
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 10 CFR 55.47 (refer to ES-204). 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 from 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 from information in the final safety analysis report, system description manuals and operating procedures, the facility license and license amendments, licensee event reports, and other materials requested from the facility licensee by the Commission.

The structure of the operating test is dictated, in part, by 10 CFR 55.45(b)(1). It states that the test will be administered in a plant walk-through and in either a simulation facility (as defined in 10 CFR 55.4) that the Commission has approved or a simulation facility consisting solely of a plant-referenced simulator (also as defined in 10 CFR 55.4) that has been certified to the Commission by the facility licensee.

The walk-through portion of the operating test consists of two categories, each focusing on specific knowledge and abilities (K/As) required for licensed operators to safely discharge their assigned duties and responsibilities. A third category of the operating test is administered on an NRC-approved or facility-certified simulation facility. Unless specifically waived in accordance with ES-204 and documented on the Examination Assignment Sheet (Form ES-201, Attachment 4), all three categories must be completed for every license applicant.

Each category of the operating test is briefly described below. Section D of this standard provides detailed instructions for developing each category. Procedures for administering and grading the operating test are contained in ES-302 and ES-303, respectively.

1. Category A, "Administrative Topics"

This category of the operating test covers K/As that are generally associated with the administrative control of the plant. It implements items 9 through 12 of 10 CFR 55.45(a) and is divided into four administrative topics, as described below. The 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) or by asking specific questions.

Topic A.1, "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 should 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)
- fuel handling

Topic A.2, "Equipment Control," addresses the administrative requirements associated with managing and controlling plant systems and equipment. The following subjects exemplify the types of information that should be evaluated under this topic:

- surveillance testing
- maintenance
- tagging and clearances
- temporary modification of systems
- familiarity with and use of piping and instrument drawings

Topic A.3, "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 exemplify the types of information that should 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

Topic A.4 "Emergency Plan," evaluates the applicant's knowledge of the emergency plan for the facility, including, as appropriate, the responsibility of the RO or SRO to

decide whether the plan should be executed and the duties assigned under the plan. The following subjects are examples of the types of information that should be evaluated under this topic:

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

Category A is administered in a one-on-one, walk-through format and the four topic areas are graded collectively (refer to ES-302 and ES-303).

2. Category B, "Control Room Systems and Facility Walk-through"

This category of the operating test is used to determine if the applicant's knowledge in the area of plant system design is adequate and to determine if the applicant is able to safely operate those systems. As such, this category implements the requirements of items 3, 4, 7, 8, and 9 identified in 10 CFR 55.45(a). It also encompasses several types of systems, including primary coolant, emergency coolant, decay heat removal, auxiliary, radiation monitoring, and instrumentation and control.

Category B is divided into two subcategories. The first and larger subcategory (B.1, "Control Room Systems") focuses on those systems with which licensed operators are most involved (i.e., those having controls and indications in the main control room). The second subcategory (B.2, "Facility Walk-Through") 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 follow-up questions based on the applicant's performance of each JPM.

Subcategories B.1 and B.2 are administered in a one-on-one, walk-through format and are graded collectively (refer to ES-302 and ES-303).

3. Category C, "Integrated Plant Operations"

This category of the operating test implements items 1 through 8 and 11 through 13 identified in 10 CFR 55.45(a). This is the most performance-based category 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 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 CFR55.45(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 "Integrated Plant Operations 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 5, "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 regional office in accordance with ES-201 approximately four months before the scheduled examination date:

- a. Prepare proposed examination outlines in accordance with Section D and submit them to the NRC regional office for review and approval in accordance with ES-201.
- b. Submit the reference materials necessary for the NRC regional office to prepare and/or review the requested examination(s) (refer to ES-201, Attachment 2).
- c. Prepare and review the final operating tests in accordance with the previously approved examination outline(s) and the instructions in Sections D and E, and submit the tests to the NRC regional office in accordance with ES-201.
- d. Make the simulation facility available, as necessary, for NRC examiners to prepare for the operating tests.
- e. Meet with the NRC in the regional office or at the facility, when and as necessary, to review the proposed operating tests and discuss potential changes (refer to ES-201).

