee submission by May 1981 of a plan for implementing the NRC requirements for upgrading of management and technical resources whether or not an effective active guide on personnel qualification has been issued by that date. Thus, the impact on each licensee will be determined on a case-by-case basis.

Once fully implemented, this regulatory position should provide assurance of a consistent level of staff qualifications.

7. Regulatory Position 2.2.1 provides limitations concerning acceptability of certification of plant managers and technical managers at the plant or at an appropriate simulator as a condition of qualification. It states that this certification should either be conducted or approved by the NRC staff. This

regulatory position provides for regulatory staff involvement in the certification process since the provision of the standard for such certification is intended as an alternative to holding a senior operator license. The position should not significantly impact licensees; however, NRC staff time will be required in conducting or approving certification examinations.

8. Regulatory Position 2.2.2 states that the recommendation of the standard for the maintenance manager to have nondestructive testing familiarity, craft knowledge, and an understanding of electrical, pressure vessel, and piping codes and standards should be construed as a requirement.

These qualifications are essential to the performance of the duties of a maintenance manager. The most significant impact of this position may be that the provision of the standard is very general and application of the general requirement may not be applied uniformly. This could result in additional staff review time.

9. Regulatory Position 2.2.3.1 presents the minimum formal training a radiation protection manager should receive while Section 4.4.4 of ANS 3.1 states only that a manager must receive formal training. This position further clarifies the intent of a similar position contained in the first proposed revision of Regulatory Guide 1.8 issued for comment in February 1979.

10. Regulatory Position 2.2.3.2 specifies that a certified (ABHP) health physicist's experience be in a position of supervisory capacity in a health physics program for an operating nuclear power plant because the NRC staff does not believe that a health physicist who has no such experience should qualify as a radiation protection manager.

11. Regulatory Position 2.2.3.3 has been added to provide clarification that the 4 years of experience required by the standard for the Radiation Protection Manager should be above the technician level and that the 3 years of experience at a nuclear facility required by the standard should involve directing the activities of radiation protection technicians. The provision for 3 years of experience directing the activities of radiation protection technicians is consistent with the first proposed revision of Regulatory Guide 1.8 issued for comment in February 1979. The provision that 4 years of experience be above

the technician level when coupled with the provision for 3 years of experience directing the activities of radiation protection technicians represents only a minor modification of present staff practice and is consistent with the requirement for 4 years of professional-level experience for other group leaders.

12. Regulatory Position 2.3.1 addresses qualifications of shift supervisors. See Appendix A to the guide for a detailed discussion of this regulatory position.

13. Regulatory Position 2.3.2 provides for corporate management involvement in the certification of the competency of shift supervisor candidates and for documentation of such certification. This provision is similar to the provisions for certification by corporate management of the competency of operators and senior operators.

To ensure proper conduct of training programs and qualification of plant personnel, corporate management of each licensee should establish a definitive presence and involvement in the selection, training, and qualification of operations personnel. Such a provision should have minimal impact on licensees. This particular position is responsive, in part, to one of the subitems of Task I.B.1.1, "Organization and Management of Long-term Improvements," of NUREG-0660.

14. Regulatory Position 2.4.1 makes experience requirements for onsite professional-technical group leaders more consistent than past guidance. The regulatory position is self-explanatory. The overall experience requirements for technical group leaders should be more consistent.

15. Regulatory Position 2.4.2 is self-explanatory. The standard contains a potential loophole that could allow the position of chemistry and radiochemistry group leader to be filled without the person having had nuclear power plant experience. In order to ensure that this situation will not be permitted, the equivalence of the training program to experience should be allowed only to a maximum of 6 months.

16. Regulatory Position 2.5 states that training for the Training Coordinator should include the training required by Section 5.4, "General Employee Training,"

of ANS 3.1. This type of training is required by ANS 3.1 for other professional-technical group leaders and such training is appropriate for the Training Coordinator.

17. Regulatory Position 2.6 takes exception to the requirement of Section 4.4.7.2 of ANS 3.1 that "Instructors who provide instruction on the simulator shall hold a senior operator license for a similar unit (PWR, BWR, HTGR) or have been certified at an appropriate plant simulator...." The proposed regulatory position is consistent with the staff recommendation approved by the Commission that training center and facility instructors who teach systems, integrated responses, transient, and simulator courses should demonstrate their competence to NRC by successful completion of a senior operator examination and should participate in appropriate requalification programs to ensure they are cognizant of current operating history, problems, and changes to procedures and administrative limitations (see Commission Paper SECY-79-330E).

This provision was contained in the March 28, 1980, letter from H. Denton to all power reactor applicants and licensees.

