U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NUREG-1021 Revision 12

Training on Changes

October 2021

Overview of Revision 12

Goals:

- Improve usability
- Refocus content
- Implement GFE re-integration
- Improvements to the simulator operating test (critical tasks and grading performance deficiencies)
- End the NRC approval of eligibility waivers for training program requirements
- Incorporate: Experience, OLPFs and Cold Licensing lessons learned

Streamline Project

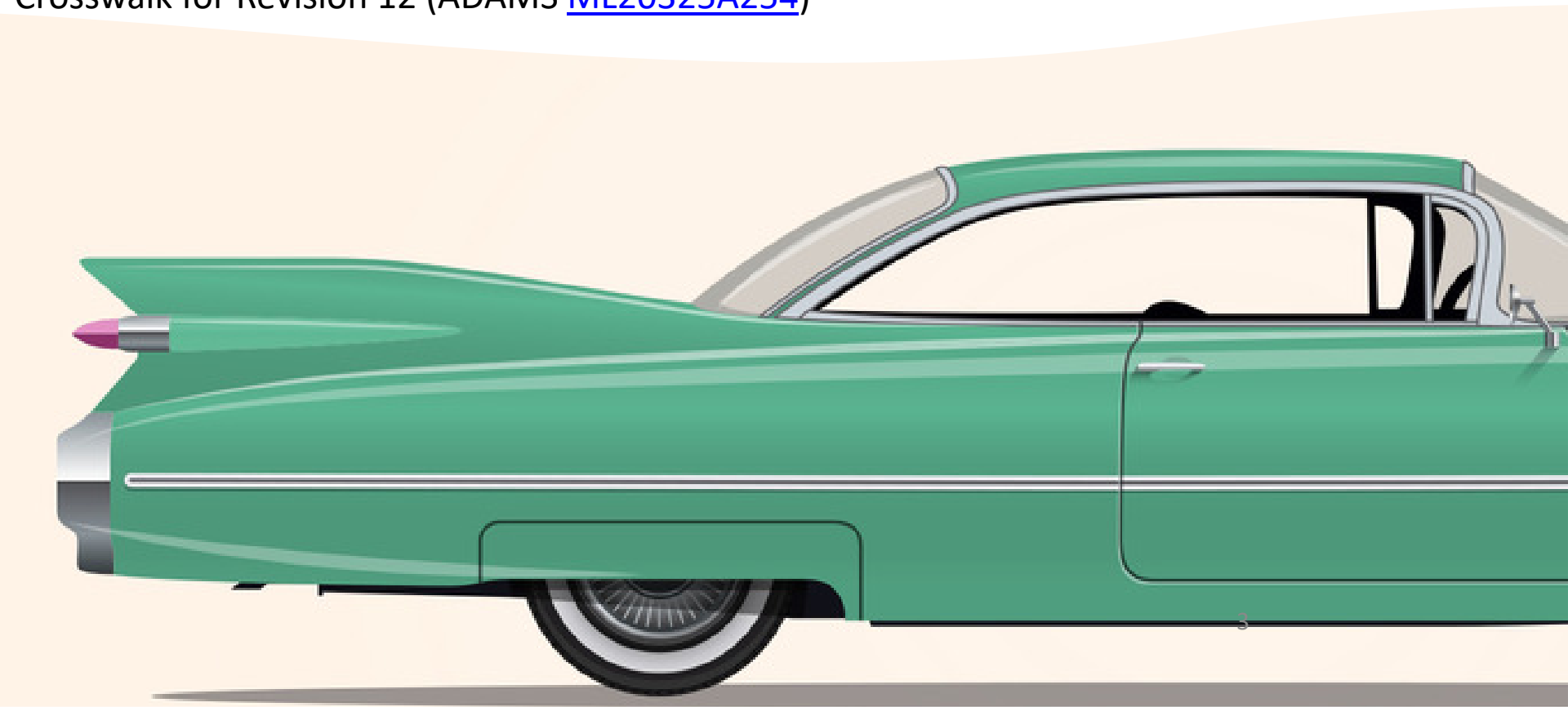
Revision 11

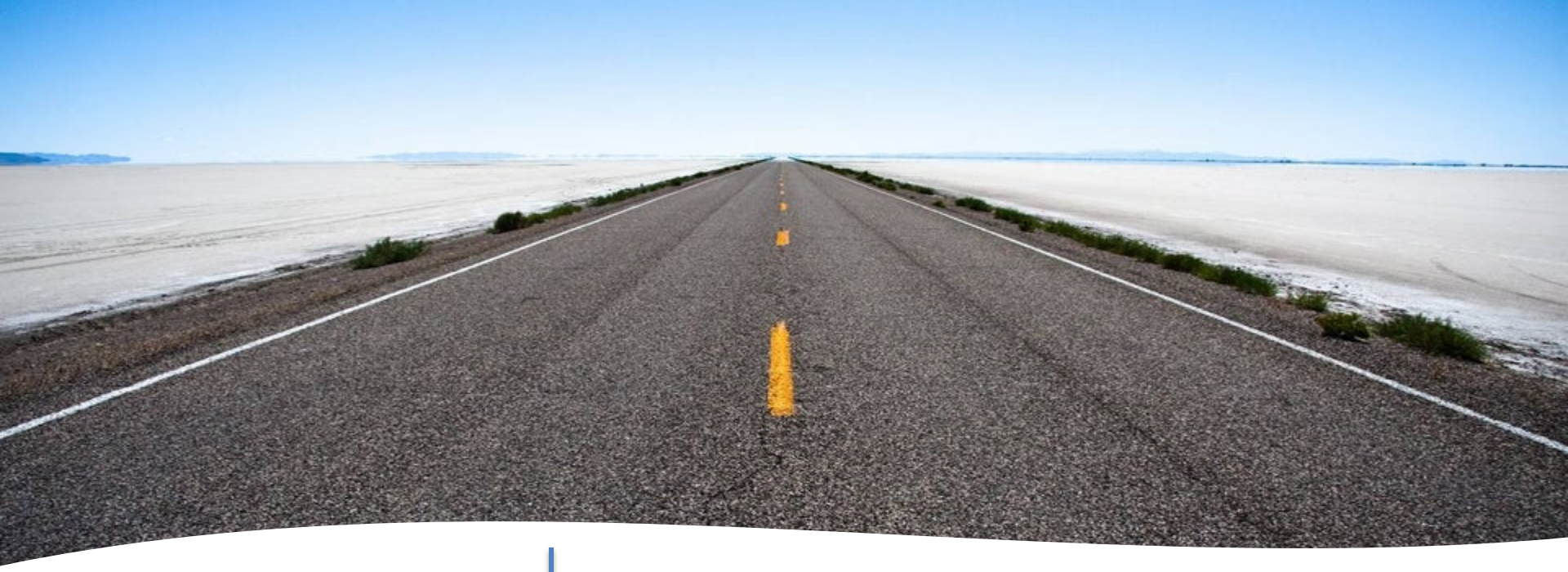
- 22 examination standards
- 6 appendices
- 605 Pdf pages

Revision 12

- 26 **topic based** examination standards
- 2 appendices
- ~ 450 Pdf pages

Crosswalk for Revision 12 (ADAMS ML20325A254)