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

2. NRC Regional Office

The NRC regional office is responsible for the following activities:

- a. Ensure that the operating tests are developed in accordance with Section D.
- b. Ensure that the operating tests are reviewed for quality in accordance with Section E.
- c. Meet with the facility licensee, when and as appropriate, to prereview the operating tests in accordance with ES-201.

D. INSTRUCTIONS

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

1. General Guidelines

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

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

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

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

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

- b. To the extent permitted for each category of the operating test, select and modify testing materials (i.e., JPMS, questions, and simulator scenarios) from the facility's examination banks. Every selected test item must satisfy the qualitative and quantitative criteria specified for the applicable section of the operating test or be modified accordingly.
- c. Consider the K/As associated with normal, abnormal, and emergency tasks and evolutions as a source of topics for use in evaluating applicant competency in each category of the operating test.

The knowledge and abilities associated with the tasks and questions planned for the operating test should have importance factors of at least 2.5. Tasks with importance factors of less than 2.5 may be used if there is a substantive reason for including them (e.g., a recent licensee event or a significant system modification).

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

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

- d. When selecting and developing materials (JPMS, scenarios, and questions) for the operating test, ensure that the materials contribute to the test's overall capacity to differentiate between those applicants who are competent to safely operate the plant and those who are not. Additionally, all of the test items should include the three facets of test validity (i.e., content, operational, and discrimination) discussed in Appendix A. Any test items that, when missed, would raise questions regarding adequate justification for denying the applicant's license should not be included on the operating test.
- e. SRO applicants, whether upgrade or instant, will be examined for the highest on-shift position for which the SRO's license is applicable (e.g., shift supervisor), regardless of the position to be assigned when licensed. SRO applicants should demonstrate their supervisory abilities and an attitude of responsibility for safe operation, and are expected to assume a management role during plant

transients and upset conditions while taking Category C of the operating test. The operating test briefing, discussed in Appendix E, ensures that the applicants are advised of this policy.

Differences in administrative controls and facility design will affect the SRO's responsibilities, but, in general, the following guidelines should be used to differentiate the SRO operating test from that of an RO.

- In directing licensed activities, the SRO must evaluate plant performance and make operational judgments accordingly. SRO applicants should, therefore, be more knowledgeable in areas such as operating characteristics, reactor behavior, and instrument interpretation.
 - In directing licensed activities, the SRO must have a broader and more thorough knowledge of facility administrative controls and methods, including limitations imposed by the regulations and the facility's technical specifications and their bases.
 - The SRO may be assigned responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems) and are not normally operated by licensed operators. Because the SRO may have these additional responsibilities, the SRO license applicant should demonstrate knowledge of the designs of such systems as they relate to maximum permissible concentrations, effluent release rates, and other radiological considerations.
- f. Incorporate facility-specific and industry-generic operating experience into the operating test whenever possible. Documentation such as licensee event reports, significant event reports, and service information letters are readily available sources of operationally oriented plant anomalies.

Evaluate the dominant accident sequences (DASs) for the facility to determine if they are suitable for testing, on a sampling basis, during the dynamic simulator or walk-through tests. DASs are those sequences that contribute significantly to the frequency of core damage as determined by the facility licensee's probabilistic risk assessment (PRA) or individual plant examination (IPE).

The PRA/IPE should also be used to identify risk-important operator actions. Chapter 13, "Operational Perspectives," of NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," identifies a number of important human actions that may be appropriate for evaluation on the operating test. In determining what actions to evaluate, do not overlook actions that are relied upon or result in specific events being driven to low risk contribution. This will help identify those human actions, assumed to be very reliable, that might otherwise not show up in a list of risk-dominant actions.

- g. If the applicants at a facility qualify for dual or multi-unit licenses, the operating tests should evaluate their knowledge of the design, procedural, and operational differences between the units.

Divide the operating test coverage among the units and do not become predictable by conducting the walk-through tests on only one unit. Different applicants may be examined on different units, or each applicant may be asked to explain or demonstrate his or her understanding of variations in control board layouts, systems, instrumentation, and procedural actions between the units at the facility.

Most dual- or multi-unit stations have a simulator that is modeled after only one of the units. Therefore, ensure that the applicants are properly tested on the different systems, control board layouts, and any other differences between the units during the walk-through portion of the operating test. For example, after administering Category C of the operating test on Browns Ferry Unit 1, the control room systems portion of Category B of the operating test could be administered on Unit 2 or Unit 3 or both.

