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Report Number: **NUREG-1021, Revision 9**

Report Title: Operator Licensing Examination Standards for Power Reactors

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

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Instructions: Please remove and replace pages as instructed on the following table:

Publishing Services Branch
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Instructions

Remove existing Revision 9 pages and insert replacement pages as noted below (corrections and clarifications have been made as indicated; forms identified with an "*" have been edited to support electronic completion in portable document format):

Section / Standard	Remove Page(s)	Replacement Page(s) / Correction Summary
Abstract	iii - iv	iii - iv / Correct OMB control number and regulatory citation.
ES-201	17 - 18 21 - 22 23 - 24	17 - 18, 21 - 22 / Attachments 2 & 3: Sensitive examination information should be marked and segregated. 23 - 24 / Form ES-201-1*: Items that do not apply to NRC-prepared exams are denoted with { }; Form ES-201-3 added to Item 8; audit requirements in Item 14 are clarified.
ES-202	13 - blank	13 - blank / Correct over-strikes.
ES-301	1 - 4 11 - 12 21 - 22 23 - 24 25 - 26 27 - blank	1 - 4 / B.1: Swap fuel handling and drawings; emphasize that listed administrative topics are examples. 11 - 12 / D.3.a: Remove reference to B.1 examples; select administrative subjects from Section 2 of the K/A catalog. D.3.d: move fuel handling from operations to equipment control. 21 - 22 / Form ES-301-1*: Added "Class(R)oom" as possible venue. 23 - 24 / Form ES-301-2*: Control room systems for SRO-U must include ESF; Type Code (L) includes shutdown. 25 - 26 / Form ES-301-5*: Minimum event requirements vary based on license level; signatures removed. 27 - blank / Form ES-301-6*: Signatures removed.
ES-303	9 - 10 11 - 12 13 - 14	9 - 10 / Form ES-303-1, Page 1: SRO Exam Types corrected; "Deny License" recommendation added. 11 - 12 / Form ES-303-1, Page 3.a: RO Competency 1 rating factors corrected (there is no "d"). 13 - 14 / Correct over-strikes.
ES-401	15 - 16 21 - 22 29 - 32	15 - 16, 21 - 22 / Forms ES-401-1&2: SRO Column "A2" split for fuel handling in Tier 2, Group 2; Note 8 clarified. 29 - 32 / Form ES-401-6*: Intent of Items 4 & 5 clarified; Form ES-401-7*.
ES-403	5 - blank	5 - blank / Form ES-403-1*.
ES-501	13 - 14 21 - 24	13 -14 / E.4.c & F.1.f: Reference SECY-04-0191 to ensure that sensitive information is withheld from public disclosure and require inclusion of handouts in the examination file. 21 - 24 / Correct over-strikes; add facility and date to Form ES-501-1; Form ES-501-2*.
ES-604	11 - 12	11 - 12 / Correct over-strikes.
ES-701	1 - 18 (all)	1 - 18 / Correct over-strikes; clarify intent of Form ES-701-6, Items 4 & 5; Form ES-701-8*.
Appendix C	1 - 10 (all)	1 - 10 / Correct over-strikes.
Appendix F	1 - 6 (all)	1 - 6 / Correct over-strikes.

Inserted by: _____ Date: _____

ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) publishes NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," to establish 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 help NRC examiners and facility licensees 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 before the next formal revision of these standards will be promulgated on the NRC's operator licensing Web page at http://www.nrc.gov/reactors/operator-licensing.html.

The NRC is issuing Revision 9 primarily to (1) improve efficiency by reducing the length of the reactor operator written examination, without sacrificing validity or reliability; (2) clarify and simplify the design of the senior reactor operator written examination; (3) better risk-inform both written examinations; (4) better balance the administrative and systems portions of the walk-through operating test; (5) clarify the grading criteria for the simulator operating test to improve objectivity and ensure proper emphasis on competence; and (6) incorporate guidance that was previously promulgated on the NRC's operator licensing Web page regarding the suppression of inappropriate knowledge and ability (K/A) statements and the conduct of peer checks. The changes are identified with bars in the margins and described in the Executive Summary.

Revision 9 will become effective for corporate notification letters issued 60 days after publication of the revision 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 policies, procedures, and practices. Facility licensees may make arrangements for earlier implementation by contacting their NRC regional office.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in this final regulatory guidance are covered by the requirements of Title 10, Part 55 of the Code of Federal Regulations, which the Office of Management and Budget has approved under OMB control number 3150-0018.

Public Protection Notification

The NRC may neither conduct nor sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

The examination outlines and examinations shall not be transmitted via non-secure electronic means. However, they may be transmitted via the NRC's "AUTOS" LAN 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 (***not*** email), fax, 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, JPMs, 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 NUREG-1021 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; the regional office may request additional materials 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 prepare 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 the facility licensee and will 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; any personal, proprietary, sensitive, or safeguards information should be marked and submitted in a separate enclosure. 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 facility licensee may submit reference materials on computer diskettes (in a format that is 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 materials may prompt the NRC to return the materials 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 materials and the basis for postponing or canceling the examinations.

Unless otherwise instructed by the NRC's 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

(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 staff of the U.S. Nuclear Regulatory Commission (NRC)]] will prepare the examinations based on the guidelines in Revision 9 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors."[The NRC's 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 supporting] reference materials identified in Attachment 2 to ES-201 [will be due] by (date). [Pursuant to Title 10, Section 55.40(b)(3), of the Code of Federal Regulations (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.] We request that any personal, proprietary, sensitive unclassified, or safeguards information in your response be contained in a separate enclosure and appropriately marked. 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 to 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 OMB, under approval number 3150-0018, which expires on June 30, 2006. 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 to 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 neither conduct nor sponsor, and a person is not required to respond to, an information collection, unless it displays a currently valid OMB control number.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the Electronic Reading Room page of the NRC's public Web site at http://www.nrc.gov/reading-rm/adams.html.

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.

(Date)

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

SUBJECT: OPERATOR LICENSING EXAMINATION APPROVAL

Dear (Name):

The purpose of this letter is to confirm the final arrangements for the upcoming operator licensing examinations at (Facility).

The NRC has completed its review of the operator license applications submitted in connection with this examination and separately provided a list of approved applicants to (Name, Title). Note that any examination waivers and application denials have been addressed in separate correspondence.

The NRC has approved the subject examinations and hereby authorizes you to administer the written examinations in accordance with Revision 9 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," on (date). The NRC staff will administer the operating tests during the week of (date).

Please contact your Chief Examiner, (Name), at (phone number), if you have any questions or identify any errors or changes in the license level (RO or SRO) or type of examination (partial or complete written examination and/or operating test) specified for each applicant.

Sincerely,

(Appropriate regional representative, Title)

Docket No.: 50-

cc: Public
NRC Document Control System
Regional Distribution

Facility: _____ Date of Examination: _____

Developed by: Written - Facility ☐ NRC ☐ // Operating - Facility ☐ NRC ☐

Target Date*	Task Description (Reference)	Chief Examiner's Initials
-180	1. Examination administration date confirmed (C.1.a; C.2.a and b)	
-120	2. NRC examiners and facility contact assigned (C.1.d; C.2.e)	
-120	3. Facility contact briefed on security and 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; Attachment 2)]	
{-75}	6. Integrated examination outline(s) due, including Forms ES-201-2, ES-201-3, ES-301-1, ES-301-2, ES-301-5, ES-D-1's, ES-401-1/2, ES-401-3, and ES-401-4, as applicable (C.1.e and 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 (including written, walk-through JPMs, and scenarios, as applicable), supporting documentation (including Forms ES-301-3, ES-301-4, ES-301-5, ES-301-6, and ES-401-6, and any Form ES-201-3 updates), and reference materials due (C.1.e, f, g and h; C.3.d)	
-30	9. Preliminary license applications (NRC Form 398's) due (C.1.l; C.2.g; ES-202)	
-14	10. Final license applications due and Form ES-201-4 prepared (C.1.l; C.2.i; 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 and 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; 1 or 2 (if >10) applications audited to confirm qualifications / eligibility; and examination approval and waiver letters sent (C.2.i; Attachment 4; ES-202, C.2.e; ES-204)	
-7	15. Proctoring/written exam administration guidelines reviewed with facility licensee (C.3.k)	
-7	16. Approved scenarios, job performance measures, and questions distributed to NRC examiners (C.3.i)	

* Target dates are generally based on facility-prepared examinations and 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] {Does not apply} to examinations prepared by the NRC.

NRC Letterhead

(date)

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

Dear (Name):

This is to inform you that your application, dated (date), for a (reactor operator, senior reactor operator) license, submitted in connection with (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 Title 10, Section 55.31, of the Code of Federal Regulations (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 Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attention: Rulemakings and Adjudications Staff, with a copy to the Associate General Counsel for Hearings, Enforcement, and Administration, Office of the General Counsel, at the same address. (Refer to 10 CFR 2.302 for additional filing options and instructions.)

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

ES-301
PREPARING INITIAL OPERATING TESTS

A. Purpose

All applicants for reactor operator (RO) and senior reactor operator (SRO) licenses at power reactor facilities are required to take an operating test, unless it has been waived in accordance with Title 10, Section 55.47, of the Code of Federal Regulations (10 CFR 55.47). (Refer to ES-204, "Processing Waivers Requested by Reactor Operator and Senior Reactor Operator Applicants.") The specific content of the operating test depends on the type of license for which the applicant has applied.

This standard describes the procedure for developing operating tests that meet the requirements of 10 CFR 55.45, including the use of reactor plant simulation facilities and the conduct of multi-unit evaluations.

B. Background

To the extent applicable, the operating test will require the applicant to demonstrate an understanding of, and the ability to perform, the actions necessary to accomplish a representative sampling of the 13 items identified in 10 CFR 55.45(a). (All 13 items do not need to be sampled on every operating test). In addition, the content of the operating test will be identified, in part, from learning objectives contained in the facility licensee's training program and information in the final safety analysis report, system description manuals and operating procedures, the facility license and amendments thereto, licensee event reports, and other materials that the Commission requests from the facility licensee.

