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Rev. 8, Supp. 1

Operator Licensing Examination Standards for Power Reactors

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Division of Inspection Program Management
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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ABSTRACT

NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," establishes the policies, procedures, and practices for examining licensees and applicants for reactor operator and senior reactor operator licenses at power reactor facilities pursuant to Title 10, Part 55, of the *Code of Federal Regulations* (10 CFR Part 55). The related guidance that was previously published in the "Examiners' Handbook for Developing Operator Licensing Written Examinations" (NUREG/BR-0122, Rev. 5, dated March 1990) has been incorporated herein. NUREG/BR-0122 is no longer in effect.

These examination standards are intended to assist NRC examiners and facility licensees to better understand the processes associated with initial and requalification examinations. The standards also ensure the equitable and consistent administration of examinations for all applicants. These standards are *for guidance purposes* and are not a substitute for the operator licensing regulations (i.e., 10 CFR Part 55), and they are subject to revision or other changes in internal operator licensing policy. Minor policy clarifications that become necessary prior to the next formal revision of these standards will be promulgated on the NRC's operator licensing web page (http://www.nrc.gov/NRC/REACTOR/OL/OLhome.html).

Revision 8, which was published in April 1999, implemented an amendment to 10 CFR Part 55 that allows facility licensees to prepare the entire operator licensing examination and to proctor and grade the written portion of the examination. The NRC will prepare the examinations at least four times per year to maintain the proficiency of its examiners, as necessary to ensure quality, and upon written request by facility licensees consistent with NRC staff availability.

Supplement 1 to Revision 8 is being issued to update and clarify the NRC's guidelines regarding: (1) the systematic and random selection of topics and questions for the written examination, including limits on question usage; (2) the training and qualification of operator license applicants; (3) the documentation of NRC staff concerns related to draft examination quality; and (4) a number of other minor issues.

Supplement 1 will become effective for corporate notification letters issued 60 days after publication of the Supplement is noticed in the *Federal Register*. This will provide facility licensees with at least 180 days notice that the examinations will be administered in accordance with the revised procedures. Facility licensees may make arrangements for earlier implementation by contacting their NRC Regional Office.

Supplement 1 to Revision 8 of NUREG-1021,
"Operator Licensing Examination Standards for Power Reactors"

Instructions

Remove existing Revision 8 pages and insert replacement pages as noted below:

Section / Standard	Remove Page(s)	Insert Page(s)
Abstract	iii	iii
Supplement Instructions	blank	iv
ES-102	3-6	3-6
ES-201	1-24 (all)	1-24
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ES-204	3-5	3-5
ES-205	3-4, 11-12	3-4, 11-12
ES-301	5-6, 17-18, 23-26	5-6, 17-18, 23-26
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ES-402	5-6	5-6
ES-403	3-5	3-5
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ES-601	19-20	19-20
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Appendix C	1-2	1-2
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Appendix E	1-4	1-4
Appendix F	1-6 (all)	1-6
Supplement 1 Inserted by: _____		Date: _____

A vertical line in the right margin indicates that material has been added or changed; a vertical line in the left margin indicates that material has been deleted.

5. 10 CFR Part 55, Operators' Licenses

10 CFR Part 55 is the implementing regulation that establishes the requirements and the regulatory basis for licensing and requalifying ROs and SROs.

D. REGULATORY GUIDES

1. Regulatory Guide 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 3, May 2000

Section C of this RG currently endorses, with additions, exceptions, and clarifications, ANSI/ANS 3.1-*1993*, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plants." No backfitting is intended or required in connection with the issuance of the revised RG.

2. Regulatory Guide 1.33, "Quality Assurance Program Requirements -Operations"

Appendix A to this RG contains a list of typical procedures for pressurized water reactors and boiling water reactors.

3. Regulatory Guide 1.114, "Guidance on Being an Operator at the Controls of a Nuclear Power Plant"

This RG describes a method acceptable to the NRC staff for complying with the Commission's regulations in 10 CFR 50.54(k) - (m), which require the presence of an RO at the controls of a nuclear power unit and an SRO in the control room from which the nuclear power unit is being operated.

4. Regulatory Guide 1.134, "Medical Evaluation of Licensed Personnel for Nuclear Power Plants," Revision 3, March 1998

This RG currently endorses ANSI/ANS 3.4-1996, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants," with exceptions. However, facility licensees may continue to use the 1983 version of ANSI/ANS 3.4, which was previously endorsed in its entirety by Revision 2 of RG 1.134, dated April 1987.

5. Regulatory Guide 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator License Examinations," Revision 2, April 1996

This RG currently endorses, with exception, ANSI/ANS 3.5-1993, "Nuclear Power Plant Simulators for Use in Operator Training and Examination." It is expected that Revision 3 will endorse ANSI/ANS 3.5-1998. However, facility licensees may continue to use the 1985 version of ANSI/ANS 3.5, which was previously endorsed, with exceptions, by Revision 1 of the RG dated April 1987.

E. NUREG REPORTS

1. NUREG-0660, Vol. 1, "NRC Action Plan Developed as a Result of the TMI-2 Accident," May 1980

   Item I.A.4.2 of this document describes the guidelines for long-term simulator upgrades.

2. NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980

   This document clarifies the following action plan items which are intended to upgrade the training, licensing, education, and experience of operators on the basis of experience gained from the accident at Three Mile Island, Unit 2:

   - Item I.A.2.1, "Immediate Upgrading of RO and SRO Training and Qualifications"
   - Item 1.A.2.3, "Administration of Training Programs"
   - Item 1.A.3.1, "Revised Scope and Criteria for Licensing Exams"
   - Item 11.B.4, "Training for Mitigating Core Damage"

3. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, LWR Edition," July 1981

   Section 13.2, "Reactor Operator Training," describes the training and licensing of operators and identifies information to be submitted by applicants for construction permits and operating licenses.

4. NUREG-1122, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors," Revision 2

   This document provides the basis for developing content-valid licensing examinations for operators at pressurized water reactors (PWRs). It contains knowledge and ability (K/A) statements that have been rated for their importance to ensuring that the plant is operated in a manner consistent with the health and safety of plant personnel and the public.

5. NUREG-1123, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors," Revision 2

   This document provides the basis for developing content-valid licensing examinations for operators at boiling water reactors (BWRs). It contains K/A statements that have been rated for their importance to ensuring that the plant is operated in a manner consistent with the health and safety of plant personnel and the public.

6. NUREG-1291, "BWR and PWR Off-Normal Event Descriptions," November 1987

The reactor event descriptions in this document provide a reliable, performance-based source of information that examiners may use to design simulator scenarios that will be a valid test of an applicant's ability to safely and competently perform all licensed duties and responsibilities.

7. NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance"

This report provides perspectives gained by reviewing 75 individual plant examination (IPE) submittals pertaining to 108 nuclear power plant units. Chapter 13, "Operational Perspectives," is of particular interest because it identifies a number of important human actions that should be considered for evaluation on BWR and PWR licensing and requalification examinations.

8. NUREG-1600, "General Statement of Policy and Procedure for NRC Enforcement Actions"

This report addresses the NRC's expectations regarding compliance with 10 CFR 55.49, "Integrity of Examinations and Tests," and possible enforcement actions against parties subject to that regulation (i.e., Part 55 license holders and applicants and Part 50 licensees).

9. NUREG/BR-0122, "Examiners' Handbook for Developing Operator Licensing Written Examinations," Revision 5, March 1990

This document, which presented a procedure for systematically constructing content-valid licensing examinations for nuclear power plant operators, has been incorporated into the examination standards in NUREG-1021, Revision 8. It may be used for historical perspective, but is no longer used for developing examinations.

F. INDUSTRY STANDARDS

1. ANSI/ANS 3.1, "American National Standard for Selection, Qualification and Training of Personnel for Nuclear Power Plants"

This standard provides criteria for selecting and training nuclear power plant employees performing a variety of functions at various levels of responsibility (e.g., managers, supervisors, operators, and technicians). RG 1.8, Revision 3 (May 2000) endorses, with additions, exceptions, and clarifications, the 1993 version of the standard.

2. ANS 3.2 (ANSI N18.7-1976), "Administrative Controls and QA for the Operational Phase of Nuclear Power Plants"

   This standard provides guidance and recommendations for administrative rules of practice and related subjects and for preparing procedures and audit programs. See RG 1.33.

3. ANSI/ANS 3.4-1996, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants"

   This standard is the basic document covering the general health and disqualifying conditions applicable to license applicants and licensed personnel. Revision 3 of RG 1.134 currently endorses this standard with exceptions, but facility licensees may continue to use the 1983 version, which was previously endorsed in its entirety by Revision 2 of the RG.

4. ANSI/ANS 3.5-1993, "Nuclear Power Plant Simulators for Use in Operator Training"

   This standard establishes the minimum functional requirements and capabilities for nuclear power plant simulators for use in operator training. Revision 2 of RG 1.149 endorses this standard, with exceptions, and it is expected that Revision 3 of RG 1.149 will endorse the 1998 version of this standard. However, facility licensees may continue to use the 1985 version, which was previously endorsed, with exceptions, by Revision 1 of the RG.

A. PURPOSE

This standard describes the activities that must be completed to prepare for initial operator licensing examinations (including written examinations and operating tests) at power reactor facilities. It includes instructions for scheduling and coordinating examination development, assigning NRC examiners and facility personnel, maintaining examination security, and obtaining reference and examination materials from the facility licensee.

B. BACKGROUND

Title 10, Part 55, of the *Code of Federal Regulations* (10 CFR Part 55) requires that applicants for reactor operator (RO) and senior reactor operator (SRO) licenses pass a written examination and an operating test. The regulation allows power reactor facility licensees to prepare the site-specific written examinations and operating tests subject to the following conditions: (1) the facility licensee shall prepare the examinations and tests in accordance with the criteria contained herein; (2) the facility licensee shall establish, implement, and maintain procedures to control examination security and integrity; (3) an authorized representative of the facility licensee shall approve the examinations and tests before they are submitted to the NRC for review and approval; and (4) the facility licensee shall obtain NRC approval of its proposed written examinations and operating tests. Moreover, the regulation requires that the license examinations be developed and administered in accordance with 10 CFR 55.41 and 55.45 for ROs or 10 CFR 55.43 and 55.45 for SROs.

Facility licensees may propose alternatives from the examination criteria contained herein and evaluate how the proposed alternatives provide an acceptable method of complying with the Commission's regulations. The NRC staff will review any proposed alternatives and make a decision regarding their acceptability. The NRC will not approve any alternative that would compromise its statutory responsibility of prescribing uniform conditions for the operator licensing examinations.

The NRC will continue to prepare the examinations (or discrete portions of the examinations - i.e., the outline, written, or operating tests) upon written request by facility licensees (consistent with NRC staff availability) and retains the authority to develop the examinations on a case-by-case basis to certify new examiners or if it loses confidence that a facility licensee will develop examinations upon which the NRC can base its licensing decisions. If the NRC determines that a facility is unable to develop acceptable examinations, the examinations could be delayed until sufficient NRC resources can be scheduled to develop and conduct the examinations, or until the facility licensee can develop an acceptable examination. Each NRC regional office will also prepare at least one examination per calendar year to certify new examiners, as required, and to maintain examiner proficiency.

The NRC will make a reasonable attempt to administer all license examinations on the dates requested by facility licensees. At times, however, resource limitations may compel the staff to prioritize its examination review and development activities based on need and safety considerations. Examinations for fewer than three applicants should be scheduled only under extenuating circumstances such as a shortage of licensed ROs or SROs at the facility. If a facility licensee has fewer than three license applicants, the examinations may be delayed until more applicants are trained. Moreover, facility licensees that elect to have the NRC prepare

their licensing examinations should keep in mind that it takes the NRC more time to prepare than to review an examination and that the NRC will require greater flexibility to schedule those services.

In accordance with 10 CFR 55.40(a), the NRC shall use the criteria in NUREG-1021 to prepare the written examinations required by Sections 55.41 and 55.43 and the operating tests required by Section 55.45. The NRC shall also use the criteria in NUREG-1021 to evaluate the written examinations and operating tests prepared by power reactor facility licensees pursuant to 10 CFR 55.40(b). The NRC regional offices shall obtain approval from the NRR operator licensing program office before knowingly deviating from the intent of NUREG-1021. Moreover, the regional offices shall obtain program office approval before undertaking any initiative that could undermine interregional examination consistency.

Other pre-examination activities, such as submitting and reviewing license applications and eligibility waivers and administering the generic fundamentals examination program, are addressed in ES-202, ES-204, and ES-205. Specific instructions for developing, administering, and grading the written examinations and operating tests are found in ES-401 through ES-403 and ES-301 through ES-303, respectively. Post-examination administrative activities, including management review of the examination results and preparation of examination reports, are discussed in ES-501. Cross-references to each of these standards have been made where appropriate.

C. RESPONSIBILITIES

Facility licensees and NRC staff should use Form ES-201-1, "Examination Preparation Checklist," to track the examination preparations. As noted on the form, the target due dates can be adjusted as necessary to accommodate a given situation. The NRC chief examiner will initial the items as they are completed and ensure that the original form is retained for the master examination file (refer to ES-501).

1. Facility Licensee

If a facility licensee requests the NRC to prepare the licensing examinations, then only those items identified with an asterisk (*) are applicable.

a*. The facility licensee is expected to apprise its NRC regional office of changes in its examination requirements.

The facility licensee should respond in writing to the NRC's annual letter soliciting estimated operator licensing needs (including estimated numbers of applicants, examination dates, and their intended level of participation in developing all parts of the examination) and notify its NRC regional office if its examination requirements change significantly from those stated in its response. Facility licensees are strongly encouraged to schedule their examinations and to resolve any applicant eligibility questions with their NRC regional office *before* commencing an initial license training class.

In accordance with 10 CFR 55.40(c), facility licensees that elect to have the NRC prepare, proctor, and grade any portion of their operator licensing examinations shall submit a written request (to the responsible NRC regional office) for those

examinations pursuant to 10 CFR 55.31(a)(3). A response to the NRC's annual letter will satisfy this requirement.

b*. In accordance with 10 CFR 55.49, facility licensees and applicants shall not engage in any activity that compromises the integrity of any application, test, or examination required by 10 CFR Part 55. Attachment 1 of this ES summarizes several examination security and integrity considerations. NUREG-1600, "General Statement of Policy and Procedures for NRC Enforcement Actions," addresses possible enforcement actions against parties subject to the requirements in the regulation (i.e., Part 55 license applicants and licensees and Part 50 licensees).

c. Pursuant to 10 CFR 55.40(b)(2), facility licensees that elect to prepare their own examinations shall establish, implement, and maintain procedures to control examination security and integrity. Attachment 1 discusses a number of examination security and integrity guidelines that may be appropriate for incorporation in those procedures.

d*. All facility and contractor personnel involved with an examination are subject to the restrictions stated in Section D of this ES. Any questions regarding those restrictions should be resolved with the NRC chief examiner before granting an individual access to the licensing examination.

The facility licensee shall designate a point of contact to work with the NRC chief examiner and assign additional personnel as required to ensure that the examinations are developed, reviewed, administered, and graded in accordance with the applicable examination standards. The facility licensee may use contractors or other outside assistance to develop the examinations, but the licensee bears full responsibility for the product, including conformance with the examination criteria and maintenance of examination security and integrity.

e*. The facility contact shall submit the required reference materials, examination outlines, and examinations, as applicable, based on the level of facility participation. Form ES-201-1 specifies target due dates for the various materials; the actual dates may be adjusted with prior agreement from the NRC regional office.

f. The examination outlines and the examinations shall be prepared in accordance with the guidelines in ES-301, ES-401, and ES-701, as applicable. The proposed outlines and examinations shall cover all portions of the license examination (written, dynamic simulator, and walk-through) at all license levels relevant to the applicants (RO, SRO, and limited SRO) to be tested.

A facility supervisor or manager shall independently review the examination outline(s) and the proposed examination(s) before they are submitted to the NRC regional office per Item (g) below.

In conducting this review, the facility shall use Forms ES-201-2, "Examination Outline Quality Checklist," ES-301-3, "Operating Test Quality Checklist," ES-301-4, "Simulator Scenario Quality Checklist," and ES-401-7, "Written

Examination Quality Checklist."

g. Pursuant to 10 CFR 55.40(b)(3), an authorized representative of the facility licensee shall approve the proposed examination(s) before they are submitted to the NRC regional office for review and approval. The outline(s) and examination(s) should be forwarded to the NRC regional office with a cover letter signed by the facility representative. The materials must be complete and ready-to-use.

h. In its examination submittal to the NRC, the facility licensee (or its contractor) shall provide the following information for each test item proposed for use on the written examination and the operating tests:

- State the source of each item (e.g., Is the item taken directly, without changes, from the facility licensee's or ANY other bank; is the item a modified version of a bank item; or is the item new?). Facility licensees are encouraged to identify those bank items that were used on an NRC license examination at the facility since October 1995 because they will generally undergo less rigorous review by the NRC.

- For those items that are derived by modifying existing bank items, note the changes that were made or submit a copy of the item from which it originated.

i*. The facility licensee shall make its simulation facility available, as necessary, for NRC examiners to prepare for and administer the operating tests. The NRC will take reasonable efforts to minimize the impact on other training activities.

Before developing or administering an initial licensing examination, facility licensees are encouraged to review the simulator examination security considerations in Appendix D to NUREG-1021 for applicability to their facility. Because facility licensees are more familiar than the NRC examiners with the unique capabilities, limitations, and vulnerabilities of their simulators, it is expected that the licensees will take responsibility for determining and implementing whatever measures might be necessary to ensure the integrity of the operating tests.

j*. The facility licensee shall meet with the NRC in the regional office or at the facility, as necessary and appropriate, to review the examinations and discuss potential changes.

If the examination was prepared by the NRC, the facility reviewers should make their comments and recommendations on a copy of the written examination(s) and operating test(s) provided to them by the NRC examiner. Simple editorial changes that do not change the intent of the question require no justification; however, *every* substantive change (e.g., deleting a question, replacing a distractor, or revising an answer) must be supported by approved facility reference material.

If the facility licensee has significant concerns with the content or difficulty of the

NRC-prepared examination, the changes that the NRC has directed the facility licensee to make in its proposed examination, or the general implementation of the requirements and guidelines in this NUREG, the facility licensee is encouraged to communicate those concerns to the NRC and, if appropriate, to request a meeting with the NRC to address the concerns. The NRC chief examiner is normally the first point of contact for resolving any concerns regarding the examination. If the concerns are not resolved at that level, the facility licensee should contact NRC regional management, and, if necessary, the chief of the NRR operator licensing program office for resolution.

k. If the facility licensee developed the examinations, it will generally make any necessary changes as agreed upon with the NRC; however, the NRC retains final authority to approve the examinations.

l*. In accordance with ES-202, the facility licensee shall submit the license applications along with a letter requesting that licensing examinations be administered.

2. NRC Regional Management, Supervision, and Designees

a. The regional office shall schedule the NRC's initial operator licensing examinations and shall arrange for the development, administration, and grading of those examinations as discussed below. The regional office shall periodically review each facility licensee's examination requirements and shall negotiate with the facility licensee's training representatives as necessary to schedule specific examination dates consistent with operational requirements and NRC resource availability. Each regional office shall plan to prepare at least one complete examination per calendar year.

b. Approximately six months before each anticipated examination date, the regional office should contact the facility licensee and confirm the examination date(s) and the expected number of applicants to be examined. The regional office should use that information to estimate the required number of NRC examiners and to make preliminary work assignments.

c. The regional office should contact the facility licensee by telephone at least four months before the scheduled examinations to reconfirm the expected number of applicants and the examination dates, and to make other preliminary arrangements for developing the examinations. The person who contacts the facility licensee shall discuss the following examination arrangements, as applicable, depending on the facility licensee's level of participation in the examination development process:

- the examination integrity and security requirements and considerations (refer to Attachment 1)
- the requirement for an authorized representative of the facility licensee to approve the examination outlines and examinations before they are submitted to the NRC for review
- the need to have the examination outlines delivered to the NRC approximately 75 days before the scheduled examination date

- the need to have the reference materials necessary for the NRC to develop the examination (if applicable; refer to Attachment 2) delivered to the regional office at least 75, but preferably 90, days before the scheduled examination date
- the guidelines for developing, administering, and grading the written examinations, as applicable (i.e., the effective version of ES-401, ES-402, and ES-403, respectively)
- the need to have the simulator available and the guidelines for developing and administering the operating tests (i.e., the effective version of ES-301 and ES-302, respectively)
- the need to have the examinations and the supporting reference materials (refer to Attachment 2) delivered to the NRC regional office approximately 45 days before the scheduled examination date
- the option to submit some sample test items (e.g., 5 to 10 written questions, 1 scenario, and 1 to 2 job performance measures) for preliminary NRC review and comment (This could increase the efficiency of the examination review process by promoting early identification and correction of generic examination development concerns.)
- the requirements (refer to 10 CFR 55.31) and guidelines (refer to ES-202) for submitting the license applications

The NRC regional office may negotiate earlier due dates with the facility contact but should refrain from advancing the dates if it is unlikely that the review will begin promptly after the material arrives in the regional office. The regional office should also keep the facility contact informed of the dates by which the region expects to provide its comments regarding the licensee's submittals.

d. The NRC regional office shall normally issue a letter confirming the arrangements no later than 120 days before the examination begins. The letter should be addressed to the person at the highest level of corporate management who is responsible for plant operations (e.g., Vice President of Nuclear Operations). Attachment 3 is an example of such a letter; the exact wording may be modified as necessary to reflect the situation.

e. Approximately four months before the scheduled examination, the NRC regional office will assign the required number of examiners to develop, prepare for, and administer the examination as arranged with the facility licensee. The regional office will also designate a chief examiner to coordinate the examination project with the facility licensee and other examiners assigned to the examination. When making assignments, the region should consider each examiner's certification status, other examination commitments, possible conflicts of interest (as discussed in Section D of this ES), and general availability.

Once the facility licensee has begun preparing the examination, the regional office shall avoid changing the chief examiner assignment unless it is absolutely necessary. If a change is unavoidable, the responsible supervisor shall attempt to minimize the impact on the facility licensee.

Regional management should try to assign a sufficient number of examiners so that no examiner will have to administer more than four operating tests per week.

f. The regional office will evaluate each examination assignment to determine if some or all of the assigned examiners should make a separate preparatory site visit. The purposes of such a visit may include providing examiner orientation, retrieving additional reference material, or reviewing and validating the examinations. When making a decision, the region should carefully weigh the costs and benefits associated with each additional trip to the facility. The region should also consider such factors as the experience of the assigned examiners, the quality of the facility licensee's examinations (if applicable), the number of written examinations and operating tests to be validated, and the status of the simulation facility (e.g., Is it new or recently upgraded?). In addition, the region should consider the alternative of reviewing the written examination(s) and operating test(s) with the facility licensee via telephone (if the examination quality is high) or in the regional office, as well as the alternative of validating the operating test(s) on-site at the beginning of the examination week.

g. Upon receiving the preliminary license applications, approximately 30 days before the examination date, the regional office shall review the applications in accordance with ES-202. In addition, the regional office shall evaluate any waiver requests in accordance with ES-204 to determine if the applicants meet the eligibility criteria specified in 10 CFR 55.31.

After reviewing and approving the preliminary license applications and resolving all waiver requests, the region will prepare an examination assignment sheet (in the format of Attachment 4) as far in advance as possible, but at least two weeks before the scheduled examination date. The region will review and revise the assignment sheet as necessary after receiving and evaluating the final license applications.

The assignment sheet will identify the chief and other examiners by name and list the applicants by name, docket number, and type of examination (e.g., SRO upgrade, RO written only) to be administered. All applicants listed on the assignment sheet should be administered complete examinations (written and operating) as indicated under "Examination Type" unless waivers have been granted in accordance with ES-204. A copy of the assignment sheet will be distributed to all assigned examiners, the NRR operator licensing program office, and regional distribution.

h. The responsible regional supervisor will review the examination outlines and the draft examinations and evaluate any recommended changes and corrections noted during the chief (and other) examiner's review (refer to ES-301 and ES-401 for additional guidance regarding examination reviews). The supervisory review is not intended to be another detailed review, but rather a check to ensure that all applicable administrative requirements have been implemented. If the outlines, examinations, and recommended changes are acceptable, the supervisor will authorize the chief examiner to resolve any noted deficiencies with the author or facility contact.

If any of the facility-developed examination materials (written, walk-through, or simulator) require substantive changes and cannot be made to conform with the examination standards by the end of the designated examination review week,

regional management shall consult the NRR operator licensing program office and make a decision whether to proceed with the facility-developed examinations or develop the examinations in-house. If the region does not have the resources to ensure that acceptable examinations are prepared by the scheduled administration date, regional management shall negotiate with the facility licensee to reschedule the examinations as necessary. Although it is generally easier to postpone the written examination and focus on the operating tests so that they can be administered on schedule and without affecting examinations at other facilities, regional management may delay either part of an examination for up to 30 days. The regional office shall consult the NRR program office regarding any examination delay and notify the facility licensee in writing of the reasons for the delay.

The responsible supervisor will also ensure that any significant deficiencies and problems are addressed in the examination report in accordance with ES-501.

i. After the chief examiner has verified that the necessary changes and corrections have been made, the responsible supervisor will review and approve the examinations for administration. Before signing the applicable quality checklist (i.e., Form ES-301-3 and/or Form ES-401-7), the supervisor must be satisfied that the examination is acceptable for administration.

The responsible supervisor shall query the facility licensee management counterpart regarding the licensee's views on the examination sometime before it is administered. The following subjects should be considered for discussion, and corrective measures shall be implemented when necessary:

- whether the NRC test item comments were justified and clearly explained;
- the licensee's assessment of the significant test item changes;
- whether any of the examination changes are believed to render the test items or the examination/test as a whole unfair and whether this concern was shared with the chief examiner;
- whether the NRC requested the licensee to rework any "NRC-validated" questions; and
- whether the facility licensee requested and was permitted to defer the correction of minor test item flaws identified as minor in nature.

j. If there is an indication that an examination may have been compromised, the responsible supervisor will take action as necessary to ensure and restore the integrity and security of the examination process. Actions may include not giving the examination, making additional changes to the examination, voiding the results if the examination has already been given, reevaluating the licensing decisions pursuant to 10 CFR 55.61(b), and possibly imposing enforcement action in accordance with NUREG-1600. The supervisor shall keep regional management and the NRR operator licensing program office informed of any concerns regarding examination integrity or security.

3. Assigned NRC Examiners

a. When assigned to administer operating tests for the first time at a particular facility, the examiner should inform the chief examiner and the responsible supervisor so that arrangements can be made to conduct an orientation trip to the facility as described in Item C.2.f, if deemed appropriate.

b. NRC examiners monitor and ensure the integrity of the examination process. If they perceive that a compromise has occurred, they must immediately report it to the responsible regional supervisor so that the necessary actions can be taken to restore the integrity of the examination. Attachment 1 summarizes several examination security and integrity considerations that examiners should note when reviewing the facility licensee's procedures established pursuant to 10 CFR 55.40(b)(2), as applicable.

c. The assigned examiners shall review and inventory the reference materials received from the facility licensee in response to the 120-day corporate notification letter. The purpose of this review is to determine if the materials are complete and adequate to enable the regional office to review or develop the examinations, as applicable. If it is not, the reviewer(s) shall inform the chief examiner and the responsible supervisor and request that the facility licensee send any additional materials that might be required. If necessary, an examiner may review and select additional reference materials during a site orientation trip (refer to Item C.2.f).

d. The chief examiner will work with the assigned examiners and the designated facility contact, as applicable, to ensure that the examination outlines and examinations are developed in accordance with the applicable examination standards. The chief examiner should adapt the level of oversight and coordination based upon the experience of the individuals who are preparing the examinations. Facility employees are generally less familiar with the examination standards and will require more oversight to ensure that a quality examination is ready on time.

e. The chief examiner will ensure that the examination outlines are independently reviewed using Form ES-201-2, "Examination Outline Quality Checklist," as a guide; if the chief examiner prepared any portion of the outline, another NRC examiner shall perform that part of the independent review. The NRC reviewer(s) will initial Column "c" of Form ES-201-2 for the specific items they reviewed. A thorough and timely review (i.e., within 5 working days) will minimize the potential for significant problems with the examinations.

   The chief examiner will note/review any necessary changes and forward the outlines to the responsible supervisor for review and comment before resolving any deficiencies with the author or facility contact. The chief examiner will document his/her review/concurrence, as applicable, by signing the bottom of the form. If the outlines are significantly deficient, refer to Item C.2.h for additional guidance.

f. The chief examiner will ensure that the written examinations and operating tests are independently reviewed for quality in accordance with the applicable checklists (refer to ES-301 and ES-401) forwarded with the examination. If the

chief examiner wrote any portion of the examination, another NRC examiner shall perform the independent review of that portion. The NRC reviewer(s) will initial Column "c" of the applicable checklist for the specific items they reviewed. The regional office may conduct additional reviews at its discretion if resources permit.