- h. The operating test should examine a broad range of knowledge and abilities, systems and components, and operations and events. The three categories of the test should not be redundant, nor should they duplicate material that is covered on the written examination. It is particularly important that Categories B and C be developed and reviewed as a package to preclude the same tasks and events from appearing on both parts of the test.
- i. Every facet of the operating test, including the prescribed Category A questions and answers, the JPMs for Categories A and B, and the Category C simulator scenarios, should be planned, researched, validated, and documented to the maximum extent possible before the test is administered.
- j. Examiners who will be administering the operating tests but were not involved in their development are expected to research and study the topics and systems to be examined on the operating test so that they are prepared to ask whatever performance-based follow-up questions might be necessary to determine if the applicant is competent in those areas. As stated in 10 CFR 55.45(a), the operating test requires the applicant to demonstrate an understanding of and the ability to perform the actions necessary to accomplish a representative sample from among 13 items listed in the rule. If the applicant correctly performs a JPM (including both critical and noncritical steps) and demonstrates familiarity with the equipment and procedures, it is not necessary to ask any follow-up questions. However, if the applicant fails to accomplish the task standard for the JPM or demonstrates a lack of understanding regarding the equipment and procedures such as having difficulty locating information, control board indications, or controls, the examiner must be prepared to ask performance-based follow-up questions, as necessary, to clarify or confirm the applicant's understanding of the system as it relates to the task that was performed.

Examination team members are strongly encouraged to meet as a group with the chief examiner to review the examination materials after they have been approved for administration by the responsible supervisor. The discussions should focus on those test items that might require extensive cuing by the examiner and those that are unique to the facility and require a response different from what the examiner might expect based on past experience.

- k. JPMs should include the elements identified in Appendix C (e.g., initiating and terminating cues, critical steps, and performance criteria). The guidelines and forms (or equivalents) in that appendix should be used when developing new JPMs. Facility procedures may be adapted for use as JPMs by identifying critical steps and entering comments on how to execute particular steps.
- l. The prescribed questions for Category A and the performance-based follow-up questions for Category B may include a combination of open- and closed-reference items. Open-reference items that require applicants to apply their knowledge of the plant to postulated normal, abnormal, and emergency situations are preferred. Closed-reference items may be used to evaluate the immediate actions of emergency and other procedures, certain automatic actions, operating characteristics, interlocks, set points, and routine administrative activities, as appropriate to the facility.

Refer to Attachment 1 for more guidance regarding the development and use of prescribed open reference questions for Category A of the walk-through test. To the extent possible, the concepts in the attachment should also be applied to performance-based follow-up questions.

- m. If it becomes necessary to deviate from a test outline that has been approved by the NRC chief examiner in accordance with ES-201, discuss the proposed deviation with the chief examiner and obtain concurrence before proceeding with the changes. Be prepared to explain why the original proposal could not be implemented and why the proposed replacement is considered an acceptable substitute.

2. Specific Instructions for Category A, "Administrative Topics"

Although the administrative topics may be examined separately, it is preferable, whenever possible, to link, associate, or integrate them with tasks and events conducted during Categories B and C. However, it is important to keep in mind that the applicant's proficiency in the administrative topics should be deliberately evaluated and not inferred solely from observations made during the simulator portion of the operating test.

- a. For *each* of the administrative topics listed below, select the required number of subjects to be evaluated during the operating test. Section B.1 provides examples of the types of subjects that should be evaluated under each topic; the lists are not all-inclusive.

<u>Topic</u>	<u>Number of Subjects</u>
A.1, "Conduct of Operations"	2
A.2, "Equipment Control"	1
A.3, "Radiation Control"	1
A.4, "Emergency Plan"	1

K/As associated with each administrative topic can be found in Section 2 of the applicable NRC K/A catalog (i.e., NUREG-1122 for PWRs and NUREG-1123 for BWRs). For Topic A.4, 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, determine the best method for evaluating the applicant's knowledge or ability in that area. Although a performance-based evaluation, using a single administrative JPM is generally preferred, two prescribed questions may be used to conduct the evaluation in each specific subject area selected for evaluation. The questions may be associated with Category B JPMs or they may be administered separately.
- 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 prescribed questions or JPMs to confirm the applicant's competence with regard to each topic:

Topic A.1, "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 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.