The structure of the operating test is dictated, in part, by 10 CFR 55.45(b). Specifically, that requirement states that the test will be administered in a plant walk-through and in either a simulation facility that the Commission has approved pursuant to 10 CFR 55.46(b), a plant-referenced simulator that conforms with 10 CFR 55.46(c), or the plant, if approved by the Commission under 10 CFR 55.46(b).

The walk-through portion of the operating test consists of two parts ("Administrative Topics" and "Control Room/In-Plant Systems"), each focusing on specific knowledge and abilities (K/As) required for licensed operators to safely discharge their assigned duties and responsibilities. The second major portion of the operating test (the "Simulator Test") is administered on an NRC-approved or plant-referenced simulator. Unless specifically waived in accordance with ES-204 and documented on the "List of Applicants" (Form ES-201-4), each license applicant must complete the entire operating test.

Each part of the operating test is briefly described below. Section D of this standard provides detailed instructions for developing each part. Procedures for administering and grading the operating test are contained in ES-302, "Administering Operating Tests to Initial License Applicants," and ES-303, "Documenting and Grading Initial Operating Tests," respectively.

1. "Administrative Topics"

This part of the walk-through operating test covers K/As that are generally associated with administrative control of the plant. It implements items 9–12 of 10 CFR 55.45(a) and is divided into four administrative topics, as described below. The scope and depth of coverage required in each topic is based on the applicant's license level. The applicant's competence in each topic is evaluated by administering job performance measures (JPMs) and asking specific "for cause" followup questions, as necessary, based on the applicant's performance (refer to ES-302).

The first topic, "Conduct of Operations," evaluates the applicant's knowledge of the daily operation of the facility. The following subjects are examples of the types of information that could be evaluated under this topic:

- shift turnover
- shift staffing requirements
- temporary modifications of procedures
- reactor plant startup requirements
- mode changes
- plant parameter verification [estimated critical position (ECP), heat balance, etc.]
- short-term information (e.g., night and standing orders)
- key control
- security (awareness and familiarity)
- familiarity with and use of piping and instrument drawings

The second topic, "Equipment Control," addresses the administrative requirements associated with managing and controlling plant systems and equipment. The following subjects are examples of the types of information that could be evaluated under this topic:

- surveillance testing
- maintenance
- tagging and clearances
- temporary modification of systems
- fuel handling

The third topic, "Radiation Control," evaluates the applicant's knowledge and abilities with respect to radiation hazards and protection (of plant personnel and the public). The following subjects are examples of the types of information that could be evaluated under this topic:

- use and function of portable radiation and contamination survey instruments and personnel monitoring equipment

- knowledge of significant radiation hazards

- the ability to perform procedures to reduce excessive levels of radiation and to guard against personnel exposure

- radiation exposure limits and contamination control, including permissible levels in excess of those authorized

- radiation work permits

- control of radiation releases

The fourth topic, "Emergency Plan," evaluates the applicant's knowledge of the facility's emergency plan, including, as appropriate, the responsibility of the RO or SRO to decide whether the plan should be executed and duties assigned under the plan. The following subjects are examples of the types of information that could be evaluated under this topic:

- lines of authority during an emergency
- emergency action levels and classifications
- emergency facilities
- emergency communications
- emergency protective action recommendations

The "Administrative Topics" are administered in a one-on-one, walk-through format in accordance with ES-302 and graded in accordance with ES-303.

2. "Control Room/In-Plant Systems"

This part of the walk-through operating test is used to determine whether the applicant has an adequate knowledge of plant system design and is able to safely operate those systems. This part implements the requirements of items 3, 4, 7, 8, and 9 identified in 10 CFR 55.45(a) and encompasses several types of systems, including primary coolant, emergency coolant, decay heat removal, auxiliary, radiation monitoring, and instrumentation and control.

This part of the walk-through focuses primarily on those systems with which licensed operators are most involved (i.e., those having controls and indications in the main control room). To a lesser extent, it also ensures that the applicant is familiar with the design and operation of systems located outside the main control room. The applicant's knowledge and abilities relative to each system are evaluated by administering JPMs and, when necessary, specific followup questions based on the applicant's performance of each JPM.

This part of the operating test is administered in a one-on-one, walk-through format in accordance with ES-302 and graded in accordance with ES-303.

3. "Simulator Operating Test"

This part of the operating test implements items 1–8 and 11–13 of 10 CFR 55.45(a). This is the most performance-based aspect of the operating test and is used to evaluate the applicant's ability to safely operate the plant's systems under dynamic, integrated conditions.

The simulator test is administered in a team format with up to three applicants (or surrogates) filling the RO and SRO license positions (as appropriate) on an operating crew. (Refer to ES-201, "Initial Operator Licensing Examination Process," for additional guidance on crew composition and ES-302 for test administration instructions.) This format enables the examiner to evaluate each applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated. [Refer to 10 CFR 55.45(a)(13).]

Each team or crew of applicants is administered a set of scenarios designed so that the examiners can individually evaluate each applicant on a range of competencies applicable to the applicant's license level. Appendix D describes those competencies, and Forms ES-303-3 and ES-303-4, the "Simulator Competency Grading Worksheets" for ROs and SROs, break down each competency into a number of specific rating factors to be considered during the grading process (refer to ES-303).

Each applicant must demonstrate proficiency on every competency applicable to his or her license level. The only exception is that SRO Competency Number 3, "Control Board Operations," is optional for SRO-upgrade applicants (i.e., SRO-upgrade applicants do not have to fill a position that requires control board operations; however, if they do rotate into such a position, they will be graded on this competency even though they may not be individually observed by an NRC examiner, as discussed in ES-302).

C. Responsibilities

1. Facility Licensee

The facility licensee is responsible for the following activities, as applicable, depending upon the examination arrangements confirmed with the NRC's regional office in accordance with ES-201 approximately 4 months before the scheduled examination date:

a. Prepare proposed examination outlines in accordance with Section D and submit them to the NRC's 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 review the requested examination(s). (Refer to ES-201, Attachment 2.)

RO applicants need not be evaluated on every topic (as indicated above, "Equipment Control," "Radiation Control," or "Emergency Plan" can be omitted by doubling-up on "Conduct of Operations"), unless the applicant is retaking only the "Administrative Topics" (with a waiver of the systems walk-through and simulator test pursuant to ES-204).

K/As associated with each administrative topic shall be selected from Section 2 of the applicable NRC K/A catalog for pressurized- or boiling-water reactors (i.e., NUREG-1122 and 1123, respectively). For the "Emergency Plan" topic, only those K/As related to the emergency plan and implementing procedures [not those associated with the emergency operating procedures (EOPs)] are applicable to this category of the operating test.

b. For each administrative subject, select a performance-based activity for which an administrative JPM can be developed. The administrative JPMs may require the applicant to identify and respond to one or more postulated administrative errors in a manner similar to the alternate path methodology discussed in Appendix C.

c. In general, SROs have more administrative responsibilities than ROs, so SRO applicants should be evaluated in greater depth on the administrative topics. RO applicants need only understand the mechanics and intent of the related subjects, as they pertain to tasks at the facility.

d. The following specific guidelines should be applied when selecting or developing JPMs to confirm the applicant's competence with regard to each topic:

"Conduct of Operations"

Many of these subjects can be covered within the framework of a shift turnover or by integrating them into other discussions, as they apply, throughout the examination.

The applicant's security awareness should be evaluated by observing his or her behavior during the operating test. However, passive observations, in and of themselves, are insufficient to justify an evaluation in that subject area.

"Equipment Control"

These subjects can be evaluated within the framework of a normal maintenance evolution. For example, have the applicant demonstrate how he or she would take a failed system or component out of service, initiate maintenance on the system, and test the system before placing it back in service.

The subject of fuel handling can be covered in the control room, but attempt to cover this subject in the fuel handling areas of the plant whenever possible. The RO applicant should be aware of his or her duties in the control room during fuel handling. These duties include monitoring instrumentation and responding to alarms from the fuel handling area, communicating with

the fuel handling and storage facility, and operating systems from the control room in support of (re)fueling operations. For the SRO applicant, evaluate topics such as core alterations, new and spent fuel storage and movement, the design of the fuel handling area, use of the fuel handling tools, and fuel handling casualties.

"Radiation Control"

This topic is best covered in conjunction with the JPMs prepared for the in-plant systems walk-through. It is most appropriate to evaluate these subjects during the required entry into the radiologically controlled area (RCA).

The levels of knowledge expected of RO and SRO applicants in some radiation control subjects are significantly different. The RO's duties generally require knowledge of radiation worker responsibilities and operation of plant systems associated with liquid and gaseous waste releases. Therefore, the depth to which RO applicants are evaluated should be limited to their responsibilities and the monitoring requirements before, during, and after the release. The SRO, however, may be involved in reviewing and approving release permits and should be cognizant of the requirements associated with those releases, as well as their potential effect on the health and safety of the public. The SRO applicants may be asked to simulate a planned release (e.g., liquid, gaseous, or containment purge) when examining these topics.

"Emergency Plan"

There are significant differences between the knowledge required of RO and SRO applicants in this area. RO applicants should be familiar with the emergency plan and with their plant-specific responsibilities under the emergency plan implementing procedures (EPIPs). By contrast, SRO applicants must demonstrate additional knowledge based upon their responsibility to direct and manage the implementation of the EPIPs during the initial phases of an emergency. As a result, SRO applicants should have a more detailed understanding of the EPIPs, in general, and should be familiar with event classification procedures, protective action recommendations, and communication requirements and methods. As discussed in Section D.1, ensure that the test does not become predictable by always performing a different variation of the same activity (e.g., repetitive emergency classifications with different events).

This topic is best evaluated by linking a JPM to a simulator transient that requires implementation of the emergency plan. Such a JPM can be conducted immediately following a simulator scenario or during the walk-through examination.

1. The most appropriate format is the short-answer question, which requires the applicant to compose a response rather than select from among a set of alternative responses, as is the case with multiple-choice, matching, and true/false questions.