It is especially important that facility-developed examinations and tests be reviewed promptly because of the extra time that may be required if extensive changes are necessary. The written examination sampling review (as described in Section E of ES-401) should be completed within one week after receiving the examination, and the balance of quality reviews should be completed within two weeks after the examinations and tests are received from the author or facility contact.

The chief examiner will note any necessary changes and forward the examinations and tests to the responsible supervisor for review and comment before reviewing the examinations with the author or facility contact. The chief examiner will document his/her review/concurrence, as applicable, by signing the bottom of each quality checklist. There are no minimum or maximum limits on the number or scope of changes the NRC may direct the facility licensee to make to its proposed examinations, provided they are necessary to make the examinations conform with established acceptance criteria or to attain an appropriate level of examination difficulty. Chief examiners shall exercise their experience and judgement to ensure that the level of difficulty remains consistent with that expected on NRC-prepared examinations. If the examinations are significantly deficient, refer to Item C.2.h for additional guidance. The chief examiner shall document the responsible supervisor's authorization to proceed with for the facility review by initialing Item 11 on Form ES-201-1.

g. Upon supervisory approval, generally about two weeks before the examinations are scheduled to be given, the chief examiner will review the written examinations and operating tests with the facility licensee.

The chief examiner may conduct the examination review via telephone, in the regional office, or at the facility, as appropriate to the circumstances, depending on the extent of the changes, and as approved by the responsible regional supervisor (refer to Item C.2.f).

If the examination was prepared by the NRC, the regional office will provide a copy of the written examination(s) and operating test(s) to the facility reviewers after they sign the security agreement (Form ES-201-3). The facility reviewers should make their comments directly on the examination(s), return the marked-up copy(ies) to the NRC chief examiner, and ensure that he or she understands their comments and recommendations. The facility reviewers may retain a copy of the marked-up examination(s), subject to the physical security considerations in Attachment 1.

If the facility reviewers have significant disagreements with the chief examiner, the chief examiner will inform the responsible regional supervisor so that the disagreements can be resolved before the examinations are administered.

h. After the examination corrections have been made, the chief examiner shall verify that the changes are appropriate and route the examinations and the mark-up drafts to the responsible supervisor for final approval.

i. As soon as possible after the responsible supervisor has approved the operating tests for administration, the chief examiner shall distribute copies of the scenarios, job performance measures (JPMs), and questions to the other assigned examiners so that they can familiarize themselves with those materials and be better prepared to probe the applicants' deficiencies if required.

j. The chief examiner should work with the designated facility contact to schedule the operating tests to optimize efficiency and the mix of RO and SRO applicants in the crews assembled for the simulator examinations. The number of applicants on a crew shall not exceed the number of assigned examiners (i.e., one-on-one evaluations are mandatory), except as noted below. However, if the facility licensee's technical specifications routinely require more than two ROs to be stationed in the control room, the chief examiner may authorize the use of additional surrogates. Only one individual (applicant or surrogate) is allowed to fill a shift supervisor or manager position during the simulator operating test.

If a three-person operating crew consists entirely of SRO-upgrade applicants (who do not have to be evaluated on the control boards), the region may assign only two examiners to observe the crew. Although the applicants in the RO and balance of plant positions may not be individually evaluated, they will be graded and held accountable for any errors that occur as a result of their action(s) or inaction(s). SRO-instant applicants will always be individually evaluated regardless what operating position they are filling during a given scenario.

Normally, for purposes of test integration and continuity, the same examiner should administer all three operating test categories to an applicant. However, under certain circumstances, the walk-through portion of the operating test may be divided among different examiners. Such division is appropriate if a facility licensee's simulator is not located near the plant, because of limitations in examiner resources or scheduling, or if a facility licensee requests examinations for an unusually large group of applicants. Refer to ES-302 for specific instructions regarding administration of the operating tests.

Operating tests will normally be administered on regular work days. If weekend or shift work is required to administer the operating tests, the chief examiner will coordinate the arrangements with the assigned examiners and the facility licensee.

The written examinations may be administered as soon as they and the license applications (including any applicable waivers) have been approved. The region shall not allow the written examination and operating test dates to diverge by more than 30 days without obtaining concurrence from the NRR operator licensing program office.

If, as an efficiency measure, the facility licensee prepared the written examination or operating tests in conjunction with another facility, then the two examinations/tests must be administered at the same time.

If the examination schedule has to be changed on short notice, the chief examiner will work with his or her supervisor and the designated facility contact to reschedule the examinations to a time when examiners are available and other examinations are not affected.

k. If the facility licensee will administer the written examinations, the chief examiner shall review the ES-402 requirements (e.g., proctoring and responding to applicant questions) and confirm the applicant's status on the assignment sheet (i.e., examination type and waivers) with the facility contact before the examinations are given.

D. PERSONNEL RESTRICTIONS

It is impossible to define criteria that anticipate every possible conflict-of-interest issue. Supervisors must apply sound judgment to the facts of each case. If any doubt exists regarding a particular case, the supervisor should consult with regional management and/or the NRR operator licensing program office to resolve the issue.

1. NRC Examiners

a. The regional office shall not assign an examiner who failed an applicant on an operating test to administer any part of that applicant's retake operating test.

b. If an examiner was previously employed by a facility licensee (or one of its contractors) and was significantly involved in training the current license applicants, the regional office will not assign that examiner any direct responsibilities for developing or administering written examinations or operating tests at that facility. Regional management will control other in-office examination activities concerning the facility, such as technical consultation and quality reviews of examinations.

c. If an examiner is assigned to an examination that might appear to present a conflict of interest, the examiner shall inform his or her immediate supervisor of the potential conflict. Such notifications should include the following information:

- the nature and extent of previous personal and professional relationships with the applicants
- anything that could affect the administration, performance, evaluation, or results of the examination
- anything that could create the *appearance* of a conflict of interest

2. Facility Personnel

a. Although there is no specific upper limit to the number of facility personnel having access to the NRC licensing examination, the facility licensee shall

ensure that access is limited on a need-to-know basis. Moreover, the facility licensee should limit each person's access to only those portions of the examination for which the individual bears responsibility (e.g., the individuals who prepare the simulator scenarios may not require access to the written examination).

b. All personnel who will receive detailed knowledge of any portion of the NRC licensing examination, including the examination outline, must acknowledge their responsibilities by reading and signing Form ES-201-3, "Examination Security Agreement," before they obtain detailed knowledge and again after the examinations are complete. Examples of prohibited activities for personnel who have signed Form ES-201-3 include the following:

- the design and administration of any classroom and simulator instruction (including scheduled sessions, individual coaching, and remedial training) specifically for the license applicants (Simulator booth operation is acceptable if the individual does not select the training content or provide direct or indirect feedback. Continued participation in requalification training for groups including SRO upgrade applicants is also acceptable, as long as it is documented on Form ES-201-3 and is limited to areas in which the instructor has no examination knowledge.)
- all on-the-job training, practice, coaching, and sign-offs
- the preparation, review, grading, and evaluation of periodic quizzes, examinations, and simulator exercises (Individuals on the security agreement may prepare and grade the audit examination subject to an NRC review for test item duplication.)

Supervisors and managers having knowledge of the examination content may continue their general oversight of the training program for the license applicants, including the review of examinations, quizzes, and remedial training programs, as well as the counseling of applicants concerning non-technical issues. However, those supervisors and managers may not provide any technical guidance, training, or other direct feedback regarding the content of those examinations, quizzes, or programs in a manner that might compromise the integrity of the licensing examination as defined in 10 CFR 55.49.

The original security agreement forms must be submitted to the NRC regional office for retention after the examinations are complete.

E. ATTACHMENTS/FORMS

Attachment 1,	"Examination Security and Integrity Considerations"
Attachment 2,	"Reference Material Guidelines for Initial Licensing Examinations"
Attachment 3,	"Sample Corporate Notification Letter"
Attachment 4,	"Sample Examination Assignment Sheet"
Form ES-201-1,	"Examination Preparation Checklist"
Form ES-201-2,	"Examination Outline Quality Checklist"
Form ES-201-3,	"Examination Security Agreement"

NRC and facility licensee personnel must be attentive to examination security measures to ensure compliance with 10 CFR 55.49; moreover, pursuant to 10 CFR 55.40(b)(2), facility licensees that elect to prepare their own examinations must establish, implement, and maintain procedures to control examination security and integrity. At the time the examination arrangements are confirmed, an NRC examiner shall review the facility licensee's security procedures and brief the facility contact on the following examination security guidelines. Although these guidelines are not regulatory requirements, facility licensees are encouraged to consider them when establishing their own procedures.

Physical Security Guidelines

1. The NRC expects that personnel will be aware of the facility licensee's physical security measures and requirements (as documented in the facility licensee's approved procedures), sign the NRC's examination security agreement, and understand their security responsibilities, including the limits on their interaction with the license applicants (as discussed in Section D.2 of ES-201), before they are given knowledge or custody of any examination materials.

2. The examination outlines and final examinations shall be positively and continuously controlled and protected as sensitive information (i.e., under lock-and-key or in the custody of someone who has signed the security agreement). The number of copies of outlines and examinations should be limited and each should be uniquely identified and controlled (e.g., with sign-out custody) at all times. Drafts, copies, and waste materials must also be controlled and disposed of properly.

   The NRC recommends that additional security measures be considered when the examinations are developed, stored, or printed using a computer network to which the license applicants or other persons not on the security agreement could gain access. Although the use of passwords should provide adequate security if normal computer security practices (e.g., selecting and changing passwords) are observed, special cases may need additional consideration. For example, if a trainee has extended access to the LAN in his normal position, additional security measures might be appropriate.

3. The examination outlines, written examinations, and operating tests that are sent to the NRC regional office shall be placed in a double envelope. The inner envelope shall be conspicuously marked "FOR OFFICIAL USE ONLY" and "TO BE OPENED BY ADDRESSEE ONLY." Furthermore, the cover letter forwarding the examination materials shall state that the materials be withheld from public disclosure until after the examinations are complete.

   The facility licensee should follow up on its examination mailing by communicating with the NRC chief examiner to ensure that the package was received.

   The examination outlines and examinations shall not be transmitted via non-secure electronic means. However, they may be transmitted via the NRC's "AUTOS" local area

network in the resident inspector's office or as password-protected electronic files over the Internet if the licensee's word processing software provides adequate security and is compatible with the NRC's and the password is separately provided to the NRC chief examiner by mail or phone. The files do not need to be encrypted.

4. The facility licensee is expected to immediately report to the NRC chief examiner any indications or suggestions that examination security may have been compromised, even if the situation is identified and corrected before the examination is submitted to the NRC for review and approval. The NRC will evaluate such situations on a case-by-case basis and determine the appropriate course of action.

5. The facility licensee and the NRC should determine if examination security problems were noted in the past and ensure that corrective actions have been taken to preclude recurrence.

6. The facility licensee and the chief examiner will review the simulator security considerations in Appendix D to ensure that the instructor station features, programmers' tools, and external interconnections do not compromise examination integrity. The primary objective is to ensure that the exam material cannot be read or recorded at other unsecured consoles, and that examination materials are either physically secured or electronically protected when not in use by individuals listed on the security agreement.

Examination Bank Limitations

1. The facility licensee and chief examiner shall ensure that written examinations and operating tests conform with the guidelines in ES-301 and ES-401 regarding the use of items taken directly from the bank, modified items, and new items.

2. If the facility licensee has an open bank, it will not place any new or modified test items (written questions, job performance measures, or simulator scenarios) that will be used on the examination in its examination bank until after the last examination has been administered.

Other Considerations

1. The NRC will consider an examination to be potentially compromised if any activity occurs that could affect the equitable and consistent administration of the examination, regardless of whether the activity takes place before, during, or after the examination is administered.

2. The license applicants should not be able to predict or narrow the possible scope or content of the licensing examination based on the facility licensee's examination practices (other than those authorized by this NUREG or in writing by the NRC).

3. Facility licensees are responsible for the integrity, security, and quality of examinations prepared for them by contractor personnel.

This attachment discusses the reference materials that facility licensees are expected to provide for each NRC initial licensing examination. The regional office will customize the list of reference materials as required to support the specific examination assignment; additional materials may be requested at a later time if necessary to ensure the accuracy and validity of the examinations.

In determining the need for reference materials, the regional office will consider the facility licensee's level of participation in the examination development process. If the facility licensee will be preparing the examinations, it may be sufficient to obtain only those references necessary to review and validate the items that appear on the examination, plus a set of key procedures and other documents required to prepare for the operating tests. The regional office will duly consider the administrative burden it places on facility licensees and request only those materials that are actually necessary for the NRC examiners to prepare for the examinations.

All reference materials provided for the license examinations should be approved, final issues and should be so marked. If any of the material is expected to change before the scheduled examination date, the facility licensee should reach agreement with the NRC chief examiner regarding changes before the examinations are administered.

The reference materials may be submitted on computer diskettes (in a format compatible with the NRC's word processing software), as hard copy, or a combination as arranged with the NRC chief examiner. If the facility licensee prepares the examinations, the hard-copy references should normally be limited to those materials required to validate the selected test items. All procedures and reference materials should be bound with appropriate indices or tables of contents so that they can be used efficiently; a master table of contents should be provided for all materials sent. Failure to provide complete, properly bound, and indexed reference material may prompt the NRC to return the material to the person at the highest level of corporate management responsible for plant operations. The returned reference materials will be accompanied by a cover letter explaining the deficiencies in the material and the basis for postponing or canceling the examinations.

Unless otherwise instructed by the NRC regional office, the facility licensee is expected to provide the following reference materials for each NRC initial licensing examination:

1. Materials used by the facility licensee to ensure operator competency

   a. The following types of materials used to train applicants for initial RO and SRO licensing, as necessary to support examination development:

      - learning objectives, student handouts, and lesson plans
      - system descriptions, drawings, and diagrams of all operationally relevant flow paths, components, controls, and instrumentation

- material used to clarify and strengthen understanding of normal, abnormal, and emergency operating procedures

- complete, operationally useful descriptions of all safety system interactions and, where available, balance-of-plant system interactions under emergency and abnormal conditions, including consequences of anticipated operator errors, maintenance errors, and equipment failures, as well as plant-specific risk insights based on a probabilistic risk analysis (PRA) and individual plant examination (IPE)

These materials should be complete, comprehensive, and of sufficient detail to support the development of accurate and valid examinations without being redundant.

b. Questions and answers specific to the facility training program that may be used in the written examinations or operating tests

c. Copies of facility-generated simulator scenarios that expose the applicants to abnormal and emergency conditions, including degraded pressure control, degraded heat removal capability, and containment challenges, during all modes of operation, including low-power conditions (A description of the scenarios used for the training class may also be provided.)

d. All JPMs used to ascertain the competence of the operators in performing tasks within the control room complex and outside the control room (i.e., local operations) as identified in the facility's job task analysis (JTA) (JPMs should evaluate operator responsibilities during normal, abnormal, and emergency conditions and events, and during all modes of operation including cold shutdown, low power, and full power.)

2. Complete index of procedures (including all categories sent)

3. All administrative procedures applicable to reactor operation or safety

4. All integrated plant procedures (normal or general operating procedures)

5. All emergency procedures (emergency instructions, abnormal or special procedures)

6. Standing orders (important orders that are safety-related and may modify the regular procedures)

7. Surveillance procedures that are run frequently (i.e., weekly) or that can be run on the simulator

8. Fuel handling and core loading procedures (if SRO applicants will be examined)

9. All annunciator and alarm procedures

10. Radiation protection manual (radiation control manual or procedures)

11. Emergency plan implementing procedures

12. Technical Specifications or similar technical requirements documents (and interpretations, if available) for all units for which licenses are sought

13. System operating procedures

14. Technical data book and plant curve information used by operators as well as the facility precautions, limitations, and set points document

15. The following information pertaining to the simulation facility:

    a. list of all initial conditions

    b. list of all malfunctions with identification numbers and cause and effect information, including a concise description of the expected result or range of results that will occur upon initiation and an indication of which annunciators will be actuated as a result of the malfunction

    c. a description of the simulator's failure capabilities for valves, breakers, indicators, and alarms

    d. the range of severity of each variable malfunction (e.g., the size of a reactor coolant or steam leak, or the rate of a component failure such as a feed pump, turbine generator, or major valve)

    d. a list of modeling conditions (e.g., simplifications, assumptions, and limits) and problems that may affect the examination

    f. a list of any known performance test discrepancies not yet corrected

    g. a list of differences between the simulator and the reference plant's control room

    h. simulator instructor's manual

16. Any additional plant-specific material that has been requested by the NRC examiners to develop examinations that meet the guidelines of these standards and the regulations

(Date)

(Name, Title)
(Name of facility)
(Address)
(City, State, Zip code)

Dear (Name):

In a telephone conversation on (date) between Mr./Ms. (Name, Title) and Mr./Ms. (Name, Title), arrangements were made for the administration of licensing examinations at (facility name) during the week(s) of (date).

[As agreed during the telephone conversation, your staff][[The NRC]] will prepare the examinations based on the guidelines in Revision 8, Supplement 1, of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors."[The NRC regional office will discuss with your staff any changes that might be necessary before the examinations are administered.][[Your staff will be given the opportunity to review the examinations during the week of (date).]]

To meet the above schedule, it will be necessary for your staff to furnish the [examination outlines by (date). The written examinations, operating tests, and the supporting] reference materials identified in Attachment 2 of ES-201 [will be due] by (date). [Pursuant to 10 CFR 55.40(b)(3), an authorized representative of the facility licensee shall approve the outlines, examinations, and tests before they are submitted to the NRC for review and approval. All materials shall be complete and ready-to-use.] Any delay in receiving the required [examination and] reference materials, or the submittal of inadequate or incomplete materials, may cause the examinations to be rescheduled.

In order to conduct the requested written examinations and operating tests, it will be necessary for your staff to provide adequate space and accommodations in accordance with ES-402, and to make the simulation facility available on the dates noted above. In accordance with ES-302, your staff should retain the original simulator performance data (e.g., system pressures, temperatures, and levels) generated during the dynamic operating tests until the examination results are final.

Appendix E of NUREG-1021 contains a number of NRC policies and guidelines that will be in effect while the written examinations and operating tests are being administered.

To permit timely NRC review and evaluation, your staff should submit preliminary reactor operator and senior reactor operator license applications (Office of Management and Budget (OMB) approval number 3150-0090), medical certifications (OMB approval number 3150-0024), and waiver requests (if any)(OMB approval number 3150-0090) at least 30 days before the first examination date. If the applications are not received at least 30 days before the examination date, a postponement may be necessary. Signed applications certifying that all training has been completed should be submitted at least 14 days before the first examination date.

This letter contains information collections that are subject to the *Paperwork Reduction Act of 1995* (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget, approval number 3150-0018, which expires on April 30, 2003. The public reporting burden for this collection of information is estimated to average [500] [[50]] hours per response, including the time for reviewing instructions, gathering and maintaining the data needed, [writing the examinations,]and completing and reviewing the collection of information. Send comments on any aspect of this collection of information, including suggestions for reducing the burden, to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail at BJS1@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0018), Office of Management and Budget, Washington, DC 20503.

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Thank you for your cooperation in this matter. (Name) has been advised of the policies and guidelines referenced in this letter. If you have any questions regarding the NRC's examination procedures and guidelines, please contact (name of regional contact) at (telephone number), or (name of responsible regional supervisor) at (telephone number).

Sincerely,

(Appropriate regional representative, Title)

Docket No.: 50-(Number)

Distribution: Public
NRC Document Control System
Regional Distribution

[ ] Include only for examinations to be prepared by the facility licensee.
[[ ]] Include only for examinations to be prepared by the NRC.

MEMORANDUM TO: (List NRC examiners by name)

FROM: (Regional Supervisor's Name, Title)

SUBJECT: EXAMINATION ASSIGNMENTS

APPLICANT	DOCKET NO.	EXAMINATION TYPE

Facility and location _____
Facility contact _____
NRC chief examiner _____
Written examinations to be prepared by (RO) _____
(SRO) _____
Dates of Examinations _____

_____
NRC Supervisor

cc: Resident inspector
Project manager
(Standard regional distribution)
NRR operator licensing program office

Facility: _____ Date of Examination: _____

Examinations Developed by: Facility / NRC (circle one)

Target Date*	Task Description / Reference	Chief Examiner's Initials
-180	1. Examination administration date confirmed (C.1.a; C.2.a & b)	
-120	2. NRC examiners and facility contact assigned (C.1.d; C.2.e)	
-120	3. Facility contact briefed on security & other requirements (C.2.c)	
-120	4. Corporate notification letter sent (C.2.d)	
[-90]	[5. Reference material due (C.1.e; C.3.c)]	
-75	6. Integrated examination outline(s) due (C.1.e & f; C.3.d)	
-70	7. Examination outline(s) reviewed by NRC and feedback provided to facility licensee (C.2.h; C.3.e)	
-45	8. Proposed examinations, supporting documentation, and reference materials due (C.1.e, f, g & h; C.3.d)	
-30	9. Preliminary license applications due (C.1.l; C.2.g; ES-202)	
-14	10. Final license applications due and assignment sheet prepared (C.1.l; C.2.g; ES-202)	
-14	11. Examination approved by NRC supervisor for facility licensee review (C.2.h; C.3.f)	
-14	12. Examinations reviewed with facility licensee (C.1.j; C.2.f & h; C.3.g)	
-7	13. Written examinations and operating tests approved by NRC supervisor (C.2.i; C.3.h)	
-7	14. Final applications reviewed; assignment sheet updated; waiver letters sent (C.2.g, ES-204)	
-7	15. Proctoring/written exam administration guidelines reviewed with facility licensee and authorization granted to give written exams (if applicable) (C.3.k)	
-7	16. Approved scenarios, job performance measures, and questions distributed to NRC examiners (C.3.i)	

* Target dates are keyed to the examination date identified in the corporate notification letter. They are for planning purposes and may be adjusted on a case-by-case basis in coordination with the facility licensee.

[ ] Applies only to examinations prepared by the NRC.

Facility: Date of Examination:

Item	Task Description	Initials a	Initials b*	Initials c#
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.			
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled.			
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.			
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.			
2. SIM	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients.			
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s)*, and scenarios will not be repeated over successive days.			
	c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D.			
3. W/T	a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks, (2) no more than 30% of the test material is repeated from the last NRC examination, (3)* no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks.			
	b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA.			
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.			
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive days.			
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.			
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.			
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.			
	d. Check for duplication and overlap among exam sections.			
	e. Check the entire exam for balance of coverage.			
	f. Assess whether the exam fits the appropriate job level (RO or SRO).			

	Printed Name / Signature	Date
a. Author		
b. Facility Reviewer (*)		
c. NRC Chief Examiner (#)		
d. NRC Supervisor		

Note: * Not applicable for NRC-developed examinations.
Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required.

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of _____ as of the date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to instruct, evaluate, or provide performance feedback to those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration, except as specifically noted below and authorized by the NRC.Furthermore, I am aware of the physical security measures and requirements (as documented in the facility licensee's procedures) and understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of _____. From the date that I entered into this security agreement until the completion of examination administration, I did not instruct, evaluate, or provide performance feedback to those applicants who were administered these licensing examinations, except as specifically noted below and authorized by the NRC.

	PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATENOTE
1.						
2.						
3.						
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15.						

NOTES:

A. PURPOSE

This standard provides instructions for facility licensees and applicants to prepare and the NRC to review initial licensing applications. It also discusses the experience, training, education, and certification requirements and guidelines that an applicant should satisfy before being allowed to take an NRC reactor operator (RO), senior reactor operator (SRO), or limited senior reactor operator (LSRO) licensing examination.

B. BACKGROUND

In accordance with 10 CFR 55.31(a)(4), as amended on March 25, 1987, a license applicant must provide evidence that he or she has successfully completed the facility licensee's requirements to be licensed as an RO or SO. An authorized representative of the facility licensee shall certify this evidence on the license application; the required certification must include the details of the applicant's qualifications, training, and experience. In lieu of these details, the Commission may accept certification that the applicant has successfully completed a Commission-approved training program that is based on a systems approach to training (SAT) and uses a simulation facility that is acceptable to the Commission.

Revision 2 of Regulatory Guide (RG) 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," which was published in conjunction with the 1987 rule change, provided guidance on an acceptable method of implementing this regulation. However, the NRC staff had reviewed[1] the industry's licensed operator training program experience guidelines in effect at the time of the 1987 rule change and determined that they were equivalent to the baseline experience criteria of RG 1.8, Revision 2. Consequently, as indicated in the statement of consideration for the 1987 rule change, a facility licensee's training program would be considered approved by the NRC when it is accredited by the National Nuclear Accrediting Board (NNAB).

On March 19, 1987, Generic Letter (GL) 87-07, "Information Transmittal of Final Rulemaking for Revisions to Operator Licensing - 10 CFR Part 55 and Conforming Amendments," informed facility licensees that they had the option of substituting an accredited, SAT-based program for their operator training program previously approved by the NRC. The GL indicated that this option may be implemented upon written notification to the NRC and that it did not require any staff review. The GL also noted the NRC's expectation that facility licensees would update their licensing basis documents (e.g., their final safety analysis reports (FSARs) and technical specifications (TSs)), as necessary, to conform with their accredited program status.

In November 1987, the NRC published NUREG-1262, "Answers to Questions at Public Meetings Regarding Implementation of Title 10, Code of Federal Regulations, Part 55 on Operators' Licenses," which reiterated and clarified the NRC staff's expectations regarding

[1] This review was conducted pursuant to the Commission's continued endorsement of the industry's accreditation process first conferred in the NRC's Final Policy Statement on Training and Qualification of Nuclear Power Plant Personnel (50 FR 11147; March 20, 1985).

Section 55.31(a), Revision 2 of RG 1.8, accredited training programs, and the need for facility licensees to update their licensing basis documents per 10 CFR 50.71(e). NUREG-1262 reminded facility licensees that Revision 2 of RG 1.8 would go into effect on March 31, 1988. This NUREG also noted that facilities having NNAB accredited license training programs did not need to meet the guidance in Revision 2 of RG 1.8.

In summary, the NRC has not changed its requirements or position with regard to license eligibility for ROs and SOs since 1987. RG 1.8 (Revision 2 or 3) and the NANT's guidelines for education and experience (those that were in effect in 1987 or those that were issued in January 2000) outline acceptable methods for implementing the Commission's regulations in this area. Methods different from those set out in RG 1.8 (Revision 2 or 3) or the NANT's guidelines may be acceptable if a facility licensee provides an adequate basis for such a finding.

The staff encourages all facility licensees to review their requirements and commitments related to RO and SO education and experience and to update their documentation (e.g., FSAR, TS, and training program descriptions) to enhance consistency and minimize confusion.

When a facility licensee's licensed operator training program description or licensing basis documents contain education and experience requirements that are more restrictive than either Revision 3 of RG 1.8 or the current NANT guidelines, the most restrictive requirements will continue to apply pending the initiation of action by the licensee to amend these requirements; any required TS changes would be considered administrative in nature.

Operator license applicants and facility licensees must provide the NRC with sufficient information to enable it to determine whether to grant or deny the applications. However, some facility licensees did not respond to GL 87-07 and/or failed to update their licensing basis documents to eliminate inconsistencies and contradictions. This has made it difficult for the NRC staff to determine whether some license applicants have successfully completed their facility licensee's requirements to be licensed as an RO or SO. The fact that every facility licensee has voluntarily obtained and periodically renewed the accreditation of its licensed operator training program suggests that every facility licensee is implementing the education and experience guidelines endorsed by the NNAB. The NRC staff understands that the current version of those guidelines are outlined by the National Academy for Nuclear Training (NANT)[2] in its "Guidelines for Initial Training and Qualification of Licensed Operators,"[3] (NANT 2000 guidelines) which were issued in January 2000.

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[2] The NANT operates under the auspices of the Institute of Nuclear Power Operations (INPO). It integrates the training efforts of all U.S. nuclear utilities, the activities of the NNAB, and the training-related activities of INPO.

[3] The NRC staff has reviewed the NANT guidelines and considers them to be equivalent to the NRC's guidelines in Revision 3 of Regulatory Guide (RG) 1.8, which was published in May 2000. RG 1.8 now endorses American National Standards Institute/American Nuclear Society (ANSI/ANS) 3.1-1993, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," with certain clarifications, additions, and exceptions. It replaces Revision 2 of RG 1.8, which was issued in conjunction with the 1987 amendment to 10 CFR Part 55 and endorsed the 1981 revision of the same industry standard.

Consequently, unless otherwise informed by a facility licensee, the NRC believes that the education and experience guidelines described in the NANT 2000 guidelines are the facility licensee's education and experience requirements to be licensed as an RO or SO.