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. It is

appropriate to question an SRO applicant on applicable aspects of the facility's security plan and the operating crew's interactions with the security shift supervisor.

Topic A.2, "Equipment Control"

These subjects can be evaluated within the framework of a normal maintenance evolution. For example, ask the applicant to 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.

Topic A.3, "Radiation Control"

This topic is best covered in conjunction with the JPMs prepared for Category B.2 of the walk-through (i.e., local systems and operations). 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 discuss or simulate (i.e., with a JPM) a planned release (e.g., liquid, gaseous, or containment purge) when examining these topics.

Topic A.4, "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 (EIPs). SRO applicants, however, must demonstrate additional knowledge based upon their responsibility to direct and manage the implementation of the EIPs during the initial phases of an emergency. Because of this, SRO applicants should have a more detailed understanding of the EIPs, in general, and be familiar with event classification procedures, protective action recommendations, and communication requirements and methods.

This topic is best evaluated by integrating it into a discussion of a Category C transient that requires implementation of the emergency plan, or by conducting a JPM requiring use of the emergency plan. Such a JPM can be conducted

immediately following a simulator scenario or during the walk-through (Category A or B) examination.

- e. The planned administrative subjects should normally take no more than 1 hour and 1.5 hours to administer to RO and SRO applicants, respectively.
- f. On Form ES-301-1, "Administrative Topics Outline," briefly describe the administrative subjects selected for evaluation and the method(s) by which each subject will be evaluated. The method of evaluation should include the title of any planned JPMs and a brief summary of the proposed questions.
- g. Forward the completed outline to the NRC chief examiner so that it is *received* by the date agreed upon with the NRC regional office at the time the examination arrangements were confirmed; the outline is normally due approximately 75 days before the scheduled examination date. Refer to ES-201 for additional instructions regarding the review and submittal of the examination outline.

The NRC chief examiner and responsible supervisor shall review the test outline coverage as soon as possible in accordance with ES-201 and forward any comments to the originator for resolution.

- h. After the NRC chief examiner approves the operating test outline, prepare the final Category A test materials (i.e., the JPMs, prescribed questions, and answers) in accordance with the general operating test guidelines in Section D.1, the open-reference question guidelines in Appendix B, and the JPM guidelines in Appendix C.
- i. When the materials are complete, review the quality of the final Category A walk-through test using Form ES-301-3, "Operating Test Quality Checklist." This review shall be performed in conjunction with the associated Category B walk-through and the dynamic simulator operating test as noted in Sections D.3 and D.4.

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

3. Specific Instructions for Category B, "Control Room Systems and Facility Walk-Through"

This category of the operating test evaluates the applicant on systems-related K/As by having the applicant perform selected tasks and, when necessary, based on the applicant's performance, probing his or her knowledge of the task and its associated system with specific follow-up questions. The Category B tasks are *in addition to* and should be *different from* the events and evolutions conducted during Category C, "Integrated Plant Operations."

- a. Refer to Section 1.9 of the K/A catalog applicable to the type of reactor for which the applicant is seeking a license (i.e., NUREG-1122 for PWRs and NUREG-1123 for BWRs). From the nine safety function groupings identified in the catalog, select the appropriate number of systems (see the table below) to be evaluated for each subcategory of the test based on the applicant's license level. The emergency and abnormal plant evolutions (E/APEs) listed in Section 1.10 of the appropriate NUREG may also be used to evaluate the applicable safety function (as specified for each E/APE in the first tier of the written examination outlines attached to ES-401).

<u>License Level</u>	<u>Subcategory B.1</u>	<u>Subcategory B.2</u>	<u>Total</u>
RO	7	3	10
SRO-instant (I)	7	3	10
SRO-upgrade (U)	2 or 3	3 or 2	5

The 10 systems and evolutions selected for RO and SRO-I applicants should evaluate at least 7 different safety functions. All of the systems and evolutions in each subcategory of the test should be selected from different safety function lists, and the same system or evolution should not be used to evaluate more than one safety function in each subcategory. For PWR operating tests, the primary and secondary systems listed under Safety Function 4, "Heat Removal From Reactor Core," in Section 1.9 of NUREG-1122 may be treated as separate safety functions; i.e., two systems, one primary and one secondary, may be selected from Safety Function 4.