Draft to Final

July 2019: Started draft

April –Aug 2020: Region review and comment

Dec 1, 2020: Published draft Rev 12 for comment

Feb 16, 2021: Public comment period ended

April 30, 2021: Legal review started

May 3-5, 2021: Trained on Revision 12 at NRC examiner conference

September 17th 2021: Published Final Rev 12

March 17th 2022: Expect to use Rev 12 for exams

Final NUREG Rev 12

- Read the Final REV 12
- Change bars show changes from draft NUREG
- Critical performance deficiency (CPD):
  - One CPD is a 3-point deduction (return to Revision 11 grading)
  - If an applicant has more than one CPD, they will receive an unsatisfactory simulator scenario operating test overall score (failure) (NEW)
  - If an applicant demonstrated a PD with serious safety consequences, the examiner may recommend an overall failure of the operating test even if the grading instructions in this examination standard would normally result in a passing grade. The NRC regional office must get concurrence from the NRR operating licensing program office before issuing the applicant a notification letter regarding a failure of the operating test for a PD with serious safety consequences (return to Revision 11 grading)

Final NUREG

- Deleted the safety function numbers from the Tier 1 outline forms
- Removed the step to reference those safety function numbers in the directions for selecting JPM tasks
- Safety function numbers remain with the systems

Form 4.1-BWR	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier						
E/APE # / Name ~~/ Safety Function~~	K1	K2	K3	A1	A2	G	
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation ~~/ 1~~							
295003 (APE 3) Partial or Complete Loss of AC Power ~~/ 6~~							
295004 (APE 4) Partial or Total Loss of DC Power ~~/ 6~~							
295005 (APE 5) Main Turbine Generator Trip ~~/ 3~~							
295006 (APE 6) Scram ~~/ 1~~							
295016 (APE 16) Control Room Abandonment							
295018 (APE 18) Partial or Complete Loss of CCW ~~/ 8~~							
295019 (APE 19) Partial or Complete Loss of Instrument Air ~~/ 8~~							

2. Select safety functions and systems for each JPM as follows:

   Refer to Section 1.9 of the applicable knowledge and abilities (K/A) catalog for the plant systems organized by safety function. For pressurized-water reactor operating tests, the primary and secondary systems listed under Safety Function 4, "Heat Removal from Reactor Core," in Section 1.9 of NUREG-1122 or NUREG-2103 may be treated as separate safety functions (i.e., two systems, one primary and one secondary, may be selected from Safety Function 4). From the safety function groupings identified in the K/A catalog, select the appropriate number of plant systems by safety functions to be evaluated based on the applicant's license level (see the table in step 1).

   ~~The emergency and abnormal plant evolutions listed in Section 1.10 of the applicable K/A catalog may also be used to evaluate the applicable safety function (as specified for each emergency and abnormal plant evolution in the first tier of the written examination outlines in ES-4.1, "Preparing Written Examination Outlines").~~

   For RO/SRO-I applicants: Each of the control room systems JPMs and, separately, each of the in-plant systems JPMs must evaluate a different safety function, and the same system or evolution cannot be used to evaluate more than one safety function in each location. One of the control room systems JPMs must be an engineered safety feature.

   For SRO-U applicants: Evaluate SRO-U applicants on five different safety functions. One of the control room systems JPMs must be an engineered safety feature, and the same system or evolution cannot be used to evaluate more than one safety function.

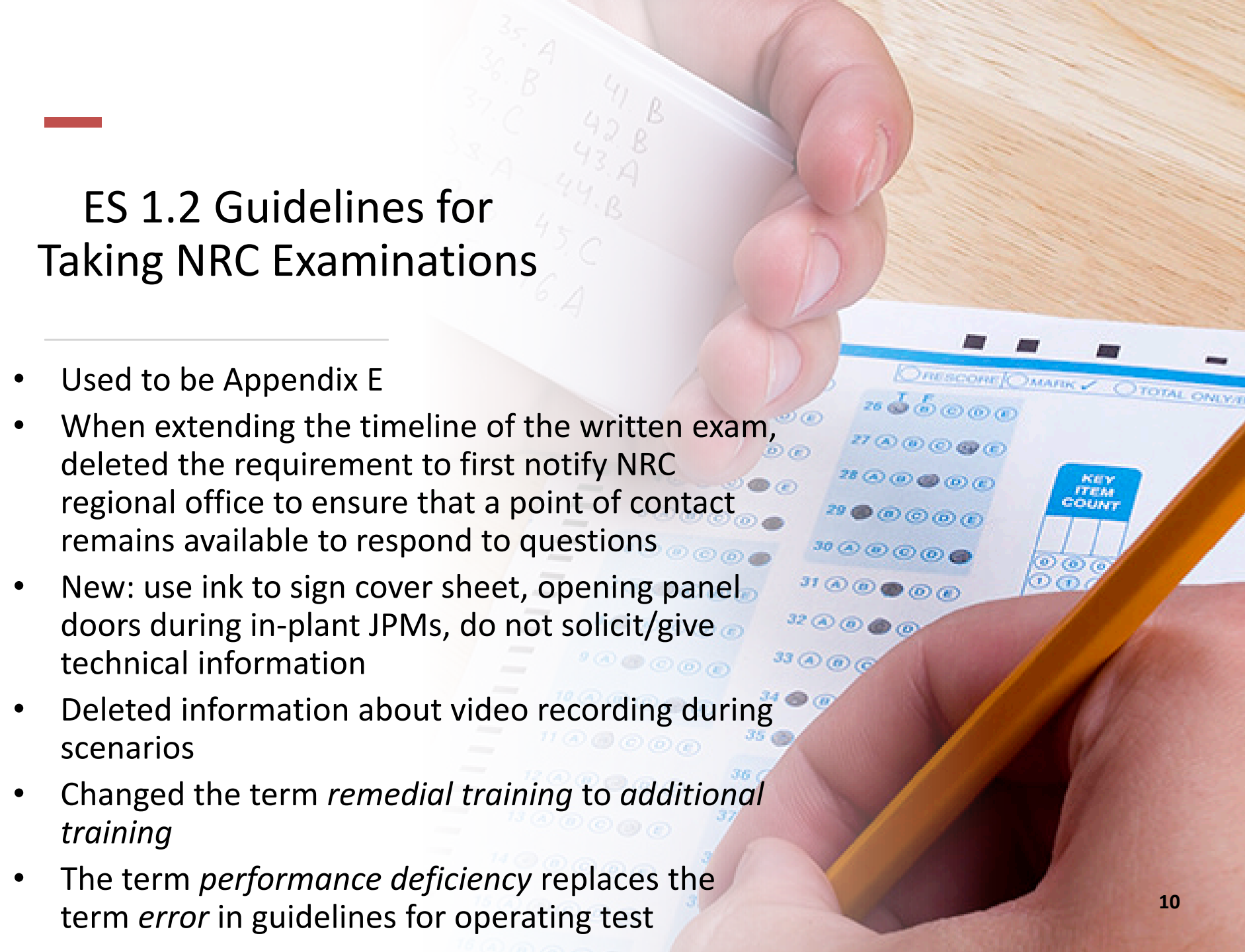
3. Select a task for each JPM that supports, either directly or indirectly and in a meaningful way, the successful fulfillment of the associated safety function. Select the task from the applicable K/A catalog (K/As for plant systems or emergency and abnormal plant evolutions) or the facility licensee's site-specific task list. If this task has an associated K/A, the K/A should have importance rating of at least 2.5 in the RO column. K/As that have importance ratings of less than 2.5 may be used if justified based on plant priorities;

ES 1 General

ES 1.1 Using the Examination Standards

- Instructions, procedures, restrictions, limits (shall)
- Guidelines and guidance (should)
- Use the glossary, know the terms
- Use the latest revision of the applicable K/A catalog available at the time the facility licensee requests the written examination outline (up to 18 months before the examination date - based on typical initial operator licensing class length)