In an effort to clarify the situation, the NRC staff has revised NRC Form 398 to make it clear that when a facility licensee certifies, pursuant to 10 CFR 55.31(a)(4), that an applicant has successfully completed a Commission-approved, SAT-based training program, it means that the applicant meets or exceeds the minimum education and experience guidelines currently outlined by the NANT (and by extension, Revision 3 of RG 1.8). Facility licensees can use revised NRC Form 398 to document any exceptions or waivers that the applicant has taken from the baseline education and experience criteria outlined by the NANT. In recognition that the only significant difference between Revision 3 of RG 1.8 and the current accreditation guidelines pertains to certified instructors seeking an SO license, those applicants can use the revised NRC Form 398 to document the details of their experience. This will minimize the potential for misunderstanding and the need to seek additional information.

C. RESPONSIBILITIES

The regulatory requirements associated with the license application process are detailed in Subpart D, "Applications," of 10 CFR Part 55. The medical requirements for license applicants and licensed operators appear in Subpart C, "Medical Requirements," of 10 CFR Part 55. These requirements should be referred to as necessary when preparing and reviewing license applications.

1. Applicant/Facility Licensee

a. To apply for an RO or SRO license, an applicant must submit an NRC Form 398, "Personal Qualifications Statement - Licensee," and an NRC Form 396, "Certification of Medical Examination by Facility Licensee." (Computer-generated duplicates are acceptable.) The application is not complete until both forms are filled out, signed by the appropriate personnel, and received by the NRC. Detailed instructions for completing NRC Form 398 are provided with the form. Applicants and facility licensees should pay particular attention to the instructions and note relating to Item 12. Additional instructions regarding waivers of training, experience, and examination requirements are provided in ES-204.

If the applicant is reapplying after a license denial, 10 CFR 55.35 applies, and the applicant must complete and submit a new Form 398. The applicant may file the second application two months after the date of the first final denial, a third application six months after the date of the second final denial, and successive applications two years after the date of each subsequent denial. Each new Form 398 shall describe the extent of the applicant's additional training since the denial and shall include a certification by the facility licensee that the applicant is ready for reexamination.

If the applicant previously passed either the written examination or the operating

test, he or she may request a waiver of that portion of the licensing examination. Such waivers are limited to the first reapplication and must be requested within one year of the date of the failed examination. Refer to ES-204 for a more detailed discussion of this and other waiver criteria.

The medical data in support of NRC Form 396 are normally good for six months from the date of the medical examination. If more than 6 months have passed since the date of an RO or SRO instant applicant's medical examination, the facility licensee shall certify in writing that the applicant has not developed any physical or mental condition that would be reportable under 10 CFR 55.25. If the time since any applicant's last medical examination is expected to exceed 24 months before the licensing action is completed, the applicant shall be reexamined by a physician and the facility licensee shall recertify the applicant's medical fitness on NRC Form 396 before the NRC regional office issues the license.

If an applicant is reapplying after withdrawing a previous application or accepting a final license denial, he or she may request a waiver of a medical reexamination by checking Item 4.f.4 on NRC Form 398. The time since the last medical examination can not exceed 24 months and the applicant must certify in Item 17, "Comments," of the form that he or she has not developed any physical or mental condition that would be reportable under 10 CFR 55.25.

b. Each applicant (except those applying for an LSRO license) must satisfactorily complete the NRC's generic fundamentals examination (GFE) section of the written operator licensing examination for the applicable vendor. Refer to ES-205 for more information on the GFE program.

Applicants do not need to take the GFE if they were previously issued an RO or SRO license or an instructor certificate based on a site-specific written examination (on the same type of facility) that was administered between February 1982 and November 1989 and included the material covered by the GFE. Enter the date of the examination in Item 4.g on NRC Form 398 and an explanation in Item 17; a waiver is not required.

c. As noted in ES-201, the facility licensee should submit preliminary, uncertified license applications and medical certifications for review by the NRC regional office at least 30 days before the examination date. This will permit the NRC to make preliminary eligibility determinations, process the medical certifications, evaluate any waivers that might be appropriate, and obtain additional information, if necessary, while allowing the facility licensee to finish training the applicants before the certified applications are due.

d. The facility licensee's senior management representative on site must certify when an applicant has completed all of the facility licensee's requirements and commitments for the desired license level (i.e., experience, control manipulations, training, and medical). Such certification involves placing a check

in Item 19.b of NRC Form 398, signing the form, and submitting it to the NRC regional office at least 14 days before the examination date.

The facility must also submit a written request that the written examination and operating test be administered to the applicant.

e. When the NRC regional office denies a license application, the applicant need not accept the proposed denial. In such instances, the applicant may request that the Director, Division of Inspection Program Management (DIPM), Office of Nuclear Reactor Regulation (NRR), review the application denial or request a hearing in accordance with 10 CFR 2.103(b)(2). Further action will be taken in accordance with ES-502.

f. The facility licensee is expected to inform the NRC regional office in writing if it desires to withdraw an application before the licensing process is complete.

2. NRC Regional Office

a. The NRC regional office shall review the preliminary applications as soon as possible after they are received. In that way, the regional office can process the medical certifications, evaluate and resolve any waiver requests in accordance with ES-204, and obtain from the facility licensee any additional information that might be necessary in order to support the final eligibility determinations.

With regard to the medical certifications, the regional office shall forward the applicant's NRC Form 396 and the supporting medical evidence to the NRC physician at the Headquarters Health Unit or the regional contract physician for evaluation any time the examining physician has recommended that the applicant be issued a restricted license or that an existing restriction be changed (by checking block A.4 or A.5 on Form 396). If, on the date of the licensing examination, an applicant's medical certification is still under review by the NRC's physician but there is no reason to expect that the applicant will be disqualified, the NRC regional office should allow the applicant to take the examination, with the understanding that the license will be withheld until the medical certification is approved.

The NRC will not process a retake application if the applicant's request for reconsideration or a hearing on the previous license denial is still outstanding (refer to ES-502).

Before entering the applicants' data in the operator licensing tracking system (OLTS), the region shall verify that none of the applicants' names appear on the "Restricted Individuals List" found on the NRC's web site at http://www.internal.nrc.gov/OE/restrict.htm. The region shall check with the appropriate contact in the Office of Enforcement by telephone or electronic mail to verify that the information on the subject individual is current before using the information on the list to deny a licensing action.

b. The regional office will verify that the applicant has successfully passed the GFE, if required, and review the data on NRC Form 398 to ensure that it is complete.

Affirmative responses to Items 12.a and 12.b of NRC Form 398, indicate that the applicant has successfully completed a Commission-approved, SAT-based training program that meets the education and experience requirements outlined by the NNAB and that uses a simulation facility acceptable to the Commission under 10 CFR 55.45(b). If the facility licensee checks "yes" in response to these items, the licensee need not complete Items 13, "Training," 14, "Experience," and 15, "Experience Details," of NRC Form 398, except as noted below, and the region may accept the application without further review.

New applications must include the number of significant control manipulations in Item 13.3; at least five are required on the facility for which the license is sought. Every effort should be made to diversify the reactivity and power changes for each applicant. Startups, shutdowns, large load changes, and changes in rod programming are some examples; these changes could be accomplished manually using such systems as rod control, chemical shim control, and recirculation flow control. This requirement can only be waived or deferred under the conditions specified in 10 CFR 55.31(a)(5); situations other than those specified would require an exemption in accordance with 10 CFR 55.11. (Refer to the note following Section D.1.b(2) below for additional information regarding exemptions from this requirement.) For ROs applying for an SRO license, certification that the operator has successfully operated the controls of the facility as a licensed operator shall be accepted as evidence of having completed the required manipulations.

As noted in the instructions for Item 12 on NRC Form 398, certified instructors (who may not have the requisite responsible nuclear power plant experience as defined in RG 1.8, Revision 3) seeking an SRO license must complete Items 14 and 15. Moreover, any exceptions or waivers from the education and experience requirements outlined in the National Academy for Nuclear Training's "Guidelines for Initial Training and Qualification of Licensed Operators" must be explained in Item 17.

If an applicant checks "no" in response to Items 12.a and 12.b, provides information that is not required, or indicates that exceptions or waivers have been taken in Item 17 on NRC Form 398, the region shall review the application against the specific eligibility requirements and commitments applicable to the facility licensee and refer any eligibility issues (e.g., any failure to meet the minimum guidelines established by the NNAB or RG 1.8, Revision 3) and questions to the NRR operator licensing program office for resolution.

If the applicant is reapplying after a previous examination failure and license denial, the region shall evaluate the applicant's additional training to determine if the facility licensee made a reasonable effort to remediate the deficiencies that caused the applicant to fail the previous examination.

c. The region may determine that the preliminary application is incomplete, that more information is necessary to make a waiver determination, or that the applicant does not meet the requirements in 10 CFR 55.31. In such instances, the region will note the deficiencies and request that the facility licensee supply additional information when it submits the final, certified license application (or sooner if possible).

Conversely, the region may determine that the preliminary application is complete, and the applicant meets the eligibility requirements or is expected to meet the requirements pending the receipt of additional information. In such instances, the region shall enter the applicant's name, docket number, and examination requirements on the examination assignment sheet in accordance with ES-201.

d. Upon receiving the final, certified license application, the reviewer shall evaluate any new information to ensure that the eligibility criteria are satisfied. If so, the reviewer shall check the "meets requirements" block at the bottom of Form 398, sign and date the form. If necessary, the reviewer shall add the applicant's name and other data to the examination assignment sheet in accordance with ES-201. The reviewer shall also ensure that the assignment sheet accurately reflects any examination waivers that may have been granted in accordance with ES-204.

If the region determines that the applicant still does not meet the eligibility requirements, the regional licensing authority will discuss its decision with the NRR operator licensing program office and notify the applicant in writing that the application is being denied and identify the deficiencies on which the denial is based (Attachment 1). The responsible regional supervisor, or designee, shall check the "does not meet requirements" block at the bottom of Form 398, and shall sign and date the form. The applicant's name shall be stricken from the examination assignment sheet; the applicant shall not be permitted to take the licensing examination until the region determines that he or she meets the eligibility criteria.

In accordance with ES-204, the region may administer a license examination to an applicant who has not satisfied the applicable training or experience requirements at the time of the examination, but is expected to complete them shortly thereafter. Assuming that the applicant passes the examination, the region shall not issue the applicant's license until the facility licensee certifies that all of the requirements have been completed. (Refer to ES-501 for additional guidance.)

D. NRC LICENSE ELIGIBILITY GUIDELINES

Regulatory Guide (RG) 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to the training and qualifications of nuclear power plant personnel. For

the positions of shift supervisor, senior operator, and licensed operator, Revision 3 of RG 1.8, which was issued in May 2000, endorses the guidelines contained in ANSI/ANS-3.1-1993; specific clarifications, additions, and exceptions are noted in Section C, "Regulatory Position," of RG 1.8. The license eligibility guidelines in RG 1.8, Revision 3, and ANSI/ANS-3.1-1993 are summarized below; refer to those documents for more detailed information. No backfitting is intended or required in connection with the issuance of the revised RG.

As noted in Section B above, the NRC has reviewed the current education and experience guidelines outlined in the National Academy for Nuclear Training's "Guidelines for Initial Training and Qualification of Licensed Operators" and concluded that they are equivalent to the NRC staff guidelines in RG 1.8, Revision 3.

Except as specifically noted below, experience and training are separate aspects of license eligibility. As stated in NUREG-1262 (in response to Question No. 113), a person should meet the experience guidelines before entering the license training program. Time spent in training before entering the license training program may qualify as experience, but time spent in an NRC-approved training program leading up to license eligibility should normally not be double-counted as experience.

1. Reactor Operator

   a. Experience

      (1) The applicant should have a minimum of three years of power plant experience, at least one of which should be spent at the nuclear power plant for which the license is sought (preferably in the performance of nonlicensed operator duties) and should not include any of the time spent in the control room as an extra person on shift.

      (2) The applicant should spend at least six months performing plant operational duties as a nonlicensed operator at the nuclear power plant for which the license is sought.

   b. Training

      (1) Before being assigned RO duties, the applicant should complete at least three months as an extra person on shift in training for the RO position. This training should include all phases of day-to-day operations and be conducted under the supervision of licensed personnel. This time should not count toward the one-year on-site experience specified in Item D.1(a)(1) above.

      (2) The applicant should complete an RO training program that is established and maintained using a systematic approach to training (SAT).

      (3) The applicant must manipulate the controls of the reactor during five significant changes in reactivity or power level (refer to 10 CFR 55.31(a)(5)). Every effort should be made to diversify the reactivity and

power changes for each applicant. Startups, shutdowns, large load changes, and changes in rod programming are some examples; these changes could be accomplished manually using such systems as rod control, chemical shim control, and recirculation flow control.

[Note: The NRC is preparing a regulatory amendment that, if approved by the Commission, will allow applicants to optionally complete some or all of the required reactivity manipulations on a plant-referenced simulator. While this rulemaking is in progress, the staff is considering requests for exemption from the requirements of §55.31(a)(5) so that a simulation facility may be considered acceptable for completing the requirement on a case-by-case basis. As part of any exemption request, the facility licensee shall provide evidence that the reactivity manipulations are conducted under defined scenario conditions and that simulator fidelity with respect to the current configuration of the reference unit is confirmed before the training session. The staff will consider implementation of ANSI/ANS 3.5-1998 to be sufficient evidence of simulator fidelity to fulfill the experience requirement of §55.31(a)(5) without a need to submit additional information regarding simulator core data and performance testing.]

c. Education

The applicant should have a high school diploma or equivalent.

2. Senior Reactor Operator

a. Experience

(1) A nonlicensed (i.e., instant SRO) applicant should have a minimum of three years of responsible nuclear power plant experience, as defined in RG 1.8. At least six months of the responsible nuclear power plant experience should be at the plant for which the applicant seeks a license and should not include any of the time spent in the control room as an extra person on shift. A maximum of one year of responsible nuclear power plant experience may be fulfilled by academic or related technical training on a one-for-one basis.

(2) Applicants for an SRO license who do not hold a bachelor's degree in engineering or the equivalent should have held an operator's license and should have been actively involved in the performance of licensed duties for at least one year or have at least two years in a position equivalent (or superior) to a licensed RO at a military reactor (e.g., propulsion plant watch officer, reactor operator, chief reactor watch, engineering officer of the watch, propulsion plant watch supervisor, and engineering watch supervisor). Maintaining a minimally active operator's license pursuant to 10 CFR 55.53(e) is not sufficient to satisfy this experience guideline.

(3) During the years of responsible nuclear power plant experience, the applicant should participate in reactor operator activities at power levels greater than 20 percent for at least six weeks.

(4) The eligibility of equipment operators and non-degreed licensed operator instructors will be evaluated on a case-by-case basis.

b. Training

(1) Before being assigned SRO duties, the applicant should complete at least three months as an extra person on shift in training for the SRO position. This training should include all phases of day-to-day operations and be conducted under the supervision of licensed personnel. This time does not count toward the six-month on-site responsible experience guideline in Item D.2(a)(1) above. However, any portion of the three months that is spent at or above 20 percent power may also be used to satisfy the experience guideline in Section D.2.a(3).

(2) If the applicant has not held an RO license at the facility for which a license is sought, the applicant must complete the required control manipulations as discussed in Section D.1.b(3) above.

(3) The applicant should complete a SAT-based SRO training program.

c. Education

The applicant should have a high school diploma or equivalent.

3. Limited Senior Reactor Operator

a. Experience

The applicant should have three years of responsible nuclear power plant experience that includes active participation in at least one refueling outage at the site for which the license is sought or at a similar facility. Six months of the responsible nuclear power plant experience should be at the site for which the LSRO license is sought or at a similar facility owned by the same facility licensee.

b. Training

The applicant is expected to have satisfactorily completed a SAT-based training program.

c. Education

The applicant should have a high school diploma or equivalent.

4. Cold License Eligibility

Cold examinations are those administered before the unit completes preoperational testing and the initial startup test program as described in the FSAR.

a. Each applicant must satisfactorily complete the training programs described in Section 13.2 of the FSAR and approved by the NRC. The NRC's review and approval are based on information contained in Section 13.2.1 of the Standard Review Plan (SRP) (NUREG-0800).

Note: These NRC-approved training programs typically require ten startups on a research reactor. This requirement may be waived if the applicant has completed a plant-referenced simulator training program accredited by the Institute of Nuclear Power Operations (INPO).

b. In lieu of the control manipulations on the facility for which the license is sought (per 10 CFR 55.31(a)(5)), the Commission may accept evidence of satisfactory performance of simulated control manipulations as part of a Commission-approved training program on a simulation facility acceptable to the Commission under 10 CFR 55.45(b).

E. ATTACHMENTS/FORMS

Attachment 1, "Sample Initial Application Denial from Region"

NRC Letterhead

(date)

(Applicant's name)
(Street address)
(City, State, Zip code)

Dear (Name):

This is to inform you that your application of (date) for a (reactor operator, senior reactor operator) license submitted in connection with the (facility name) is hereby denied.

(Region to discuss deficiencies and which part of 10 CFR 55.31, ES-202, NRC- approved facility training program, or Regulatory Guide 1.8 was involved.) When you have met the requirements of 10 CFR 55.31, you may submit another application.

If you do not accept this denial, you may, within 20 days of the date of this letter, take one of the following actions:

- You may request that the NRC reconsider the denial of your application by writing to the Director, Division of Inspection Program Management, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Your request must include specific reasons for your belief that your application was improperly denied. If the NRC determines that the denial of your application remains appropriate, you still have the right to request a hearing pursuant to 10 CFR 2.103(b)(2), as described below.

- You may request a hearing in accordance with 10 CFR 2.103(b)(2). Submit your request, in writing, to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555, with a copy to the Associate General Counsel for Hearings, Enforcement, and Administration, Office of the General Counsel, at the same address.

If you have any questions, please contact (name) at (telephone number).

Sincerely,

(Regional branch chief or above)

Docket No. 55-(number)

cc: (Facility representative who signed the applicant's NRC Form 398)

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

f. NRC examiners assigned to a particular examination will be notified of approved waivers by the appropriate regional supervisor and by an entry on the examination assignment sheet (ES-202, Attachment 4).

g. If the applicant is determined to be ineligible to take the licensing examination, the regional office shall issue a denial letter in accordance with ES-202.

D. WAIVER CRITERIA

1. Routine Waivers

a. If an applicant fails *only* the written examination or *one* category of the operating test, the region may waive those examination areas (categories) that were passed. This is only applicable for the first retake examination and only if it takes place within one year of the date on which the denial of the original application became final.

b. The region may waive training requirements specified in the final safety analysis report (FSAR) when the FSAR authorizes waiver of those specific requirements and the applicant otherwise meets NRC requirements (e.g., waiver of some training requirements for applicants previously licensed at a comparable facility).

c. The medical data in support of NRC Form 396 are normally good for six months from the date of the medical examination for a person applying for an RO or an SRO instant license. For reapplications following a license denial or withdrawal of an application, waivers extending the six-month period may be granted if the date of the original medical examination is within 24 months of the anticipated licensing date and Item 17, "Comments," of NRC Form 398 certifies that the applicant has not developed any physical or mental condition that would be reportable under 10 CFR 55.25. For renewal and SRO upgrade applicants, the medical examination documented on NRC Form 396 is good for two years from the date of the medical examination.

d. Substitutions allowed by Regulatory Guide 1.8, Revision 3, are not considered to be waivers and, therefore, do not require approval. For example, substitution of related technical training for up to one year of experience for an SRO is not a waiver. However, training for the examination applied for may not be counted as related technical training.

e. If the facility licensee certifies that the applicant has successfully completed a training program accredited by the Institute of Nuclear Power Operations using an acceptable simulation facility, the region may waive the requirement for ten startups on a research reactor typically required by NRC-approved cold license training programs.

f. For those applicants unable to meet the requirement for six weeks on shift at greater than 20 percent power (because of extended plant shutdowns or other

extraordinary circumstances), this requirement may be waived upon application if the following criteria are satisfied:

(1) Facility training objectives for the desired licensed position have been developed using a properly validated job and task analysis (JTA).

(2) The facility licensee's training program is based on a systems approach to training (SAT) using the five elements defined in 10 CFR 55.4.

(3) The facility licensee can accomplish the training objectives required for plant operation at greater than 20 percent power using a plant-referenced or NRC-approved simulation facility.

g. If an operator was previously licensed at a facility and reapplies for a license at the same facility and license level, the region may, pursuant to 10 CFR 55.47, waive the requirement for the applicant to pass a written examination and an operating test if it finds that the applicant

(1) previously discharged his or her responsibilities competently and safely and is capable of continuing to do so

(2) terminated participation in the facility licensee's requalification program less than two years before the date of the license application

(3) successfully completed "Additional Training," pursuant to 10 CFR 55.59(b), and a facility-prepared written examination and operating test which ensure that the applicant is up-to-date in the licensed operator requalification training program

(4) will successfully complete at least 40 hours of shift functions under the direction of an operator or senior operator, as appropriate, and in the position to which the applicant will be assigned (see 10 CFR 55.53(f)) before being assigned to licensed duties

(5) complies with the requirements of 10 CFR 55.31

h. If an applicant at a facility that has completed preoperational testing is unable to perform the five significant control manipulations required by 10 CFR 55.31(a)(5) because of an extended shutdown, the region may process the application, administer the examination, and issue a conditional license that is only valid with the reactor in cold shutdown and refueling. The region will not remove the license condition until the facility licensee supplies the required evidence that the applicant has successfully completed the control manipulations (refer to ES-501). Situations other than those specified in the regulation may require an exemption and must be processed through the NRR operator licensing program office.

i. The region may authorize a facility licensee to defer completion of the following specific experience and training guidelines until after the licensing examination is

passed. The facility licensee must provide evidence that the deferred items have been completed before the region will issue the license (refer to ES-501).

(1) Up to six months of the three years (responsible nuclear) power plant experience for an RO (or an SRO), but not to exceed two months of the year on-site experience for an RO and one month of the six for an SRO.

(2) Up to two months of the year actively performing duties as a licensed RO at the facility for which an SRO upgrade license is sought.

(3) Up to one month of the three spent as an extra RO or SRO on-shift in training.

2. Examination Waivers for Previously Licensed Operators at Comparable Facilities

Depending on the justification provided by the applicant and the facility licensee, NRR will consider examination waivers for operators who were previously licensed at a comparable facility. Pursuant to 10 CFR 55.47, the Commission may waive any or all requirements for a written examination and operating test.

3. Multi-Unit Examination Waivers

a. Generally, personnel will *not* be examined on or allowed to hold licenses for "different units" simultaneously. "Different units" owned or managed by a single facility licensee are defined for purposes of this standard as follows:

- units having the same vendor but significantly different age and/or power level (e.g., Dresden Units 1 and 2)
- units having the same vendor and similar design but different locations (e.g., Sequoyah and Watts Bar, Byron and Braidwood)
- units having different vendors (PWR only) but located on the same site (e.g., Arkansas Units 1 and 2, Millstone Units 2 and 3)

NRR may authorize a limited senior reactor operator (LSRO) to be licensed at multiple sites, provided that the units are manufactured by the same vendor and are of similar design. The applicant must pass an examination that addresses the differences in the designs, procedures, technical data, and administrative controls of the separate facilities for which the license is being sought.

b. With regard to the examination requirements for "identical" second or subsequent units at the same site, NRR may waive any or all requirements for a written examination and operating test if it finds that the applicant meets the criteria specified in 10 CFR 55.47, as noted in Item D.2 above. If the situation warrants, the Commission may impose other examination requirements, such as NRC-administered operating tests and written examinations concerning the plant differences.

recommended changes to the examination author as soon as possible. The final examinations should be ready at least 14 days before the GFE administration date.

d. The GFE contractor will assemble the approved examination packages as described below, and mail the packages to the names and addresses designated by the participating facility licensees. The examinations should normally be mailed one week before the examinations are scheduled to be administered.

The examination packet will contain the following information, enclosures, and attachments:

- cover letter (Attachment 2 is a sample letter)
- proctor instructions
- security agreement
- single copies of appropriate exam, forms A and B
- exam time zone map
- sample answer sheet
- facility docket number sheet
- applicant docket number sheet
- appropriate number of answer sheets
- applicant answer sheet instructions

e. On the day that the GFE is administered, the NRR GFE coordinator and GFE contractor shall be available to answer questions from facility proctors if the need arises.

f. When the examination answer sheets are received from the facility licensees, the GFE contractor shall score, grade, and tabulate the overall item statistics, and generate facility and regional grade reports for each GFE examination. The contractor shall forward the regional and facility grade reports, including individual scores and copies of individual answer sheets, and corrected answer keys to the applicable regional office for distribution.

The GFE contractor shall develop individual item statistics on all questions used on the GFE examinations. Questions with acceptable statistical characteristics shall be moved into the "validated" GFE question bank.

The contractor will provide copies of all grade reports to the NRR GFE coordinator, along with the following additional items:

- exam-wide item statistics (PWR and BWR)
- analysis reports of specific items deleted or answers changed
- corrected answer keys
- original answer sheets
- original signed exam cover sheets
- signed security statements

g. The NRR operator licensing program licensing assistant will ensure that copies of the final master BWR and PWR examinations are placed in the NRC's Public Document Room.

3. NRC Regional Office

a. Regional management should assign an individual to coordinate GFE administration in the region.

b. The regional operator licensing assistant (OLA) shall assign a docket number to each individual identified in the facility licensee's registration letter. The OLA shall forward the list of names and docket numbers for each facility to the GFE contractor, with a copy to the NRR GFE coordinator, no later than 20 days before the examination administration date.

c. The regional GFE coordinator should keep the NRR GFE coordinator informed of any changes in the number of applicants scheduled to take the GFE at any facility.

d. The regional office shall distribute the GFE examinations to their respective facility licensees. Sample cover letters for facility licensees that did and did not participate in the examination are provided in Attachment 3.

e. The regional OLA shall update the applicants' status (pass or fail) in the operator licensing tracking system (OLTS) and ensure that a hard copy of the GFE results is placed in each applicant's docket file.

D. EXAMINATION SCOPE AND STRUCTURE

Each GFE shall contain 100 questions covering the "Components" and "Theory" (including reactor theory and thermodynamics) sections of NUREG-1122, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors," or NUREG-1123, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors." The passing grade for the GFE is 80 percent.

The knowledge and ability (K/A) topics applicable to the GFE for PWRs and BWRs have been categorized into various component, reactor theory, and thermodynamics groups as shown in Attachment 4. The attachment also identifies the number of test questions required to evaluate each topic.

NRC Letterhead (Date)

(Name, Title)
(Facility name)
(Street address)
(City, State Zip code)

Dear (Name):

(*) On (date), the NRC administered the generic fundamentals examination (GFE) section of the written operator licensing examination to employees of your facility. Enclosed with this letter are copies of both forms of the examination, including answer keys, the grading results for your facility, and copies of the individual answer sheets for each of your employees. Please forward the results to the individuals along with the copies of their respective answer sheets. A "P" in the column labeled RESULTS indicates that the individual achieved a passing grade of 80 percent or better on the GFE. Those individuals having an "F" in the RESULTS column failed the examination.

(**) On (date), the NRC administered the generic fundamentals examination (GFE) section of the written operator licensing examination.

(**) Your facility did not participate in this examination. However, a copy of the PWR and BWR GFEs and their answer keys will be available for your review on the NRC's web site (URL: http://www.nrc.gov/NRC/reactors.html) approximately 60 days following the examination administration date.

If you have any questions concerning this examination, please contact (Name of the NRR GFE coordinator) at (phone number).

Sincerely,

(Appropriate regional representative)

Docket No. 50-(Number)

(*) Enclosures:
1. Examination Form "A" and "B" with answers
2. Examination Results Summary for (Facility Name)
3. Individual Answer Sheets

[Paragraphs marked (*) apply only to those facility licensees that participated in the examination, while paragraphs marked (**) apply only to those facility licensees that did not participate in the examination.]

K/A	Pressurized Water Reactors Topic	No. of Items
	Group I Components	
191001	Valves	4
191002	Sensors and Detectors	10
191003	Controllers and Positioners	5
191004	Pumps	7
191006	Heat Exchangers and Condensers	3
191008	Breakers, Relays, and Disconnects	7
	Group II Components	
191005	Motors and Generators	5
191007	Demineralizers and Ion Exchangers	3
	Group I Reactor Theory	
192004	Reactivity Coefficients	4
192005	Control Rods	4
192008	Reactor Operational Physics	8
	Group II Reactor Theory	
192003	Reactor Kinetics and Neutron Sources	2
192006	Fission Product Poisons	6
	Group III Reactor Theory	
192001	Neutrons	1
192002	Neutron Life Cycle	2
192007	Fuel Depletion and Burnable Poisons	1
	Group I Thermodynamics	
193009	Core Thermal Limits	2
193010	Brittle Fracture and Vessel Thermal Stress	5
	Group II Thermodynamics	
193003	Steam	2
193007	Heat Transfer	2
193008	Thermal Hydraulics	8
	Group III Thermodynamics	
193001	Thermodynamic Units and Properties	1
193004	Thermodynamic Processes	2
193005	Thermodynamic Cycles	1
193006	Fluid Statics and Dynamics	5
Total Items		100

f. Revise the operating test outlines and the final tests as applicable and as agreed upon by the NRC regional office (refer to ES-201). The NRC retains final authority to approve the operating tests.