The 5 systems and evolutions selected for an SRO-U applicant should evaluate at least 5 different safety functions. One of the control room systems or evolutions (Subcategory B.1) must be an engineered safety feature, and the same system or evolution should not be used to evaluate more than one safety function.

Keep in mind that the systems and evolutions selected for evaluation in Subcategories B.1 and B.2 must be oriented toward control room operations and local operations, respectively.

- b. For each system selected for evaluation, select from the applicable K/A catalog or the facility licensee's site-specific task list *one* task for which a JPM exists or can be developed. Review the associated simulator outline if it has already been prepared (refer to Section D.4), and avoid those tasks that have already been selected for evaluation on the dynamic simulator test.

The JPMs should, individually and as a group, have meaningful performance requirements that will provide a legitimate basis for evaluating the applicant's understanding of and ability to safely operate the associated systems and the plant (as required by 10 CFR 55.45).

In order to protect the integrity and security of the examination process, no more than 80 percent of any applicant's walk-through test (i.e., 8 out of 10 or 4 out of 5 JPMs, as applicable) may be taken directly from the facility's testing materials without significant modification. A significant modification means that at least one condition has been substantively changed in a manner that alters the course of action of the JPM. Additionally, no more than 30 percent of the walk-through test may be repeated from the last NRC licensing examination at the facility.

At least one of the tasks shall be related to a shutdown or low-power condition, and 40 percent of the tasks (i.e., 4/10 for ROs and instant SROs and 2/5 for upgrade SROs) shall require the applicant to execute alternate paths within the facility's operating procedures. In addition, at least one of the tasks conducted in the plant (i.e., Subcategory B.2) shall evaluate the applicant's ability to implement actions required during an emergency or abnormal condition, and another shall require the applicant to enter the RCA. This provides an excellent opportunity for the applicant to discuss or demonstrate the radiation control subjects described in Administrative Topic A.3.

If it is not possible to develop or locate a suitable task/JPM for each of the selected systems, return to Step (a), above, and select a different system or evolution. After identifying a JPM for each system, list it and its associated safety function number on Form ES-301-2, "Control Room Systems and Facility Walk-Through Test Outline." Also indicate the type of JPM by entering the applicable code(s) identified at the bottom of the form.

- c. Forward the completed walk-through test outline to the NRC chief examiner so that it is *received* by the date agreed upon with the NRC regional office at the time the examination arrangements were confirmed; the outlines are normally due approximately 75 days before the scheduled examination date. Refer to ES-201 for additional instructions regarding the review and submittal of examination outlines.

The NRC chief examiner and responsible supervisor shall review the test outline in accordance with ES-201 and forward any comments to the originator for resolution.

- d. After the NRC chief examiner approves the operating test outline, prepare the final Category B JPMs in accordance with the general guidance in Section D.1 and the JPM guidelines in Appendix C.
- e. When the materials are complete, review the completed walk-through test for quality using Form ES-301-3, "Operating Test Quality Checklist," and make any changes that might be necessary. To minimize duplication, this review shall be performed in conjunction with the associated administrative topics and the simulator operating test (refer to Sections D.2 and D.4).

Submit the entire operating test package to the designated facility reviewer or the NRC chief examiner, as appropriate, for review and approval in accordance

with Section E. The test must be received by the NRC chief examiner approximately 45 days before the scheduled review date, unless other arrangements have been made.

4. Specific Instructions for Category C, "Integrated Plant Operations"

- a. Based on the anticipated crew compositions, determine the number of scenarios and scenario sets necessary to rotate each RO and SRO-I applicant into the lead reactor operator position so that he or she can perform a direct reactivity manipulation. For example, a crew consisting of two ROs and one SRO-I will normally require three scenarios to evaluate each applicant's performance on the reactor controls; however, a surrogate SRO will have to fill the supervisory role while the SRO-I applicant is in the lead operator position. Similarly, the crews and scenarios will have to be planned so that every SRO applicant (U and I) fills the supervisory role for at least one scenario.