ES 1.2 Guidelines for Taking NRC Examinations



- Used to be Appendix E
- When extending the timeline of the written exam, deleted the requirement to first notify NRC regional office to ensure that a point of contact remains available to respond to questions
- New: use ink to sign cover sheet, opening panel doors during in-plant JPMs, do not solicit/give technical information
- Deleted information about video recording during scenarios
- Changed the term *remedial training* to *additional training*
- The term *performance deficiency* replaces the term *error* in guidelines for operating test

ES 1.3 Examination Security

- This new ES is applicable to facility licensee and NRC developed examinations
- Clarified information regarding audit examinations

ES 2 Initial Examination, Pre-Examination Activities

ES 2.1 Preparing for Operator Licensing Initial Examinations

- 30 days between operating test and written examination administration is from the completion of one to the start of the other
- Step for facility licensee to submit proposed outlines for operating test
- Step for facility licensee to give the NRC chief examiner a list of significant differences between the simulation facility and the reference plant
- Added 18-month limit for requesting a written examination outline from the regional office
- The 210-day target for a examination notification letter to the facility licensee does not apply for re-take examinations

ES 2.1 Preparing for Operator Licensing Initial Examinations

- For the examination preparation call, additional discussion item: if any individual applying for the NRC exam has previously failed an NRC operating test (at any facility).
- Step for assigned NRC examiners to review the facility licensee's security procedure and brief the facility contact on the examination security items in ES 1.3
- Changed target for discussing examination review results from 5 weeks to 7 weeks
- Removed section references from Form 2.1-1, "Examination Preparation Checklist"
- Requirement to update Form 2.3-3, "Operating Test Review Worksheet," to document operating test changes from validation week
- Step for the facility licensees to provide a draft schedule for administering the operating test

ES 2.1 Preparing for Operator Licensing Initial Examinations (cont.)

- New section about preparatory site visits (validation week)
- Added information about the use of secure electronic document sharing applications (e.g., BOX)
- Clarification: The option to submit some sample test items (5 to 10 written questions, 1 scenario, and 1 to 2 JPMs) for preliminary NRC review and comment is referred to as the pre-submittal sample
- Clarified that for the pre-submittal sample, review comments do not need to be formally documented
- Clarified that, following supervisor review and approval, NRC may provide documentation of NRC comments on the draft submittals to the facility
- Step to discuss expectations for deviating from the approved written examination outline and selecting replacement K/As to prevent re-work
- Changed target date for forwarding NRC-developed examinations to the facility licensee to 100 days

ES 2.2 Applications, Medical Requirements, and Waiver and Excusals

- Removed redundant eligibility information (located in ACAD)
- Clarified that a facility licensee training program is considered Commission-approved if accredited by NNAB – removed reference to specific ACAD revision
- Discontinued NRC waivers for experience requirements for licensees that follow NANT guidelines for eligibility. Substitutions allowed by NANT guidelines do not require NRC approval or NRC waivers. Deferrals allowed.
- Removed the limit on how many months of experience that the NRC regional office can approval for deferral requests

ES 2.2 Applications, Medical Requirements, and Waiver and Excusals

- Removed reference to term “exception”
- Added clarifications for cold plants under construction from the “Recommendations, Operator Licensing Process for Cold Plants,” (ML18236A870)
  - Facility licensees may also seek alternative methods
- Deleted information about not using digital signature for forms with multiple signatures, this is possible now
- Deleted information that is redundant to the instructions on NRC Forms 398 and 396

ES 2.2 Applications, Medical Requirements, and Waiver and Excusals (cont.)

- The term *multi-unit licensing* replaces the term *dual-licensing*
- Clarified how to add another unit to an operator license for construction cases
- Specified at least 520 hours of operating experience as a licensed operator on a comparable unit in the last two years to be adequate for meeting the extensive actual operating experience requirement in 10 CFR 55.47 (a)(1)
  - Based on precedence and equivalent to initial license training program “under instruction” time
- Clarified LSRO waiver information as regulations do not differentiate testing requirements

ES 2.2 Applications, Medical Requirements, and Waiver and Excusals (cont.)

- Changed 6-month expiration of medical examination for applicants to 2 years
- Added that for re-applications and excusal requests, the NRC staff will also evaluate how the applicant was trained on deficiencies in the passed portions of the examination as well as in the failed portions
- Updated all sample correspondence letters with current electronic filing instructions

ES 2.3 Reviewing and Approving Operator Licensing Initial Examinations

- Additional guidance on balance of coverage and how an NRC chief examiner can check the balance of coverage (from OLPF 401.55)
- Clarified information for NRC review of the pre-submittal sample
- Added criteria for how the NRC determines if submitted examination material requires “substantive changes”
- Moved target for NRC to discuss exam comments with facility licensee from 5 weeks before exam administration to 7 weeks
- Added statement that if region and facility cannot resolve examination comments, then inform NRR operator licensing program office

ES 2.3 Reviewing and Approving Operator Licensing Initial Examinations

- Deleted statement about facility licensee responsibility for verifying technical accuracy
- Changed from requirement to recommendation that the exam be reviewed by facility supervisor/manager familiar with NUREG requirements
- Minor enhancements to most of the forms in this section
- (Y)es/(N)o instead of reviewer initials on all quality checklists. Reviewers still sign checklists
- Clarified note regarding NRC review.
- Specific changes to the forms will be discussed during the presentations on the development sections for each portion of the exam

ES 3 Initial Examination, Operating Tests

ES 3.1 Overview of the Operating Test for Operator Licensing Initial Examinations

- Clarified the scope of the operating test for applicants getting a multi-unit license at multi-unit facility
- Deleted statement that SRO applicants should demonstrate supervisory abilities due to redundancy
- Deleted term “highest on shift position”
- Deleted statement that discussed what RO Admin JPMs are NOT, instead of what they are

ES 3.2 Specific Instructions for JPMs

- Clarified: Administrative Topics JPMs should not test system operation
- Deleted “access controls for vital/controlled plant areas” and “radiation work permits” as these were removed from Rev. 3 of the K/A catalogs nor is it required by 10 CFR Part 55
- Deleted: *For SRO applicants, an attempt should be made to cover fuel handling in the fuel handling areas of the plant whenever possible*

ES 3.2 Specific Instructions for JPMs

- Updated the expected time for Administrative Topics JPMs to align with what is done in practice
- Added statement to avoid a walk-through test heavily weighted with simplistic JPMs
- Clarified instructions for JPM task standards and provided examples
- Added clarification that a JPM critical step might not be a verifiable action
- Revised instruction for JPM termination criteria
- Added step to annotate the critical steps on JPM grading sheet

ES 3.2 Specific Instructions for JPMs

- Added requirement that each JPM contain at least two critical steps
- Added step to include summary of the JPM on the outline form
- For the control room/in-plant systems JPM outline, clarified how to select a task for each JPM: select a task that *supports, either directly or indirectly and in a meaningful way, the successful fulfillment of the associated safety function*.
  - Also, if task has associated K/A, the importance rating should be at least 2.5 (RO column) unless plant priority
- At least one alternate path JPM must be new or modified – not new requirement

ES 3.2 Specific Instructions for JPMs

- Clarified that alternate path should differ from normal path in order to test applicant's ability to use an alternate operation.
- Made minor changes to all JPM forms
- Updated all JPM outline forms to include more instructions and detail
- Revised Form 3.2-3, JPM Template to be closer to industry

ES 3.2 Specific Instructions for JPMs

Instructions for completing Form 3.2-1, "Administrative Topics Outline"

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	SRO and RO Retakes
Conduct of Operations	1 (or 2)	2
Equipment Control	1 (or 0)	1
Radiation Control	1 (or 0)	1
Emergency Plan	1 (or 0)	1
Total	**4**	**5**

* Reactor operator (RO) applicants do not need to be evaluated on every topic (i.e., "Equipment Control," "Radiation Control," or "Emergency Plan" can be omitted by doubling up on "Conduct of Operations"), unless the applicant is taking only the administrative topics part of the operating test (with a waiver or excusal of the other portions).