2. NRC Regional Office

The NRC regional office is responsible for the following activities:

a. Ensure that the operating tests are developed in accordance with Section D.

b. Ensure that the operating tests are reviewed for quality in accordance with Section E.

c. Meet with the facility licensee, when and as appropriate, to prereview the operating tests in accordance with ES-201.

D. INSTRUCTIONS

Prepare each category of the operating test in accordance with the following general guidelines and specific instructions:

1. General Guidelines

a. In an effort to reduce examination preparation effort, the same operating test may be used to examine multiple applicants and simulator crews. Depending on the number and license level of the applicants being examined, it might be possible to use the same set of JPMs and scenarios to examine all of the applicants if the operating test is administered in multiple segments (e.g., single scenarios or two-four JPMs) each of which can be given to all of the applicants in a single day. The facility licensee and the NRC chief examiner shall discuss the options and reach agreement on the process before developing the operating tests.

To minimize predictability and maintain test integrity, varied subjects, systems, and operations shall be evaluated with applicants that are not being examined at the same time, unless measures are taken to preclude interaction among the applicants. The same JPMs and simulator scenarios shall not be repeated on successive days.

Operating tests written by the facility licensee may not duplicate test items (simulator scenarios or JPMs) from the applicants' audit test (or tests if the applicant is retaking the examination) given at or near the end of the license training class. Simulator events and JPMs that are similar to those that were tested on the audit examination are permitted provided the actions required to mitigate the transient or complete the task (e.g., using an alternate path as discussed in Appendix C) are significantly different from those required during the audit examination. The facility licensee shall identify for the NRC chief

examiner those simulator events and JPMs that are similar to those that were tested on the audit examination.

Sufficient operating test materials shall be developed to ensure that all applicants can be tested with the available personnel according to the schedule agreed upon by the NRC regional office and the facility licensee (refer to ES-201).

b. To the extent permitted for each category of the operating test, select and modify testing materials (i.e., JPMs, questions, and simulator scenarios) from the facility's examination banks. Every selected test item must satisfy the qualitative and quantitative criteria specified for the applicable section of the operating test or be modified accordingly.

c. Consider the K/As associated with normal, abnormal, and emergency tasks and evolutions as a source of topics for use in evaluating applicant competency in each category of the operating test.

The knowledge and abilities associated with the tasks and questions planned for the operating test should have importance factors of at least 2.5. Tasks with importance factors of less than 2.5 may be used if there is a substantive reason for including them (e.g., a recent licensee event or a significant system modification). Failure to train the applicants on a particular K/A is not an acceptable basis for rejecting that K/A.

The K/As should be appropriate to the plant-specific requirements for the applicant's license level. Refer to the facility's job and task analysis (if available), learning objectives, and other reference material to confirm that the operating test is correctly oriented to the facility and the applicant's license level.

The facility licensee's site-specific task list may be used to supplement or override, on a case-by-case basis, selected individual items in the NRC's K/A catalogs. In order to maintain examination consistency, the site-specific task list shall not be used in place of the entire K/A catalog.

d. When selecting and developing materials (JPMs, scenarios, and questions) for the operating test, ensure that the materials contribute to the test's overall capacity to differentiate between those applicants who are competent to safely operate the plant and those who are not. Additionally, all of the test items should include the three facets of test validity (i.e., content, operational, and discrimination) discussed in Appendix A. Any test items that, when missed, would raise questions regarding adequate justification for denying the applicant's license should not be included on the operating test.

e. SRO applicants, whether upgrade or instant, will be examined for the highest on-shift position for which the SRO's license is applicable (e.g., shift supervisor), regardless of the position to be assigned when licensed. SRO applicants should demonstrate their supervisory abilities and an attitude of responsibility for safe operation, and are expected to assume a management role during plant

Appendix D provides detailed instructions for completing Form ES-D-1, the "Scenario Outline," and Form ES-D-2, the expected "Operator Actions," that examiners will use to administer the simulator operating tests. In order to minimize the amount of rework that might be required as a result of changes in the planned scenario events, Form ES-D-2 should be completed after the NRC chief examiner has had the opportunity to review and comment on the proposed simulator operating test outlines (i.e., Form ES-D-1) in accordance with ES-201.

e. When the proposed simulator operating test outlines are complete, forward them to the NRC chief examiner so they are *received* by the date agreed upon with the NRC regional office at the time the examination arrangements were confirmed; the outlines are normally due approximately 75 days before the scheduled examination date. Refer to ES-201 for additional instructions regarding the review and submittal of the examination outlines.

The NRC chief examiner shall review the operating test outlines in accordance with ES-201, and forward any comments to the originator for resolution.

f. After the NRC chief examiner approves the operating test outlines, prepare the final simulator test materials by revising Form(s) ES-D-1 as requested by the NRC chief examiner and completing a detailed operator action form (ES-D-2) for each event. All substantive operator actions (e.g., opening, closing, and throttling valves; starting and stopping equipment; raising and lowering level, flow, and pressure; making decisions and giving directions; *not* acknowledging alarms or verifying automatic actions) shall be documented, and critical tasks shall be identified. Events that do not require an operator to take one or more substantive actions will not count toward the minimum number of events required for each operator per Form ES-301-5.

g. Review the completed simulator operating test for quality using Form ES-301-4, "Simulator Scenario Quality Checklist," and make any changes that might be necessary. This review shall be performed in conjunction with the associated walk-through test (refer to Sections D.2 and D.3) to minimize duplication.

Submit the entire operating test package to the designated facility reviewer or the NRC chief examiner, as appropriate, for review and approval in accordance with Section E. The test must be received by the NRC chief examiner approximately 45 days before the scheduled administration date, unless other arrangements have been made.

E. QUALITY REVIEWS

1. Facility Management Review

If the operating test was prepared by the facility licensee, the preliminary outline and the proposed test shall be independently reviewed by a supervisor or manager before they are submitted to the NRC regional office for review and approval in accordance with

ES-201. The reviewer should evaluate the outline and test using the criteria on Forms ES-201-2, ES-301-3, and ES-301-4 and include the signed forms (for each different operating test) in the examination package submitted to the NRC in accordance with ES-201.

2. NRC Examiner Review

a. The NRC chief examiner shall ensure that each operating test is independently reviewed for content, wording, operational validity, and level of difficulty. As a minimum, the examiner shall check the items listed on Forms ES-301-3 and ES-301-4, as applicable. The examiner should keep in mind that counting the number of scenario quantitative attributes is not always indicative of the scenario's level of difficulty. Although there are no definitive minimum or maximum attribute values that can be used to identify scenarios that will not discriminate because they are too easy or difficult, scenarios that fall outside the target ranges specified on Form ES-301-4 should be carefully evaluated to ensure they are appropriate. Refer to Section C.3 of ES-201 for additional guidance regarding examination reviews.

b. The NRC examiner should review the operating tests as soon as possible after receipt so that supervisory approval can be obtained before the final review with the facility licensee, which is normally scheduled about two weeks before the administration date. It is especially important that the examiner promptly review tests prepared by a facility licensee because of the extra time that may be required if extensive changes are necessary. The chief examiner shall consolidate the comments from other regional reviewers and submit one set of comments to the author.

c. If the facility licensee developed the operating test, then the facility licensee is primarily responsible for technical accuracy and compliance with the restrictions concerning the use of examination banks. However, the chief examiner is expected to use his or her best judgment and take reasonable measures, including selective review of reference materials and past tests, to verify these items.

d. The chief examiner will note/review any changes that need to be made and forward the tests to the responsible supervisor for review and comment in accordance with Section E.3 before reviewing the examinations with the author or facility contact. There are no minimum or maximum limits on the number or scope of changes the chief examiner may direct the author or facility contact to make to the proposed tests, provided that they are necessary to make the tests conform with established acceptance criteria. Refer to ES-201 for additional guidance regarding NRC response to facility-developed examinations that are significantly deficient.

Facility:	Date of Examination:	Operating Test Number:

	1. GENERAL CRITERIA	Initials a	b*	c#
a.	The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution).			
b.	There is no day-to-day repetition between this and other operating tests to be administered during this examination.			
c.	The operating test shall not duplicate items from the applicants' audit test(s)(see Section D.1.a).			
d.	Overlap with the written examination and between operating test categories is within acceptable limits.			
e.	It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.			
	2. WALK-THROUGH (CATEGORY A & B) CRITERIA	--	--	--
a.	Each JPM includes the following, as applicable: · initial conditions · initiating cues · references and tools, including associated procedures · reasonable and validated time limits (average time allowed for completion) and specific designation if deemed to be time critical by the facility licensee · specific performance criteria that include: - detailed expected actions with exact criteria and nomenclature - system response and other examiner cues - statements describing important observations to be made by the applicant - criteria for successful completion of the task - identification of critical steps and their associated performance standards - restrictions on the sequence of steps, if applicable			
b.	The prescripted questions in Category A are predominantly open reference and meet the criteria in Attachment 1 of ES-301.			
c.	Repetition from operating tests used during the previous licensing examination is within acceptable limits (30% for the walk-through) and do not compromise test integrity.			
d.	At least 20 percent of the JPMs on each test are new or significantly modified.			
	3. SIMULATOR (CATEGORY C) CRITERIA	--	--	--
a.	The associated simulator operating tests (scenario sets) have been reviewed in accordance with Form ES-301-4 and a copy is attached.			

	Printed Name / Signature	Date
a. Author		
b. Facility Reviewer(*)		
c. NRC Chief Examiner (#)		
d. NRC Supervisor		

NOTE: * The facility signature is not applicable for NRC-developed tests.
Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required.

Facility:	Date of Exam:	Scenario Numbers: / /	Operating Test No.:

	QUALITATIVE ATTRIBUTES	Initials a	b*	c#
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.			
2.	The scenarios consist mostly of related events.			
3.	Each event description consists of · the point in the scenario when it is to be initiated · the malfunction(s) that are entered to initiate the event · the symptoms/cues that will be visible to the crew · the expected operator actions (by shift position) · the event termination point (if applicable)			
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.			
5.	The events are valid with regard to physics and thermodynamics.			
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.			
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.			
8.	The simulator modeling is not altered.			
9.	The scenarios have been validated. Any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.			
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.4 of ES-301.			
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).			
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).			
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.			

	TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4.D)	Actual Attributes	--	--	--
1.	Total malfunctions (5-8)	/ /			
2.	Malfunctions after EOP entry (1-2)	/ /			
3.	Abnormal events (2-4)	/ /			
4.	Major transients (1-2)	/ /			
5.	EOPs entered/requiring substantive actions (1-2)	/ /			
6.	EOP contingencies requiring substantive actions (0-2)	/ /			
7.	Critical tasks (2-3)	/ /			

OPERATING TEST NO.:

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			1	2	3	4
RO	Reactivity	1				
	Normal	1				
	Instrument / Component	4				
	Major	1				
As RO	Reactivity	1				
	Normal	0				
	Instrument / Component	2				
	Major	1				
SRO-I						
As SRO	Reactivity	0				
	Normal	1				
	Instrument / Component	2				
	Major	1				
SRO-U	Reactivity	0				
	Normal	1				
	Instrument / Component	2				
	Major	1				

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _____

NRC Reviewer: _____

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms												
Diagnose Events and Conditions												
Understand Plant and System Response												
Comply With and Use Procedures (1)												
Operate Control Boards (2)												
Communicate and Interact With the Crew												
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: _____

NRC Reviewer: _____

A. PURPOSE

This standard describes how to administer operating tests to initial license applicants in accordance with the requirements of 10 CFR 55.45. It includes policies and guidelines for administering both the walk-through and the integrated plant operations categories of the operating test. It is assumed that the operating test was prepared in accordance with ES-301.

B. BACKGROUND

As noted in ES-201, facility licensees will generally prepare proposed operating tests in accordance with ES-301 and submit them to the responsible NRC regional office for review and approval. Regardless of whether it was prepared by the facility licensee or the NRC, every operating test will be independently administered and graded by an NRC licensing examiner in accordance with the instructions contained herein and in ES-303.

C. RESPONSIBILITIES

1. Facility Licensee

The facility licensee is responsible for the following activities:

a. Make the plant and simulation facility available, as necessary, for validating and administering, Category A (administrative topics), Category B (control room and in-plant systems), and Category C (integrated plant operations) of the operating tests.

b. Safeguard the integrity and security of the operating tests in accordance with facility procedures established pursuant to 10 CFR 55.40(b)(2) and the guidelines discussed in Attachment 1 of ES-201.

c. Provide administrative and logistics support (e.g., personnel to operate the simulation facility, surrogate operators, copies of the approved operating test materials as arranged with the chief examiner, etc.) to facilitate the administration of the operating tests in accordance with Section D.

d. Inform the NRC regional office in writing if an applicant withdraws from the examination process before it is complete.

2. NRC Regional Office

The NRC regional office is responsible for the following activities:

a. Work with the facility contact to coordinate the operating test administration schedule in a manner that maximizes efficiency and maintains security. Normally, the operating tests should be administered within 30 days before or after the written examinations. The region shall obtain concurrence from the NRR operator licensing program office if the examination dates diverge by more than 30 days. (Refer to ES-201 for additional guidance regarding examinations that have to be rescheduled to achieve an acceptable product.)

b. Administer the operating tests in accordance with Section D.

D. TEST ADMINISTRATION INSTRUCTIONS AND POLICIES

1. General

a. Before beginning the operating test, an examiner shall brief the applicant(s) using Parts A, C, D, and E of Appendix E. To save time, it is recommended that the examiner(s) brief the applicants as a group.

b. If an applicant requests to withdraw during any part of the examination process, the examiner shall inform the applicant that this will result in automatic license denial and that he or she may reapply in accordance with 10 CFR 55.35. The chief examiner will request the facility licensee to document the applicant's withdrawal in a letter to the NRC regional administrator.

c. Each applicant listed on the examination assignment sheet (see ES-201, Attachment 4) shall be administered an operating test as indicated under "Examination Type."

d. For purposes of test integration and continuity, the chief examiner should generally schedule the same examiner to administer all three operating test categories to an applicant. However, under certain circumstances, such as when a licensee's simulation facility is not located near the plant or if a licensee requests examinations for an unusually large group of applicants, the responsible regional supervisor may authorize the chief examiner to divide the operating test categories and subcategories among different examiners (simulator operating tests consisting of multiple scenarios shall not be divided among examiners). The chief examiner will be responsible for ensuring that each applicant gets a complete operating test and that the tests are thoroughly and accurately documented.

Normally, an NRC examiner will be assigned to individually evaluate each applicant during the simulator operating test. However, if a three-person operating crew consists entirely of senior reactor operator (SRO) upgrade applicants (who do not have to be evaluated on the control boards), the chief examiner may assign only two examiners to observe the crew. Although the applicants in the reactor operator and balance of plant positions may not be individually evaluated, they will be held accountable for any errors that occur as a result of their action(s) or inaction(s) and graded on their ability to "Operate the Control Boards" (i.e., SRO Competency 5). SRO-instant applicants will always be individually evaluated by an NRC examiner regardless what operating position they are filling during a given scenario.

e. The examiner is expected to administer the planned operating test in accordance with the prepared and approved walk-through test outlines (Forms ES-301-1, "Administrative Topics Outline," and ES-301-2, "Control Room Systems and Facility Walk-Through Test Outline") and simulator scenarios (Forms ES-D-1, "Scenario Outline," and ES-D-2, "Operator Actions"). Examiners shall document every significant aspect of each applicant's performance for later evaluation, but they shall *not* use the applicant's unplanned actions and statements to displace any part of the planned operating test.

Normally, examiners should substitute or replace planned operating test

materials only if it is determined that an item is invalid or impossible to perform or simulate because of unanticipated access restrictions or equipment failures.

f. Examiners may administer the same operating test (walk-through and simulator) to consecutive applicants and crews on the same day, but they must ensure that the security of the operating test is maintained. The same simulator scenarios shall not be repeated during successive days.

If previously agreed upon by the facility licensee, examiners may also administer the same operating test (walk-through and simulator) by dividing the test into segments that can be administered to all of the applicants on the same day. This will minimize the amount of effort required to develop different operating tests but will complicate the scheduling process.

g. The examiner should normally administer Categories B and C of the operating test first and attempt to concurrently evaluate as many of the planned administrative subjects in Category A as possible. The remaining administrative subjects should then be evaluated in accordance with the approved outline.

h. The examiner must take sufficient notes to facilitate the thorough documentation of any and all applicant deficiencies in accordance with ES-303. The examiner must be able to cross-reference each comment to a specific JPM, simulator event, or question.

I. The making of videotapes during the administration of operating tests is not authorized.

j. The number of persons present during an operating test should be limited to ensure the integrity of the test and to minimize distractions to the applicants.

- Except for the simulation facility operators, no other member of the facility's staff shall be allowed to observe an operating test without the chief examiner's permission. Facility management and other personnel deemed necessary by the facility licensee should generally be allowed access to the examination (under security agreements, as appropriate), provided the simulation facility can accommodate them and there is no impact on the applicants.

  Although the simulation facility operator will normally assume the role of the other personnel that the applicants direct or notify regarding plant operations, the chief examiner may permit other members of the facility training or operations staff (e.g., a shift technical advisor (STA)) to augment the operating shift team if necessary. The chief examiner shall fully brief those individuals regarding their responsibilities, reporting requirements, duties, and level of participation before the operating test begins. All participants in the testing process must also be mindful of their responsibilities with regard to examination integrity pursuant to 10 CFR 55.49.

  When surrogate operators are required to complete the operating crew (e.g., during retake tests or for a class consisting entirely of ROs), the chief examiner shall ensure that the surrogate operator(s) are briefed

regarding the content of the scenario(s) and their expected actions in response to every event. The examiners must not restrict the surrogate operators' activities to such an extent that the applicants being evaluated are required to assume responsibilities beyond the scope of their position. The surrogate operators do not need to be licensed at the facility, but they must have the knowledge and ability required to assume the full responsibilities of the roles they take in the operating test. Consultations with an STA shall be conducted in accordance with the facility licensee's normal control room practice; e.g., an STA shall not be stationed in the simulator if they are on-call at the site. The STA, if used, shall also be briefed regarding the content of the scenario(s) and their expected actions in response to every event. Surrogates and STAs should not take a proactive role in assisting or coaching the applicants because it would hinder the examiners' ability to evaluate the applicants' competence. Examiners shall run additional scenarios if necessary to make a licensing decision.

If the facility licensee normally operates with and is required by its technical specifications to have more than two reactor operators (ROs) in the control room, the chief examiner may authorize the use of additional surrogates to fill out the crews. In such cases, examiners must take care that the presence of additional operators does not dilute the examiners' ability to evaluate each applicant during the required number of events and on every applicable competency and rating factor. Examiners shall not hesitate to run additional scenarios, as necessary, to ensure that every applicant is given the opportunity to demonstrate his or her competence. Only one individual (applicant or surrogate) is allowed to fill a shift supervisor or manager position during the simulator operating test.

- Under *no* circumstances will another applicant be allowed to witness an operating test. Operating tests are not to be used as training vehicles for future applicants.

- Other examiners may observe an operating test as part of their training or to audit the performance of the examiner administering the operating test.

- The chief examiner may permit other NRC employees, such as resident inspectors, regional personnel, researchers, or NRC supervisors, to observe an operating test. Personnel who are not NRC employees (e.g., representatives from the Institute of Nuclear Power Operations (INPO)) may observe the operating tests with prior approval from the NRR operator licensing program office. The chief examiner will control the observer's activities in accordance with guidance provided by NRR. The examiner should also give the applicant the opportunity to object to the presence of observers.

k. The chief examiner should confirm with the facility licensee that the simulator instructor's station, programmers' tools, and external interconnections do not compromise operating test security while conducting examinations (refer to Section F of Appendix D). The primary objective is to ensure that the exam material cannot be read or recorded at other unsecured consoles and that examination material is either physically secured or electronically protected when not in use by individuals listed on the security agreement.

l. The chief examiner should arrange for any NRC examiners who are not familiar with the facility to obtain a tour before they administer any operating tests. The tours shall not be conducted or observed by any of the applicants. In addition, the tours should concentrate on areas of the plant that will be used during the examination process, such as the control room, the simulation facility, and planned walk-through locations.

m. The chief examiner will conduct an exit briefing with the facility licensee after the operating tests are complete. The briefing should address any generic weaknesses noted during the operating tests and any other significant issues (e.g., problems with the reference material, the simulation facility, or the plant) that might be addressed in the examination report. The individual operating test results are predecisional until approved by NRC management in accordance with ES-501 and shall *not* be shared with the facility licensee during the exit briefing.

2. Walk-Through (Categories A and B)

a. The examiner should validate any JPMs that were not previously validated by the facility licensee or by the NRC during a preparatory site visit. This is particularly important for complex JPMs and those that require the applicant to implement an alternative method directed by plant procedures.

b. To the extent possible, the examiner should have the applicant perform the control room JPMs on the simulator, rather than asking the applicant to describe how he or she would accomplish the task.

If the examiner observes a discrepancy between the simulator setup and the conditions specified in a JPM, then the examiner shall stop the JPM and correct the situation, as necessary. If the task can be completed with different values (e.g., wind direction when determining a protective action recommendation during an emergency), then the examiner shall document the differences and coordinate with the facility contact and the NRC chief examiner to validate the applicant's response under the actual conditions.

The chief examiner is expected to coordinate the administration of the JPMs to maximize the use of the simulator. To increase efficiency, different JPMs may be administered simultaneously to multiple applicants, but the examiners must ensure that mutual interference is minimized and test integrity is not compromised.

Under certain circumstances, it may be more efficient to administer some or all of the JPMs in "station-keeping" mode, in which the examiners remain in position at designated operating stations and the applicants, under escort, rotate through the various stations. Such arrangements would have to be agreed to by and coordinated with the facility licensee; moreover, the guidelines in Sections D.1.d and D.1.f would apply.

When JPMs or discussions are conducted in the control room, the examiners shall make every effort to accommodate and not interfere with normal shift operations. The chief examiner should request that the facility training manager notify the shift supervisor when the NRC will be conducting examination activities in the control room. If the number of persons or the noise level in the control room is excessive, the examiner should, if possible, move to a quieter location,

modify the sequence of the JPMs and return when the level of activity in the control room has abated, or ask the facility training manager to address the issue.

c. The examiner should encourage the applicant to sketch diagrams, flow paths, or other illustrations to aid in answering the examiner's questions. In all cases, the examiner shall collect the supporting material because it provides additional documentation to support a pass or fail decision (refer to ES-303). To facilitate copying, the applicant's drawings should be restricted to one side of separate sheets of 8.5-inch by 11-inch paper; the back of Form ES-303-1 or its attachments shall *not* be used for this purpose.

d. The examiner should encourage the applicant to use such material as facility forms, schedules, and procedures if they are relevant to the questions asked.

e. The examiner should keep in mind that the applicant's proficiency in every administrative topic and each control room and in-plant system should be deliberately evaluated in accordance with the operating test that was prepared in accordance with ES-301.

f. As stated in 10 CFR 55.45(a), the operating test requires the applicant to demonstrate an understanding of and the ability to perform the actions necessary to accomplish a representative sample from among 13 items listed in the rule. If the applicant correctly performs a JPM (including both critical and noncritical steps) and demonstrates familiarity with the equipment and procedures, the examiner should infer that the applicant's understanding of the system/task is adequate and refrain from asking follow-up questions. However, if the applicant fails to accomplish the task standard for the JPM, exhibits behavior that demonstrates a lack of familiarity with the equipment and procedures, or is unable to locate information, control board indications, or controls, the examiner should ask performance-based follow-up questions as necessary to clarify or confirm the applicant's understanding of the system as it relates to the task that was performed.

Similarly, if the applicant gives an ambiguous answer to a prescripted administrative question in Category A, the examiner is expected to ask probing questions to ensure that the applicant understood the original question and the applicable knowledge or ability. The examiner shall document all performance-based questions and answers for later evaluation.

If the applicant exceeds twice the validated time estimate for any JPM (including time-critical) because he or she has selected an incorrect procedure or operated the wrong equipment (despite being presented with sufficient plant feedback to correct the error), the examiner should stop the JPM, document the circumstances, and proceed with the next JPM. However, if the applicant is on the correct path but has simply stopped making progress toward completing a non-time-critical JPM, the examiner should ask the applicant to describe the work to be done and how long it should take to complete the JPM. If the applicant does not then make timely progress toward completing the described actions, the examiner should inform the applicant that the allowed time for the JPM has elapsed and the applicant will be evaluated on the work completed. The examiner should then proceed with the next JPM.

D. GRADING AND DOCUMENTATION INSTRUCTIONS

1. Review and Categorize Rough Notes and Documentation

a. Review the job performance measures (JPMs) and simulator scenarios that were performed and the prescripted Category A and performance-based followup questions that were asked. Evaluate all rough notes and documentation generated while administering the operating test to determine the areas in which the applicant was deficient. If the applicant generated or used any material (such as figures, drawings, flowcharts, or forms) during the operating test, the material may be used to aid in documenting the applicant's performance. If it contributes to an unsatisfactory performance evaluation, the material shall be appropriately marked and cross-referenced to the applicable deficiency and attached to the examination package for retention.

b. Verify the validity and technical accuracy of any performance-based questions that were asked during the operating test but had not been prescripted, as well as any unexpected events or actions that occurred during the simulator operating test. If necessary, work through the chief examiner to obtain any additional reference material that might be required to resolve any technical questions.

c. On the rough notes and documentation, label or highlight *every* action, response, note, or comment that may constitute a performance deficiency.

d. Label each deficiency related to the applicant's administrative and plant system knowledge and abilities with the alphanumeric code of the administrative topic (e.g., A.1) or the control room or plant system (e.g., B.1.c or B.2.a) to which it applies.

e. Review each simulator operating test performance deficiency. Using as a guide the competency and rating factor descriptions in Appendix D and on Form ES-303-3 (RO) or Form ES-303-4 (SRO), code each deficiency with the number and letter of the rating factor(s) it most accurately reflects (e.g., C.4.a). Whenever possible, attempt to identify the root cause of the applicant's deficiencies and code each deficiency with no more than two different rating factors. However, one significant deficiency may be coded with additional rating factors if the error can be shown, consistent with the criteria in Section D.3.b, to be relevant to each of the cited rating factors.

   As stated in ES-302, it is essential that the simulator operating test documentation is consistent and mutually supportive for all applicants in an operating crew. Operating errors that involved more than one applicant should be noted by each applicant's evaluating examiner. If the examination team members do not have the opportunity to discuss and compare their observations before leaving the site, the chief examiner shall schedule a conference call after the examiners return to their respective offices.

2. Evaluate the Applicant's Performance

After categorizing and coding the rough notes, review, evaluate, and grade the applicant's performance in operating test Category A, "Administrative Topics," Category B, "Control Room Systems/Facility Walk-Through," and Category C, "Integrated Plant Operations," as follows:

a. Form ES-303-1, Category A

Review the identified deficiencies and decide whether the applicant's knowledge and understanding of each administrative topic was satisfactory or unsatisfactory (refer to the discussion in Section B). Grade any JPMs that were used to evaluate the administrative topics as described in Section D.2.b below. Document the grade for each administrative topic by placing an "S" or "U" in the appropriate block on page 2 of Form ES-303-1. Document and justify every deficiency in accordance with Section D.3.

After grading all four of the topics in Category A, assess the applicant's topic grades and deficiencies and assign a single "S" or "U" grade for the category. If the applicant has a "U" in only one administrative topic, the examiner may fail the applicant in Category A depending on the safety significance of the identified deficiency. However, if the applicant has a "U" in two or more of the administrative topics, the examiner must assign a grade of "U" for Category A. Place the assigned grade in the "Administrative Topics" block of the "Operating Test Summary" on page 1 of Form ES-303-1. Enter "N/E" (not examined) if this category was waived in accordance with ES-204.

b. Form ES-303-1, Category B

On page 2 of the applicant's Form ES-303-1, enter the names of the systems and JPMs examined during operating test Subcategories B.1, "Control Room Systems," and B.2, "Facility Walk-Through."

To determine a grade for the systems/JPMs listed on Form ES-303-1, evaluate each deficiency coded in the rough notes for Category B. If the following criteria are met, assign a satisfactory grade by placing an "S" in the "Evaluation" column for that system/JPM; otherwise enter a "U":

- Time-critical JPMs must be completed within the allotted time. All other JPMs should normally be completed within twice the validated time estimate (refer to Section D.2.f of ES-302). The reason for terminating any JPM shall be documented in accordance with Section D.3

- The task standard for the JPM must be accomplished by correctly completing all of the critical steps.

  If the applicant initially missed a critical step, but later performed it correctly and accomplished the task standard without degrading the condition of the system or the plant, the applicant's performance on that JPM should be graded as satisfactory. However, the applicant's error shall be documented in accordance with Section D.3.

A. PURPOSE

This standard specifies the requirements, procedures, and guidelines for preparing site-specific written examinations for the initial licensing of reactor operator (RO) and senior reactor operator (SRO) applicants at power reactor facilities.