2. Provide clear, explicit directions and/or guidelines for answering the question so that the applicant understands what constitutes a fully correct response. Choose words carefully to ensure that the stipulations and requirements of the question are appropriately conveyed. Words such as "evaluate," "outline," and "explain," can invite a lot of detail that is not necessarily relevant.

3. Make sure that the expected response matches (and is limited to) the requirements posed in the question. Consider the amount of partial credit to be granted for an incomplete answer. For questions requiring computation, specify the degree of precision expected. Try to make the answer turn out to be whole numbers.

4. Avoid giving away part or all of the answer by the way the question is worded. For example, "If the letdown line became obstructed, could borating of the plant be accomplished shortly after a reactor trip to put the plant in cold shutdown? If so, how?"

   A test-wise applicant can realize that the answer has to be yes, or else the second part of the question would have read something like "If not, why not?"

5. Avoid what could be considered "trick" questions, in which the expected answer does not precisely match the question. For example, asking "How do the SI termination criteria change following an SI re-initiation?" implies that the termination criteria will change, when in actuality they do not.

6. Do not use direct look-up questions that only require the applicant to recall where to find the answer to the question. The operational orientation required of questions on the walk-through test and the applicant's access to reference documents, argue against the use of questions that test recall and memorization. Any questions that do not require any analysis, synthesis, or application of information by the applicant should be answerable without the aid of reference materials. Refer to ES-602, Attachment 1, for a more detailed discussion of direct look-up questions.

7. Questions should also adhere to the generic item construction principles and guidelines in Appendix B. Moreover, Form ES-602-1, "NRC Checklist for Open-Reference Test Items," contains a list of questions that can be used to evaluate the suitability of the questions for the walk-through portion of the operating test. Although the checklist was developed for use in evaluating requalification written examinations, all of the criteria except 9–11, and the K/A rating on item 7 are generically applicable.

Facility: _____ Date of Examination: _____

Examination Level: RO ☐ SRO ☐ Operating Test Number: _____

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations		
Conduct of Operations		
Equipment Control		
Radiation Control		
Emergency Plan		

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (# 3 for ROs; # 4 for SROs & RO retakes)
(N)ew or (M)odified from bank ($ 1)
(P)revious 2 exams (# 1; randomly selected)

Facility: _____ Date of Examination: _____
Exam Level: RO ☐ SRO-I ☐ SRO-U ☐ Operating Test No.: _____

Control Room Systems[@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
In-Plant Systems[@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i.		
j.		
k.		

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	# 9 / # 8 / # 4
(E)mergency or abnormal in-plant	$ 1 / $ 1 / $ 1
(L)ow-Power / Shutdown	$ 1 / $ 1 / $ 1
(N)ew or (M)odified from bank including 1(A)	$ 2 / $ 2 / $ 1
(P)revious 2 exams	# 3 / # 3 / # 2 (randomly selected)
(R)CA	$ 1 / $ 1 / $ 1
(S)imulator	

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 different parts of the operating test 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 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 • operationally important 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.	Ensure that any changes from the previously approved systems and administrative walk-through outlines (Forms ES-301-1 and 2) have not caused the test to deviate from any of the acceptance criteria (e.g., item distribution, bank use, repetition from the last 2 NRC examinations) specified on those forms and Form ES-201-2.			
	3. Simulator Criteria	--	--	--
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. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies or deviations from the referenced plant 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.5 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.5.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)	/ /			

Facility: Date of Exam: Operating Test No.:

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

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 requirements specified for the applicant's license level in the right-hand columns.

Facility:	Date of Examination:	Operating Test No.:

Competencies	APPLICANTS															
	RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions																
Comply With and Use Procedures (1)																
Operate Control Boards (2)																
Communicate and Interact																
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:

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

4. Make a Final Recommendation

a. After grading and documenting the operating test, make an overall recommendation by checking the "Pass" or "Fail" (or "Waive" if the entire operating test was waived in accordance with ES-204) block, and signing and dating the "Examiner Recommendations" section on the applicant's Form ES-303-1. Make a "Pass" recommendation only if *all* summary blocks of the operating test contain satisfactory ("S") grades or the letter "W," indicating that the applicant was not examined in that area.

b. Assemble the operating test package (including Forms ES-303-1, ES-303-2, ES-D-1, and ES-D-2 and all supporting documentation such as strip chart recordings and applicant notes and drawings) for each applicant and forward the package to the chief examiner for review in accordance with ES-501.

E. Attachments/Forms

Form ES-303-1, "Individual Examination Report"
Form ES-303-2, "Operating Test Comments"
Form ES-303-3, "RO Competency Grading Worksheet for the Simulator Test"
Form ES-303-4, "SRO Competency Grading Worksheet for the Simulator Test"

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U.S. Nuclear Regulatory Commission Individual Examination Report					
Applicant's Name			Docket Number 55-		
I	R	Examination Type (Initial or Retake)	Facility Name		
		Reactor Operator	Facility Description		Hot
		Senior Reactor Operator (SRO) Instant			Cold
		SRO Upgrade			BWR
		SRO Limited to Fuel Handling			PWR

Written Examination Summary	
NRC Author/Reviewer	RO/SRO/Total Exam Points ___ /___ /___
NRC Grader/Reviewer	Applicant Points ___ /___ /___
Date Administered	Applicant Grade (%) ___ /___ /___

Operating Test Summary		
Administered by	Date Administered	
Walk-Through (Overall)		
Administrative Topics		
Simulator Operating Test		

Examiner Recommendations					
Check Blocks	Pass	Fail	Waive	Signature	Date
Written Examination					
Operating Test					
Final Recommendation					

License Recommendation			
	Issue License	Supervisor's Signature	Date
	Deny License		

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Walk-Through Grading Details	Evaluation (S or U)	Comment Page Number
Administrative Topics		
a.		
b.		
c.		
d.		
e.		
Systems — Control Room		
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
Systems — In-Plant		
i.		
j.		
k.		

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Reactor Operator Simulator Operating Test Grading Details

Competencies/ Rating Factors (RFs)	RF Weights	RF Scores	RF Grades	Comp. Grades	Comment Page No.
1. Interpretation/Diagnosis					
a. Recognize & Verify Status	_____	_____	_____		_____
b. Interpret & Diagnose Conditions	_____	_____	_____	_____	_____
c. Prioritize Response	_____	_____	_____		_____
2. Procedures/Tech Specs					
a. Reference	_____	_____	_____		_____
b. Procedure Compliance	_____	_____	_____	_____	_____
c. Tech Spec Entry	_____	_____	_____		_____
3. Control Board Operations					
a. Locate & Manipulate	_____	_____	_____		_____
b. Understanding	_____	_____	_____	_____	_____
c. Manual Control	_____	_____	_____		_____
4. Communications					
a. Provide Information	_____	_____	_____		_____
b. Receive Information	_____	_____	_____	_____	_____
c. Carry Out Instructions	_____	_____	_____		_____

[Note: Enter RF Weights (nominal, adjusted, or "0" if not observed (N/O)), RF Scores (1, 2, 3, or N/O), and RF Grades from Form ES-303-3 and sum to obtain Competency Grades.]

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Senior Reactor Operator Simulator Operating Test Grading Details

Competencies/ Rating Factors (RFs)	RF Weights	RF Scores	RF Grades	Comp. Grades	Comment Page No.
1. Interpretation/Diagnosis					
a. Recognize & Attend	_____	_____	_____		_____
b. Ensure Accuracy	_____	_____	_____	____	_____
c. Understanding	_____	_____	_____		_____
d. Diagnose	_____	_____	_____		_____
2. Procedures					
a. Reference	_____	_____	_____		_____
b. EOP Entry	_____	_____	_____	____	_____
c. Correct Use	_____	_____	_____		_____
3. Control Board Operations					
a. Locate & Manipulate	_____	_____	_____		_____
b. Understanding	_____	_____	_____	____	_____
c. Manual Control	_____	_____	_____		_____
4. Communications					
a. Clarity	_____	_____	_____		_____
b. Crew & Others Informed	_____	_____	_____	____	_____
c. Receive Information	_____	_____	_____		_____
5. Directing Operations					
a. Timely & Decisive Action	_____	_____	_____		_____
b. Oversight	_____	_____	_____	____	_____
c. Solicit Crew Feedback	_____	_____	_____		_____
d. Monitor Crew Activities	_____	_____	_____		_____
6. Technical Specifications					
a. Recognize and Locate	_____	_____	_____		_____
b. Compliance	_____	_____	_____	____	_____

[Note: Enter RF Weights (nominal, adjusted, or "0" if not observed (N/O)), RF Scores (1, 2, 3, or N/O), and RF Grades from Form ES-303-4 and sum to obtain Competency Grades.]

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Form ES-303-1 Cross-Reference	Comments

PRIVACY ACT INFORMATION — FOR OFFICIAL USE ONLY

1. When preparing the outline for Tier 1 (E/APEs) and Tier 2 (Plant Systems), the examination author shall not exclude from the random selection process for Category "G" any of the following K/As from Section 2 of the applicable K/A Catalog: 2.1.2, 2.1.14, 2.1.23, 2.1.27, 2.1.28, 2.1.30, 2.1.32, 2.1.33, 2.2.22, 2.2.25, 2.4.4, 2.4.6, 2.4.30, 2.4.31, 2.4.49, and 2.4.50. However, these K/As may be rejected and justified on a case-by-case basis while developing the examination outline. The NRC will review the author's justification for each rejected K/A. The remaining Section 2 K/As may be excluded from the random selection process and/or rejected without explanation or justification.

   [Note: With the exception of K/A #2.4.6, the listed K/As equate to the "Old System-Generic K/As" identified on page xiv of NUREG-1122 (Revision 2) and page xiii of NUREG-1123 (Revision 2). K/A #2.4.6 replaces old E/APE-generic K/A #12, "ability to utilize symptom-based procedures," which was omitted from Revision 2 of the catalogs.]

2. All[1] of the K/As in Section 2 of the applicable NRC K/A Catalog shall remain eligible for random selection for Tier 3 (generic knowledge and abilities) of the outline for RO examinations; all[1] K/As that are linked to 10 CFR 55.43 are eligible for SRO-only examinations. They may not be pre-screened out; however, they may be rejected and justified on a case-by-case basis while developing the examination outline. The NRC will review the author's justification for each rejected K/A.