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

Location:

(C)ontrol room, (S)imulator, or Class(R)oom

Source and Source Criteria:

(P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams

(D)irect from bank (no more than three for ROs, no more than four for SROs and RO retakes)

(N)ew or Significantly (M)odified from bank (no fewer than one)

ES 3.2 Specific Instructions for JPMs

Form 3.2-2 Instructions for Control Room/In-Plant Systems Outline

1. Determine the number of control room system and in-plant systems job performance measures (JPMs) to develop using the following table:

License Level	Control Room	In-Plant	Total
Reactor Operator (RO)	8	3	11
Senior Reactor Operator-Instant (SRO-I)	7	3	10
Senior Reactor Operator-Upgrade (SRO-U)	2 or 3	3 or 2	5

2. Select safety functions and systems for each JPM as follows:

   Refer to Section 1.9 of the applicable knowledge and abilities (K/A) catalog for the plant systems organized by safety function. For pressurized-water reactor operating tests, the primary and secondary systems listed under Safety Function 4, "Heat Removal from Reactor Core," in Section 1.9 of NUREG-1122 or NUREG-2103 may be treated as separate safety functions (i.e., two systems, one primary and one secondary, may be selected from Safety Function 4).

   From the safety function groupings identified in the K/A catalog, select the appropriate number of plant systems by safety functions to be evaluated based on the applicant's license level (see the table in step 1).

   The emergency and abnormal plant evolutions listed in Section 1.10 of the applicable K/A catalog may also be used to evaluate the applicable safety function (as specified for each emergency and abnormal plant evolution in the first tier of the written examination outlines in ES-4.1, "Preparing Written Examination Outlines").

   For RO/SRO-I applicants: Each of the control room systems JPMs and, separately, each of the in-plant systems JPMs must evaluate a different safety function, and the same system or evolution cannot be used to evaluate more than one safety function in each location. One of the control room systems JPMs must be an engineered safety feature.

   For SRO-U applicants: Evaluate SRO-U applicants on five different safety functions. One of the control room systems JPMs must be an engineered safety feature, and the same system or evolution cannot be used to evaluate more than one safety function.

3. Select a task for each JPM that supports, either directly or indirectly and in a meaningful way, the successful fulfillment of the associated safety function. Select the task from the applicable K/A catalog or the facility licensee's site-specific task list. If this task has an associated K/A, the K/A should have importance rating of at least 2.5 in the RO column. K/As that have importance ratings of less than 2.5 may be used if justified based on plant priorities; inform the NRC chief examiner if selecting K/As with an importance rating less than 2.5.

   The selected tasks must be different from the events and evolutions conducted during the simulator operating test and tasks tested on the written examination. A task that is similar to a simulator scenario event may be acceptable if the actions required to complete the task are significantly different from those required in response to the scenario event.

   Apply the following specific task selection criteria:

   - At least one of the tasks shall be related to a shutdown or low-power condition.
   - Four to six of the tasks for RO and SRO-I applicants shall require execution of alternative paths within the facility licensee's operating procedures. Two to three of the tasks for SRO-U applicants shall require the execution of alternative paths within the facility licensee's operating procedures.
   - At least one alternate path JPM must be new or modified from the bank.
   - At least one of the tasks conducted in the plant shall evaluate the applicant's ability to implement actions required during an emergency or abnormal condition.
   - At least one of the tasks conducted in the plant shall require the applicant to enter the radiologically controlled area. This provides an excellent opportunity for the applicant to discuss or demonstrate radiation control administrative subjects.

   If it is not possible to develop or locate a suitable task for a selected system, return to step 2 and select a different system.

4. For each JPM, specify the codes for type, source, and location:

Code	License Level Criteria		
	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
(EN)gineered safety feature (for control room system)	≥ 1	≥ 1	≥ 1
(L)ow power/shutdown	≥ 1	≥ 1	≥ 1
(N)ew or (M)odified from bank (must apply to at least one alternate path JPM)	≥ 2	≥ 2	≥ 1
(P)revious two exams (randomly selected)	≤ 3	≤ 3	≤ 2
(R)adiologically Controlled Area	≥ 1	≥ 1	≥ 1
(S)imulator			

ES 3.3 Testing Guidelines for Dynamic Simulator Scenarios

- Deleted the example scenario outlines
- A low power initial condition is not required for every scenario set (use periodically)
- Replaced “operator actions” with “verifiable actions” for consistency
- Clarified terms *events* and *malfunctions*: events consist of one or more simulator malfunctions
- An I/C failure before the major event/EOP entry can only be counted again, as a separate event, after the major event/EOP entry if the operator actions differ distinctly from the actions before the major event/EOP entry - and gave examples
- Do not count I/C failures that occur after entry into EOPs as abnormal events. Do count them as events after EOP entry

ES 3.3 Testing Guidelines for Dynamic Simulator Scenarios

- Some abnormal events for each scenario should require operators to recognize and interpret TSs
- Identify and document events impacting TS functions prior to major transients
- For the target number of EOPs entered: clarified that the EOP entry needs to involve significant operator action to maintain plant safety and, where a success path exists, prevent further degradation to plant safety
- For EOP contingency procedures: added a list for Westinghouse AP1000 and revised the list for General Electric BWR
- Add an area to include Symptoms/Cues for events on Form 3.3-2 *Required Operator Actions*
- For time critical CTs, added caution to ensure that the time-critical assumptions and consequences are applicable to the specific scenario

ES 3.3 Testing Guidelines for Dynamic Simulator Scenarios

- CT definition - used during simulator scenarios to evaluate whether an individual or crew can complete actions that are of significant importance to the safety of the plant and public.
- Methodology
  - Reference facility CT list
    - Not reviewed by NRC
    - Scenarios have specific equipment configurations and malfunctions which may invalidate a CT from the list
  - CTs include: tasks for mitigating significant safety challenges with actions directly leading to restoration of one or more safety functions, tasks with EOP-directed actions essential to an event's overall mitigative strategy, one or more actions to prevent challenge to plant safety

ES 3.3 Testing Guidelines for Dynamic Simulator Scenarios

- Methodology continued
  - A challenge to plant safety includes
    - Conditions warranting initiation of emergency depressurization
    - Conditions resulting in orange or red path critical safety functions
    - Conditions warranting transition to functional recovery guidelines
    - Conditions adversely impacting implementation of EOPs essential to the mitigative strategy for event
  - CTs also include prevention of inappropriate actions that create a challenge to plant safety
    - Unnecessarily creating situations resulting in EAL entry or escalation on loss or potential loss of >1 fission product barrier
- Clarified that all CTs must have success path

ES 3.3 Testing Guidelines for Dynamic Simulator Scenarios

- Measurable Performance Criteria bounding conditions
  - Preferred
    - Thresholds at which safety functions are severely challenged/lost
    - Thresholds that result in changes to the mitigative strategy for an event
    - Time-critical actions necessary to mitigate event
  - Alternative
    - Exiting or transitioning from procedure first directing CT performance
    - Exceeding a parameter value as agreed up by the CE and facility
    - Expiration of a reasonable time limit, as agreed by the CE and facility
    - For post-scenario CTs, boundary conditions as determined by the lead examiner

ES 3.4 Developing Scenarios

- Revised definition of significantly modified scenario based on public comment
- Clarified: If any major event is repeated from the previous two NRC examinations, change the major event, the initial conditions, or subsequent malfunctions (or a combination of these) to alter the course of action (within the emergency procedures) for that scenario
- Added a step to check for overlap between content on simulator scenarios and written examinations (in addition to checking overlap with JPMs)
- Change: Can test SRO-Instant applicants for certain events and evolutions while they are in the ATC or the BOP position

ES 3.4 Developing Scenarios (cont.)