SRO-U applicants are given credit for their previous RO license evaluation and experience and are normally not required to manipulate the controls.

It may be possible to significantly reduce the number of simulator scenario sets required to examine a large group of applicants by administering the same set of scenarios on the same day to two (or more) different crews of applicants. However, provisions must be made to ensure that the crews remain out of contact until all crews have completed the set of scenarios (refer to ES-302).

Additional or replacement scenarios should also be prepared and available while administering the operating tests in accordance with ES-302 in case one of the planned scenarios does not work as intended.

- b. The simulator operating tests (i.e., scenario sets) will be constructed by selecting and modifying scenarios from existing facility licensee or NRC scenario banks and by developing new scenarios.

In order to maintain test integrity, every applicant shall be tested on at least one new or significantly modified scenario that he or she has not had the opportunity to rehearse or practice. A significant modification means that at least one condition or event has been substantively changed to alter the course of action in the scenario. Furthermore, any other scenarios that are extracted from the facility licensee's bank must be altered to the degree necessary to prevent the applicants from immediately recognizing the scenarios based on the initial conditions or other cues.

- c. The initial conditions, normal operations, malfunctions, and major transients should be varied among the scenarios and should include startup, low-power, and full-power situations. Review the associated walk-through outline if it has already been prepared (refer to Section D.3), and take care not to duplicate operations that will be tested during the walk-through portion of the operating test.

- d. In order to maximize the quality and consistency of the operating tests, develop new scenarios in accordance with the instructions in Appendix D. Modify existing scenarios, as necessary, to make them conform with the qualitative and quantitative attributes described in that appendix and enumerated on Form ES-301-4, "Simulator Scenario Quality Checklist." The quantitative attribute target ranges that are specified on the form are not absolute limitations; some scenarios may be an excellent evaluation tool but may not fit within the ranges. A scenario that does not fit into these ranges shall be evaluated to ensure that the level of difficulty is appropriate. Whenever possible, the critical tasks should be distributed so that each applicant is required to respond.

Each scenario set must, at a minimum, require each applicant to respond to the types of evolutions, failures, and transients in the quantities identified for the applicant's license level on Form ES-301-5, "Transient and Event Checklist." An applicant should only be given credit for those events that require the applicant to perform verifiable actions that provide insight to the applicant's competence. The required instrument and component failures should normally be completed before starting the major transient; those that are initiated after the major transient should be carefully reviewed because they may require little applicant action and provide little insight regarding their performance. Each event should only be counted once per applicant; for example, a power change can be counted as a normal evolution OR as a reactivity manipulation, and, similarly, a component failure that immediately results in a major transient counts as one or the other, but not both.

Any normal evolution, component failure, or abnormal event (other than a reactor trip or other automatic power reduction) that requires the operator to perform a *controlled* power or reactivity change will satisfy the requirement for a reactivity manipulation. This includes events such as an emergency boration, a dropped rod recovery, a significant rod bank realignment, or a manual reactor power reduction in response to a secondary system upset. Such events may produce a more timely operator and plant response than a normal power change.

Furthermore, each scenario set must also allow the examiner to evaluate the applicant's performance on each competency and rating factor germane to the applicant's license level. Use Form ES-301-6, "Competencies Checklist," to verify that the competencies are adequately evaluated by entering the scenario and event numbers that are intended to assess each competency.

If the facility licensee normally operates with and is required by its technical specifications to have more than two ROs in the control room, the chief examiner may authorize the use of additional surrogates to fill out the crews. In such cases, take care in planning the scenarios to ensure that the additional operators do not reduce the examiners' ability to evaluate each applicant on the required number of events and on every competency and rating factor.

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

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

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

- f. After the NRC chief examiner approves the operating test outlines, prepare the final simulator test materials by revising Form(s) ES-D-1 as requested by the NRC chief examiner and completing a detailed operator action form (ES-D-2) for each event. All substantive operator actions (e.g., opening, closing, and throttling valves; starting and stopping equipment; raising and lowering level, flow, and pressure; making decisions and giving directions; *not* acknowledging alarms or verifying automatic actions) shall be documented, and critical tasks shall be identified. Events that do not require an operator to take one or more substantive actions will not count toward the minimum number of events required for each operator per Form ES-301-5.
- g. Review the completed simulator operating test for quality using Form ES-301-4, "Simulator Scenario Quality Checklist," and make any changes that might be necessary. This review shall be performed in conjunction with the associated walk-through test (refer to Sections D.2 and D.3) to minimize duplication.