   [Note: As stated in Section D.2.a of ES-401, the intent of Tier 3 questions is to evaluate the applicants' knowledge in areas applicable to generic plant operation and not a specific system or procedure. If one of the Old System-Generic K/As is randomly selected for Tier 3, the question should avoid testing knowledge specific to a particular system or procedure but test a plant-wide generic concept.]

3. Examination authors and reviewers should ask themselves the following questions to help determine whether or not any K/A statement is appropriate for testing:

   - Is the subject K/A relevant (e.g., is the system, component, process, procedure, or event installed, in use, or possible) at the subject facility?
   - Is the subject K/A's importance rating equal to or greater than 2.5 for the license level of the proposed examination, or is there a site-specific priority that justifies keeping the K/A if its importance rating is below 2.5?
   - Is it possible to prepare a psychometrically sound question related to the subject K/A?

   If these questions can all be answered in the affirmative, then the subject K/A is probably appropriate for testing. The fact that a K/A does not have a corresponding facility learning objective, was not covered in training, or is subject to selection in multiple tiers, are not sufficient bases for eliminating the K/A from any tier of the outline.

4. Facility licensees that elect to pre-screen and eliminate any K/A statements from the random selection process should make arrangements for their NRC regional office to review their screening process and results before they submit their next examination outline. Any subsequent changes to the list of K/As from which the examination outline is generated would also have to be documented, justified, and reviewed by the NRC.

5. Except as noted in Item 1 above, all K/A statements that are eliminated after they have been randomly selected to fill an examination outline shall be documented on Form ES-401-4, "Record of Rejected K/As," or equivalent, and submitted to the NRC's regional office for review in conjunction with the proposed examination outline.

---

[1] Single-unit facilities may pre-screen out multi-unit generic K/As 2.2.3 and 2.2.4.

Facility: Date of Exam:

Tier	Group	RO K/A Category Points												SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2		G*		Total
1. Emergency & Abnormal Plant Evolutions	1				N/A					N/A			20					7
	2												7					3
	Tier Totals												27					10
2. Plant Systems	1												26					5
	2												12					3
	Tier Totals												38					8
3. Generic Knowledge and Abilities Categories		1		2		3		4					10	1	2	3	4	7

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, 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 RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) 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.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

Facility: Date of Exam:

Tier	Group	RO K/A Category Points											SRO-Only Points		
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1				N/A			N/A					18			6
	2												9			4
	Tier Totals												27			10
2. Plant Systems	1												28			5
	2												10			3
	Tier Totals												38			8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, 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 RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) 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.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3									
000015/17 RCP Malfunctions / 4									
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4									
000026 Loss of Component Cooling Water / 8									
000027 Pressurizer Pressure Control System Malfunction / 3									
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3									
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4									
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6									
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6									
000058 Loss of DC Power / 6									
000062 Loss of Nuclear Svc Water / 4									
000065 Loss of Instrument Air / 8									
W/E04 LOCA Outside Containment / 3									
W/E11 Loss of Emergency Coolant Recirc. / 4									
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
K/A Category Totals:							Group Point Total:		18/6

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

Item Description					Initial a	Initial b*	Initial c#
1.	Questions and answers are technically accurate and applicable to the facility.						
2.	a. NRC K/As are referenced for all questions. b. Facility learning objectives are referenced as available.						
3.	SRO questions are appropriate in accordance with Section D.2.d of ES-401						
4.	The sampling process was random and systematic (If more than 4 RO or 2 SRO questions were repeated from the last 2 NRC licensing exams, consult the NRR OL program office).						
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 new or modified); enter the actual RO / SRO-only question distribution(s) at right.	Bank /	Modified /	New /			
7.	Between 50 and 60 percent of the questions on the RO exam are written at the comprehension/ analysis level; the SRO exam may exceed 60 percent if the randomly selected K/As support the higher cognitive levels; enter the actual RO / SRO question distribution(s) at right.	Memory /	C/A /				
8.	References/handouts provided do not give away answers or aid in the elimination of distractors.						
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 the guidelines in ES Appendix B.						
11.	The exam contains the required number of one-point, multiple choice items; the total is correct and agrees with the value on the 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 RO Written Examination

Applicant Information	
Name:	
Date:	Facility/Unit:
Region: I ☐ II ☐ III ☐ IV ☐	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. To pass the examination, you must achieve a final grade of at least 80.00 percent. Examination papers will be collected 6 hours after the examination begins.

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

U.S. Nuclear Regulatory Commission

Site-Specific SRO Written Examination

Applicant Information	
Name:	
Date:	Facility/Unit:
Region: I ☐ II ☐ III ☐ IV ☐	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. To pass the examination you must achieve a final grade of at least 80.00 percent overall, with 70.00 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80.00 percent to pass. You have 8 hours to complete the combined examination, and 3 hours if you are only taking the SRO portion.

Applicant Certification

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

_____
Applicant's Signature

Results	
RO/SRO-Only/Total Examination Values	_____ / _____ / _____ Points
Applicant's Scores	_____ / _____ / _____ 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.
   - The distractors are not credible; single implausible distractors should be repaired, more than one is unacceptable.
   - 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)nsatisfactory (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).

Facility:	Date of Exam:	Exam Level: RO ☐ SRO ☐		
		Initials		
	Item Description	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% overall and 70 or 80, as applicable, ±4% on the SRO-only) 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.

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

c. Agency policy requires that all documents that are not classified, proprietary, sensitive or otherwise protected (e.g., under the Privacy Act or Freedom of Information Act) must be made available to the public. Therefore, the NRC's 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 Document Room as soon as possible after the examinations have been completed. NRC Manual Chapter 0620, "Inspection Documents and Records," and SECY-04-0191, "Withholding Sensitive Unclassified Information Concerning Nuclear Power Reactors from Public Disclosure," provide additional policies and guidance in this area.

F. NRC Record Retention

1. The NRC's regional office shall ensure, for the most recent initial examination at each facility, that originals (whenever possible) or copies of the following items either are retained in the facility's master examination file or are electronically available via the NRC's Agencywide Documents Access and Management System (ADAMS). The italicized items should be retained or available for the last two examinations at each facility so that examiners can verify compliance with the guidelines for test item repetition.

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

   b. ES-201, Attachment 4, "Examination Approval Letter," with pen-and-ink changes on Form ES-201-4, "List of Applicants," to identify the applicants who 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-401-4, "Record of Rejected K/As" (or the equivalent LSRO forms from ES-701)

   e. the proposed NRC- or facility-developed operating tests and written examination (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),

Forms ES-401-6, "Written Examination Quality Checklist," and ES-401-9, "Written Examination Review Worksheet" (or the equivalent LSRO forms from ES-701), and any reference handouts (or a list thereof) provided to the applicants

g. *the as-given scenarios including Forms ES-D-1, "Scenario Outline,"* and ES-D-2, "Required 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/In-Plant Systems Outline,"* and the JPMs *for each walk-through test* (all record copies should 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" (or the equivalent LSRO forms from ES-701)

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

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

k. *the final "Examination Report," with all enclosures*

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

2. The NRC's regional office shall place the following items[2] in each applicant's docket file:

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, "Required Operator Actions," if the applicant failed the simulator 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 sheet (Form ES-401-7, ES-401-8, or ES-701-8) and answer sheet

[2] 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.

of your examination that you believe were graded incorrectly or too severely. In addition, you must provide the basis, including supporting documentation (such as procedures, instructions, computer printouts, and chart traces), in as much detail as possible, to support your contention that certain of your responses were graded incorrectly or too severely.

The NRC will review your contentions, reconsider your grading, and inform you of the results. If the proposed denial is sustained, you will have the opportunity to request a hearing pursuant to 10 CFR 2.103(b)(2) at that time.

- You may request a hearing pursuant to 10 CFR 2.103(b)(2). Submit your request, in writing, to the Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attention: Rulemakings and Adjudications Staff, with a copy to the Associate General Counsel for Hearings, Enforcement, and Administration, Office of the General Counsel, at the same address. (Refer to 10 CFR 2.302 for additional filing options and instructions.)

Pursuant to 10 CFR 55.35, you may not reapply for a license until your license has been finally denied. Failure on your part to exercise either of the above options within 20 days constitutes a waiver of your opportunity for informal review and your right to demand a hearing. For the purpose of re-application under 10 CFR 55.35, such a waiver renders this letter a notice of final denial of your application, effective as of the date of this letter.

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

Sincerely,

(Name and title of licensing official)

Docket No. 55-(number)

Enclosures: As stated

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

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

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* Use for initial RO or SRO license applicants who passed either the operating test or the written examination but failed the other.

** Use for second and subsequent retake applicants.

*** Use for applicants who failed both the operating test and the written examination.

NRC Letterhead

(Date)

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

Dear (Name):

The purpose of this letter is to forward the results of the site-specific operating test and written examination administered to you during the week of (date) in connection with your application for a (reactor operator, senior reactor operator, limited senior reactor operator) license for the (facility name). Copies of your operating test and written examination answer sheets are enclosed.

However, as explained in paragraph D.3.c of Examination Standard (ES) 501 in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 9, we will not issue your license [until your employer certifies in writing that you have acquired all of the training and experience for which you were previously granted a waiver.] [[until we determine that your medical condition and general health are satisfactory for licensing.]] [[[because any written examination with a passing grade of 82 (74 for SRO-only) percent or below is normally held for review until those applicants who failed the examination have had an opportunity to appeal their license denials.

After resolving potential changes from any appeal, the NRC will issue your license if your final grade remains above 80 (70 for SRO-only) percent. Should changes result in your final grade being below 80 (70 for SRO-only) percent, the NRC will send you a proposed denial letter, which will outline your response options.]]]

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

Sincerely,

(Name and title of licensing official)

Docket No. 55-(number)

Enclosures: As stated

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

[ ] Use only for applicants who need to complete training or experience prior to licensing.
[[ ]] Use only for applicants whose medical condition is still under review.
[[[ ]]] Use only for applicants whose final licensing action is pending the resolution of written examination appeals.