- Deleted Form ES-301-6, *Competencies Checklist*. The requirement for manual control of automatic function transferred to the *Transient and Event Checklist*, which has been renamed, Form 3.4-1, *Events and Evolutions Checklist*
- Clarified: target for EOP-contingency procedures is "1 per scenario set"
- Clarified: a calculation is a verifiable action only if it is subsequently used to diagnose an event or for decision-making
- Added requirement for CE to document qualitative evaluation when quantitative attribute target ranges are not met
- The term *I/C failure* replaces *I/C malfunction*
- Added manual control of automatic function to Events and Evolutions Checklist

ES 3.4 Developing Scenarios (cont.)

- Clarification – for the minimum required number of reactivity manipulations, normal evolutions, manual control of an automatic function, and instrument and component failures, only count those events that require applicant to perform verifiable actions which provide insight into applicant's competence
- Each Technical Specification (TS) evaluation must be tied to a separate event and involve entry into one or more TS action statements
- The offsite dose calculation manual cannot be used to meet the minimum number of TS evaluations for SRO applicants
- TS evaluations can be standalone events for the SRO applicant; not required to also count as an I/C failure requiring a verifiable action by the control board operators
- Deleted statement about "credit" for control board manipulations for SROs

ES 3.4 Developing Scenarios (cont.)

Form 3.4-1 Events and Evolutions Checklist

Facility:		Date of Exam:													Operating Test No.:		
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM*		
		1			2			3			4						
		POSITION			POSITION			POSITION			POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		RO	I	U
RO ☐	RX														1	1	0
SRO-I ☐	NOR														1	1	1
	I/C														4	4	2
SRO-U ☐	MAJ														2	2	1
	Man. Ctrl														1	1	0
	TS														0	2	2
RO ☐																	

Form 3.4-1 Instructions for the Events and Evolutions Checklist

Instructions for filling out Form 3.4-1, "Events and Evolutions Checklist":

1. Mark the applicant license level for each simulator operating test number.

2. For the set of scenario columns, fill in the associated event number from Form 3.3-1, "Scenario Outline," to show the specific event types being used for the applicant while in the assigned crew position for that scenario.

* Minimums are subject to the instructions in Section B, Step 4.B, "License Level Criteria."

KEY: RX = Reactivity Manipulation; NOR = Normal Evolution; I/C = Instrument/Component Failure; MAJ = Major Transient; Man. Ctrl = Manual Control of Automatic Function; TS = Technical Specification Evaluation; RO = Reactor Operator; SRO-I or I = Instant Senior Reactor Operator; SRO-U or U = Upgrade Senior Reactor Operator; Senior Reactor Operator; ATC = At the Controls; and BOP = Balance of Plant

Manual Control of an Automatic Function

- Automatic Function
  - Use of I&C logic to monitor and respond to current plant performance such that plant equipment is manipulated without operator action
- Manual Control of an Automatic Function
  - The automatic function has failed such that plant equipment will not be manipulated in response to plant conditions without operator intervention
  - **Safety or nonsafety-related**

Examples: Manual Control of Automatic Function

- Controller fails in auto, operator has to control in manual
- Pump trips and standby fails to autostart, operator must start standby pump
- Reactor fails to automatically trip when required, operator must take action to trip/shutdown the reactor
- Valve fails to auto close/open on safety injection, operator must close/open the valve
- Bus breaker fails to close automatically, operator must close breaker

NOT Manual Control of Automatic Function

- Intrinsic characteristics – Power decrease due to temperature increase
- No automatic function exists
  - Standby pump does not have an auto start feature, therefore starting the pump does not exhibit control of an automatic function
- No verifiable action OR automatic function works as expected
  - Checking that an automatic function worked, such as auctioneering out a bad input in a digital controller
  - Verifying reactor trip after automatic trip signal received

How to Count for Events

- Manual Control event can also count as:
  - I/C event,
  - Reactivity manipulation, OR
  - Major transient
- Cannot count the manual control event for SRO while they are in the CRS position – must be in either the ATC or BOP position

ES 2.3 Op Test Review and Approval

- No significant changes to Form 2.3-1 Examination Outline Quality Checklist
- Changes to Form 2.3-2, Operating Test Quality Checklist
  - Added line item to check that there are enough test items such that test items will not be repeated on more than 1 day of the operating test
  - Clarified: minimize overlap of the op test with the written examination and between the different parts of the operating test
  - The list of criteria for each JPM: added task standard and the labelling of alternate path JPMs
  - Deleted requirement to check that all individual operator competencies and rating factors can be evaluated due to redundancy

ES 2.3 Op Test Review and Approval

Form 2.3-3 Instructions for Completing the JPM Table

1. Enter the JPM number and/or title.

2. Enter the type of JPM—(S)imulator, (P)lant, or (A)dministrative.

3. Enter (Y)es or (N)o for an Alternate Path JPM.

4. Rate the level of difficulty (LOD) of each JPM using a scale of 1–5 (easy–difficult). A JPM containing less than two critical steps, a JPM that tests solely for recall or memorization, or a JPM that involves directly looking up a single correct answer is likely LOD = 1 (too easy). Conversely, a JPM with over 30 steps or a JPM that takes more than 45 minutes to complete is likely LOD = 5 (too difficult).

5. Check the appropriate block for each JPM error type, using the following criteria:

   - LOD = 1 or 5 is unsatisfactory (U).
   - REF: The JPM lacks required references, tools, or procedures (U).
   - IC: The JPM initial conditions are missing or the JPM lacks an adequate initial cue (U).
   - CUE: The JPM lacks adequate evaluator cues to allow the applicant to complete the task, or the evaluator cues are subjective or leading (U).
   - TSK: The JPM lacks a task standard or lacks completion criteria for a task standard (U).
   - CS: The JPM contains errors in designating critical steps, or the JPM lacks an adequate performance standard for a critical step (U).
   - TL: The JPM validation times are unreasonable, or a time-critical JPM lacks a completion time (U).

6. Mark the JPM as unsatisfactory (U), satisfactory (S), or needs enhancements (E). A JPM is (U) if it has one or more (U) errors as determined in step 5. Examples of enhancements include formatting, spelling, or other minor changes.

7. Briefly describe any JPM determined to be unsatisfactory (U) or needing enhancement (E). Save initial review comments and detail subsequent comment resolution so that each exam-bound JPM is marked by a satisfactory (S) resolution on this form.