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

E. QUALITY REVIEWS

1. Facility Management Review

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

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

2. NRC Examiner Review

- a. The NRC chief examiner shall independently review each operating test for content, wording, operational validity, and level of difficulty. As a minimum, the chief examiner shall check the items listed on Forms ES-301-3 and ES-301-4, as applicable. The examiner should keep in mind that counting the number of scenario quantitative attributes is not always indicative of the scenario's level of difficulty. Although there are no definitive minimum or maximum attribute values that can be used to identify scenarios that will not discriminate because they are too easy or difficult, scenarios that fall outside the target ranges specified on Form ES-301-4 should be carefully evaluated to ensure they are appropriate. If the chief examiner wrote the operating test, another NRC examiner shall perform the independent review.
- b. The chief examiner should review the operating tests as soon as possible after receipt so that supervisory approval can be obtained before the final review with the facility licensee, which is normally scheduled about two weeks before the administration date. It is especially important that the chief examiner promptly review tests prepared by a facility licensee because of the extra time that may be required if extensive changes are necessary. The chief examiner shall consolidate the comments from other regional reviewers and submit one set of comments to the author.
- c. If the facility licensee developed the operating test, then the facility licensee is primarily responsible for technical accuracy and compliance with the restrictions concerning the use of examination banks. However, the chief examiner is expected to use his or her best judgment and take reasonable measures, including selective review of reference materials and past tests, to verify these items.
- d. The chief examiner will note any changes that need to be made and forward the tests to the responsible supervisor for review and comment in accordance with Section E.3 before reviewing the examinations with the author or facility contact. There are no minimum or maximum limits on the number or scope of changes the chief examiner may direct the author or facility contact to make to the proposed tests, provided that they are necessary to make the tests conform with established acceptance criteria. Refer to ES-201 for additional guidance regarding NRC response to facility-developed examinations that are significantly deficient.

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

Tests that were developed by the NRC should be clean, properly formatted, and "ready-to-give" before they are reviewed with the facility licensee. The region should not rely on the facility licensee to ensure that the tests are of acceptable quality to administer.

- f. After reviewing the tests with the facility licensee, the chief examiner will ensure that any comments and recommendations are resolved and the tests are revised as necessary. If the facility licensee developed the tests, it will generally be expected to make whatever changes are recommended by the NRC.
- g. After the necessary changes have been made and the chief examiner is satisfied with the test, he or she will sign Form(s) ES-301-3 and forward the test package to the responsible supervisor for final approval.

3. NRC Supervisory Review

- a. Per ES-201, the responsible supervisor shall review the operating tests before authorizing the chief examiner to proceed with the facility prereview. The supervisory review is not intended to be another detailed review, but rather a general assessment of test quality, including a review of the changes recommended by the chief examiner, and a check to ensure that all of the applicable administrative requirements have been implemented.
- b. The responsible supervisor should ensure that any significant deficiencies in the original operating tests submitted by a facility licensee are evaluated in accordance with ES-201 to determine the appropriate course of action. At a minimum, the supervisor should ensure that they are addressed in the final examination report in accordance with ES-501.
- c. Following the facility review, the responsible supervisor should again review the tests to ensure that the concerns expressed by the facility licensee and the chief examiner have been appropriately addressed. The supervisor shall not sign Form(s) ES-301-3 until he or she is satisfied that the examination is acceptable to be administered.

F. ATTACHMENTS/FORMS

Attachment 1,	"Open-Reference Question Guidelines"
Form ES-301-1,	"Administrative Topics Outline"
Form ES-301-2,	"Control Room Systems and Facility Walk-Through Test Outline"
Form ES-301-3,	"Operating Test Quality Checklist"
Form ES-301-4,	"Simulator Scenario Quality Checklist"
Form ES-301-5,	"Transient and Event Checklist"
Form ES-301-6,	"Competencies Checklist"

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/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 boration 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 reinitiation?" 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 for 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, 10, 11, and the K/A rating on item 7 are generically applicable.