Post-Examination Check Sheet		
Facility:		**Date of Examination:**
Task Description		**Date Complete**
1.	Facility written exam comments or graded exams received and verified complete	
2.	Facility written exam comments reviewed and incorporated and NRC grading completed, if necessary	
3.	Operating tests graded by NRC examiners	
4.	NRC chief examiner review of operating test and written exam grading completed	
5.	Responsible supervisor review completed	
6.	Management (licensing official) review completed	
7.	License and denial letters mailed	
8.	Facility notified of results	
9.	Examination report issued (refer to NRC MC 0612)	
10.	Reference material returned after final resolution of any appeals	

PRIVACY ACT INFORMATION — FOR OFFICIAL USE ONLY

Power Plant Examination Results Summary

Facility:	Plant Status: Hot ☐ Cold ☐
Written Examination Date: Prepared by: Facility ☐ NRC ☐	Operating Test Date(s): Prepared by: Facility ☐ NRC ☐
NRC Examiners:	

Overall Results

Applicants: Total #		# Passed	% Passed	# Failed	% Failed
RO					
SRO					

Individual Results

Name	Docket # 55-(_____)	Type (1)	Written Grade	Operating Test(2)		
			RO / SRO / TOT	W-T	ADM	SIM
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			
			/ /			

NOTES:
(1) 1=RO; 2=SRO-I; 3=SRO-U; 4=RO-Retake; 5=SRO-I-Retake; 6=SRO-U-Retake; 7=SRO-Fuel
(2) P=Passed; F=Failed; W=Waived

PRIVACY ACT INFORMATION — FOR OFFICIAL USE ONLY

The examination team should use this evaluation form during the dynamic simulator component of the requalification examination. The rating scales on this form are for evaluating the crew as a whole, rather than the individual operators. Use the following instructions when rating team performance on the simulator examination:

1. Review the rating scales before the simulator examination so that you are familiar with each competency to be evaluated.

2. Use Form ES-D-2, "Required Operator Actions," or an equivalent facility form to make notes during the examination, as described in Appendix D and ES-302, "Administering Operating Tests to Initial License Applicants."

3. Complete this form immediately after the simulator examination. Evaluate the crew's performance on each applicable rating factor by comparing the actions of the crew against the associated behavioral anchors and selecting the appropriate grade. The tasks planned and performed during the crew's scenario set may not permit you to evaluate every rating factor for every crew. Annotate those rating factors that are not used in the evaluation.

   The examination team should pay particular attention to the completion of tasks that they identified as critical to plant safety. The crew may compensate for actions that individual operators performed incorrectly, as long as the critical task was completed satisfactorily. Other less-significant deficiencies should also be accounted for in the rating factor evaluations to provide a source of information for crew remedial training during subsequent requalification training.

4. Justify all rating factor grades of "1," and document each justification in the space for "Comments" on the form. Rating factor grades of "1" must be linked to the performance of at least one critical task.

5. Complete the examination summary sheet, recording for each scenario, the scenario name (or identifier), and the critical tasks performed by the crew. Annotate whether the critical task was performed satisfactorily or unsatisfactorily. Complete the crew's overall evaluation using the criteria listed in the next paragraph. Space is provided for additional comments about the crew's performance.

6. The threshold for failing the simulator portion of the examination is to receive a (behavioral anchor) score of "1" in either of the following:

   a. any two rating factors in any one competency

   b. any one rating factor in any one competency if, in the judgement of the examination team, the crew's performance deficiency jeopardizes the safety of the plant or has significant safety impact on the public. (NRC management will make the final decision concerning all crew failures resulting from a single rating factor evaluation of "1.")

Simulator Examination Summary Sheet

Facility: _____ Examination Date: _____

Overall Dynamic Simulator Crew Evaluation: **SAT or UNSAT**

Crew Members	Docket No.	Scenario #1 Position	Scenario #2 Position
1. _____	55-_____	_____	_____
2. _____	55-_____	_____	_____
3. _____	55-_____	_____	_____
4. _____	55-_____	_____	_____
5. _____	55-_____	_____	_____
6. _____	55-_____	_____	_____

Scenario #1: [Enter scenario descriptor]

Crew Critical Tasks	SAT	UNSAT
1. [Enter critical task descriptor]		
2.		
3.		
4.		
5.		

Scenario #2:

Crew Critical Tasks	SAT	UNSAT
1.		
2.		
3.		
4.		
5.		

Comments:

_____

_____

ES-701
ADMINISTRATION OF INITIAL EXAMINATIONS FOR SENIOR OPERATORS LIMITED TO FUEL HANDLING

A. Purpose

This standard provides specific instructions for use in preparing, administering, grading, and documenting initial examinations for senior operators who are limited to fuel handling (LSROs).

B. Background

Pursuant to Title 10, Sections 55.41 and 55.43, of the *Code of Federal Regulations* (10 CFR 55.41 and 55.43), the NRC's written LSRO examinations must contain a representative selection of questions concerning the specific knowledge, skills, and abilities needed to perform licensed fuel handling duties. Similarly, to the extent applicable, the operating tests must require the applicant to demonstrate an understanding of and the ability to perform the actions necessary to accomplish a representative sample of the items in 10 CFR 55.45. The regulations also stipulate that the content of the examinations and tests will be identified, in part, from learning objectives derived from a systematic analysis of the operators' duties performed by the facility licensee. Therefore, the facility licensee's job task analysis (JTA) for fuel handlers would provide an excellent source of information for developing the written examination and operating test.

Except as noted herein, the guidance in Examination Standards (ESs) 201, 202, 204, 301, 302, 303, 401, 402, 403, 501, and 502 for administering unrestricted initial licensing examinations at power reactors also applies to the LSRO examination. However, the "Procedure for Administering the Generic Fundamentals Examination [GFE] Program" (described in ES-205) does not apply to LSRO applicants.

C. Responsibilities

1. Facility Licensee

The facility licensee is responsible for the same activities specified in the unrestricted ESs, with the following exceptions and modifications:

a. As an exception to ES-202, "Preparing and Reviewing Operator License Applications," the facility licensee may request LSRO licenses that are valid for more than one site. To do so, the facility licensee shall provide documentation that describes the differences in the design, procedures, technical data, and administrative controls of the separate facilities for which the license is being sought.

b. The scope, content, administration, and grading of the written examination and operating test shall be as described in Sections D and E, below.

c. In accordance with 10 CFR 55.46(b), the facility licensee shall request the Commission's approval to use the plant or a simulation facility, other than a plant-referenced simulator, in administering the operating test under 10 CFR 55.45(b)(1) or (3).

2. NRC Regional Office

The NRC's regional office is responsible for the same activities specified in the unrestricted ESs, with the following exceptions and modifications:

a. The regional office should generally conduct the LSRO examinations during a time when the fuel handling equipment will be available for the operating tests.

b. With the concurrence of the NRR operator licensing program office, the regional office may issue LSRO licenses that are valid for units at more than one site, 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 design, procedures, technical data, and administrative controls of the separate facilities for which the license is being sought.

c. The scope, content, administration, and grading of the written examination and operating test shall be as described in Sections D and E, below.

d. The regional office shall coordinate with the NRR operator licensing program office regarding approval to use the plant or a simulation facility, other than a plant-referenced simulator, in administering the operating test under 10 CFR 55.45(b)(1) or (3).

D. Written Examination Instructions

1. Preparation

The NRC's written LSRO examination should meet all of the guidelines and requirements for question construction, quality, and facility reviews specified in ES-401, "Preparing Initial Site-Specific Written Examinations," and Appendix B, "Written Examination Guidelines," except as noted below:

a. Develop the examination outline as described in Section D.1 of ES-401, with the following exceptions and clarifications:

- Instead of using the RO and SRO models in ES-401, use Form ES-701-1 or Form ES-701-2, as applicable to the facility, and Form ES-701-3 to develop the examination outline. As with the unrestricted examinations, topics that are not applicable to LSROs at the subject facility should be eliminated in accordance with Attachment 2 to ES-401. Given the large number of knowledge and ability (K/A) statements that will not apply to LSROs, it may be advantageous to pre-screen the K/As as discussed in Item 4 of that Attachment. When reviewing K/As for elimination,

do not focus only on the fuel handling equipment; rather, focus more broadly on the knowledge and abilities that an LSRO would need to support safe operation during fuel handling. If the facility licensee's JTA identified other LSRO-relevant components, systems, and evolutions that are not included on Form ES-701-1 or ES-701-2, those items must be added to the appropriate tier of the outline before beginning the random selection process. Additional instructions are noted on the forms.

- Section D.1.c of ES-401 is not applicable to the LSRO examination.

- Use Form ES-701-5, "LSRO Examination Outline Quality Checklist," instead of Form ES-201-2 when reviewing the examination outline.

b. Select and develop questions as described in Section D.2 of ES-401, with the following exceptions:

- Construct the LSRO written examination so that a competent applicant can complete the examination in 2.5 hours. (The applicants will be allowed 4 hours to complete and review the examination.)

- Between 50 and 60 percent (20 to 24) of the LSRO examination questions shall be written at the comprehension/analysis level.

- Reactor theory, component, and thermodynamic questions that directly relate to the LSRO JTA may be selected from prior GFE examinations.

- Section D.2.d of ES-401 is not applicable to the LSRO examination.

- Limit the use of bank questions to no more than 30; include at least 4 new and 6 significantly modified questions on every examination. Questions selected from the bank must be relevant to the LSRO function.

- If the examination will be used to license the applicants at more than one facility, ensure that it adequately covers all of the applicable units. An examination developed for the purpose of cross-qualifying a licensed LSRO at another similar facility may focus exclusively on the differences between the facilities.

c. Review and assemble the examination as described in Sections D.3, D.4, and E of ES-401, using Forms ES-701-6 and ES-701-8 instead of the equivalent forms in ES-401.

2. Administration and Grading

The NRC's written LSRO examination shall be administered and graded in accordance with ES-402, "Administering Initial Written Examinations," and ES-403, "Grading Initial Site-Specific Written Examinations." The examination may be administered concurrently and in the same room with full-scope, initial license examinations. However, in such instances, the proctor should minimize any disturbance to those applicants taking the longer examination.