ES 2.3 Op Test Review and Approval

Form 2.3-3 Instructions for Completing the Scenario Table

1. For each scenario, enter the scenario event names and descriptions.

2. Review the individual events contained in each scenario, and identify and mark event errors:

   - The scenario guide event description is not realistic/credible—unsatisfactory (U).
   - The scenario guide event description lacks adequate crew/operator performance standards—needs enhancement (E).
   - The scenario guide event description lacks verifiable actions for a credited normal event, reactivity event instrument/component malfunction, or technical specification (TS) event (or a combination of these) (U).
   - The scenario guide event description incorrectly designates an event as a critical task (i.e., a noncritical task labeled as critical or a critical task labeled as noncritical). This includes critical tasks that do not meet the critical task criteria (i.e., the critical task does not have a measurable performance standard) (U).
   - The scenario guide event description incorrectly designates entry into TS actions when not required or does not designate entry into TS actions when required (U).

3. Based on the outcome in step 2, mark the scenario event as unsatisfactory (U), satisfactory (S), or needs enhancements (E). An event is (U) if it has one or more (U) errors as determined in step 2. Examples of enhancements include formatting, spelling, or other minor changes.

4. Briefly describe any scenario event determined to be unsatisfactory (U) or needing enhancement (E). Save initial review comments and detail subsequent comment resolution so that each exam-bound scenario event is marked by a satisfactory (S) resolution on this form.

ES 3.5 Administering Operating Tests (1 of 3)

- Added: Chief examiner needs branch chief permission to administer examination outside of normal working hours
- Discontinued option for audio/video recording of operating tests
- Deleted requirement to mark chart recorders with date/time/initials for data collection. Added allowance for digital/electronic recording
- Deleted ES-301 Attachment 1, *Open Reference Question Guidelines*
- The term *monitor* replaces *proctor* for facility licensee staff that assist with operating test administration
- Clarified guidance for simultaneous administration of different JPMs
- Added guidance for when to use the spare scenario and no longer need to notify Branch Chief before using it
- Added guidance for how to run parallel JPMs in the simulator with examples

ES 3.5 Administering Operating Tests (2 of 3)

- New section on *Instructions for Use of Surrogate Operators During Administration,* with clarifications including: *surrogate operators shall not take a proactive role in assisting or coaching applicants*
- New section on *Instructions for the Use of Follow-Up Questions,* with clarifications for examiners for when/how to ask performance-based follow-up questions
  - Deleted: Asking SRO applicants for applicable EALs
  - Evaluate the SRO applicant (while in the SRO position) on applicable TS actions in accordance with the simulator scenario guide. Do this by first asking the applicant to explain the TS implications for each event of the scenario without providing any cues as to which events should be considered. Then, use more detailed questions if a performance deficiency is identified to determine which rating factor to cite during grading activities. DO NOT give them performance feedback on TS events*
- Clarified that: If the STA position is implemented during a simulator scenario, the chief examiner will give or participate in the brief for the STA on the content of the scenario(s) and their expected actions in response to every event.

ES 3.5 Administering Operating Tests (3 of 3)

- The term *performance deficiency* replaces *error*
- Added: Immediately after scenario: Identify any significant performance deficiencies occurring during the scenario

ES 3.6 Grading and Documenting Operating Tests (1 of 8)

- New terms and criteria for identifying and grading:
  - Performance Deficiency (PD),
  - Significant Performance Deficiency (SPD)
  - Critical Performance Deficiency (CPD)

Performance deficiency:

An observed action or inaction OR a statement of understanding or intent related to an

- operational or administrative task
- procedure or process implementation
- communication

that demonstrates a lack of ability or understanding as outlined by an established standard for operator performance

(e.g., facility procedure, policy, learning objective, regulatory requirement).

ES 3.6 Grading and Documenting Operating Tests (2 of 8)

Significant performance deficiency: More severe than a regular PD but does not meet the criteria for a critical performance deficiency.

- Can only identify post-scenario, because of an error made during the scenario by one or more applicants
- PDs that either cause an automatic RPS/ESF actuation or necessitate a manual RPS/ESF actuation that should have otherwise been avoidable had the applicant responded to the event as expected
  - NOT: Subsequent RPS/ESF actuations that do not alter equipment alignments
  - NOT: Single RPS/ESF channel actuations
- PDs would result in an unplanned EAL entry/escalation to Alert or SAE
- PDs that result in an unplanned power change for >10% thermal power
  - NOT: Placing the unit at a lower reactor power level as the result of a conservative decision
- 2 point deduction for each associated RF

ES 3.6 Grading and Documenting Operating Tests (3 of 8)

Critical performance deficiency: A performance deficiency associated with a critical task.

- CT may be a preidentified or a post-scenario CT
- CT must meet the ES 3.3, CT methodology
- One CPD is a 3-point deduction (return to Revision 11 grading)
- 

If an applicant has more than one CPD, they will receive an unsatisfactory simulator scenario operating test overall score (failure) (NEW)
- If an applicant demonstrated a PD with serious safety consequences, the examiner may recommend an overall failure of the operating test even if the grading instructions in this examination standard would normally result in a passing grade. The NRC regional office must get concurrence from the NRR operating licensing program office before issuing the applicant a notification letter regarding a failure of the operating test for a PD with serious safety consequences (return to Revision 11 grading)

ES 3.6 Grading and Documenting Operating Tests (4 of 8)

Table 3.6-1 Unscripted EALs and Associated PD Type

Applicant's Simulator Scenario Performance Result:	**PD Type:**
Criteria met for a General Emergency	CPD (post scenario CT)
Criteria met for a Site Area Emergency based on more than one fission product barrier	CPD (post scenario CT)
Criteria met for an Alert or a non-fission product barrier Site Area Emergency	SPD
Criteria met for an Unusual Event	PD

ES 3.6 Grading and Documenting Operating Tests (5 of 8)

- No change: An applicant who is corrected by another crew member will still be held accountable for what would have transpired if he or she had taken the action without correction. **This is for any PD type**
- No change: Limit of 2 RFs per PD
- New: If second RF assigned, it must be in a different competency area

ES 3.6 Grading and Documenting Operating Tests (6 of 8)

Table 3.6-2 Summary of RF Scores by PD Type

	PD Type		
	CPD	**SPD**	**All other PDs**
Competency/RF			
RFs *other* than those in the communications competency	3 point deduction per RF	2 point deduction per RF	1 point deduction per RF
Communications Competency All RFs	No point deduction for the first PD in each RF. For the 2nd and 3rd PDs in a RF, deduct 1 point from the associated RF. For the 4th and subsequent PD in a RF, deduct 2 points. The minimum score for any RF is a "1"		

ES 3.6 Grading and Documenting Operating Tests (7 of 8)

- Added instructions for identifying and grading PDs involving Technical Specifications
- New: If during followup questioning, the applicant corrects a TS determination that was made incorrectly during the scenario (provided that time limits associated with any required actions had not yet expired by the end of the scenario), then do not penalize the applicant for the original PD in the TS competency
- Forms 3.6-5 and 3.6-6, *RO/SRO Competency Grading Worksheets* now contain the competency details from the former Appendix D with some clarifications for consistent use of rating factors