B. BACKGROUND

The content of the written licensing examinations for ROs and SROs is dictated by 10 CFR 55.41 and 55.43, respectively. Each examination shall contain a representative selection of questions concerning the knowledge, skills, and abilities (K/As) needed to perform duties at the desired license level.

The written operator licensing examination is administered in two sections, including a generic fundamentals examination (GFE) and a site-specific examination. The GFE covers those K/As that do not vary significantly among reactors of the same type (i.e., pressurized or boiling water) and is generally administered early in the license training process (refer to ES-205 for a description of the program). The instructions in this standard apply only to the site-specific examination.

Except as noted in Section D.1.b, the "Knowledge and Abilities Catalog[s] for Nuclear Power Plant Operators: Pressurized [and Boiling] Water Reactors," NUREG-1122 and -1123, respectively, provide the basis for developing content-valid licensing examinations. Each K/A stem statement has been linked to the applicable item number in 10 CFR 55.41 and/or 55.43. Preparing the license examination using the appropriate K/A catalog, in conjunction with the instructions in this NUREG, will ensure that the examination includes a representative sample of the items specified in the regulations.

C. RESPONSIBILITIES

1. Facility Licensee

The facility licensee will perform the following activities, as applicable, depending upon the examination arrangements confirmed with the NRC regional office (in accordance with ES-201) approximately four months before the scheduled examination date:

a. Prepare the proposed examination outline(s) in accordance with Section D.1, and submit the outline(s) to the NRC regional office for review and approval in accordance with ES-201.

b. Submit the reference materials necessary for the NRC regional office to prepare and/or validate the requested examination(s) (refer to ES-201, Attachment 2).

c. Prepare the proposed examination(s) in accordance with Sections D.2 through D.4, review the examination(s) in accordance with Section E, and submit the examination(s) to the NRC regional office in accordance with ES-201.

d. Meet with the NRC in the regional office or at the facility, when and as necessary, to review the proposed examination(s) and discuss potential changes (refer to ES-201).

e. Revise the proposed examination outline(s) and examination(s) as agreed upon with the NRC regional office; however, the NRC retains final authority to approve the examination.

f. Facility licensees that prepare the examination shall ensure that appropriate controls are implemented to keep the comprehensive audit or screening examination that is given at or near the end of the license training class (as well as any practice exams and quizzes that are developed after beginning work on the licensing examination) from compromising the integrity of the licensing examination. Examples of acceptable control measures are as follows (other methods may also be acceptable but will have to be reviewed and approved on a case-by-case basis):

- the facility licensee could prepare the audit examination using a systematic and random sampling process that is similar to that used to prepare the NRC licensing examination as discussed in Section D; or
- the facility licensee could prepare and finalize the audit examination (and any practice exams and quizzes) before it begins developing the NRC licensing examination outline as discussed in Section D; or
- the facility licensee could develop the audit (as well as any practice exams and quizzes) and the licensing examinations using independent examination teams; or
- the facility licensee could certify as part of the examination submittal that there is no question duplication between the facility licensee's audit and the NRC licensing examinations.

2. NRC Regional Office

The NRC regional office will perform the following activities:

a. Ensure that the examinations are prepared in accordance with Section D.

b. Ensure that the examinations are reviewed for quality as described in Section E.

c. Meet with the facility licensee, when and as appropriate, to prereview the examination(s) in accordance with ES-201.

D. EXAMINATION PREPARATION

1. Develop the Outline

Develop each written examination outline in accordance with the following general instructions:

a. Select the appropriate examination outline model for the licensing examination being developed (i.e., RO or SRO, BWR or PWR) from Forms ES-401-1 through ES-401-4; Form ES-401-5, "Generic Knowledge and Abilities Outline," applies to all examinations.

b. Systematically and randomly select specific K/A statements (e.g., K1.03 or A2.11) from NUREG-1122 (for PWRs) or -1123 (for BWRs) to complete each of the three tiers (i.e., Tier 1, Emergency and Abnormal Plant Evolutions; Tier 2, Plant Systems; and Tier 3, Generic Knowledges and Abilities) of the examination outline. In order to maintain examination consistency, the facility licensee's site-specific K/A list shall not be used in place of the K/A catalog. Attachment 1 provides an example of an acceptable methodology for randomly selecting 100 K/As within the defined structure of the examination outline. Other methodologies may be used provided they are reproducible and scrutable and yield an examination outline that is free of bias, adhere to the applicable examination model, and samples at the specific K/A statement level. The facility licensee shall, when it submits the examination outline to the NRC, describe (in sufficient detail for the NRC to confirm that it meets the systematic and random selection criteria) the process that was used to develop the examination outline. Examples of adequate documentation would include: (1) a statement that the facility licensee used the sampling process described in Attachment 1; (2) identification of the industry standard or widely-available commercial product that was used; or (3) a description or copy of the facility licensee's process document.

The topics for the generic K/A category in Tiers 1 and 2 (i.e., Column "G" on Forms ES-401-1 through ES-401-4) and the four K/A categories in Tier 3 (i.e., "Conduct of Operations," "Equipment Control," Radiation Control," and "Emergency Procedures/Plan") shall be selected from Section 2, "Generic Knowledges and Abilities," of the applicable K/A catalog. However, only those topics that are relevant to the selected evolution or system shall be included in the sample for Tiers 1 and 2.

If the systematic selection process identifies a K/A statement having an importance rating that is below 2.5, a K/A statement that clearly does not apply to the subject facility, a generic (Column "G") K/A statement for which it would not be possible to develop a Tier 1 or Tier 2 question, or a K/A category that contains no K/A statements, systematically and randomly select another K/A category and/or statement, as applicable. K/A statements with importance ratings below 2.5 may be justified on the basis of plant-specific priorities. Failure to train the applicants on a K/A statement is not an acceptable basis for rejecting the statement. The facility licensee shall document on Form ES-401-10, "Record of Rejected K/As," the basis for excluding from the examination outline any K/A statements that were randomly selected and submit the form to the NRC with the completed outline. Alternatively, if the facility licensee screened the entire K/A catalog to eliminate inapplicable K/A statements before beginning the random selection process, the facility licensee should make arrangements for the NRC regional office to review the associated documentation and justification prior to submitting the examination outline.

Enter the K/A statement numbers, a brief description of each topic, the topics' importance ratings for the license level of the exam, and the point totals (system, category, group, and tier) on the examination outline. The proposed point totals for each group and tier must match the number specified on Form ES-401-1, 2, 3, or 4, as applicable.

If a facility licensee proposes to use an outline that was previously used at the

subject or another facility, it shall identify the source of the outline and explain what effect its reuse is expected to have on examination integrity.

c. Special attention is required to ensure that the SRO examination tests at the appropriate license level and is distinguishable from the RO examination. The SRO outline shall include at least 25 K/A statements that relate to the topics in 10 CFR 55.43(b). The fact that a K/A is linked to both 55.41and 55.43 does not mean that the K/A cannot be used to develop an SRO-only question. Questions related to 55.41 topics may also be appropriate SRO-level questions if they evaluate knowledge and abilities at a level that is unique to the SRO job position as determined by the facility licensee's learning objectives. The fact that a particular K/A does not reference 55.43 does not disqualify the K/A from testing on the SRO written examination if the licensee has a learning objective. (When the NRC developed the current revision of NUREGs-1122 and -1123, it included at least one, but not an exhaustive, Part 55 cross-reference for every K/A.)

   If the SRO outline is being adapted from a previously-completed RO outline, it is important to note that a system or evolution that is in one group on the RO outline may not be in the same group on the SRO outline. Therefore, some of the RO K/A statements may have to be replaced if they cause a group point total to exceed the number specified on the SRO outline.

d. After systematically selecting 100 K/As for the examination, the examination author may identify up to ten additional K/As based on the facility licensee's site-specific task list or other plant-specific, high-priority topics (e.g., operating events or problems, PRA-identified risk-important systems and operator actions[1], and recent technological developments) that are appropriate for testing on the written examination. Enter the applicable information in the space provided at the bottom of Tier 2, Group 3 of the examination outline (i.e., the system/topic, an indication of which systematically selected K/A the plant-specific priority topic will replace, a brief explanation for making the substitution, and the proposed number of examination points applicable to the topic).

e. After completing the outline, check the selected K/As for balance of coverage within and across the three tiers. Ensure that every applicable K/A category is sampled at least twice within each of the three tiers so that a valid sample will likely be maintained in the event some questions are deleted as a result of post-examination comments. Similarly, ensure that no E/APE, system, or K/A category is over-sampled; e.g., avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities. Make any adjustments that might be necessary by systematically and randomly selecting replacement K/A statements. Also check the overall balance of the entire licensing examination, including the walk-through and the dynamic simulator test, and make any necessary adjustments. Document and justify all changes on Form ES-401-10 and submit the documentation with the completed outline.

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[1] Chapter 13 of NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," identifies a number of risk-important human actions that may be appropriate for examination. In determining important operator actions, do not overlook actions that are relied upon or result in specific events being driven to low risk contribution. This will help identify those human actions, assumed to be very reliable, that might otherwise not show up in a list of risk-dominant actions.

f. Review and submit the completed outline to the NRC chief examiner for review and approval in accordance with ES-201. Facility-developed outlines shall be independently reviewed by a facility supervisor or manager before being submitted to the NRC regional office in accordance with ES-201. Facility licensees are responsible for ensuring that contractor-prepared outlines meet the guidelines herein. The NRC must receive the outlines by the date agreed upon when the examination arrangements were confirmed (normally approximately 75 days before the scheduled examination date).

g. The NRC chief examiner will ensure that the outline is independently reviewed within five working days (or as otherwise agreed with the facility licensee) and provide comments and recommended changes, as appropriate. The NRC examiner shall review the sampling methodology, including all K/A rejections and changes, to ensure it is unbiased. The examiner shall also review and approve the site-specific item or topic substitutions. Refer to Section C.3 of ES-201 for additional guidance regarding outline reviews.

2. Select and Develop Questions

a. Prepare the site-specific written operator licensing examination using a combination of existing, modified, and new questions that match the specific K/A statements in the previously approved examination outline (refer to Item D.1 and ES-201) and the criteria summarized below. Ensure that the questions selected for Tier 3 maintain their focus on plant-wide generic knowledge and abilities and do not become an extension of Tier 2, "Plant Systems."

If it becomes necessary to deviate from the previously approved examination outline, discuss the proposed deviations with the NRC chief examiner and obtain concurrence. Be prepared to explain why the original proposal could not be implemented and why the proposed replacement is considered an acceptable substitute.

b. Ensure that each question is technically accurate and free of the following psychometric flaws that could diminish the validity of the examination. Appendix B provides a detailed discussion and examples of questions containing each of these and other errors; the parenthetic references identify the applicable sections of Appendix B and its Attachment 2. Appendices A and B contain more detailed instructions and guidelines for preparing and formatting content-valid examinations and should be referred to as necessary while preparing the examination.

- implausible distractors (C.2.g, h, k; D)
- confusing or ambiguous language (C.1.c; E)
- confusing or inappropriate negatives (C.2.e; E.3)
- collection of true/false statements (C.2.c; F)
- backward logic (C.1.h; G)
- specific determiners (C.2.m)

c. Ensure that the questions will differentiate between competent and less-than-competent applicants, that they are appropriate for the job level being examined, and that they are operationally oriented when possible. Refer to Appendix A (Section C.2) and Appendix B (Section C.1.a and Section B of Attachment 2) for

additional discussion of and examples to illustrate the concept of operational validity.

Establish a level of difficulty that discriminates between applicants who have and have not mastered the required knowledge, skills, and abilities. See Appendices A (Section C.3) and B (Section C.1.e and Section C of Attachment 2) for further guidance on setting individual test question level of difficulty. The applicants should be able to complete and review the examination within four hours (even though they will be given six hours to take the examination).

In order to maintain examination quality and consistency, between 50 and 60 percent of the questions on the examination shall be written at the comprehension/analysis level. The cognitive level of any question drawn directly from a bank will be counted at its face value. Refer to Appendix B (Section C.1.d and Section A of Attachment 2) for further guidance regarding the levels of knowledge and sample questions written at each level.

d. The 25 SRO-level questions shall evaluate the additional knowledge and abilities required for the higher license level per 10 CFR 55.43(b) or the facility licensee's learning objectives and should be distributed among the three tiers of the examination. Questions related to 10 CFR 55.41(b) topics may also be appropriate SRO-level questions if they evaluate knowledge and abilities at a level that is unique to the SRO job position. The SRO-only questions are not required to be written at the higher cognitive levels (comprehension/analysis) discussed in the previous item.

e. All test questions shall be in the multiple choice format described in Appendix B. Each question shall have four possible answer choices and be worth one point.

f. To avoid compromising the integrity and security of the examination and to enhance consistency, observe the following limits on bank use when preparing the examination:

- Take no more than 75 percent of the questions for the examination directly from the facility licensee's or ANY other written examination question bank without significant modification.
- If the bank contains more than one question that fits a specific K/A statement, randomly select from among the available questions unless there is an appropriate basis for selecting a specific question (e.g., higher cognitive level, better discrimination validity, more operationally oriented, or site-specific priority).
- Write at least 10 new questions at the comprehension and analysis level, as described in Appendix B.
- Select the remaining questions for the examination from the facility licensee's or ANY other bank, but significantly modify each question by changing the at least one pertinent condition in the stem and at least one distractor. Changing the conditions in the stem such that one of the three distractors in the original question becomes the correct answer would also be considered a significant modification. The intent or objective of

the question does not necessarily have to be changed. Adding or deleting irrelevant information and making minor changes (e.g., the unit number, component train, or power level when it makes no difference) would not be considered a significant modification to the question.

g. A technical reference and a cross-reference to the facility licensee's examination question bank, if applicable, shall be noted for every question. If the facility licensee has a learning objective applicable to the question, it should be referenced as well. However, the absence of a learning objective does not invalidate the question provided it has an appropriate K/A and technical reference. Refer to ES-201 for additional instructions regarding the documentation of the source of questions on facility-written examinations.

To facilitate the review process, examination authors should consider providing a brief explanation of why the answer is correct, and each of the distractors is plausible but incorrect. This ***optional*** practice increases the efficiency of the examination review process and promotes the detection and correction of problem questions before the examinations are administered.

Reference materials such as diagrams, sketches, and portions of facility procedures may be used on a selective basis as attachments to the written examination. Ensure that any reference material used in the examination is easy to read and clearly marked, provides an effective and objective way for the applicant to demonstrate knowledge of the topic or concept, and does not give away the answers to other questions on the examination.

Form ES-401-6 is a sample worksheet for use in preparing the written examination questions. Facility licensees may use that or a similar form to document the information related to each proposed question that is submitted to the NRC for review and approval.

3. Review and Submit the Examination

a. Review the entire examination to ensure that the criteria on Form ES-401-7, "Written Examination Quality Checklist," are satisfied.

b. Forward the examination package, including all proposed attachments, and the completed quality checklist to the first reviewer. Section E provides instructions for conducting the quality reviews.

Facility-developed examinations must be reviewed by a supervisor or manager before they are sent to the NRC regional office in accordance with ES-201. Facility authors shall submit their examinations for management review in time to support their delivery to the NRC regional office approximately 45 days before the scheduled examination date.

NRC examiners shall submit their examinations to the chief examiner for review at least one week before the scheduled prereview by the facility licensee (refer to ES-201).

4. Assemble the Examinations

a. Format the examinations using the one-question-per-page layout specified in Appendix B or by placing as many complete questions as possible on each page.

b. Use a cover sheet in the format shown in Form ES-401-8, "Site-Specific Written Examination Cover Sheet," for all RO and SRO written examinations. Fill out all items in the upper section of the cover sheet, except the name of the applicant, when preparing the examinations.

E. QUALITY REVIEWS

When reviewing questions, reviewers should try to put themselves in the position of the applicants by attempting to answer the questions without using reference material or referring to the answer key. Reviewers should ensure that the conditions and requirements posed in the question are complete and unambiguous, all necessary information is provided, all unnecessary information is deleted, the intended answer clearly follows from what is asked in the question, and the distractors are plausible.

1. Facility Management Review

If the examination was prepared by the facility licensee, it shall be independently reviewed by a supervisor or manager before it is submitted to the NRC regional office for review and approval in accordance with ES-201. The reviewer should evaluate the examination using the criteria on Form ES-401-7 and include the signed form in the examination package submitted to the NRC. Facility licensees are responsible for ensuring that contractor-prepared examinations meet the guidelines herein and are encouraged to verify the origin of the questions used to construct the examination.

2. NRC Examiner Review

a. The NRC regional office staff shall review the examination as soon as possible after receipt so that supervisory approval can be obtained before the final review with the facility licensee, which is normally scheduled about two weeks before the examination date. It is especially important that the region promptly review examinations prepared by a facility licensee because of the extra time that may be required if extensive changes are necessary. The chief examiner shall consolidate the comments from all NRC reviewers and submit one set of comments to the author or facility contact. Refer to Section C.3 of ES-201 for additional guidance regarding examination reviews.

b. If the NRC prepared the examination, the NRC chief examiner shall ensure that a second examiner independently reviews all examination questions for content, wording, operational validity, and level of difficulty. As a minimum, the independent reviewer shall check the items listed on Form ES-401-7. The facility reviewer blocks in Column "b" are not applicable for NRC-prepared examinations.

c. If the facility licensee developed the examination, the licensee is primarily responsible for ensuring compliance with the items listed on Form ES-401-7. However, the regional office staff is expected to take reasonable measures, including the selective review of reference materials, individual questions, and past examinations, to verify these items when reviewing the examination;

exclusive reliance on the facility author's and reviewer's initials is *not* adequate. Depending upon the expected technical quality of the examination and the time available before the scheduled review with the facility licensee, the regional office staff shall independently review and verify the technical accuracy of a sample of the written examination questions. The regional office staff shall also confirm that the question content for a selected sample of the questions accurately implements the intent of the associated K/A statement from the previously approved examination outline. The sample shall include at least 30 questions with an emphasis on those questions taken directly from the facility licensee's examination bank. If more than 20 percent of the sampled questions clearly do not match the intent of the associated K/A statement, the region shall verify the K/A conformance on the remainder of the examination and, as appropriate, discuss its findings with the operator licensing program office and facility licensee and assess the number of questions that were repeated from the applicants' audit examination and the last two NRC licensing examinations at the facility.

With regard to assessing the psychometric quality of the proposed examination questions, the regional office shall begin by systematically selecting a sample of questions for detailed review. The sample is based on the nominal 75/15/10 (bank/modified/new) question distribution discussed in Section D.2.f above and the question background information provided by the facility licensee (using Form ES-401-6 or similar method). The sample shall include 10 of the new questions on the examination and 20 additional questions that are randomly selected from among the remaining questions that have not been prevalidated through successful use on an NRC licensing examination administered at that facility since October 1, 1995. The regional office shall conduct and document the review of the 30 selected questions using Form ES-401-9, "Written Examination Review Worksheet."

When the sample review is complete, the chief examiner shall consult with the responsible supervisor and proceed as directed to evaluate the remainder of the examination.

d. There are no minimum or maximum limits on the number or scope of changes the regional office may direct the author or facility contact to make to the proposed examinations, provided that they are necessary to make the examinations conform with established acceptance criteria. All unacceptable flaws identified by using Form ES-401-9 (including questions that do not match the intent of the approved K/A or that are intended as SRO-only questions but are not at the SRO license level as discussed in Section D.2.d) shall be corrected by rewriting or replacing the questions before the examination is administered. Other flaws of a minor nature (e.g., editorial clarifications or enhancements) should, as time permits, be corrected before the examination is administered, but the NRC expects such corrections to be made before the question is deposited in any examination bank.

e. Upon supervisory approval, generally at least 14 days before the examinations are scheduled to be given, the chief examiner will review the written examinations with the facility licensee in accordance with ES-201.

When providing feedback to the facility licensee regarding unacceptable questions, the chief examiner shall, at a minimum, *explain* how the Appendix B psychometric quantitative and qualitative attributes are not being met. For

example, if the question is determined to have more than one implausible distractor, the attendant explanation shall articulate the reasons the examiner believes each of the faulty distractors is not credible.

Examinations that are written by the NRC shall be clean, properly formatted, and "ready-to-give" before they are reviewed with the facility licensee. The region shall not rely on the facility licensee to ensure that the quality of the examination is acceptable for administration.

f. After reviewing the examination with the facility licensee, the chief examiner will ensure that any comments and recommendations are resolved and the examination is revised as necessary. If the facility licensee developed the examination, it will generally be expected to make whatever changes are recommended by the NRC.

g. After the necessary changes have been made and the chief examiner is satisfied with the examination, he or she will sign the quality checklist and forward the examination package to the responsible supervisor for final approval. If the examination was written by the facility licensee, the chief examiner should include a copy of the original submittal with the examination package.

3. NRC Supervisory Review

a. The responsible supervisor shall review all questions determined to have unacceptable flaws in accordance with Form ES-401-9 before any comments are provided to the facility licensee. The responsible supervisor shall review the entire examination before authorizing the chief examiner to proceed with the facility prereview per ES-201. The supervisory review is not intended to be another technical review, but rather a general assessment of examination quality, including a review of the changes being recommended by the chief examiner, and a check to ensure that all the applicable administrative requirements have been implemented.

b. Based on the results of the sampling review conducted in accordance with Section E.2.c above, the responsible supervisor (in coordination with regional management and the NRR operator licensing program office, as appropriate) will continue the examination review as follows:

- If fewer than six of the 30 sampled questions contain unacceptable flaws as determined by using Form ES-401-9, then the regional office shall review in detail the remainder of the examination (excluding those questions that were prevalidated by the NRC) using Form ES-401-9 and provide comments to the facility licensee for rework and correction. The NRC-validated questions need not be reviewed in detail but will be evaluated as necessary to complete Form ES-401-7 (including the identification and correction of technical and psychometric flaws that cause the question to have no or multiple correct answers) before reviewing the examination with the facility licensee. The responsible supervisor will review and approve each comment that would require the facility licensee to rework an NRC-validated question.

- If six or more of the 30 sampled questions contain unacceptable flaws as determined by using Form ES-401-9, then the regional office may return the written examination (with explanatory comments) to the facility

licensee for rework and correction without reviewing the remainder of the examination (refer to Section C.2.h of ES-201 for additional guidance regarding examination delays). The facility licensee will be expected to correct the unacceptable flaws in the sampled questions and like-kind flaws that exist in the remainder of the examination. When the facility licensee resubmits the examination, every question (excluding the NRC-validated questions) will be subject to NRC review using Form ES-401-9. The NRC-validated questions will be reviewed as discussed above.

Alternatively, if the responsible supervisor concludes that the remainder of the examination (excluding the NRC-validated questions) can be reviewed and corrected in time for the scheduled examination date, the regional office should continue the review using Form ES-401-9 and provide comments to the facility licensee for correction.

c. The responsible supervisor should ensure that any significant deficiencies in the original examinations submitted by a facility licensee are evaluated in accordance with ES-201 to determine the appropriate course of action. At a minimum, the supervisor should ensure that they are addressed in the final examination report in accordance with ES-501.

d. Following the facility review, the responsible supervisor should again review the examination to ensure that the concerns expressed by the facility licensee and the NRC have been appropriately addressed. The supervisor shall not sign Form ES-401-7 until he or she is satisfied that the examination is acceptable to be administered.

4. Facility Peer Review

As a final check of the examination's technical accuracy, facility management should consider administering the NRC-approved examination (under security agreements) to one or more licensed personnel who were previously uninvolved in developing the examination. In light of examination security concerns, the NRC discourages the use of certain individuals (e.g., the applicants' supervisors or coworkers) to validate the examination. Any comments made and problems identified during the trial administration shall be discussed with the NRC chief examiner and resolved before the examination is administered to the license applicants. The intent of the review is to identify and correct deficiencies that may affect the validity of the examination.

F. ATTACHMENTS/FORMS

Attachment 1,	"Example Systematic Sampling Methodology"
Form ES-401-1,	"BWR SRO Examination Outline"
Form ES-401-2,	"BWR RO Examination Outline"
Form ES-401-3,	"PWR SRO Examination Outline"
Form ES-401-4,	"PWR RO Examination Outline"
Form ES-401-5,	"Generic Knowledge and Abilities Outline"
Form ES-401-6,	"Sample Written Examination Question Worksheet"
Form ES-401-7,	"Written Examination Quality Checklist"
Form ES-401-8,	"Site-Specific Written Examination Cover Sheet"
Form ES-401-9,	"Written Examination Review Worksheet"
Form ES-401-10	"Record of Rejected K/As"

The following process, which uses the BWR SRO outline (Form ES-401-1) for illustration, *may be used* for each group in Tiers 1 and 2 of the examination outline.

1. Review each group and delete those items (Emergency/Abnormal Plant Evolutions (E/APEs) for Tier 1 and systems for Tier 2) that clearly do not apply to the facility for which the examination is being written; be prepared to explain the basis for the deletions to the NRC chief examiner.

2. Sequentially number the remaining items in the group and sequentially annotate the same number of tokens. If we assume that none of the 20 E/APEs in Tier 1, Group 1 was deleted in Step 1, there should be 20 tokens, numbered from 1 to 20.

   a. If the number of items remaining in the group (in this case 20) is smaller than the required number of points for the group specified in the right hand column of the examination outline (in this case 26), then each item in the group would be sampled at least one time. The rest of the sample would be determined by randomly selecting and removing tokens (in this case 6 of the 20) until the required total number of points is reached. Update Form ES-401-1 to note the selected items.

   b. If the number of items remaining in the group is larger than the required number of points for the group (e.g., Tier 1, Group 2 has 20 items but only requires 17 points), then randomly select and remove the required number of tokens and note them on Form ES-401-1.

3. After selecting the topics to be sampled in each group as described in Step 2, count the number of K/A categories in the group (e.g., 6 for each group in Tier 1; i.e., K1, K2, K3, A1, A2, and G) and sequentially annotate the same number of tokens (in this case 6). For each E/APE (and system) selected in Step 2, randomly select and remove a token and note the K/A category on Form ES-401-1. If the E/APE (or system) was sampled more than once per Step 2.a, randomly select a second K/A category. If the selected K/A category contains no K/A statements having an importance rating that is above 2.5, systematically select another K/A category, unless the lower importance is justified based on plant-specific priorities. Then replace all the tokens in the container and repeat the process for every selected item in each group.

4. Use a similar method to randomly select from among the K/A statements under each selected K/A category. Describe each K/A topic in the space provided on Form ES-401-1 and enter the importance rating. K/As having importance ratings less than 2.5 can be used if justified based on plant priorities; the facility contact should be prepared to explain the basis to the NRC chief examiner.

For Tier 3 (Plant-Wide Generics) of the examination outline, randomly select K/As from Section 2 of the NRC K/A catalog so that each of the four K/A categories (i.e., "Conduct of Operations," "Equipment Control," Radiation Control," and "Emergency Procedures/Plan") has at least two items.