E. Operating Test Instructions

The LSRO operating test shall generally be prepared, administered, and documented in accordance with ES-301, "Preparing Initial Operating Tests"; ES-302, "Administering Operating Tests to Initial License Applicants"; and ES-303, "Documenting and Grading Initial Operating Tests," except as noted below and in the specific criteria at the bottom of Form ES-701-4, "LSRO Operating Test Outline."

The operating test shall be performance-based to the maximum extent possible; however, given the nature of the LSROs' duties, it is neither practical nor appropriate to administer the test on the plant-referenced simulator. Therefore, pursuant to 10 CFR 55.45(b), the test shall be administered in a plant walk-through and in either the plant or a simulation facility, as approved by the Commission under 10 CFR 55.46(b). The facility licensee is encouraged to permit the actual use of equipment to handle dummy fuel elements, assemblies, or modules during the operating test whenever feasible. This may require careful coordination with the facility licensee to establish a schedule and to make sure that a licensed SRO is available, if needed. When actual equipment is not available or accessible (e.g., because of high radiation), administer the test using walk-through methods near the actual equipment or by using mockup equipment. If the facility licensee has a refueling machine simulator, use it to the extent possible during the administration of the operating test.

The operating test shall assess the applicant's ability to execute normal, abnormal, and emergency procedures associated with fuel handling. Each applicant will be required to simulate or perform tasks related to fuel handling and, if necessary based on their performance, to answer questions associated with the refueling equipment and associated systems. The applicant shall not be held accountable for duties that are performed exclusively by the control room staff or shift supervisor.

1. Preparation

The operating test shall consist entirely of job performance measures (JPMs) covering those administrative topics, systems, and emergency/abnormal plant evolutions (E/APEs) related to refueling. No distinction between control room and facility systems/evolutions is required, because most (if not all) of the test will be conducted outside the control room. The dynamic simulator operating test requirements and guidelines in Section D.5 of ES-301 do not apply to the LSRO license examination.

Part of the operating test may be conducted in the control room so that those controls, instruments, and other materials or equipment related to fuel handling (e.g., procedures and diagrams) are available for reference. Although LSROs will not operate any systems from the control room, they must be aware of the effects (e.g., alarms) that fuel handling operations will have in the control room. They must also be familiar with the methods and requirements for communicating with the control room staff and shift supervisor. At least two of the JPMs must require the applicant to use the facility's technical specifications.

The following additional guidelines clarify the expectations for each part of the LSRO operating test.

a. Develop the Administrative portion of the operating test in accordance with Section D.3 of ES-301; however, given the reduced scope of the LSROs' responsibilities, the required number of tasks is reduced from five to three, distributed among the four administrative topics. Note that some "Conduct of Operations" subjects (e.g., reactor plant startup requirements) may not apply; however, most can be adapted for use during the LSRO operating test. The "Equipment Control" subjects all lend themselves to evaluating the required refueling maintenance and surveillance actions that the LSRO should be able to supervise or perform. All of the "Radiation Control" subjects apply to refueling operations and should be evaluated on a sampling basis. The "Emergency Plan" topic shall be evaluated to the extent that the applicant is required to respond to a declared event and the knowledge required of a radiation worker.

b. Develop the Systems portion of the operating test as follows:

   - Develop two JPMs that require the applicant to manipulate the facility's fuel handling equipment.

   - Develop two JPMs related to systems other than fuel handling equipment (i.e., 234000 or 034) listed in Tier 2 of the appropriate written examination outline (i.e., Form ES-701-1 or ES-701-2, as modified in Section D.1.a, above).

   - The specific criteria in Sections D.4.a and b of ES-301 do not apply. Two of the tasks shall require the applicant to execute alternative paths within the facility's operating procedures.

c. Develop the E/APE portion of the operating test as follows:

   - Develop three JPMs based on the evolutions listed in Tier 1 of the appropriate written examination outline (i.e., Form ES-701-1 or ES-701-2, as modified in Section D.1.a, above); one of the JPMs must involve a refueling accident.

   - One of the tasks shall require the applicant to execute alternative paths within the facility's operating procedures.

d. The operating test should normally take between 4 and 6 hours, depending on whether the LSRO actually operates refueling equipment.

e. Use Form ES-701-4, "LSRO Operating Test Outline," to document the selection of Administrative, System, and E/APE JPMs to be performed (instead of using Forms ES-301-1 and ES-301-2); insert the applicable type codes and adhere to the specific criteria noted at the bottom of the form. Review the outline using Form ES-701-5, "LSRO Examination Outline Quality Checklist" (instead of Form ES-201-2).

f. Review the final operating test in accordance with Section E of ES-301, as applicable, using Form ES-701-7, "LSRO Operating Test Quality Checklist" (instead of Form ES-301-3).

2. Administration

Administer the operating test in accordance with Sections D.1 and D.2 of ES-302, as applicable; Section D.3 (in its entirety) does not apply to the LSRO operating test.

3. Grading

Grade and document the applicant's performance on the operating test in accordance with Sections D.1, D.2.a, D.3, and D.4 of ES-303, as applicable, with the following specific exceptions and clarifications:

a. Substitute Form ES-701-4 for Pages 2 and 3.b of Form ES-303-1 and determine a grade for each Administrative, System, and E/APE JPM as described in Section D.2.a of ES-303. "N/A" the "Simulator Operating Test" in the Summary section on page 1 of Form ES-303-1.

b. The applicant must achieve a satisfactory grade on at least 80 percent of the JPMs (8/10) overall and at least 60 percent (2/3) of the administrative JPMs (i.e., the same criteria as in ES-303).

F. Attachments/Forms

Form ES-701-1, "LSRO BWR Written Examination Outline"
Form ES-701-2, "LSRO PWR Written Examination Outline"
Form ES-701-3, "LSRO Generic Knowledge and Abilities Outline (Tier 3)"
Form ES-701-4, "LSRO Operating Test Outline"
Form ES-701-5, "LSRO Examination Outline Quality Checklist"
Form ES-701-6, "LSRO Written Examination Quality Checklist"
Form ES-701-7, "LSRO Operating Test Quality Checklist"
Form ES-701-8, "LSRO Written Examination Cover Sheet"

Facility: Date of Exam:

Tier	K/A Category Points											
	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G *	Total
1. Emergency & Abnormal Plant Evolutions												10
2. Plant Systems												20
3. Generic Knowledge and Abilities Categories	1			2		3		4		GFE		10

Note:
1. Ensure that at least one topic from every K/A category is sampled within each tier .
2. The point total for each tier in the proposed outline must match that specified in the table. The final point total for each tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 40 points.
3. Select topics from many systems and evolutions; avoid selecting more than two K/A topics from a given system (except fuel handling equipment) or evolution (except refueling accident).
4. The shaded areas are not applicable to the category/tier.
5.* The generic (G) 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.
6. If the applicants have not previously taken the GFE, Tier 3 shall include basic reactor theory, component, and thermodynamic topics that apply to fuel handling operations.
7. Systems/evolutions within each tier are identified on the associated outline. Enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the SRO license level, and the point totals (#) for each system and category. Enter the tier totals for each category in the table above.
8. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, importance ratings, and point totals (#) on Form ES-701-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements. The facility licensee's JTA for fuel handlers should be used as the basis for eliminating or adding testable topics.

ES-701	LSRO BWR Written Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1	Form ES-701-1

	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295003 Partial or Complete Loss of AC									
295004 Partial or Total Loss of DC									
295014 Inadvertent Reactivity Addition									
295018 Partial or Total Loss of CCW									
295021 Loss of Shutdown Cooling									
295023 Refueling Accidents									
295033 High Secondary Containment Area Radiation Levels									
295034 Secondary Containment Ventilation High Radiation									
295006 SCRAM									
295008 High Reactor Water Level									
295009 / 295031 Reactor Low Water Level									
295017 / 295038 High Offsite Release Rate									
295019 Partial or Total Loss of Inst. Air									
295020 Inadvertent Cont. Isolation									
295030 Low Suppression Pool Wtr Lvl									
295035 Secondary Containment High Differential Pressure									
600000 Plant Fire On Site									
K/A Category Totals:							Tier Point Total:		10

ES-701	LSRO BWR Examination Outline Plant Systems - Tier 2	Form ES-701-1

	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
205000 Shutdown Cooling														
215004 Source Range Monitor														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														
262001 AC Electrical Dist.														
263000 DC Electrical Dist.														
290002 Reactor Vessel Internals														
201002 RMCS														
201003 Control Rod and Drive Mechanism														
203000 RHR/LPCI: Injection Mode														
204000 RWCU														
211000 SLC														
212000 RPS														
214000 RPIS														
215001 Traversing In-Core Probe														
215003 IRM														
215005 APRM / LPRM														
223001 Primary CTMT and Aux.														
223002 PCIS/Nuclear Steam Supply Shutoff														
261000 SGTS														
264000 EDGs														
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														
300000 Instrument Air														
400000 Component Cooling Water														
K/A Category Totals:												Tier Point Total:		20

Facility: Date of Exam:

Tier	K/A Category Points											
	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G *	Total
1. Emergency & Abnormal Plant Evolutions												10
2. Plant Systems												20
3. Generic Knowledge and Abilities Categories	1			2		3		4		GFE		10

Note:
1. Ensure that at least one topic from every K/A category is sampled within each tier .
2. The point total for each tier in the proposed outline must match that specified in the table. The final point total for each tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 40 points.
3. Select topics from many systems and evolutions; avoid selecting more than two K/A topics from a given system (except fuel handling equipment) or evolution (except refueling accident).
4. The shaded areas are not applicable to the category/tier.
5.* The generic (G) 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.
6. If the applicants have not previously taken the GFE, Tier 3 shall include basic reactor theory, component, and thermodynamic topics that apply to fuel handling operations.
7. Systems/evolutions within each tier are identified on the associated outline. Enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the SRO license level, and the point totals (#) for each system and category. Enter the tier totals for each category in the table above.
8. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, importance ratings, and point totals (#) on Form ES-701-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements. The facility licensee's JTA for fuel handlers should be used as the basis for eliminating or adding testable topics.