Facility: _____ Date of Examination: _____ Examination Level (circle one): RO / SRO Operating Test Number: _____	
Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	
A.2	
A.3	
A.4	

FOR
Comment
And
Interim
Use.

Facility: _____		Date of Examination: _____
Exam Level (circle one): RO / SRO(I) / SRO(U)		Operating Test No.: _____
B.1 Control Room Systems		
System / JPM Title	Type Code*	Safety Function
a.		
b.		
c.		
d.		
e.		
f.		
g.		
B.2 Facility Walk-Through		
a.		
b.		
c.		
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA		

Facility:	Date of Examination:	Operating Test Number:				
1. GENERAL CRITERIA				Initials		
				a	b	c
a.	The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution).					
b.	There is no day-to-day repetition between this and other operating tests to be administered during this examination.					
c.	The operating test shall not duplicate items from the applicants' audit test(s)(see Section D.1.a).					
d.	Overlap with the written examination and between operating test categories is within acceptable limits.					
e.	It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.					
2. WALK-THROUGH (CATEGORY A & B) CRITERIA				--	--	--
a.	Each JPM includes the following, as applicable: <ul style="list-style-type: none"> · initial conditions · initiating cues · references and tools, including associated procedures · 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: <ul style="list-style-type: none"> - detailed expected actions with exact criteria and nomenclature - system response and other examiner cues - statements describing important observations to be made by the applicant - criteria for successful completion of the task - identification of critical steps and their associated performance standards - restrictions on the sequence of steps, if applicable 					
b.	The prescribed questions in Category A are predominantly open reference and meet the criteria in Attachment 1 of ES-301.					
c.	Repetition from operating tests used during the previous licensing examination is within acceptable limits (30% for the walk-through) and do not compromise test integrity.					
d.	At least 20 percent of the JPMs on each test are new or significantly modified.					
3. SIMULATOR (CATEGORY C) CRITERIA				--	--	--
a.	The associated simulator operating tests (scenario sets) have been reviewed in accordance with Form ES-301-4 and a copy is attached.					
			Printed Name / Signature	Date		
a. Author	_____			_____		
b. Facility Reviewer(*)	_____			_____		
c. NRC Chief Examiner (*)	_____			_____		
d. NRC Supervisor (*)	_____			_____		
(*) The facility signature is not applicable for NRC-developed tests; two independent NRC reviews are 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 <ul style="list-style-type: none"> · the point in the scenario when it is to be initiated · the malfunction(s) that are entered to initiate the event · the symptoms/cues that will be visible to the crew · the expected operator actions (by shift position) · the event termination point (if applicable) 							
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.							
5.	The events are valid with regard to physics and thermodynamics.							
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.							
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.							
8.	The simulator modeling is not altered.							
9.	The scenarios have been validated. Any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.							
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.4 of ES-301.							
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).							
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).							
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.							
TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4.D)						Actual Attributes		
1.	Total malfunctions (5-8)					/	/	
2.	Malfunctions after EOP entry (1-2)					/	/	
3.	Abnormal events (2-4)					/	/	
4.	Major transients (1-2)					/	/	
5.	EOPs entered/requiring substantive actions (1-2)					/	/	
6.	EOP contingencies requiring substantive actions (0-2)					/	/	
7.	Critical tasks (2-3)					/	/	

OPERATING TEST NO.:

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			1	2	3	4
RO	Reactivity	1				
	Normal	1				
	Instrument / Component	2 24				
	Major	1				
As RO	Reactivity	1				
	Normal	0				
	Instrument / Component	1 12				
	Major	1				
SRO-I As SRO	Reactivity	0				
	Normal	1				
	Instrument / Component	1 12				
	Major	1				
SRO-U	Reactivity	0				
	Normal	1				
	Instrument / Component	1 12				
	Major	1				

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

Author: _____

Chief Examiner: _____

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms												
Diagnose Events and Conditions												
Understand Plant and System Response												
Comply With and Use Procedures (1)												
Operate Control Boards (2)												
Communicate and Interact With the Crew												
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.												

Instructions:

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

Author: _____

Chief Examiner: _____