Facility: Date of Exam: Exam Level:

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1												26
	2												17
	Tier Totals												43
2. Plant Systems	1												23
	2												13
	3												4
	Tier Totals												40

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
					17

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	BWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							Form ES-401-1
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295003 Partial or Complete Loss of AC Pwr / 6									
295006 SCRAM / 1									
295007 High Reactor Pressure / 3									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1									
295016 Control Room Abandonment / 7									
295017 High Off-site Release Rate / 9									
295023 Refueling Accidents Cooling Mode / 8									
295024 High Drywell Pressure / 5									
295025 High Reactor Pressure / 3									
295026 Suppression Pool High Water Temp. / 5									
295027 High Containment Temperature / 5									
295030 Low Suppression Pool Water Level / 5									
295031 Reactor Low Water Level / 2									
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1									
295038 High Off-site Release Rate / 9									
500000 High Containment Hydrogen Conc. / 5									
K/A Category Totals:							Group Point Total:		26

ES-401	BWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-1
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4									
295002 Loss of Main Condenser Vacuum / 3									
295004 Partial or Total Loss of DC Pwr / 6									
295005 Main Turbine Generator Trip / 3									
295008 High Reactor Water Level / 2									
295011 High Containment Temperature / 5									
295012 High Drywell Temperature / 5									
295018 Partial or Total Loss of CCW / 8									
295019 Partial or Total Loss of Inst. Air / 8									
295020 Inadvertent Cont. Isolation / 5 & 7									
295021 Loss of Shutdown Cooling / 4									
295022 Loss of CRD Pumps / 1									
295028 High Drywell Temperature / 5									
295029 High Suppression Pool Water Level / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
600000 Plant Fire On Site / 8									
K/A Category Point Totals:							Group Point Total:		17

ES-401	BWR SRO Examination Outline Plant Systems - Tier 2/Group 1												Form ES-401-1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201005 RCIS														
202002 Recirculation Flow Control														
203000 RHR/LPCI: Injection Mode														
206000 HPCI														
207000 Isolation (Emergency) Condenser														
209001 LPCS														
209002 HPCS														
211000 SLC														
212000 RPS														
215004 Source Range Monitor														
215005 APRM / LPRM														
216000 Nuclear Boiler Instrumentation														
217000 RCIC														
218000 ADS														
223001 Primary CTMT and Auxiliaries														
223002 PCIS/Nuclear Steam Supply Shutoff														
226001 RHR/LPCI: CTMT Spray Mode														
239002 SRVs														
241000 Reactor/Turbine Pressure Regulator														
259002 Reactor Water Level Control														
261000 SGTS														
262001 AC Electrical Distribution														
264000 EDGs														
290001 Secondary CTMT														
K/A Category Point Totals:												Group Point Total:		23

ES-401	BWR SRO Examination Outline Plant Systems - Tier 2/Group 2	Form ES-401-1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201001 CRD Hydraulic														
201002 RMCS														
201004 RSCS														
201006 RWM														
202001 Recirculation														
204000 RWCU														
205000 Shutdown Cooling														
214000 RPIS														
215002 RBM														
215003 IRM														
219000 RHR/LPCI: Torus/Pool Cooling Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
234000 Fuel Handling Equipment														
239003 MSIV Leakage Control														
245000 Main Turbine Gen. and Auxiliaries														
259001 Reactor Feedwater														
262002 UPS (AC/DC)														
263000 DC Electrical Distribution														
271000 Offgas														
272000 Radiation Monitoring														
286000 Fire Protection														
290003 Control Room HVAC														
300000 Instrument Air														
400000 Component Cooling Water														
K/A Category Point Totals:												Group Point Total:		13

ES-401	BWR SRO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201003 Control Rod and Drive Mechanism														
215001 Traversing In-core Probe														
233000 Fuel Pool Cooling and Cleanup														
239001 Main and Reheat Steam														
256000 Reactor Condensate														
268000 Radwaste														
288000 Plant Ventilation														
290002 Reactor Vessel Internals														
K/A Category Point Totals:												Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total (limit 10):			

Facility: Date of Exam: Exam Level:

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1												13
	2												19
	3												4
	Tier Totals												36
2. Plant Systems	1												28
	2												19
	3												4
	Tier Totals												51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
					13

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							Form ES-401-2
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295005 Main Turbine Generator Trip / 3									
295006 SCRAM / 1									
295007 High Reactor Pressure / 3									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1									
295024 High Drywell Pressure / 5									
295025 High Reactor Pressure / 3									
295031 Reactor Low Water Level / 2									
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1									
500000 High Containment Hydrogen Conc. / 5									
K/A Category Totals:							Group Point Total:		13

ES-401	BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-2	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4									
295002 Loss of Main Condenser Vacuum / 3									
295003 Partial or Complete Loss of AC Pwr / 6									
295004 Partial or Complete Loss of DC Pwr / 6									
295008 High Reactor Water Level / 2									
295011 High CTMT Temperature / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295016 Control Room Abandonment / 7									
295017 High Off-site Release Rate / 9									
295018 Partial or Complete Loss of CCW / 8									
295019 Part. or Comp. Loss of Inst. Air / 8									
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295026 High Suppression Pool Water Temp. / 5									
295027 High Containment Temperature / 5									
295028 High Drywell Temperature / 5									
295029 High Suppression Pool Water Level / 5									
295030 Low Suppression Pool Water Level / 5									
295033 High Sec. Cont. Area Rad. Levels / 9									
295034 Sec. Cont. Ventilation High Rad. / 9									
295038 High Off-site Release Rate / 9									
600000 Plant Fire On Site / 8									
K/A Category Point Totals:							Group Point Total:		19

ES-401	BWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3							Form ES-401-2	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
295021 Loss of Shutdown Cooling / 4									
295023 Refueling Accidents / 8									
295032 High Secondary Containment Area Temperature / 5									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
K/A Category Point Totals:							Group Point Total:		4

ES-401	BWR RO Examination Outline Plant Systems - Tier 2/Group 1												Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201001 CRD Hydraulic														
201002 RMCS														
201005 RCIS														
202002 Recirculation Flow Control														
203000 RHR/LPCI: Injection Mode														
206000 HPCI														
207000 Isolation (Emerg.) Condenser														
209001 LPCS														
209002 HPCS														
211000 SLC														
212000 RPS														
215003 IRM														
215004 SRM														
215005 APRM / LPRM														
216000 Nuclear Boiler Instrumentation														
217000 RCIC														
218000 ADS														
223001 Primary CTMT and Auxiliaries														
223002 PCIS/Nuclear Steam Supply Shutoff														
239002 SRVs														
241000 Reactor/Turbine Pressure Regulator														
259001 Reactor Feedwater														
259002 Reactor Water Level Control														
261000 SGTS														
264000 EDGs														
K/A Category Point Totals:												Group Point Total:		28

ES-401	BWR RO Examination Outline Plant Systems - Tier 2/Group 2												Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
201003 Control Rod and Drive Mechanism														
201004 RSCS														
201006 RWM														
202001 Recirculation														
204000 RWCU														
205000 Shutdown Cooling														
214000 RPIS														
215002 RBM														
219000 RHR/LPCI: Torus/Pool Cooling Mode														
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
239001 Main and Reheat Steam														
245000 Main Turbine Gen. and Auxiliaries														
256000 Reactor Condensate														
262001 AC Electrical Distribution														
262002 UPS (AC/DC)														
263000 DC Electrical Distribution														
271000 Offgas														
272000 Radiation Monitoring														
286000 Fire Protection														
290001 Secondary CTMT														
290003 Control Room HVAC														
300000 Instrument Air														
400000 Component Cooling Water														
K/A Category Point Totals:												Group Point Total:		19

ES-401	BWR RO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
215001 Traversing In-core Probe														
233000 Fuel Pool Cooling and Cleanup														
234000 Fuel Handling Equipment														
239003 MSIV Leakage Control														
268000 Radwaste														
288000 Plant Ventilation														
290002 Reactor Vessel Internals														
K/A Category Point Totals:												Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: Date of Exam: Exam Level:

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1												24
	2												16
	3												3
	Tier Totals												43
2. Plant Systems	1												19
	2												17
	3												4
	Tier Totals												40

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	17

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							Form ES-401-3
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000005 Inoperable/Stuck Control Rod / 1									
000011 Large Break LOCA / 3									
W/E04 LOCA Outside Containment / 3									
W/EO1 & E02 Rediagnosis & SI Termination / 3									
000015/17 RCP Malfunctions / 4									
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
000024 Emergency Boration / 1									
000026 Loss of Component Cooling Water / 8									
000029 Anticipated Transient w/o Scram / 1									
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
000051 Loss of Condenser Vacuum / 4									
000055 Station Blackout / 6									
000057 Loss of Vital AC Elec. Inst. Bus / 6									
000059 Accidental Liquid RadWaste Rel. / 9									
000062 Loss of Nuclear Service Water / 4									
000067 Plant Fire On-site / 9									
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									
BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9									
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:							Group Point Total:		24

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-3	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4									
W/E11 Loss of Emergency Coolant Recirc. / 4									
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000027 Pressurizer Pressure Control System Malfunction / 3									
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000037 Steam Generator Tube Leak / 3									
000038 Steam Generator Tube Rupture / 3									
000054 (CE/E06) Loss of Main Feedwater / 4									
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000058 Loss of DC Power / 6									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
W/E16 High Containment Radiation / 9									
000065 Loss of Instrument Air / 8									
CE/E09 Functional Recovery									
K/A Category Point Totals:							Group Point Total:		16

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3							Form ES-401-3
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									
000036 (BW/A08) Fuel Handling Accident / 8									
000056 Loss of Off-site Power / 6									
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
K/A Category Point Totals:							Group Point Total:		3

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 1												Form ES-401-3	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive														
003 Reactor Coolant Pump														
004 Chemical and Volume Control														
013 Engineered Safety Features Actuation														
014 Rod Position Indication														
015 Nuclear Instrumentation														
017 In-core Temperature Monitor														
022 Containment Cooling														
025 Ice Condenser														
026 Containment Spray														
056 Condensate														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater														
063 DC Electrical Distribution														
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
K/A Category Point Totals:												Group Point Total:		19

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant														
006 Emergency Core Cooling														
010 Pressurizer Pressure Control														
011 Pressurizer Level Control														
012 Reactor Protection														
016 Non-nuclear Instrumentation														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
035 Steam Generator														
039 Main and Reheat Steam														
055 Condenser Air Removal														
062 AC Electrical Distribution														
064 Emergency Diesel Generator														
073 Process Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
103 Containment														
K/A Category Point Totals:												Group Point Total:		17

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
076 Service Water														
078 Instrument Air														
K/A Category Point Totals:												Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: Date of Exam: Exam Level:

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1												16
	2												17
	3												3
	Tier Totals												36
2. Plant Systems	1												23
	2												20
	3												8
	Tier Totals												51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
					13

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1									
000015/17 RCP Malfunctions / 4									
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4									
000024 Emergency Boration / 1									
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3									
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
CE/A11; W/E08 RCS Overcooling - PTS / 4									
000051 Loss of Condenser Vacuum / 4									
000055 Station Blackout / 6									
000057 Loss of Vital AC Elec. Inst. Bus / 6									
000062 Loss of Nuclear Service Water / 4									
000067 Plant Fire On-site / 9									
000068 (BW/A06) Control Room Evac. / 8									
000069 (W/E14) Loss of CTMT Integrity / 5									
000074 (W/E06&E07) Inad. Core Cooling / 4									
BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9									
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:							Group Point Total:		16

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-4
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1									
000003 Dropped Control Rod / 1									
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3									
W/E04 LOCA Outside Containment / 3									
BW/E08; W/E03 LOCA Cooldown/Depress. / 4									
W/E11 Loss of Emergency Coolant Recirc. / 4									
W/EO1 & E02 Rediagnosis & SI Termination / 3									
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000029 Anticipated Transient w/o Scram / 1									
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000037 Steam Generator Tube Leak / 3									
000038 Steam Generator Tube Rupture / 3									
000054 (CE/E06) Loss of Main Feedwater / 4									
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000058 Loss of DC Power / 6									
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7									
W/E16 High Containment Radiation / 9									
CE/E09 Functional Recovery									
K/A Category Point Totals:							Group Point Total:		17

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3							Form ES-401-4
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									
000036 (BW/A08) Fuel Handling Accident / 8									
000056 Loss of Off-site Power / 6									
000065 Loss of Instrument Air / 8									
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5									
K/A Category Point Totals:							Group Point Total:		3

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 1											Form ES-401-4		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive														
003 Reactor Coolant Pump														
004 Chemical and Volume Control														
013 Engineered Safety Features Actuation														
015 Nuclear Instrumentation														
017 In-core Temperature Monitor														
022 Containment Cooling														
025 Ice Condenser														
056 Condensate														
059 Main Feedwater														
061 Auxiliary/Emergency Feedwater														
068 Liquid Radwaste														
071 Waste Gas Disposal														
072 Area Radiation Monitoring														
K/A Category Point Totals:												Group Point Total:		23

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 2												Form ES-401-4	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant														
006 Emergency Core Cooling														
010 Pressurizer Pressure Control														
011 Pressurizer Level Control														
012 Reactor Protection														
014 Rod Position Indication														
016 Non-nuclear Instrumentation														
026 Containment Spray														
029 Containment Purge														
033 Spent Fuel Pool Cooling														
035 Steam Generator														
039 Main and Reheat Steam														
055 Condenser Air Removal														
062 AC Electrical Distribution														
063 DC Electrical Distribution														
064 Emergency Diesel Generator														
073 Process Radiation Monitoring														
075 Circulating Water														
079 Station Air														
086 Fire Protection														
K/A Category Point Totals:												Group Point Total:		20

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-4

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal														
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
034 Fuel Handling Equipment														
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator														
076 Service Water														
078 Instrument Air														
103 Containment														
K/A Category Point Totals:												Group Point Total:		8

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility:	Date of Exam:			Exam Level:
Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.			
	2.1.			
	2.1.			
	2.1.			
	2.1.			
	2.1.			
	Total			
Equipment Control	2.2.			
	2.2.			
	2.2.			
	2.2.			
	2.2.			
	2.2.			
	Total			
Radiation Control	2.3.			
	2.3.			
	2.3.			
	2.3.			
	2.3.			
	2.3.			
	Total			
Emergency Procedures/ Plan	2.4.			
	2.4.			
	2.4.			
	2.4.			
	2.4.			
	2.4.			
	Total			
Tier 3 Point Total (RO/SRO)				13/17

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	_____	_____
Group #	_____	_____
K/A #	_____	_____
Importance Rating	_____	_____

Proposed Question:

Proposed Answer: _____

Explanation (Optional):

Technical Reference(s): _____ (Attach if not previously provided)
_____

Proposed references to be provided to applicants during examination: _____

Learning Objective: _____ (As available)

Question Source:
Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____
(Optional - Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

Question Cognitive Level:
Memory or Fundamental Knowledge _____
Comprehension or Analysis _____

10 CFR Part 55 Content:
55.41 _____
55.43 _____

Comments:

Facility:	Date of Exam:	Exam Level: RO/SRO

Item Description					Initial a	Initial b*	Initial c#
1.	Questions and answers technically accurate and applicable to facility						
2.	a. NRC K/As referenced for all questions b. Facility learning objectives referenced as available						
3.	RO/SRO overlap is no more than 75 percent, and SRO questions are appropriate per Section D.2.d of ES-401						
4.	Question selection and duplication from the last two NRC licensing exams appears consistent with a systematic sampling process						
5.	Question duplication from the license screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate: __ the audit exam was systematically and randomly developed; or __ the audit exam was completed before the license exam was started; or __ the examinations were developed independently; or __ the licensee certifies that there is no duplication; or __ other (explain)						
6.	Bank use meets limits (no more than 75 percent from the bank at least 10 percent new, and the rest modified); enter the actual question distribution at right	Bank	Modified	New			
7.	Between 50 and 60 percent of the questions on the exam (including 10 new questions) are written at the comprehension/analysis level; enter the actual question distribution at right	Memory	C/A				
8.	References/handouts provided do not give away answers						
9.	Question content conforms with specific K/A statements in the previously approved examination outline and is appropriate for the Tier to which they are assigned; deviations are justified						
10.	Question psychometric quality and format meet ES, Appendix B, guidelines						
11.	The exam contains 100, one-point, multiple choice items; the total is correct and agrees with value on cover sheet						

	Printed Name / Signature	Date
a. Author		
b. Facility Reviewer (*)		
c. NRC Chief Examiner (#)		
d. NRC Regional Supervisor		

Note: * The facility reviewer's initials/signature are not applicable for NRC-developed examinations.
Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required.

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information	
Name:	Region: I / II / III / IV
Date:	Facility/Unit:
License Level: RO / SRO	Reactor Type: W / CE / BW / GE
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

Results	
Examination Value	_____ Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	U/E/S	Explanation

Instructions

[Refer to Section D of ES-401 and Appendix B for additional information regarding each of the following concepts.]

1. Enter the level of knowledge (LOK) of each question as either (F)undamental or (H)igher cognitive level.

2. Enter the level of difficulty (LOD) of each question using a 1 - 5 (easy - difficult) rating scale (questions in the 2 - 4 range are acceptable).

3. Check the appropriate box if a psychometric flaw is identified:
   - The stem lacks sufficient focus to elicit the correct answer (e.g., unclear intent, more information is needed, or too much needless information).
   - The stem or distractors contain cues (i.e., clues, specific determiners, phrasing, length, etc).
   - The answer choices are a collection of unrelated true/false statements.
   - More than one distractor is not credible.
   - One or more distractors is (are) partially correct (e.g., if the applicant can make unstated assumptions that are not contradicted by stem).

4. Check the appropriate box if a job content error is identified:
   - The question is not linked to the job requirements (i.e., the question has a valid K/A but, as written, is not operational in content).
   - The question requires the recall of knowledge that is too specific for the closed reference test mode (i.e., it is not required to be known from memory).
   - The question contains data with an unrealistic level of accuracy or inconsistent units (e.g., panel meter in percent with question in gallons).
   - The question requires reverse logic or application compared to the job requirements.

5. Check questions that are sampled for conformance with the approved K/A and those that are designated SRO-only (K/A and license level mismatches are unacceptable).

6. Based on the reviewer's judgment, is the question as written (U)nacceptable (requiring repair or replacement), in need of (E)ditorial enhancement, or (S)atisfactory?

7. At a minimum, explain any "U" ratings (e.g., how the Appendix B psychometric attributes are not being met).

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	U/E/S	Explanation

Tier / Group	Randomly Selected K/A	Reason for Rejection

4. Complete the Examination

a. As the applicants complete the examination, ensure that they sign the examination cover sheet and staple it on top of their answer sheets. Collect the examination packages, including the questions and answer sheets, and any reference material provided with the examination. Verify that all applicants have entered their names on both the answer and cover sheets, and record the official start time and the time at which each applicant completed the examination in the space provided on the examination cover sheet.

b. Retain the cover and answer sheets for grading in accordance with ES-403. The question books may be distributed to the applicants after the last examination has been collected.

c. Remind the applicants to leave the examination area, as previously defined.

d. When six hours have elapsed, instruct the remaining applicants to stop work, sign their examination cover sheets, and turn in their examinations. The time allowed to complete the examination shall not be extended without prior approval by the NRC regional office. Under extenuating circumstances, the regional office may authorize additional time in 30-minute increments.

e. Deliver the completed examination packages, the marked-up master examinations, the list of applicant questions and answers, and the seating chart to the NRC chief examiner or the appropriate facility representative, as applicable, for review and grading in accordance with ES-403.

E. POST-EXAMINATION REVIEWS

1. If the NRC administered the examination, the chief examiner shall ensure that the master copy of the examination reflects all changes made to questions during the administration of the examination. The chief examiner will then provide a copy of the master examination and answer key to the facility staff and answer any questions they may have regarding the NRC's examination review and comment process.

2. If the NRC developed the examination, the chief examiner will also provide the facility licensee with a copy of the examination as edited during the facility prereview. If the facility reviewers believe that the NRC did not adequately resolve the prereview comments, they should address those concerns in a formal comment letter.

3. The NRC chief examiner will request that the facility prereviewers confirm that they did not divulge any information about the examination(s) by having them sign the post-examination security statement (Form ES-201-3) after the examinations are completed.

4. The facility licensee should submit formal comments within five working days after the examination is administered. However, the facility licensee may expedite the grading process by giving draft comments to the NRC chief examiner before he or she leaves

the site. The NRC will consider comments not submitted within the requested time on a case-by-case basis; however, late comments may delay the examination grading process.

The facility licensee is also encouraged to collect and consider comments from the license applicants and include them in its submittal to the NRC.

5. The facility licensee should submit all comments in the following format:

   - List the question, answer, and reference.
   - State the comment and make a recommendation whether the answer should be changed or the question should be deleted. If the facility licensee does not support an applicant's comment, it should briefly explain the reason for its rejection.
   - Support the comment with a reference, and provide a copy if it was not included in the original reference material submittal. (Note: The NRC will not change the examination without a reference to support the facility's comment.)

6. Formal comments should be signed by an authorized facility representative and addressed to the responsible NRC regional office, with a copy to the NRC chief examiner.

correct or there is no correct answer, the question shall be deleted. Annotate the recommended changes on the master examination and answer key and document the reason for every change or deletion.

c. Those applicant questions, facility comments, and recommendations that do not result in answer key changes or question deletions, should be evaluated to determine if the associated test questions might benefit from editorial changes before they are used on another examination.

d. Before depositing the questions in any examination bank, revise the questions to incorporate all changes, comments, and enhancements, as appropriate.

2. Grade the Examinations

a. Copy each applicant's answer sheet, and set the copies aside for later use during the grading review process.

d. On each applicant's original answer sheet, indicate in *red pen or pencil* which questions were answered incorrectly, note their correct answers, and indicate which questions (if any) were deleted. If the answer sheet is more than one page long, it is helpful to note the total number of incorrect answers on each page to aid in tabulating the final grade.

If the examinations are graded by machine, attach a copy of each applicant's profile report to his or her answer sheet, or manually annotate the answer sheet as noted above.

c. If it is necessary to change a grade during the grading process, do so by lining out the original grade in such a way that it remains legible. Briefly explain the reason for the change on the applicant's answer sheet, and initial the change. Under no circumstances will a grader use "white-out" or other methods that obscure the change.

d. After grading all the questions, enter the "Examination Value" (i.e., the original test point total minus the point value of any deleted questions), the "Applicant's Score," and the "Applicant's Grade" (i.e., the Applicant's Score divided by the Examination Value) in the "Results" section of the applicant's written examination cover sheet.

If a facility chooses to share its preliminary grades with the applicants, it should caution them that the outcome may change if the NRC does not accept all of the facility licensee's recommended changes to the examination answer key.

3. Evaluate and Review the Grading

a. Evaluate the applicants' performance on each examination question to identify any indications of a problem with the question or a deficiency in the applicants' training program. A table that summarizes the applicants' answers on each question, or a computerized item analysis (if the examinations were graded by machine) may be used to identify items with which the applicants had problems.

If it appears that a test question was faulty, determine whether the question should be deleted, the answer key should be changed, and/or the question should be revised before reuse. Then regrade the examinations as necessary.

If it appears that the training program was deficient, determine the need for remedial training and/or a program upgrade.

b. After evaluating the examinations, review the grading *in detail* and complete Form ES-403-1, "Examination Grading Quality Checklist."

c. Forward the examination package (i.e., the master examination and answer key, justification for any examination changes, any item analysis that was performed, the applicant's examination cover and answer sheets (the graded original and one clean copy), and Form ES-403-1) to the designated facility representative (if applicable) or to the NRC chief examiner for review in accordance with ES-501.

E. ATTACHMENTS/FORMS

Form ES-403-1, "Written Examination Grading Quality Checklist"

Facility:	Date of Exam:	Exam Level: RO/SRO		
	Item Description	Initials a	b	c
1.	Clean answer sheets copied before grading			
2.	Answer key changes and question deletions justified and documented			
3.	Applicants' scores checked for addition errors (reviewers spot check > 25% of examinations)			
4.	Grading for all borderline cases (80% +/- 2%) reviewed in detail			
5.	All other failing examinations checked to ensure that grades are justified			
6.	Performance on missed questions checked for training deficiencies and wording problems; evaluate validity of questions missed by half or more of the applicants			

	Printed Name / Signature	Date
a. Grader		
b. Facility Reviewer(*)		
c. NRC Chief Examiner (*)		
d. NRC Supervisor (*)		

(*) The facility reviewer's signature is not applicable for examinations graded by the NRC; two independent NRC reviews are required.

A. PURPOSE

This standard describes and coordinates the activities that must be completed after the written examinations and operating tests have been administered and graded in accordance with the ES-300 and ES-400 series. Specifically, the standard includes instructions for assembling and reviewing the examination package, notifying the facility licensee and applicants of the examination results, preparing the examination report, and retaining examination records.

B. BACKGROUND

The goal of the NRR operator licensing program office is to complete licensing or denial actions within 30 days after the facility licensee submits the graded examinations or its formal written examination comments to the NRC. The NRC and facility licensee staffs should establish their priorities and schedules to achieve this goal.

Applicants must achieve a grade of 80 percent or greater on the written examination and a grade of "satisfactory" on all three categories of the operating test to qualify for a license.

C. RESPONSIBILITIES

1. Facility Licensee

a. If the facility licensee participated in developing, administering, and grading the examination, the licensee shall forward the following examination documentation to the NRC chief examiner ("addressee only") as soon as possible (when practical, within five working days) after the examinations were administered:

- the graded written examinations (i.e., each applicant's original answer and examination cover sheets) plus a clean copy of each applicant's answer sheet (ES-403)
- the master examination(s) and answer key(s), annotated to indicate any changes made while administering (ES-402) and grading the examination(s) (ES-403)
- any questions asked by and answers given to the applicants during the written examination (ES-402)
- any substantive comments made by the applicants after the written examination with an explanation why the comment was accepted or rejected (this item is encouraged but not required) (ES-402)
- the written examination seating chart (ES-402)
- a completed Form ES-403-1, "Written Examination Grading Quality Checklist" (ES-403 and Section D.1)
- the results of any written examination performance analysis that was performed, with recommended substantive changes (ES-403)
- original Form(s) ES-201-3, "Examination Security Agreement," with a pre- and post-examination signature by every individual who had detailed knowledge of any part of the written examination or operating tests before they were administered.

Refer to the referenced Examination Standards for a more detailed discussion of each documentation requirement.

b. If the facility licensee did not participate in developing, administering, and grading the examination, the licensee should submit comments and recommendations regarding the NRC-developed written examination to the NRC regional office as soon as possible (within five working days, when practical) after the exit meeting. The facility licensee should also include and consider comments made by the license applicants that took the examination. (Refer to ES-402 for more detailed instructions.)

2. NRC Regional Office

a. The NRC regional office shall ensure that the operating tests and written examinations are graded in accordance with ES-303 and ES-403, respectively.

b. The NRC regional office shall ensure that the examination results and licensing recommendations receive the required reviews and approvals in accordance with Section D, that the associated administrative requirements are completed in accordance with Section E, and that the required records are retained in accordance with Section F.

The regional office may use Form ES-501-1, "Post-Examination Check Sheet," to track completion of the administrative items after the examinations are administered.

c. NRC regional management should also review the overall examination results and any generic findings, deficiencies, or issues to determine if any follow-up action is required.

If the facility licensee recommends deleting or changing the answers to five percent or more of the questions on a written examination that it developed, the regional office should request that the facility licensee explain why so many post-examination changes were necessary and what actions will be taken to improve future license examinations.

If ten percent or more of the examination questions are deleted during the grading process, the region shall evaluate the remaining examination to ensure that the test outline sampling requirements in ES-401 are still satisfied. The training and assessment specialist on the program office staff should be consulted if the validity of the examination is in question.

If the content validity of the examination is affected (e.g., several knowledge and ability (K/A) topics are not covered, or the majority of the remaining K/As are associated with a small number of systems) as a result of deleting questions, NRR operator licensing program office will make a decision whether the examination should be voided.

E. EXAMINATION FOLLOW-UP

1. Notify Facility Licensee of Results

The NRC regional office will notify the facility licensee and applicants of the examination results (as described below) only after they are reviewed and approved by the licensing official.

a. The regional office should normally notify the facility licensee's designated representative of the examination results by telephone, and may confirm the results by mailing a copy of Form ES-501-2 under a separate cover letter. For each applicant that failed or had significant deficiencies that warrant further evaluation and retraining by the facility licensee, the regional office will also send to the facility licensee a copy of the applicant's Form ES-303-1 and written examination answer sheet. These form(s) shall *not* be placed in the public document room or distributed with the final examination report.

   If the written examinations were administered much before the operating tests and management has approved the results of those examinations, the regional office may notify the facility licensee of those results rather than waiting until the operating tests are completed.

b. After the licensing official has signed the license, denial, and notification letters, the regional office shall send each applicant's letter along with the following materials:

   - a copy of Forms ES-303-1, ES-303-2, and ES-D-1 (and Forms ES-D-2 if the applicant failed Category C of the operating test) reflecting the "as run" scenario conditions but *without* any rough examiner notes regarding the applicant's performance (pen-and-ink markups of the original, approved scenarios are acceptable)

   - a copy of the applicant's written examination cover and answer sheets (as well as a copy of the master written examination and answer key if the applicant failed the written examination)

c. The regional office shall send a copy of Form ES-501-2 to the NRR operator licensing program office. If any of the examinations are later regraded in response to an applicant's request for review (refer to ES-502), the original Form ES-501-2 on file in the regional office shall be corrected by lining out the old grade, entering the new grade, and initialing the change. Whenever a change is made, the regional office shall mail a copy of the revised form to the program office.

d. The responsible supervisor should consider phoning the facility licensee management counterpart to discuss the examination outcome and lessons learned. Any pertinent feedback on the examination process should be forwarded to the operator licensing program office for consideration.

2. Return the Facility Reference Material

If desired by the facility licensee, the NRC chief examiner shall ensure that the reference materials provided for NRC examiners to prepare for the examinations are returned as soon as possible. If none of the applicants failed the examination, the materials should be returned as soon as the licenses are issued. If any applicant was denied a license based on an examination failure, the reference materials should be retained pending expiration of the 20-day period during which the applicant may request a regrade. If an applicant requests a regrade in accordance with ES-502, the chief examiner shall determine what reference materials need to be retained and should return all unnecessary materials. All reference materials should be returned to the facility licensee within 30 days following the resolution of any appeals.

3. Prepare the Examination Report

The NRC chief examiner shall prepare the final examination report when all portions of the examination have been graded and documented. If the regional office delays some licensing actions in accordance with Section D.3, it should issue and later amend the examination report. The examiner should follow the principles in NRC Manual Chapter 0610*, "Power Reactor Inspection Reports," when preparing the report.

a. The final examination report shall document the following:

- whether or not the quality of the submitted examination material was within the range of acceptability expected by the NRC. This will be determined as follows:

  The NRC will evaluate the submitted written examination questions (RO and SRO combined) using the guidance in Sections E.2-3 of ES-401 to determine the percentage of submitted questions that required replacement or significant modification or that clearly did not conform with the intent of the approved K/A statement.