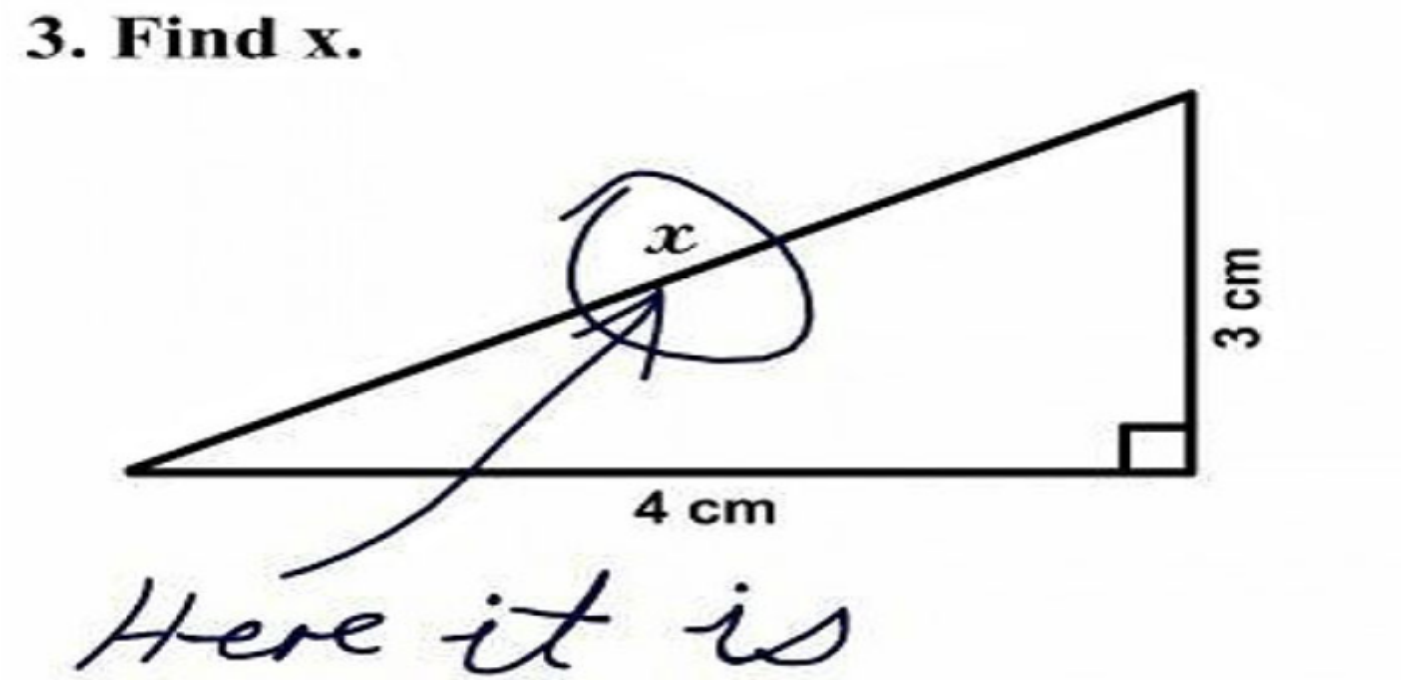
ES 3.6 Grading and Documenting Operating Tests (8 of 8)

- Documenting Op Test: two types of PD write-ups depending if applicant failed JPM/Simulator portion or not.
- Deleted guidance for what to keep after giving the operating test
- Added: Retain the examination material generated during administration of the operating test to support the NRC licensing action on all the applications and adjudicatory actions on any hearing demands. When those actions are complete, consult Management Directive 3.53, "NRC Records and Document Management Program," to determine the record status and disposition the operating test examination material accordingly.

ES 3.7 Alternatives for In Plant JPMs at Plants Under Construction

- New ES with guidance for exemption requests for in-plant JPMs at plants under construction

ES 4
Initial Written Examinations



Overview of Changes to Written Exam Sections

- Streamlining
- Improve clarity and consistency of NUREG guidance
- GFE changes

  There is no longer a GFE and a site-specific examination – there is now <u>just one</u> written examination

New Structure for ES-4.x

ES-4.1, "Developing Written Examination Outlines"

- Includes outline forms and record of rejected K/As

ES-4.2, "Developing Written Examinations"

- Includes forms for the written exam question worksheet (i.e., question pedigree information), the question development checklist, and the RO and SRO exam cover sheets

ES-4.3, "Administering Written Examinations"

ES-4.4, "Grading and Documenting Written Examinations"

Note: see ES-2.3 for review of outlines and exams

ES 4.1, Developing Written Examination Outlines (1/)

- Renamed outlines: Form 4.1-BWR, Form 4.1-PWR, Form 4.1-AP1000
- Edited outlines:
  - For use with Rev 2 or 3 of BWR/PWR K/A catalogs
  - New Tier 4 category for operationally valid, theory-based questions on the RO portion of the exam

  - New Form 4.1-COMMON, *Common Examination Outline* and is for all vendor type Tier 3 and Tier 4 K/As
  - Removed reference to Safety Function #'s on PWR/BWR/AP1000/ABWR APE/EPE line items

ES 4.1, Developing Written Examination Outlines (2/4)

How will the outlines change?

- One less K/A in Tier 1/Group 2
- One less K/A in Tier 2/Group 2
- Four less K/As in Tier 3
- Six new Tier 4 items - three “Reactor Theory” and three “Thermodynamics” K/As from Section 6 “Theory”
- Tier 2 “G” K/As will also include topics from Section 5, “Components,” of the applicable K/A catalog

Note: changes only affect RO examination

Tier 1 and 2

Tier	Group	RO K/A Category Points											Total
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	
1. Emergency and Abnormal Plant Evolutions	1				N/A					N/A			20	20
	2												~~7~~	6
	Tier Totals												~~27~~	26
2. Plant Systems	1												26	26
	2												~~12~~	11
	Tier Totals												~~38~~	37

Tier 3 and 4

3. Generic Knowledge and Abilities Categories	1	2	3	4	~~10~~	6

4. Theory	Reactor Theory	Thermodynamics	6
	3	3	

ES 4.1, Developing Written Examination Outlines (3/4)

- Clarified that when sampling Tier 1 and 2 K/As for SRO-only questions on fuel handling equipment, sampling is not limited to A2 and G
- Deleted the list of pre-screened K/As for Tiers 1 and 2 from K/A catalog Section 2 Generic K/As

ES 4.1, Developing Written Examination Outlines (4/4)

- Deleted the safety function numbers from the Tier 1 outline forms
- Removed the step to reference those safety function numbers in the directions for selecting JPM tasks
- Safety function numbers remain with the systems

Form 4.1-BWR	BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier						
E/APE # / Name ~~/ Safety Function~~	K1	K2	K3	A1	A2	G	
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation ~~/ 1~~							
295003 (APE 3) Partial or Complete Loss of AC Power ~~/ 6~~							
295004 (APE 4) Partial or Total Loss of DC Power ~~/ 6~~							
295005 (APE 5) Main Turbine Generator Trip ~~/ 3~~							
295006 (APE 6) Scram ~~/ 1~~							
295016 (APE 16) Control Room Abandonment							
295018 (APE 18) Partial or Complete Loss of CCW ~~/ 8~~							
295019 (APE 19) Partial or Complete Loss of Instrument Air ~~/ 8~~							

2. Select safety functions and systems for each JPM as follows:

   Refer to Section 1.9 of the applicable knowledge and abilities (K/A) catalog for the plant systems organized by safety function. For pressurized-water reactor operating tests, the primary and secondary systems listed under Safety Function 4, "Heat Removal from Reactor Core," in Section 1.9 of NUREG-1122 or NUREG-2103 may be treated as separate safety functions (i.e., two systems, one primary and one secondary, may be selected from Safety Function 4). From the safety function groupings identified in the K/A catalog, select the appropriate number of plant systems by safety functions to be evaluated based on the applicant's license level (see the table in step 1).