18. Regulatory Position 2.7 notes that the requirements of Section 4.4.8 of Draft Standard ANS 3.1 concerning Shift Technical Advisor qualifications are not consistent with the requirements for the Shift Technical Advisor previously forwarded to all applicants and licensees. (Dates of letters to licensees and applicants are indicated in the proposed regulatory position.) The proposed regulatory position states that the previously issued requirements are included as Appendix B to the guide and should be followed. The proposed regulatory position provides for consistency with present staff practice.

19. Regulatory Position 2.8 is an amplification of the requirements contained in Sections 5.3.4 and 5.4 of the standard for training programs for radiation protection technicians. The guide position should be helpful in establishing the content of the training program for radiation protection technicians. The guide position does not represent a significant change from the more general provisions of Draft Standard ANS 3.1.

20. Regulatory Position 2.9 states that training in accordance with Section 5.4, "General Employee Training," should be provided for the "Engineer-in-Charge"

independent of whether this is an onsite or offsite position. General employee training is provided to all persons regularly employed in a nuclear power plant. Such training is essential for the "Engineer-in-Charge" since this person is to provide additional services to the plant beyond those provided by the operations organization professional-technical personnel. It cannot be envisaged that such a person can successfully perform his or her required duties without training in the subjects covered in Section 5.4 of Draft Standard ANS 3.1.

21. Regulatory Position 3.1 states that a position task analysis should be performed for all operations personnel in which the tasks performed by the person in each position are defined, and the required training, in conjunction with education and experience, is identified to provide assurance that the tasks can be effectively performed. For many positions described in Draft Standard ANS 3.1, a position task analysis is a requirement of the standard.

This proposed regulatory position is consistent with Task I.A.2.2, "Training and Qualifications of Operations Personnel," of NUREG-0660. NUREG-0660 states that the Office of Nuclear Reactor Regulation will issue a requirement by October 1, 1980, for each licensee to review its training program for all operations personnel, including maintenance and technical personnel and to justify the acceptability of training programs on the basis that these programs provide sufficient assurance that safety-related functions will be effectively carried out. NUREG-0660 states that the preferred method of fulfilling this provision is a position task analysis.

In the February 1980 report to the AIF Policy Committee on Follow-up to the Three Mile Island Accident by the Working Group on Action Plan Priorities and Resources, it was indicated that tasks analyses of positions were worthwhile and should be pursued jointly by the NRC and INPO, with INPO performing task analyses for those positions that are generally used industry wide. The working group also provided the following additional comments:

> "These analyses would be conducted by professionals and include recommendations for qualifications and training needed for a particular position. Each utility would then evaluate in a similar manner any unique position in their organization not addressed in the INPO study. These

studies by INPO should be completed by early 1981 and would greatly reduce individual utility costs.

"Evaluating positions affecting safe operation other than the licensed operators to ascertain that their training and qualifications are adequate has considerable merit. It would introduce no plant safety hazards and would have a small degree of positive effect on reducing overall risks if a need for additional training is identified. The cost for a utility-unique analysis would be an unnecessary use of resources for each utility at an aggregate cost which is large."

The NRC staff agreed with the AIF working group comments and revised NUREG-0660 to state that the task is amenable to a generic approach in which INPO could perform task analyses of those positions generally used throughout industry and each utility could evaluate in a similar manner any unique position in its organization not covered by the INPO study.

22. Regulatory Position 3.2.1 incorporates Task II.B.4, "Training for Mitigating Core Damage," of NUREG-0660 as a proposed regulatory position. The Commission on February 7, 1980, approved this item in conjunction with other "Near-Term Operating License Requirements" (see Table A.1 of NUREG-0660) as being necessary to implement before full power operation is permitted for near-term operating license applicants. Task II.B.4 of NUREG-0660 states NRR will issue a requirement by October 1, 1980, for licensees to develop a training program by January 1, 1981, and implement the training program by April 1, 1981.

The AIF Working Group on Action Plan Priorities and Resources stated that the inclusion of this item in the periodic retraining program will increase its potential for effectiveness.

23. Regulatory Position 3.2.2 incorporates Task I.A.2.5, "Plant Drills," of NUREG-0660 as a proposed regulatory position. Task I.A.2.5 indicates that requirements for conduct of plant drills will be issued by January 1981 and that drills will begin at operating reactors by July 1, 1981. Operating

licensee applicants will begin drills by July 1, 1981, or before operating license issuance, whichever is later.

The AIF Working Group on Action Plan Priorities and Resources indicated plant walk-throughs and drills would be effective in training.

24. Regulatory Position 3.2.3 takes exception to Section 5.5.1.3.1 of Draft Standard ANS 3.1 concerning criteria for requiring a licensed individual to participate in accelerated requalification. This proposed regulatory position was included to provide consistency with instructions that were included in the NRR H. R. Denton letter of March 28, 1980, to all reactor applicants and licensees.

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