  The NRC will evaluate the submitted operating test material by combining the scenario events, JPMs, and prescripted questions (e.g., an operating test composed of 4 administrative JPMs, 2 prescripted questions, 10 walk-through JPMs, and 2 scenarios with 6 events or malfunctions each would total 28 proposed test items for evaluation). For the combined total, the NRC will determine the percentage of submitted test items that required replacement or significant modification to conform with the acceptance criteria in Section D of ES-301.

  Note: If the review indicated that a specific event in a scenario did not require significant, discriminatory operator actions, it should not be included in the total unless that event was one of the required minimum events for any of the applicants according to Form ES-301-5 or the whole scenario was inadequate. Specific malfunctions that were added to the scenarios to provide complications or distractions for other events should not be judged solely on their individual merits.

  If 20 percent or fewer of the test items for the submitted written examination and operating test (judged separately) required replacement

or significant modification, the report will simply state that the facility licensee's submittal was within the range of acceptability expected for a proposed examination. If applicable, an observation shall be included, indicating that the examination changes agreed upon between the NRC and the facility were made according to NUREG-1021.

Note: NRC-validated questions, JPMs, prescripted questions, and scenario events that required replacement or substantial modification will not be counted unless the reason for the current unacceptable flaw was caused by the facility licensee since the time the test item was previously approved by the NRC. (For example, the question's reference changed but the question was not revised accordingly.)

If more than 20 percent of the submitted test items (written exam and operating test judged separately) required replacement or significant modification, the report shall include a factual description of the test item changes (observations), including the type and number of test items replaced and significantly modified as a result of the joint NRC and facility licensee examination review process. The report shall also note that the overall submittal was outside the acceptable quality range expected by the NRC and that future examination submittals should incorporate any lessons learned from this effort.

Negative observations regarding the adequacy of the facility licensee's proposed examination (e.g., stating that the proposed examination was not adequate for administration) shall only be made if the examination was not the facility's first submittal to exceed the 20 percent threshold for unacceptable test items and the NRC operator licensing program office has concurred in the evaluation.

- any delay in administering the examination and the reason for the delay, and any extensions of the written examination time beyond six hours
- the results of the examination, including any significant grading deficiencies if the examinations were graded by the facility licensee
- an overview of the examination security measures and activities evaluated while preparing and administering the examinations and any examination security issues and incidents or other matters requiring facility attention (consistent with NRC enforcement policy)
- any other issues or findings discussed at the exit meeting

b. The report shall include (or cite the accession number for) the following items, as applicable:

- a copy of the final written examination(s) and answer key(s) with all changes (during and post-examination) incorporated
- a copy of the facility licensee's (and applicants') specific comments and

recommended changes regarding the written examination and operating tests that were administered

- the specific NRC explanation for accepting or rejecting each facility recommendation and a specific justification for every additional item deletion or change (Refer to Attachment 1 for examples of facility comments and NRC resolutions.)
- a simulation facility report (as described below, when applicable)

Generic comments submitted by the facility licensee about the examinations or the administration process should also be included in the report, with regional office responses, as appropriate.

c. The simulation facility report shall document the NRC examiners' evaluation of the performance or fidelity of the simulation facility during the preparation or conduct of the operating tests. A sample report is provided in Attachment 2.

All previously undocumented simulator deficiencies encountered while preparing or conducting the operating tests should be described in sufficient detail to allow screening and classification during a simulation facility follow-up. The NRC examiners may include in the simulation facility report any concerns about physical fidelity (hardware or equipment discrepancies) or functional fidelity (performance of the simulation facility during normal, surveillance, abnormal, or emergency events). Each deficiency should include a description of the operation, event, or transient that was in progress, and how the simulation facility failed to accurately model the expected performance of the reference plant.

d. The applicants' names and specific grades (i.e., Form ES-501-2) shall *not* be published in the examination report.

e. The NRC regional office shall send the final examination report to the facility licensee and ensure that a copy is made available to the public.

4. Perform Other Activities

a. If an applicant did not complete the SRO upgrade training program or failed the upgrade examination, regional management should ensure that the RO licensee complies with the requirements of 10 CFR 55.53(e), (f), and (h) and 10 CFR 55.59(a) before resuming active duties as an RO.

b. The NRC regional office should also conduct a case-specific review of the SRO upgrade examination to determine if the applicant failed as a result of significant deficiencies in RO knowledge or abilities. Pursuant to 10 CFR 55.7, the NRC may, by rule, regulation, or order, impose upon any licensee additional requirements deemed appropriate or necessary to protect public health and to minimize danger to life and property. If the SRO upgrade applicant's deficiencies pose such a threat, the NRC may require the facility licensee to provide remedial training and reevaluation and to submit evidence of its completion to the NRC.

c. Once the licensing decisions are complete, the NRC examiners should discard any marked-up documentation or rough notes for those applicants receiving

licenses (except as noted below). In accordance with ES-502, NRC examiners should retain all applicable notes and documentation associated with proposed denials until the denials become final; this may include simulator operating test notes regarding crew members that passed the test if the notes contain information relevant to the failing applicant's performance. Examiners are advised that such notes would be subject to disclosure if requested under the Freedom of Information Act.

d. Agency policy requires that all documents that are not classified or otherwise protected (e.g., under the Privacy Act or Freedom of Information Act) be made available to the public. Therefore, the NRC regional office shall ensure that all documents associated with the licensing examination (i.e., those listed in Section F.1 below), excluding those containing the applicants' names or grades, are placed in the NRC's Public Electronic Reading Room. NRC Manual Chapter 0620, "Inspection Documents and Records," provides additional policies and guidance in this area.

F. NRC RECORD RETENTION

1. The NRC regional office shall ensure, for the last initial examination at each facility, that the original (whenever possible) or a copy of the following items are either retained in the facility's master examination file or are electronically available via the NRC's agencywide document access and management system (ADAMS). The italicized items should be retained or available for the last two examinations at each facility so examiners can verify compliance with the guidelines on test item repetition.

a. ES-201, Attachment 3, "Corporate Notification Letter"

b. ES-201, Attachment 4, "Examination Assignment Sheet," with pen-and-ink changes to identify the applicants that were actually examined

c. Form ES-201-1, "Examination Preparation Checklist"

d. the written examination and operating test outline(s), along with Form ES-201-2, "Examination Outline Quality Checklist," and Form ES-401-10, "Record of Rejected K/As"

e. the proposed NRC- or facility-developed written examination and operating tests (including comments made by the facility licensee or the NRC, as applicable)

f. *the final written examination and answer key* with all changes incorporated (the pen-and-ink corrections made for the applicants while the examination was administered may be changed to typewritten corrections; however, all changes shall be annotated in such a way that they are evident), Form ES-401-7, "Written Examination Quality Checklist," and Form ES-401-9, "Written Examination Review Worksheet"

g. *the as-given scenarios including Forms ES-D-1, "Scenario Outline,"* and ES-D-2, "Operator Actions," *for each scenario set administered, as well as the as-given walk-through tests including Forms ES-301-1, "Administrative Topics Outline,"*

and ES-301-2, "Control Room Systems and Facility Walk-Through Test Outline," and the JPMs *for each walk-through test* (all record copies should have the required signatures and reflect the "as run" test conditions; pen-and-ink markups of the original, approved forms are acceptable)

h. for each operating test administered: Form ES-301-3, "Operating Test Quality Checklist," Form ES-301-4, "Simulator Scenario Quality Checklist," Form ES-301-5, "Transient and Event Checklist," and Form ES-301-6, "Competencies Checklist"

i. Form ES-403-1, "Written Examination Grading Quality Checklist"

j. Form ES-501-2, "Power Plant Examination Results Summary Sheet"

k. *ES-501, Attachment 1, "Examination Report," with all enclosures*

l. Form ES-201-3, "Examination Security Agreements"

2. The NRC regional office shall place the following items in each applicant's docket file. (Note that these paper documents are official Agency records and need not be placed in ADAMS. If they are placed in ADAMS, the regional office shall exercise caution to ensure that they are not accessible to the public because they contain information that is protected under the Privacy Act.)

a. Forms ES-303-1, "Individual Examination Report," ES-303-2, "Operating Test Comments" (original copies, all pages, including strip charts and other attachments that support the licensing decision), and ES-D-1, "Scenario Outline," as well as Form(s) ES-D-2, "Operator Actions," if the applicant failed Category C of the operating test (all record copies should have the required signatures and reflect the "as run" test conditions; pen-and-ink markups of the original, approved forms are acceptable)

b. all correspondence with the applicant

c. the applicant's original written examination cover and answer sheets

G. ATTACHMENTS/FORMS

Attachment 1,	"Sample Facility Comments and NRC Resolutions"
Attachment 2,	"Sample Simulation Fidelity Report"
Attachment 3,	"Sample License Letters"
Attachment 4,	"Sample Proposed Denial Letter"
Attachment 5,	"Sample Notification Letter"
Form ES-501-1,	"Post-Examination Check Sheet"
Form ES-501-2,	"Power Plant Examination Results Summary"

Administration, Office of the General Counsel, at the same address. If the applicant requests a hearing, the NRC will not consider a reapplication pursuant to 10 CFR 55.35 until the denial is final.

2. Facility Licensee

a. The facility licensee is expected to provide reference materials and technical support as necessary for the NRC to evaluate and resolve any concerns raised by a license applicant who has requested the NRC to reconsider a proposed denial of an application or a license.

b. If the facility licensee prepared the examination, it should ensure that any written examination questions that are determined to be invalid (e.g., those that have no or multiple correct answers) are retrieved from any examination bank into which they have been deposited and corrected or discarded.

3. NRC

a. The NRC will conduct administrative reviews of Part 55 license application denials based on eligibility as described in Section D.1 below.

b. The NRC will conduct administrative reviews of Part 55 license denials based on examination failures as described in Section D.2 below.

c. The NRC will conduct Part 55 operator licensing hearings in accordance with Subpart L, "Administrative Hearing Procedures for Adjudications in Materials and Operator Licensing Proceedings," of 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders."

D. ADMINISTRATIVE REVIEW PROCEDURES

1. Application Denial

If an applicant requests an administrative review in accordance with Section C.1.a, the NRR operator licensing program office will generally complete its review of the applicant's eligibility within 60 days of receiving the request. When the review is completed, the applicant will be notified in writing if he or she will be allowed to take the license examination. If the review results in the original denial being sustained, the applicant may request a hearing pursuant to 10 CFR 2.103(b)(2).

2. Examination Results

If an applicant requests an administrative review in accordance with Section C.1.b, the review will generally be completed, as follows, within 75 days after the NRR operator licensing program office receives the request.

a. The NRR operator licensing program office will determine whether to: (1) review the appeal internally; (2) have the regional office review the appeal; or (3) convene a three-person board to review the applicant's documented contentions. The appeal board normally will be composed of a branch chief and two examiners or subject matter experts; it may include a representative from the affected region but no one who was involved with the applicant's licensing examination.

   For written examinations, the review shall focus only on those questions that are being contested. The review shall evaluate the original grading of the applicant's examination, the reference material supplied by the facility licensee, and the contentions and supporting documentation provided by the applicant.

   For operating tests, the review shall evaluate the examiner's comments, the examination report, the test that was administered, and the contentions and supporting documentation provided for review by the applicant or facility licensee (e.g., plant system descriptions, operating procedures, logs, chart recorder traces, and process computer printouts).

b. Based on the findings and recommendations from the review, a decision will be made whether to sustain or overturn the applicant's license examination failure. The NRR operator licensing program office will notify the applicant in writing of the results of the review.

c. When the NRR operator licensing program office has concurred in the results of the review, the NRC regional office will: (1) issue a license if the proposed denial was overturned; (2) review the examination results of the other applicants to determine if any of the licensing decisions are affected; (3) update the master examination file to reflect any test item deletions or answer key changes; and (4) consider the need to correspond with the facility licensee regarding the quality of the examination as discussed in Section C.2.c of ES-501.

NRC Letterhead

(Date)

(Name, Title)
(Name of facility)
(Street address)
(City, State, Zip code)

SUBJECT: REQUALIFICATION PROGRAM EVALUATION

Dear (Name):

In a telephone conversation on (date), (Name, title) and (Name, title) arranged to evaluate the requalification program and licensed personnel at the (facility name). The evaluation is scheduled for the week of (date). NRC examiners and evaluators from your facility will conduct requalification examinations, and the NRC will evaluate your requalification program in accordance with Sections ES-601 through ES-604 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 8. You are encouraged to ensure that your training staff and proposed examinees are familiar with these standards.

For the NRC to adequately prepare for this evaluation, the facility licensee will need to furnish the NRC with the approved items listed in Enclosure 1, "Reference Material Guidelines." You are also requested to submit, at your option, a proposed examination for use during the examination week. However, if you do submit a proposed examination, the personnel participating in its development will become subject to the security restrictions described in this letter.

Please review the guidance promulgated in Revision 8 of NUREG-1021 concerning the content and scope of simulator examination scenarios. The scenario examination bank should cover the entire spectrum of emergency operating procedures (EOPs), including alternative decision paths within the EOPs, and it should incorporate a range of failures with various degrees of severity for the same type of event. Each scenario should contain simultaneous events that require the senior reactor operators (SROs) to prioritize their actions and to assign particular tasks to other crew members. Each scenario should also require the SROs to decide when to make the transition between EOPs and which actions to take within EOPs.

You are requested to designate at least one employee to be a member of a joint NRC-facility examination team. That employee is expected to be an active SRO (as defined by 10 CFR 55.53(e) or (f)) from the (facility name) operations department. You are encouraged to designate a second employee from the training staff to be a member of the examination team. This employee should also be a licensed SRO, but may be a certified instructor. If desired and agreed to by the chief examiner, you may designate one additional employee from the training staff with appropriate qualifications to be a member of the examination team. In addition to these individuals, you will need to designate a simulator operator for scenario preview and validation during the on-site examination preparation week. In some cases, you may need to designate a simulator operator during the test item review period. All of these individuals will be subject to the examination security agreement.

The NRC restricts any facility licensee representatives under the security agreement from knowingly communicating by any means the content or scope of the examination to unauthorized persons and from participating in any facility licensee programs such as instruction, examination, or tutoring in which an identified requalification examinee will be present. These restrictions apply from the day that the facility licensee representative signs the examination security agreement indicating that the representative understands that he or she has specialized knowledge of the examination. The chief examiner will determine when a facility licensee representative has received specialized knowledge concerning the examination and will execute an examination security agreement. In most cases, the examination team members will not be required to enter into an examination security agreement more than 60 days before the examination week. The simulator operator will normally become subject to the security restrictions during the examination preparation and validation week; however, this may occur as much as 45 days before the examination week.

Sixty days before the examination administration date, please provide the NRC regional office with a proposed list of operators, including crew composition, for the examination. The list should include at least 12 operators, comprising three or more crews, and the current mailing address for each proposed operator, if different from that listed on the most recent Form 398 submitted to the NRC. Your training staff should send this information directly to the NRC chief examiner, ensuring that each operator's address is sent in a manner to ensure privacy.

The facility licensee may request that the NRC chief examiner or another NRC representative meet with the operators to be examined and the licensee managers during the examination preparation week, normally two weeks before the examination. However, if the schedule does not allow them to meet during the preparation week, they may meet at any mutually agreeable time. The NRC examiner will explain the examination and grading processes and will respond to any questions that the operators may have about the NRC's examination procedures. If such a meeting is desired, your training staff should schedule it with the NRC chief examiner.

The facility licensee staff is responsible for providing adequate space and accommodations to properly develop and conduct the examinations. Enclosure 2, "Administration of Requalification Examinations," describes our requirements for developing and conducting the examinations. Also, a facility operations management representative above a shift supervisor level should observe the simulator examination process at the site.

This letter contains information collections that are subject to the *Paperwork Reduction Act of 1995* (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget, approval number 3150-0018, which expires on April 30, 2003.

The public reporting burden for this collection of information is estimated to average 25 hours per response, including the time for reviewing instructions, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments on any aspect of this collection of information, including suggestions for reducing the burden, to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or by Internet electronic mail at bjs1@nrc.gov; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0018), Office of Management and Budget, Washington, D.C. 20503.

A. PURPOSE

This standard describes the requirements for maintaining an NRC operator's license and the procedures for processing license renewal applications, requests for administrative reviews and hearings by licensed operators in connection with failures of NRC-conducted requalification examinations, and denials of applications for license renewal.

B. BACKGROUND

The renewal license application differs in some respects from the initial license application. The staff developed this standard to establish the procedures for processing operators' renewal applications and requests for administrative reviews and hearings regarding the denial of renewal applications as a result of failures on an NRC-conducted requalification examination.

C. LICENSE MAINTENANCE

1. Requalification Training

A licensed operator must, in accordance with 10 CFR 55.53(h), complete a requalification training program as described by 10 CFR 55.59. The facility licensee may request in writing that an operator temporarily suspend participation in the facility licensee's requalification training program. The NRC regional office may authorize the operator to temporarily suspend participation in the requalification training program if it finds that:

a. the operator will be reassigned to full-time, career-enhancing duties at another location, making it impractical to participate in the training program (e.g., assignment to the Institute of Nuclear Power Operations or a foreign interchange program; college attendance)

b. the duration of the assignment will not exceed 24 months (If the assignment extends beyond the date of license expiration, the operator may apply for timely license renewal in accordance with 10 CFR 55.55(b) and 10 CFR 55.57(a).)

c. the facility licensee's plan for ensuring the operator's qualifications and status is acceptable (i.e., the operator must be retrained, tested, reactivated, and medically fit for duty)

If the region approves the temporary suspension, the region will amend the operator's license to prohibit the performance of licensed duties during the reassignment. The region will also confirm its expectations regarding the operator's return to licensed duties and the need for the facility licensee to certify when the actions have been completed. The expectations will be documented in a letter to the facility licensee with a copy to the operator.

The regional office shall refer situations outside the specified parameters to the NRR operator licensing program office for evaluation.

2. Proficiency Watches

In accordance with 10 CFR 55.53(e), licensed operators are required to maintain their proficiency by actively performing the functions of an operator or senior operator on at least seven 8-hour or five 12-hour shifts per calendar quarter. This requirement may be completed with a combination of complete 8- and 12-hour shifts (in a position required by the plant's technical specifications) at sites having a mixed shift schedule, and watches shall not be truncated when the minimum quarterly requirement (56 hours) is satisfied. Overtime may be credited if the overtime work is in a position required by the plant's technical specifications. Overtime as an extra "helper" after the official watch has been turned over to another watchstander does not count toward proficiency time.

3. Medical Standards

a. If an operator is *temporarily* unable to meet medical standards but is expected to meet those standards again in the future, the facility licensee may administratively classify that operator's license as "inactive" or require compensatory measures or impose other operating restrictions to accommodate the operator's medical condition until the operator is once again certified to meet all medical standards by the facility licensee. The facility licensee need not notify the NRC nor request a conditional license for the temporary disability provided the operator is administratively prevented from performing licensed duties or otherwise compensated or restricted as appropriate during the period of his or her temporary disability. If the disability extends beyond the date of license expiration, the operator may apply for timely license renewal in accordance with 10 CFR 55.55(b) and 10 CFR 55.57(a). The facility licensee should document the nature of the operator's temporary disability on the medical certificate and submit a revised certificate to the NRC after the physician determines that the operator meets the requirements of 10 CFR 55.33(a)(1). The NRC will not renew the operator's license until it finds that all of the conditions specified in 10 CFR 55.57(b) are satisfied.

b. If the facility licensee determines that an operator's medical condition is *permanently* disqualifying in accordance with ANSI/ANS 3.4, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants," the facility licensee shall notify the NRC within 30 days of learning of the diagnosis (see 10 CFR 50.74 and 55.25). A permanent disqualifying condition is always reportable, even if it is being controlled and regardless whether or not the compensatory measures are recognized in the applicable version of ANSI/ANS-3.4.

D. LICENSE RENEWAL

1. An operator wishing to renew a license must comply with the requirements of 10 CFR 55.57(a) as follows:

a. The operator will complete NRC Form 398, including the operator's experience under the current license, the approximate number of hours the operator spent on operating shifts, and the date and results of the applicant's most recent

APPENDIX C
JOB PERFORMANCE MEASURE GUIDELINES

A. PURPOSE

This Appendix provides a framework for preparing and evaluating job performance measures (JPMs) to ensure they are of appropriate substance and format for initial operator licensing and requalification examinations. The following elements are discussed in detail or attached for information:

- a basic procedure for developing new JPMs (Section B), including forms to document the JPM and to assess the quality of the product (Form ES-C-1 and ES-C-2)
- guidelines for the development and use of alternate-path JPMs (Section C)
- a discussion of walk-through evaluation techniques (Section D)

Adhering to the concepts and guidelines discussed herein, in association with the specific operating test criteria cited in ES-301 or ES-603, as applicable, will enhance the consistency and validity of the walk-through tests.

B. DEVELOPING AND REVIEWING JPMs

The major JPM components and instructions for their development are summarized below. The instructions apply to both the initial and the requalification examination programs, except as noted. Although they are written from the perspective of new JPM development, the instructions should also be referenced, as necessary, when modifying existing JPMs for reuse and reviewing proposed JPMs for quality.

Select the systems and tasks to be evaluated during the walk-through portion of the operating test in accordance with the specific initial and requalification examination criteria in ES-301 and ES-603, respectively. If a JPM already exists for the selected task, it should be reviewed against the guidelines and criteria discussed below to ensure that it is acceptable for use. If a new JPM is required to evaluate the selected system or task, prepare the JPM in accordance with the following basic steps and document the JPM using Form ES-C-1, "Job Performance Measure Worksheet," or equivalent. Form ES-C-2, "Job Performance Measure Quality Checklist," can be used to verify that the relevant criteria are satisfied.

1. Specify Initial Conditions

Determine those system and plant conditions that would permit the task to be performed realistically. They should provide sufficient information regarding the status of the plant and system to facilitate task performance, without coaching the examinee. If the task is intended to be performed on the simulator, it is worthwhile to differentiate those specific initial conditions and system realignments that are necessary for the task to be performed as planned from those other general conditions that add realism and set the stage for performing the task but have no real bearing on the successful execution of the task. Breaking down the initial conditions in such a manner will simplify the simultaneous administration of different tasks by two or more examinees.

All of the required operator actions preceding the start point of the JPM should be completed unless the action is purposely omitted as part of an alternate path JPM. If the JPM is intended to evaluate the examinee's ability to implement an alternate path (refer to Section C) within the facility licensee's procedural guidance, the initiating equipment or instrument failure should be reflected in the simulator initial condition specifications.

The JPM shall also include an *initiating cue* that provides the stimulus for the examinee to begin the task performance. When appropriate, the cue should clearly specify the desired endpoint for the task. For example, if it is desired for the examinee to start and load the emergency diesel generator, the cue should state the load at which the task will be considered complete. Alternate path tasks, as described in Section C, may have an actual endpoint different from that stated in the initiating cue.

The initial conditions and initiating cue may be duplicated on a separate sheet of paper so that they can be handed to the examinee. This is particularly helpful for tasks with detailed initial conditions or those that will be performed in high-noise areas. Take care to ensure that the initial conditions and initiating cue do not reveal the nature of any alternate path JPMs that are planned.

2. Identify References and Tools

The JPM shall identify those plant procedures that require task performance and the procedures that provide guidance, directions, or standards for performing the task. When reviewing JPMs selected from the facility licensee's bank, it is important to ensure that the procedures identified in the JPM are still current.

The JPM shall also identify any special tools or equipment (e.g., a stop watch, wrench, fuse puller, or spool piece) that the examinee will need to perform the task. It is helpful to the examiner who will be giving the test if the location in which these items may be found is stated in the JPM. It is expected that any required tools will be readily available to the plant operators; they should not be staged specifically for the examination.

3. Develop Performance Criteria

The JPM should have meaningful performance requirements that will provide a legitimate basis for evaluating the examinee's ability to safely operate the system or the plant. Artificially subdividing existing tasks to generate new ones may dilute the value of the JPMs to a point where they become meaningless.

The JPM shall identify specific *performance standards*, or check points, that will permit the examiner to evaluate successful progress toward completing the task in accordance with the procedural references. Detailed control and indication nomenclature and criteria (e.g., switch positions and meter readings) should be identified whenever possible, even if these criteria are not specified in the procedural step. The JPM should also note any *important observations* that should be made by the examinee while performing the task.

APPENDIX D
SIMULATOR TESTING GUIDELINES

A. PURPOSE

This Appendix provides a framework for preparing and evaluating simulator scenarios to ensure they are of appropriate scope, depth, and complexity for initial operator licensing and requalification examinations. The following elements are discussed in detail or attached for information:

- a basic procedure for developing new simulator scenarios (Section B), including a description of the associated qualitative and quantitative attributes (Section C) and the critical task methodology (Section D)
- the competencies in which reactor operators (ROs) and senior reactor operators (SROs) are expected to be proficient (Section E)
- the simulator security considerations that should be kept in mind during scenario validation and administration (Section F)
- selected examples of initial and requalification scenarios (Attachments 1 and 2)

Adhering to the concepts and guidelines discussed herein, in association with the specific criteria cited in ES-301 or ES-604, as applicable, will enhance the consistency and validity of the dynamic simulator operating tests.

B. INTEGRATED SCENARIO DEVELOPMENT

The major activities applicable to the development of dynamic simulator scenarios are summarized below. The instructions apply to both the initial and the requalification examination programs, except as noted. Although they are written from the perspective of new scenario development, the instructions should also be referenced, as necessary, when modifying existing scenarios for reuse and while reviewing proposed scenarios for quality.

1. Identify Scenario Objectives

A scenario should have specific objectives. For a requalification examination, these should come, in part, from the facility's requalification training program objectives. However, 10 CFR Part 55 requires that the initial licensing and the annual requalification operating tests be a comprehensive sampling of items (2) through (13) listed in 10 CFR 55.45. Therefore, both tests should sample from all the operating skills and abilities required of an operator and the operating crew. Limiting the requalification examination to topics covered in the requalification cycle is not sufficient.

The basic objective of a scenario should be to evaluate the operators' ability to respond to events that are most appropriately tested in a dynamic simulator environment. These are events that require the operators to demonstrate their knowledge of integrated plant operations, diagnose abnormal plant conditions, and demonstrate their ability to work

together and to mitigate plant transients that exercise their knowledge and use of AOPs and EOPs. Additionally, the scenario should require the operators (usually the SROs) to utilize technical specifications (TS) and, for requalification examinations, to implement the emergency plan. The full range of competencies in which the operators must demonstrate proficiency during the simulator test are described in Section E of this Appendix.

2. Select Initial Conditions

Initial conditions must be established that will allow the scenario to commence realistically. The initial conditions should be representative of a typical plant status, with various components, instruments and annunciators out of service. To have maintenance or surveillance activities in progress is realistic. All, some, or even none of these initial conditions may have a bearing on subsequent scenario events. Initial conditions should be frequently changed, to prevent predictability of future events. The initial conditions should be varied among the scenarios and should include startup, low-power, and full-power situations.

Briefly describe the initial conditions, including any items that should be addressed during the shift turnover, in the space provided at the top of Form ES-D-1, or equivalent.

3. Select and Document Events

Once the initial conditions are established, select a sequence of events designed to attain the stated objectives. Section C discusses a number of qualitative and quantitative criteria that should be considered when selecting events. The specific requirements for each quantitative criterion are enumerated in ES-301 and ES-604, as applicable.

Each event should have or contribute to an objective, whether it is to evaluate the operators' knowledge of a recent system modification, evaluate their ability to respond to a safety-significant event, or assess their use of TS for a particular safety-related component. Uncomplicated events that require no operator action beyond the acknowledgment of alarms and verification of automatic actions provide little basis for evaluating the operators' competence and should not be included on the operating test unless they are necessary to set the stage for subsequent events.

The scenarios should be developed so that a variety of systems is affected within each type of event (i.e., normal evolutions, instrument failures, component failures, and major plant transients). Having one equipment failure cause or exacerbate another can be used to evaluate the operators' understanding of system and component interactions. Balancing the severity of events and the demands they place on each operating position

- *Graphical User Interfaces* - Instructor station graphical user interfaces often display simulated plant conditions and performance in real-time. At remote locations, such as a programmer's desk, the GUI could display the full scenario.

3. External Interconnections

- *ESF Feeds* - Many simulators have data links to the ESF and the operations management offices for emergency planning drills. These links can display simulated plant condition to observers outside the simulated control room during scenario validation or examinations.

- *Remote Plant Process Computer and Instructor Station Screens* - Repeater screens in the training area can display scenarios in real time to observers outside the simulated control room.

- *Modems and Remote Simulator Support Systems* - Many simulators are equipped with modems from the instructor station or simulation computers for outside monitoring and control of simulator status and activities by parties off site.