ES-701	LSRO PWR Written Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1	Form ES-701-2

	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
000025 Loss of RHR System									
000026 Loss of Component Cooling Water									
000032 Loss of Source Range NI									
000036 (BW/A08) Fuel Handling Accident									
000061 ARM System Alarms									
000033 Loss of Intermediate Range NI									
000055 Station Blackout									
000056 Loss of Offsite Power									
000057 Loss of Vital AC Inst. Bus									
000058 Loss of DC Power									
000062 Loss of Nuclear Svc Water									
000065 Loss of Instrument Air									
000067 Plant Fire On Site									
000069 (W/E14) Loss of CTMT Integrity									
W/E16 High Containment Radiation									
K/A Category Totals:							Tier Point Total:		10

ES-701	LSRO PWR Written Examination Outline Plant Systems - Tier 2											Form ES-701-2		
	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
005 Residual Heat Removal														
015 Nuclear Instrumentation														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
103 Containment														
062 AC Electrical Distribution														
063 DC Electrical Distribution														
002 Reactor Coolant														
004 Chemical and Volume Control														
008 Component Cooling Water														
013 Engineered Safety Features Actuation														
064 Emergency Diesel Generator														
072 Area Radiation Monitoring														
076 Service Water														
078 Instrument Air														
079 Station Air														
086 Fire Protection														
K/A Category Totals:												Tier Point Total:		20

ES-701	LSRO Generic Knowledge and Abilities Outline (Tier 3)			Form ES-701-3
Facility:		Date of Exam:		
Category	K/A #	Topic	IR	#
1. Conduct of Operations	2.1.			
	2.1.			
	2.1.			
	2.1.			
	Subtotal			
2. Equipment Control	2.2.			
	2.2.			
	2.2.			
	2.2.			
	Subtotal			
3. Radiation Control	2.3.			
	2.3.			
	2.3.			
	2.3.			
	Subtotal			
4. Emergency Procedures / Plan	2.4.			
	2.4.			
	2.4.			
	2.4.			
	Subtotal			
5. Generic Fundamentals				
	Subtotal			
Tier 3 Point Total				10

Applicant Docket Number: 55- Page 2 of
Facility: Date of Examination:

Title / Description of Tasks (JPMs)	Type Codes*	Evaluation (S or U)	Comment Page Number
Administrative			
1.			
2.			
3.			
Systems			
1.			
2.			
3.			
4.			
Emergency/Abnormal Plant Evolutions			
1.			
2.			
3.			

Type Codes & Criteria:
(A)lternative path (2 systems; 1 E/APE))
(C)ontrol room
(D)irect from bank (≤ 7)
(I)n-plant
(N)ew or (M)odified from bank including 1(A) (≥ 1 / section)
(P)revious two exams (≤ 1 / section)
(R)efueling accident (1)
(T)echnical specification (≥ 2)

Facility: Date of Examination:

Item	Task Description	Initials a	Initials b*	Initials c#
1. WRITTEN	a. Verify that the outline fits the model in accordance with ES-701.			
	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 sampled at least once.			
	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. OPERATING	a. Verify that the overall operating test: (1) includes at least two tasks that require the use of technical specifications (2) does not duplicate any tasks from the applicants' audit test(s)			
	b. Verify that the administrative tasks: (1) are distributed among the four administrative topics described in ES-301 (2) include no more than one repeat from the last two NRC licensing examinations (3) include at least one task that is new or significantly modified			
	e. Verify that the systems walk-through includes: (1) two tasks requiring the manipulation of fuel handling equipment (2) two additional tasks related to Tier 2 systems other than fuel handling equipment (3) two tasks requiring implementation of alternative path procedures (4) no more than one repeat from the last two NRC licensing examinations (5) at least one task that is new or significantly modified			
	d. Verify that the E/APE walk-through includes: (1) three JPMs based on the Tier 1evolutions, including a refueling accident (2) one task requiring implementation of an alternative path procedure (3) no more than one repeat from the last two NRC licensing examinations (4) at least one task that is new or significantly modified			
	e. Determine whether there are enough different outlines to test the projected number of applicants and ensure that no items are duplicated on subsequent days.			
3. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered inthe appropriate exam section.			
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.			
	c. Assess whether the sampling process adequately considered plant-specific refueling components, systems, and procedures that are not included in the generic models.			
	d. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.			
	e. Check for duplication and overlap among exam sections.			
	f. Check the entire exam for balance of coverage.			
	g. Assess whether the proposed sample is consistent with the LSRO's job responsibilities.			

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

Note: # Independent NRC reviewer initial items in Column "c"; chief examiner concurrence required.

Facility: Date of Exam:

Item Description					Initial a	Initial b*	Initial c#
1.	Questions and answers are technically accurate and applicable to the facility.						
2.	a. NRC K/As are referenced for all questions (as applicable). b. Facility learning objectives are referenced as available.						
3.	Questions are appropriate for LSRO applicants.						
4.	The sampling process was random and systematic (If more than 3 questions were repeated from the last 2 NRC licensing exams, consult the NRR OL program office).						
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 30 questions from the bank, at least 4 new, and the rest modified); enter the actual question distribution at right.	Bank	Modified	New			
7.	Between 50 and 60 percent (20 and 24) of the questions on the exam 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 or aid in eliminating distractors.						
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 guidelines in ES Appendix B.						
11.	The exam contains 40 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.

Facility: Date of Examination: Operating Test Number:

	Item Description	Initials a	Initials b*	Initials c#
1.	The operating test conforms with the LSRO's job responsibilities and the previously approved outline (Form ES-701-4).			
2.	Any changes from the previously approved outline have not caused the test to deviate from any of the acceptance criteria (e.g., item distribution, bank use, repetition from the last two NRC examinations) specified on the outline.			
3.	There is no day-to-day repetition between this and other operating tests to be administered during this examination.			
4.	The operating test does not duplicate items from the applicants' audit test(s). (See Section D.1.a of ES-301).			
5.	Overlap between the written examination and the operating test is within acceptable limits.			
6.	It appears that the operating test will differentiate between competent and less-than-competent applicants.			
7.	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			

	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.

U.S. Nuclear Regulatory Commission

LSRO Written Examination

Applicant Information	
Name:	
Date:	Region: I ☐ II ☐ III ☐ IV ☐
Facility/Unit:	Reactor Type: W ☐ CE ☐ BW ☐ GE ☐
Start Time:	Stop 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 picked up 4 hours after the examination begins.

Applicant Certification

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

_____
Operator's Signature

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

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 JPMs and to assess the quality of the product (Form ES-C-1 and ES-C-2)
- guidelines for developing and using 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, "Preparing Initial Operating Tests," or ES-603, "Requalification Walk-Through Examinations," as applicable, will enhance the consistency and validity of the walk-through tests.

B. Developing and Reviewing JPMs

This section addresses the major JPM components and instructions for their development. The instructions apply to both the initial and requalification examination programs, except as noted. Although they are written from the perspective of developing new JPMs, the instructions should also be referenced, as necessary, when modifying existing JPMs for reuse and when 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 herein 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 its successful execution. 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 starting point of the JPM should be completed unless a given 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 performing the task. 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, as well as 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 administering the test if the JPM states the location(s) in which these items may be found. 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 JPM to a point where it becomes 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 the examinee should make while performing the task.

The JPM must clearly identify the *task standard* (i.e., the predetermined qualitative and/or quantitative outcome) against which task performance will be measured. Every procedural step that the examinee must perform correctly (i.e., accurately, in the proper sequence, and at the proper time) in order to accomplish the task standard shall be identified as a *critical step* and shall have an associated performance standard.

If there are any specific procedural restrictions on the sequence in which the steps are performed, they shall be clearly noted in the JPM.

4. Develop Examiner Cues

The JPM shall identify appropriate *system response cues* so that the examiner can provide the examinee with specific feedback regarding the component and system reactions to the examinee's manipulations, especially those procedural steps that are identified as critical to task completion. The response cues are particularly important in the following situations:

- in-plant tasks that will be simulated because the examinee will not have available the normal indications (e.g., alarms, flow rates, temperatures, and pressures) that would be observed during actual task performance

- alternate path JPMs that require the examinee to perform auxiliary procedures when equipment or instrumentation fails during use

System response cues may not be necessary for those tasks that will be performed on the simulator.

To the extent that it is possible to anticipate incorrect actions that the examinees might take, it is beneficial to note the expected system response cues in the JPM as an aid to the examiner who will be administering and evaluating the task.

The JPM shall also identify any *additional cues or instructions* that the examiner might need to provide to the examinee in response to procedural steps for which the examinee will not be held accountable (i.e., those steps that have either already been performed or will be performed by other personnel in remote locations).

5. Develop a Time Standard

Every JPM shall identify an estimated average time for completing the task. The time should be measured from the moment that the examinee is read the initiating cue at the plant location in which an operator would normally be given the order to perform the specified task.

JPMs that are considered time-critical (i.e., those having a task standard that must be completed within a time period specified in a regulation or a facility commitment to the NRC) shall be uniquely identified and specifically validated. The facility licensee must agree that a failure to complete the task within the specified time will justify a failure of the given JPM.

C. Developing and Using Alternate Path JPMs

JPMs are intended to be tasks that an operator must be able to perform, which relate to the operator's particular job task analysis (JTA). Operators are frequently challenged to perform auxiliary procedures when equipment or instrumentation fails during use. Therefore, examinees are expected to be able to use alternative methods to perform tasks. Alternative paths are evaluated during an examination by incorporating malfunctions of instrumentation or components that require the examinee to perform actions other than those performed when a system responds normally.

JPMs in which malfunctions occur are used to provide a methodology to evaluate whether an examinee has the skills and knowledge at the level needed to safely operate the system. This type of JPM, called "alternate path," provides an excellent opportunity to observe how the examinees execute alternative paths within the wide spectrum of procedures under their cognizance that would not otherwise be examined. All alternate path JPMs should include the following five characteristics:

1. **Success Path**: Each JPM should have a valid, facility-endorsed success path. This path may require analyzing initial conditions to determine an alternative method for completing the task, mitigating a system-related problem that occurs during the task, or realigning the system.

2. **Procedurally Driven**: For each JPM, a procedure should address the actions that are required (i.e., if the JPM requires an alternative method to complete the task, the procedure would have an exit step that directs the use of that alternative method). The examinee may be required to use some common practices endorsed by the facility that are addressed through generic administrative procedures or policies (e.g., shifting controls to manual).

3. **Logical Sequence**: The sequence of procedurally driven actions should be logical. For example, an examinee performing a normal evaluation when a malfunction occurs should not be expected to enter emergency operating procedures (EOPs). More realistically, the examinee would attempt to correct the problem by referring to an annunciator response procedure (ARP) or abnormal operating procedure (AOP). However, an examinee performing a normal evolution may encounter a situation requiring a reactor trip. The JPM should not contain a cascading sequence of malfunctions, for which several procedures must be used simultaneously, that occur while performing a task. This type of activity is better tested in the dynamic simulator portion of the examination.

4. **Independent of Crew Dynamics**: Each JPM should allow the examinee to complete the task or mitigate a problem that occurs during a task without having to rely on the actions of other control room operators. This provision does not prohibit simulator operators from acknowledging non-pertinent alarms or unexpected reactions of other systems that are not associated with the task. Also, the JPMs may still require the examinee to use the simulator operator to perform needed manipulations in the plant.

5. **Validated in Advance**: Each JPM should be validated before the examination begins and should not be changed thereafter. The JPM should not be a surprise to the examiners or simulator operators. Each JPM should be validated as early as possible before the examination is to be administered to allow time for changes to be made.

D. Walk-Through Evaluation Techniques

This guidance is intended to assist NRC examiners and facility evaluators in administering JPMs by illustrating good and bad examples of walk-through examination techniques.

1. Providing Cues

Cuing refers to the information that an examiner provides to an examinee when conducting a JPM. When conducting JPMs on the simulator, the simulator provides most of the required cues. However, when conducting JPMs outside of the simulator, the examiner must provide realistic and timely information to the examinee.

a. *Verbal Cues*

Verbal cues are often required to provide relevant system information, such as valve position, meter deflection, or indicating light status. The examiner must be careful to provide the examinee with the indications that should be readily observed (e.g., "the red light just illuminated" or "the valve position indicator does not move"). An examiner can give too much information or inappropriate information (e.g., providing indications that are not visible or audible to the examinee) that could invalidate the JPM. The examiner must keep in mind what the examinee would see and hear while performing the JPM, and provide consistent cues.

b. *Non-Verbal Cues*

It is important to maintain a "poker face" when an examinee provides an incorrect response or performs the wrong procedural step. Voice inflections indicating something has been performed incorrectly, or changing the manner in which cues are given (e.g., talking more methodically, or rapidly) are examples of non-verbal communications that should be avoided.

Thorough preparation and familiarity with the JPM is vital to providing proper cuing. Knowledge of what indications will be available and how they will respond to the examinee's actions allow an examiner to give accurate and timely cues when an examinee is incorrectly performing the task.

2. Evaluation Skills

When evaluating an examinee, an examiner must have the ability to differentiate between what he or she knows or believes to be true about an examinee's ability and how the examinee actually performs on the JPM. As previously discussed,

an examiner must be familiar with the JPM to be able to accurately evaluate performance. Errors made by the examinee performing the JPM may not be seen, or pertinent questions may not be asked, if the examiner has not prepared for the examination.

An examiner must remain attentive to the examinee's actions at all times. This will ensure that the examiner provides timely cues and detects errors in performance.

3. Exam Administration

While conducting the walk-through examination, the examiner must be aware of conduct that is appropriate for a trainer, but is inappropriate for an examiner. As a trainer, interacting with the examinee during the performance of the JPM to gain insight into what the examinee is thinking is a good practice. However as an examiner, this is distracting to the examinee and may inadvertently result in prompting or leading the examinee.

When conducting JPMs in the simulator, examiners should not manipulate any controls or silence/acknowledge any alarms. The examiner must take a "hands off" approach to maintain the proper testing environment.

The examiner must be careful to shield any notes or grading from the examinee to prevent giving an indication of performance, which may either provide a false sense of security or increase stress levels.

If an examinee's actions are not clear, the examiner must be prepared to ask appropriate followup or clarifying questions. Documenting these questions and the subsequent answers is important as they may have a bearing on an examinee's overall grade.

E. Attachments/Forms

Form ES-C-1, "Job Performance Measure Worksheet"
Form ES-C-2, "Job Performance Measure Quality Checklist"

Facility: _____ Task No: _____

Task Title: _____ Job Performance Measure No: _____

K/A Reference: _____

Examinee: _____ NRC Examiner: _____

Facility Evaluator: _____ Date: _____

Method of testing:

Simulated Performance _____ Actual Performance _____

Classroom _____ Simulator _____ Plant _____

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions:

Task Standard:

Required Materials:

General References:

Initiating Cue:

Time Critical Task: Yes/No

Validation Time:

Performance Information

Denote critical steps with a check mark

_____ Performance step:

Standard:

Comment:

_____ Performance step:

Standard:

Comment:

_____ Performance step:

Standard:

Comment:

Terminating cue:

Verification of Completion

Job Performance Measure No. _____

Examinee's Name:

Examiner's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:_____
_____
_____

Response:_____
_____
_____
_____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: _____ _____

Every JPM should:

1. _____ be supported by the facility licensee's job task analysis.

2. _____ be operationally important (meet the NRC's K/A Catalog threshold criterion of 2.5 (3 for requalification exams) or as determined by the facility and agreed to by the NRC).

3. _____ be designed as either SRO only, RO/SRO or AO/RO/SRO.

4. include the following, as applicable:

   a. _____ initial conditions

   b. _____ initiating cues

   c. _____ references and tools, including associated procedures

   d. _____ validated time limits (average time allowed for completion) and specific designation of those JPMs that are deemed to be time-critical by the facility operations department

   e. _____ operationally important specific performance criteria that include:

      (1) _____ expected actions with exact control and indication nomenclature and criteria (switch position, meter reading), even if these criteria are not specified in the procedural step

      (2) _____ system response and other cues that are complete and correct so that the examiner can properly cue the examinee, if asked

      (3) _____ statements describing important observations that the examinee should make

      (4) _____ criteria for successful completion of the task

      (5) _____ identification of those steps that are considered critical

      (6) _____ restrictions on the sequence of steps

APPENDIX F
GLOSSARY

Achievement test: An instrument designed to measure a trainee's skill proficiency or grasp of some body of knowledge.

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 the following calendar year. However, annual requirements in successive years can reach a period of nearly 2 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, "Personal Qualifications Statement — Licensee," in pursuit of an RO or SRO license. For purposes of this and the NRC's other examination standards, "applicant" 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 "2 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. In this case, January is seen as the anniversary month, and the biennial requirement is satisfied even though the period of time between the two examinations is longer than 730 days.

Bloom's Taxonomy: A classification system that depicts knowledge and information processing in a hierarchy from lowest to highest as 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.

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 a given 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 0 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 assessing 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 for 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 of "Minimum Requirements Per Shift for On-Site Staffing of Nuclear Power Units by Operators and Senior Operators Licensed Under 10 CFR Part 55" in Title 10, Section 50.54(m)(2)(I), of the *Code of Federal Regulations* [10 CFR 50.54(m)(2)(i)].

Diagnostic test: An instrument that is designed to identify an individual's strengths and weaknesses in a given content area.

Difficulty index: A numerical index, ranging from 0.00 to 1.00, that indicates the percentage of trainees who correctly answer a test item. An index of 0.00 indicates that no one correctly answered the test item, while an index of 1.00 indicates that all individuals correctly answered the item.

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 correctly answered the item. (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 possible answers for a test item.

Error of measurement: Any difference between an obtained score and a true score on a test. The actual error of measurement can only be estimated, since it is impossible to know the true score.

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 item 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 that is 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.

Low-power: In accordance with NUREG-1449, "NRC Staff Evaluation of Shutdown and Low-Power Operation," the range of reactor power from criticality to 5 percent.

Mastery test: A term synonymous with "criterion-referenced test" (i.e., one that evaluates the expected behavior following instruction).

Mean: An indication of "central tendency." Mean 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, with 50 percent of the scores below this point, and 50 percent of the scores 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 that is composed of an item 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, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plants," applicable work performed in a nuclear-fueled electric power production plant during pre-operational, startup testing, or operational activities. Observation of others performing work does not constitute 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 that is based on direct interaction between an examiner and an applicant. The operating test assesses 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 a simulation facility.

Operational validity: A test item that (1) relates to the operations of the job and appears reasonable to ask and (2) is 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 used to administer operating tests (under 10 CFR 55.45(b)) or to meet experience requirements (under 10 CFR 55.31(a)(5)) must be designed and implemented in accordance with 10 CFR 55.46.

Power plant experience: As defined in Section 2 of ANSI/ANS-3.1-1993, applicable work performed in a fossil-fueled or nuclear-fueled electric power production plant during pre-operational, startup testing, or operational activities. Observation of others performing work does not constitute 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, 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 textual material and lectures.

Reliability: The consistency or repeatability of any measure as an indicator of confidence in that measure.

Responsible nuclear power plant experience (RNPPE): As defined in Section C.1.3 of Regulatory Guide 1.8, Revision 3, 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 RNPPE, on a one-for-one basis, up to a maximum of 1 year.

Scenario: An integrated group of events that simulates 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., "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, 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 [under 10 CFR 55.45(b)] or to establish on-the-job training and experience prerequisites for operator license eligibility [under 10 CFR 55.31(a)(5)]:

(1) a plant-referenced simulator
(2) a Commission-approved simulator under 10 CFR 55.46(b)
(3) another simulation device, including part-task and limited-scope simulation devices, approved under 10 CFR 55.46(b)

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 plant equipment control; integrated operation procedures; operations, maintenance, and radiological support; and/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 standard deviation 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 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.