G. ATTACHMENTS/FORMS

Attachment 1, "Example Initial Dynamic Simulator Scenarios"
Attachment 2, "Example Requalification Dynamic Simulator Scenarios"
Form ES-D-1, "Scenario Outline"
Form ES-D-2, "Operator Actions"

Facility: _____PWR_____ Scenario No.: ____1___ Op-Test No.: ___1___

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-38; 100% power, middle of life; CCP "B" is running; Unit 2 is in Mode 5.

Turnover: The following equipment is out of service: DG "A" (6 hrs); CCW pump "A" (2 days); VCT level transmitter LT-185; the block valve for PORV 456 is inoperable with power removed; MFP "A;" and AFW pump "A" (30 hrs). All required surveillances have been done. A severe thunderstorm warning is in effect.

Event No.	Malf. No.	Event Type*	Event Description
1	XXX, XXX	C(RO) N(BOP) R(RO)	70 gpm tube leak on "A" SG (ramped over 5 min) with running CCP trip and failure of standby pump to start; requires power reduction
2	XXX	I(RO)	pressurizer level instrument L-459 fails low
3	XXX	C(ALL)	instrument bus 112 inverter failure
4	XXX, XXX	M(ALL) I(BOP)	450 gpm tube rupture on "A" SG (ramped over 3 min) with an "A" SG pressure transmitter failure causing the PORV to open
5	XXX, XXX, XXX	M(ALL) C(BOP)	concurrent failures of the station auxiliary transformer and the "B" DG result in a loss of all AC power; power remains available through Unit 2 TDAFW pump trips on overspeed (can be reset)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Note: The scenarios in this attachment are individual examples; they are not intended to represent complete scenario sets/operating tests.

For each of the planned events, enter on a Form ES-D-2 (or equivalent) a description of the event and detailed actions required by the applicable plant procedures (e.g., normal, abnormal, emergency, and administrative, including the TS and emergency plan) for each operating position (i.e., SRO, RO, BOP) in a manner similar to the first event on the next page.

Op-Test No.: __1__ Scenario No.: __1__ Event No.: __1__ Page _1_ of _5_

Event Description: A 70 gpm tube leak on the "A" SG (ramped over 5 minutes), combined with a trip of the running CCP and a failure of the backup CCP to start, forces a reduction in power because RCS leakage exceeds TS limits.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of the tube leak on the "A" SG - - air ejector off gas radiation monitor - steam line radiation monitor - charging/letdown mismatch - SG blowdown radiation monitor
	SRO	Direct RO/BOP actions per AOP-1.2 - - monitor and control pzr level & pressure - monitor and control VCT level - verify leakage greater than TS limit - announce possible high radiation in turbine bldg - verify tube leak with SG samples - have health physics verify release calculation - commence unit shutdown - notify NRC - minimize secondary contamination - classify the event per the EPIPs (unusual event)
	RO/BOP	Execute AOP actions per SRO directions
	SRO/RO	Recognize running CCP tripped - - no charging flow - pump tripped light - various charging/letdown annunciators
	SRO	May direct RO/BOP per AOP-1.3 - - isolate letdown - monitor pressurizer level and pressure - start the standby CCP - reestablish letdown - refer to TS 3.8.1 - initiate repairs
	SRO	Supervise/coordinate power reduction - - review precautions in GOP-3 - ensure delta-I maintained within limits - verify load reduction rate
	RO	Coordinate with BOP to initiate power reduction - - review GOP-3 precautions - calculate/estimate boration required for shutdown - contact load dispatcher - borates and/or inserts rods to maintain T-ave within 5F of T-ref and maintains delta-I within limits
	BOP	Coordinate with RO to initiate power reduction - - review GOP-3 precautions - operate turbine controls to maintain unloading rate

Facility: _____PWR_____ Scenario No.: ____2___ Op-Test No.: ___2___

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-20; approximately 100% power, 218 ppm boron (EOL), equilibrium xenon; bank "D" rods are at step 216

Turnover: The operations department is making preparations to shut down the plant due to equipment problems. Train "B" CSS logic failed an actuation test last shift; the LCO for TS 3.3.2 was entered 2 hrs ago; I&C is working on the problem. MDAFW pump "B" is out of service to repair an oil leak and should be back in about 45 min. The block valve for PORV 445A is closed and deenergized for leakage control.

Event No.	Malf. No.	Event Type*	Event Description
1	XXX, XXX	I(BOP)	spurious containment spray actuation, phase "B" isolation, and CSS pump "A" failure to auto start (reset malf. to allow equipment restoration and before required stop of RCPs)
2	N/A	N(BOP) R(RO)	begin normal shutdown due to CS problems
3	XXX	C(RO)	boric acid filter plugged (100% in 1 min) at start of boration; when asked, filter d/p is 80# (remove when backflushed)
4	XXX	I(RO)	narrow range RCS temperature detector fails high
5	XXX, XXX	C(BOP)	emergency bus 1A-SA normal feeder breaker trips and DG "A" breaker trips 2 min later
6	XXX, XXX, XXX, XXX	M(ALL) C(BOP) C(RO)	"A" SG line break in containment with auto SI on high containment pressure but failure of reactor and turbine trip; the local manual breaker is operable and the turbine will follow; TDAFW pump overspeed on SI; PORV "B" failure to open in auto or manual

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

For each of the planned events, enter on a Form ES-D-2 (or equivalent) a description of the event and detailed actions required by the applicable plant procedures (e.g., normal, abnormal, emergency, and administrative, including the TS and emergency plan) for each operating position (i.e., SRO, RO, BOP) in a manner similar to the first event for the first PWR scenario (page 2 of this Attachment).

Facility: _____BWR_____ Scenario No.: ____1___ Op-Test No.: ___1___

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-11; approximately 90% reactor power at dispatcher request; at power for 28 days, beginning of cycle; core spray pump 2A is out of service to replace a breaker closing coil; APRM F failed downscale last shift and is bypassed

Turnover: Raise power to 100% when contacted by dispatcher; test core spray pump 2A when the clearance is lifted (imminent)

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R(RO)	raise reactor power to 100% upon load dispatcher's request
2	XXX	N(BOP) C(BOP)	test core spray pump 2A starting at step 7.9.2 of PT-07.2.4a and respond to the motor overload
3	XXX	C(SRO)	individual bus breaker failure (MCC DGD), requiring DG #4 to be declared inoperable and a plant shutdown per TS 3.0.5
4	XXX	I(RO) C(BOP)	UPS inverter 2A malfunction and loss of UPS (no APRMs, rod positions, or rod control)
5	XXX	C(BOP)	turbine bearing #3 vibration alarm
6	XXX, XXX, XXX, XXX	M(ALL)	turbine trip and reactor scram with very few rods inserted (SLC pump 2A will trip after initiation and the scram discharge volume vents and drains fail to reopen when RPS is reset)
		C(ALL)	bypass valves fail closed after turbine coasts down (no UPS)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

For each of the planned events, enter on a Form ES-D-2 (or equivalent) a description of the event and detailed actions required by the applicable plant procedures (e.g., normal, abnormal, emergency, and administrative, including the TS and emergency plan) for each operating position (i.e., SRO, RO, BOP) in a manner similar to the first event for the first PWR scenario (page 2 of this Attachment).

Facility: _____BWR_____ Scenario No.: ____2___ Op-Test No.: ___2___

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-17; 100% reactor power; B CRD pump is in service

Turnover: The load dispatcher has asked that power be lowered to 70%, and chemistry requests an SSW surveillance to be run at the beginning of the shift.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R(RO)	decrease power to 70%
2	XXX	N(BOP) C(BOP)	perform SSW surveillance per chemistry request; SSW pump B will trip shortly after start
3	XXX	I(RO)	feedwater master controller fails as is
4	XXX	C(BOP)	loss of power to Division 2 ESF bus
5	XXX, XXX, XXX	M(ALL) C(BOP) M(ALL) C(BOP)	1.5 minutes after event 4, the service transformers lock out, the Division 1 EDG fails to start, and a 5% recirculation loop break develops in the drywell 30 seconds after initiating, the high pressure core spray pump trips

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

For each of the planned events, enter on a Form ES-D-2 (or equivalent) a description of the event and detailed actions required by the applicable plant procedures (e.g., normal, abnormal, emergency, and administrative, including the TS and emergency plan) for each operating position (i.e., SRO, RO, BOP) in a manner similar to the first event for the first PWR scenario (page 2 of this Attachment).

Facility: _____ Scenario No.: _____ Op-Test No.: _____
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: _____
_____
_____

Turnover: _____
_____
_____

Event No.	Malf. No.	Event Type*	Event Description

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page ___ of ___

Event Description: _____

Time	Position	Applicant's Actions or Behavior

APPENDIX E
POLICIES AND GUIDELINES FOR TAKING NRC EXAMINATIONS

Each examinee shall be briefed on the policies and guidelines applicable to the examination category (written and/or operating test) being administered. The applicants may be briefed individually or as a group. Facility licensees are encouraged to distribute a copy of this appendix to every examinee before the examinations begin. All items apply to both initial and requalification examinations, except as noted.

PART A - GENERAL GUIDELINES

1. ***[Read Verbatim]*** Cheating on any part of the examination will result in a denial of your application and/or action against your license.

2. If you have any questions concerning the administration of any part of the examination, do not hesitate asking them before starting that part of the test.

3. SRO applicants will be tested at the level of responsibility of the senior licensed shift position (i.e., shift supervisor, senior shift supervisor, or whatever the title of the position may be).

4. You must pass every part of the examination to receive a license or to continue performing license duties. Applicants for an SRO-upgrade license may require remedial training in order to continue their RO duties if the examination reveals deficiencies in the required knowledge and abilities.

5. The NRC examiner is not allowed to reveal the results of any part of the examination until they have been reviewed and approved by NRC management. Grades provided by the facility licensee are preliminary until approved by the NRC. You will be informed of the official examination results about 30 days after all the examinations are complete.

PART B - WRITTEN EXAMINATION GUIDELINES

1. ***[Read Verbatim]*** After you complete the examination, sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination.

2. To pass the examination, you must achieve a grade of 80.00 percent or greater; grades will not be rounded up to achieve a passing score. Every question is worth one point.

3. For an initial examination, the nominal time limit for completing the examination is six hours; extensions will be considered under extenuating circumstances.

   For a requalification examination, the time limit for completing both sections of the examination is three hours. If both sections are administered in the simulator during a single three-hour period, you may return to a section of the examination that was already completed or retain both sections of the examination until the allotted time has expired.

4. You may bring pens, pencils, and calculators into the examination room. Use black ink to ensure legible copies; dark pencil should be used only if necessary to facilitate machine grading.

5. Print your name in the blank provided on the examination cover sheet and the answer sheet. You may be asked to provide the examiner with some form of positive identification.

6. Mark your answers on the answer sheet provided and do not leave any question blank. Use only the paper provided and do not write on the back side of the pages. If you are using ink and decide to change your original answer, draw a single line through the error, enter the desired answer, and initial the change.

7. If you have any questions concerning the intent or the initial conditions of a question, do *not* hesitate asking them before answering the question. Ask questions of the NRC examiner or the designated facility instructor *only*. When answering a question, do *not* make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question. For example, you should not assume that any alarm has activated unless the question so states or the alarm is expected to activate as a result of the conditions that are stated in the question. Finally, answer all questions based on actual plant operation, procedures, and references. If you believe that the answer would be different based on simulator operation or training references, you should answer the question based on the *actual plant*.

8. Restroom trips are permitted, but only one applicant at a time will be allowed to leave. Avoid all contact with anyone outside the examination room to eliminate even the appearance or possibility of cheating.

9. When you complete the examination, assemble a package including the examination questions, examination aids, answer sheets, and scrap paper and give it to the NRC examiner or proctor. Remember to sign the statement on the examination cover sheet indicating that the work is your own and that you have neither given nor received assistance in completing the examination. The scrap paper will be disposed of immediately after the examination.

10. After you have turned in your examination, leave the examination area as defined by the proctor or NRC examiner. If you are found in this area while the examination is still in progress, your license may be denied or revoked.

11. Do you have any questions?

PART C - GENERIC OPERATING TEST GUIDELINES (CATEGORIES A, B, AND C)

1. If you are asked a question or directed to perform a task that is unclear, you should not hesitate to ask for clarification.

2. The examiner will take notes throughout the test to document your performance, and sometimes the examiner may take a short break for this reason. The amount of note-

taking does not reflect your level of performance. The examiner is required to document satisfactory as well as less than satisfactory performance.

3. The operating test is considered "open reference." The reference material that is normally available to operators in the facility and control room (including calibration curves, previous log entries, piping and instrumentation diagrams, calculation sheets, and procedures) is also available to you during the operating test. However, you should know from memory certain automatic actions, set points, interlocks, operating characteristics, and the immediate actions of emergency and other procedures, as appropriate to the facility. If you desire to use a reference, you should ask the examiner if it is acceptable to do so for the task or question under consideration.

   You may *not solicit technical information* from other operators, engineers, or technical advisors.

4. You must not discuss any aspect of your operating test with any other examinee until after all the examinations are complete.

PART D - WALK-THROUGH TEST GUIDELINES (CATEGORIES A AND B)

1. The walk-through test covers control room systems, local system operations, and administrative requirements. The examiner will evaluate these areas using a combination of job performance measures (JPMs) and specific questions.

   The initial walk-through consists of ten JPMs for RO and SRO(I) applicants and five for SRO(U) applicants. Seven of the JPMs (two or three for upgrade applicants) will be conducted in the control room or simulator and the remainder will be conducted in the plant.

   The requalification walk-through consists of five JPMs total, with at least two in the control room/simulator and at least two in the plant.

2. The examiner is a visitor at this facility. When you enter the plant, you may be expected to escort the examiner and ensure that he or she complies with safety, security, and radiation protection procedures.

3. You should not operate plant equipment without appropriate permission from the operating crew. Nothing the examiner says or asks will be intended to violate this principle.

4. Before beginning each JPM, the examiner will describe the initial conditions, explain the task that is to be completed, indicate whether the task is time-critical, and explain which steps are to be simulated or discussed. You should perform or simulate the required actions as if directed by plant procedures or shift supervision. Do not assume that the examiner will accept an oral description of the required action unless the examiner indicates otherwise.

5. Time-critical JPMs have been validated by your facility and must be completed within the predetermined time interval in order to obtain a satisfactory grade for that JPM. You will be permitted to take whatever time is necessary to complete those JPMs that are not time-critical, provided you are making reasonable progress toward achieving the task standard. If the examiner believes that you are not making reasonable progress, he will ask you to explain what remains to be done and how long it should take before stopping the task. You will be permitted at least twice the validated time to complete the JPM, whether you are making progress or not.

6. When performing JPMs, you are expected to make decisions and take actions based on the facility's procedural guidance and the indications available. Some of the tasks that the examiner asks you to perform will require the implementation of an alternative method directed by plant procedures.

7. As part of the examination, the examiner may ask questions to investigate your knowledge of an administrative topic, system, or task. Many of the questions will require you to use plant reference material, while others should be answered without the use of references. If you need to consult a reference to answer a question, ask the examiner if it is acceptable to do so. There is no specific time limit for any question, however, you may be evaluated as unsatisfactory on a question if you are unfamiliar with the subject or reference material and are unable to answer the question in a reasonable period of time. You will not be permitted to conduct unlimited searches of the plant reference material during the examination.

8. To facilitate the examination and better enable the examiner to assess your level of understanding, please verbalize your actions and observations while performing the JPMs. Also, please inform the examiner when you consider your performance of each JPM and your answer to each question to be complete.

9. If you need a break during the test, you should ask the examiner.

10. Do you have any questions before we begin the walk-through test?

PART E - SIMULATOR TEST GUIDELINES (CATEGORY C)

1. Your primary responsibility is to operate the simulator as if it were the actual plant. If you believe that the simulator is not responding properly, you should make decisions and recommendations on the basis of the indications available, unless directed otherwise by the examiner.

2. If the examiner asks you a question, you should answer it *only if* doing so will not interfere with simulation facility operations.

3. Teamwork and communications are evaluated. You can enhance the evaluation process by vocalizing your observations, analyses, and the bases for your actions.

   Requalification examinations evaluate the crew's ability to safely operate the plant and the performance of both the individuals and the crew.

APPENDIX F
GLOSSARY

Achievement test: An instrument designed to measure a trainee's grasp of some body of knowledge or skill proficiency.

Annual: In most instances, a period of time equal to 365 days reckoned from any point in a calendar year to the same point in time in the following calendar year. However, annual requirements in successive years can reach a period of nearly two years. Annual could encompass a range extending to 729 days depending on when an event occurred in the first calendar year and viewing December 31 of the following calendar year as meeting the annual requirement.

Applicant: Any individual who has submitted an NRC Form 398 in pursuit of an RO or SRO license. For purposes of this and the other Examination Standards, it is synonymous with "candidate."

Applicant license level: The level of operator license (i.e., RO or SRO) for which the applicant has applied.

Aptitude test: An instrument designed to assess an individual's potential for performing some task or skill area.

Average: A score that provides an indication of the typical performance of a group of scores. The mean, median, and mode of a distribution of scores are all commonly used as averages.

Biennial: In most instances, a period of time equal to 730 days and synonymous with the term "two years." Biennial requirements can extend beyond 730 days if the requirement is met during the anniversary month of the second year. For example, a biennial medical examination last performed on January 10, 1995, would be due again by January 31, 1997. January is seen as the anniversary month, the period of time between the two examinations is longer than 730 days, but the biennial requirement is satisfied.

Bloom's Taxonomy: A classification system that depicts knowledge and information processing of knowledge in a hierarchy from lowest to highest as follows: fundamental knowledge, comprehension, analysis, synthesis, and evaluation.

Calendar quarter: One of four parts of a calendar year, each consisting of a 3-month segment. In any calendar year, the first quarter is from the first day of January to the last day of March, the second quarter is from the first day of April to the last day of June, the third quarter is from the first day of July to the last day of September, and the fourth quarter is from the first day of October to the last day of December.

Category: One of 3 major subdivisions of related subjects on the operating test. Refer to Section D of ES-301 for a description of and detailed instructions for developing each operating test category.

Central tendency: A term referring to the most typical performance of a group of individuals; generally the mean, median, or mode

Cognitive: Aspects of a person or test level that refer to knowledge or understanding.

Content validity: The degree to which a test measures the specific objectives or content of that test.

Correlation coefficient: A numerical value ranging from -1 to +1 that indicates the relationship between two sets of scores or other measures of each individual in a group. A value of O indicates no relationship; +1 or -1 indicates a perfect relationship, either positive or negative.

Criterion: A characteristic or combination of characteristics used as the basis for judging a performance.

Criterion-referenced test: An examination based upon mastery of objectives of content that was or should have been taught and mastered and one that uses an established standard or cutoff score as a measure of acceptable performance.

Cut score: The score at which a trainee is deemed to have met the criteria on an exam.

Designated nuclear control room operator: In accordance with Section C.1.2 of Regulatory Guide 1.8, Revision 3, an individual assigned to a licensed control room operator position identified in either Technical Specification Table 6.2.1 or the table "Minimum Requirements Per shift for On-Site Staffing of Nuclear Power Units by Operators and Senior Operators Licensed Under 10 CFR Part 55" in 10 CFR 50.54(m)(2)(i).

Diagnostic test: An instrument that is designed to identify the strengths and weaknesses of an individual for a given content area.

Difficulty index: A numerical index ranging from 0.00 to 1.00 that indicates the percentage of trainees who answer a test item correctly. An index of 0.00 indicates that no one answered the test item correctly while an index of 1.00 indicates that all individuals answered the item correctly.

Discrimination index: A measure of a test item's ability to differentiate between good and poor trainees. A high discrimination index indicates that more high performers than low performers answered the item correctly (high and low are typically determined by overall test scores but may also be established by external criteria).

Discrimination validity: Setting the item difficulty at an estimated level around the cut score.

Distractor: An incorrect alternative among the choices of a test item.

Error of measurement: Any difference between an obtained score and a true score on a test is referred to as error of measurement. The actual error of measurement can only be estimated since it is impossible to know what the true score is.

Equivalent forms: Two or more exams that test the same objectives using different test items or the same test items in a different sequence.

Frequency distribution: A graphic display listing scores, or score intervals on one axis of a graph, and the number of trainees at that score or in that interval on the other.

Item analysis: A set of procedures performed on examination items to determine their difficulty and discriminating power.

Item bank: A group of test items covering a defined area. Items for a test can be chosen from this source.

Item stem: The part of a test item that presents the problem or situation to be solved. The stem may be a question requiring a response or a statement that is followed by the alternatives from which the trainee must choose the best answer.

Job performance measure (JPM): An evaluation tool that is based on tasks contained in the facility's job task analysis (JTA) or the applicable NRC Knowledge and Abilities Catalog (NUREG-1122 or 1123) and requires the applicant to perform (or simulate) a task applicable to the license level of the examination.

Job task analysis (JTA): A systematic analysis of the knowledge, skills, and abilities required to perform a particular occupation.

Learning objective: A statement of the behavior a trainee is expected to exhibit following instruction.

Mastery test: A term synonymous with criterion-referenced test, i.e., evaluating the expected behavior following instruction.

Mean: An indication of central tendency; it usually refers to the arithmetic mean, which is computed by summing all the scores of a group and dividing that sum by the number of scores in the group.

Median: A measure of central tendency; the point on a scale of scores that splits the scores in half; 50 percent of the scores are below this point, and 50 percent of the scores are above this point.

Mode: The least reliable of the common measure of central tendency; the mode is the most frequently occurring score in a distribution of scores.

Multiple choice item: A test item composed of a stem and several alternatives from which the trainee must select the best answer.

Normal distribution: A theoretical frequency distribution represented by a symmetrical bell-shaped curve; sometimes referred to as the bell curve.

Norm-referenced: A score interpretation based on the comparison of an individual's score with a comparable reference group.

Nuclear power plant experience: As defined in Section 2 of ANSI/ANS-3.1-1993, is applicable work performed in a nuclear-fueled electric power production plant during preoperational, startup testing, or operational activities. Observation of others performing work is not experience.

Objective test: A test that can be scored without subjective judgment in the scoring.

On-the-job training: Participation in nuclear power plant startup, operation, maintenance, or technical services as a trainee under the direction of experienced personnel.

Operating test: That portion of the operator licensing examination based on direct interaction between an examiner and an applicant.

It tests the applicants' knowledge of the design and operation of the reactor and its associated plant systems, both inside and outside the control room. It is administered in a plant walk-through and in a simulation facility.

Operational validity: A test item that is 1) related to the operations of the job and appears reasonable to ask and 2) expressed in an operational context that requires the candidate to mentally or physically perform through understanding or analysis.

Performance test: Any test that requires the trainee to demonstrate either mental performance through knowledge testing or skill by actual operation or manipulation of tools and equipment. Typically, performance tests connote the meaning of skill testing.

Plant-referenced simulator: As defined in 10 CFR 55.4, means a simulator modeling the systems of the reference plant with which the operator interfaces in the control room, including operating consoles, and which permits use of the reference plant's procedures. A plant-referenced simulator demonstrates expected plant response to operator input, and to normal, transient, and accident conditions to which the simulator has been designed to respond.

Power plant experience: As defined in Section 2 of ANSI/ANS 3.1-19 ANSI/ANS-3.1-1993, is applicable work performed in a fossil-fueled or nuclear-fueled electric power production plant during preoperational, startup testing, or operational activities. Observation of others performing work is not experience.

Predictive validity evidence: The ability of a test to forecast future performance on a subsequent measure.

Psychomotor: The domain of human performance that relates to physical performance based on mental activity.

Range: The smallest interval on a scale of scores that will include all scores, mathematically defined as the largest score minus the smallest score plus one.

Raw score: The numerical score first assigned when scoring a test before conversion to a derived score.

Reactor operator applicant: An unlicensed individual who is applying for an RO license.

Reference plant: As defined in 10 CFR 55.4, means the specific nuclear power plant from which a simulation facility's control room configuration, system control arrangements, and design data are derived.

Related experience: In accordance with Section C.1.1 of Regulatory Guide 1.8, Revision 3, experience in performing job duties in the discipline for which the individual seeks qualification; such experience may or may not be at a nuclear power plant.

Related technical training: Formal training beyond the high school level in technical subjects associated with the position in question, such as acquired in training schools or programs conducted by the military, industry, utilities, universities, vocational schools, or others. Such training programs shall be of a scheduled and planned length and include text material and lectures.

Reliability: The consistency or repeatability of any measure as an indicator of confidence of that measure.

Responsible nuclear power plant experience: As defined in Section C.1.*3* of Regulatory Guide 1.8, Revision 3, means that a senior operator applicant has actively performed as a designated nuclear control room operator or as a power plant staff engineer involved in the day-to-day activities of the facility.

Time spent in academic or related technical training may fulfill the requirement for responsible nuclear power plant experience, on a one-for-one basis, up to a maximum of 1 year.

Scenario: An integrated group of events that simulate a set of plant malfunctions and evolutions at a simulation facility.

Scenario set: A group of scenarios that constitutes a complete simulator test (i.e., Category C, "Integrated Plant Operations," of the operating test).

Score: A numerical indication of the performance an individual displays on a test.

Senior reactor operator upgrade (SRO-U) applicant: A licensed RO who is applying for an SRO license on the same unit(s).

Senior reactor operator instant (SRO-I) applicant: An unlicensed individual who is applying for an SRO license.

Simulation facility: As defined in 10 CFR 55.4, means one or more of the following components, alone or in combination, used for the partial conduct of operating tests for operators, senior operators, and applicants:

1. the plant
2. a plant-referenced simulator
3. another simulation device

This definition provides flexibility in the conduct of the "Integrated Plant Operations" category of the operating test, as permitted in 10 CFR 55.45(b). It allows examiners to administer the operating test on the plant itself, a plant-referenced simulator, or some other type of NRC-approved simulation device, such as a part-task or basic-principles simulator.

Staff engineer: In accordance with Section C.1.4 of Regulatory Guide 1.8, Revision 3, an individual in a technical support position (i.e., personnel covered in Sections 4.4.10 and 4.6 of ANSI/ANS3.1-1993) who is responsible for the coordination and implementation of any of the following: plant equipment control, integrated operation procedures, operations, maintenance, and radiological support, or review of modification and maintenance plans for plant systems.

Standard deviation: A measure of variability of a set of scores around the group mean. The SD is mathematically defined as the square root of the mean of the squared deviations of the scores from the mean of the distribution.

Standard error of measurement: An estimate of the standard deviation of the errors of measurement associated with the test scores in a given test.

Standardized test: A test that has the directions, time limits, and conditions of administration made consistent for all offerings of the test; this test is usually norm-referenced.

Statistic: A numerical value computed on a sample of data.

Technical Specifications: A document that identifies the plant-specific safety limits, system operability and surveillance testing requirements, and administrative controls. Whether stated or not, references to the technical specifications in this NUREG include those administrative controls that have been moved to other technical requirements documents.

Test: A measurement instrument; examination.

True score: The ideal or correct score for an individual. Its value cannot be known, but it can be estimated when assumptions regarding error of measurement are made.

Validity: The degree to which a test measures what it purports to measure.

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Replaces selected portions of Revision 8

11. ABSTRACT *(200 words or less)*

NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," esta blishes the policies, procedures, and practices for examining licensees and applicants for reactor operator and senio r reactor operator licenses at power reactor facilities pursuant to Title 10, Part 55, of the Code of Federal Regulations (1 0 CFR Part 55). The related guidance that was previously published in the "Examiners' Handbook for Developing Operator Licens ing Written Examinations" (NUREG/BR-0122, Rev. 5, dated March 1990) has been incorporated herein. NUREG/ BR-0122 is no longer in effect.

Supplement 1 to Revision 8 is being issued to update and clarify the NRC 's guidelines regarding: (1) the systematic and random selection of topics and questions for the written examination, including limits on question usage; (2) the training and qualification of operator license applicants; (3) the documentation of NRC staf f concerns related to draft examination quality; and (4) a number of other minor issues.

Supplement 1 will become effective for corporate notification letters issued 60 days after publication of the Supplement is noticed in the Federal Register. This will provide facility licensees with at least 180 days notice that the examinations will be administered in accordance with the revised procedures. Facility licensees may make arrangements for earlier implementation by contacting their NRC Regional Office.

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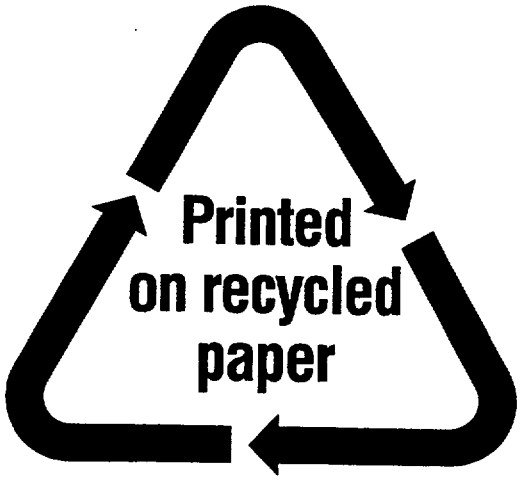

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