   ~~The emergency and abnormal plant evolutions listed in Section 1.10 of the applicable K/A catalog may also be used to evaluate the applicable safety function (as specified for each emergency and abnormal plant evolution in the first tier of the written examination outlines in ES-4.1, "Preparing Written Examination Outlines").~~

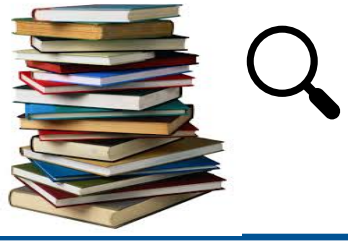
   For RO/SRO-I applicants: Each of the control room systems JPMs and, separately, each of the in-plant systems JPMs must evaluate a different safety function, and the same system or evolution cannot be used to evaluate more than one safety function in each location. One of the control room systems JPMs must be an engineered safety feature.

   For SRO-U applicants: Evaluate SRO-U applicants on five different safety functions. One of the control room systems JPMs must be an engineered safety feature, and the same system or evolution cannot be used to evaluate more than one safety function.

3. Select a task for each JPM that supports, either directly or indirectly and in a meaningful way, the successful fulfillment of the associated safety function. Select the task from the applicable K/A catalog (K/As for plant systems or emergency and abnormal plant evolutions) or the facility licensee's site-specific task list. If this task has an associated K/A, the K/A should have importance rating of at least 2.5 in the RO column. K/As that have importance ratings of less than 2.5 may be used if justified based on plant priorities;

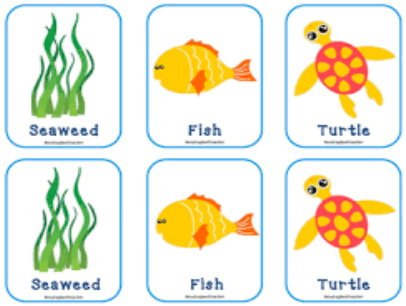
ES 4.2, Developing Written Examinations (1 of 4)

- Added examples of acceptable reasons to deviate from the approved outline
- Deleted use of the term “face validity” and clarified “individual item difficulty”
- Added why it is important to limit the use of references in a question



ES 4.2, Developing Written Examinations (2 of 4)

- Clarified -
  - bank questions include NRC questions used at other facility licensee sites and GFE bank questions
  - how to significantly modify a bank question
- Both parts of two-part questions must match the K/A



- Renamed question development checklist from App B as new Form 4.2-2, *Question Development Checklist*

ES 4.2, Developing Written Examinations (3 of 4)

- On Form 4.2-1, Written Examination Question Worksheet, the Explanation block is not listed as "optional"
- Integrated Rev 11 Attachment, *Clarification Guidance for SRO-only Questions*, into the main body of the ES
- Relocated all examples questions of SRO-only written examination questions to Appendix B
- Clarified that SRO-level questions on Technical Specifications* must test knowledge beyond "above the line" TS information and general systems knowledge and provided two examples

*Includes TRM and ODCM

ES 4.2, Developing Written Examinations (4 of 4)

- On Figure 4.2-3 *Screening for SRO-Only Questions Linked to Assessment and Selection of Procedures*, deleted term *direct* in front of *entry into major EOPs*
- Updated the list of EOPs that cannot be used for SRO-only questions
- Clarified EALs and PARs test SRO knowledge and ability for procedure selection
- Provide clarification for each tier type

New Tier 4

- Tier 4 = operationally valid, focused on fundamental theory topics
- Must meet all the same criteria as the other exam questions

  That means GFE bank questions must be reviewed against current plant references and the NUREG to determine if they meet requirements and be revised as necessary to be used for Tier 4

Tier 4 Example #1 from Pilot

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: 193005 – Thermodynamic Cycles K1.03 Describe how changes in secondary system parameter affect thermodynamic efficiency	Tier			
	Group			
	K/A			
	IR			

Question 1

Given the following conditions:

- Unit 2 is operating at 100% power

Subsequently:

- The 6A Feedwater Heater Normal Level Control Valve failed closed
- The 6A Feedwater Heater High Level Control Valve is seized closed

With NO operator action, Reactor power will ____(1)____ and the thermal efficiency of the steam plant will ____(2)____ .

A. (1) rise
   (2) increase

B. (1) rise
   (2) decrease

C. (1) lower
   (2) increase

D. (1) lower
   (2) decrease

Tier 4 Example #2 from Pilot

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: 192008 – Reactor Operational Physics K1.18 Describe the monitoring and control of T-ave, T-ref, and power during power operation	Tier			
	Group			
	K/A			
	IR			

Question 6

Given the following conditions:

- The crew is preparing to perform down power from 100% to 50% power
- RCS temperature will be maintained on program during the down power

As power is lowered, the crew should expect to see Tcold ___(1)___ and Tavg ___(2)___ .

A. (1) rise
   (2) rise

B. (1) rise
   (2) lower

C. (1) lower
   (2) rise

D. (1) lower
   (2) lower

Tier 2 Example from Pilot

KA # and Rating	291001 K1.11 RO 3.2
KA Statement	291001 Valves K1.11 Operation of manual valves and verification of position with indicator lights

Unit 1 conditions are as follows:

- ST-6-048-320-1, SLC Operability Verification and Valve Test, is being performed.
- The Reactor Building Equipment Operator is positioning 048-1F036, STANDBY LIQUID, INBOARD, to the Open position in preparation for this test.

WHICH ONE of the following describes the indications the RO in the control room will observe while 048-1F036 is being opened locally?

	Indication for mid position	Indication for full open
A.	Red light - Lit Green light - Lit	Red light - Lit Green light - Extinguished
B.	Red light - Lit Green light - Lit	Red light - Extinguished Green light - Lit
C.	Red light - Extinguished Green light - Extinguished	Red light - Lit Green light - Extinguished
D.	Red light - Extinguished Green light - Extinguished	Red light - Extinguished Green light - Lit

Change Management

- Operator Licensing Program Feedback General #60
  - Provides guidance for preparing for possible impact to the outline and exam
  - Facility licensee can decide to wait to develop or develop questions to meet Rev 12
  - Alternatively, facility licensee can request exemption
  - Keep using the KA catalog that was used when the sample plan was developed

ES 2.3, Written Examination Review and Approval (1 of 2)

- Provided additional guidance on balance of coverage and how a NRC chief examiner can check the balance of coverage

- Added criteria for how the NRC determines if submitted examination material requires "substantive changes" and need to reschedule exam

ES 2.3, Written Examination Review and Approval (2 of 2)

- On Form 2.3-4, *Written Examination Quality Checklist*:
  - added check to make sure each question has a technical reference
  - consider questions on full retake exams for overlap
- On Form 2.3-5, "Written Examination Review Worksheet," clarified what constitutes an "unsatisfactory" question (for use in the examination quality determination, ES 5.1)

ES 4.3, Administering Written Examinations

- Deleted requirement to seat RO and SRO applicants at alternate tables
- Deleted reference to a “facility pre-review” for post-examination review instructions
- Clarified how to determine 30 days between written exam and op test
- Generic Fundamentals Equations/Conversions added as Form 4.3-1

ES 4.4, Grading and Documenting Written Examinations (1 of 2)

- Discontinued use of Rev 11 Form ES-403-1, *Written Examination Grading Quality Checklist* (these steps integrated into main body of ES-4.4)
- Clarified for the facility licensee to make two copies of the original answer sheet before grading (keep one, send one)
- Facility can submit security agreement separately
- NRC staff will not accept change to a question after the exam is administered for “minutiae”

ES 4.4, Grading and Documenting Written Examinations (2 of 2)

- Clarification added for what "conflicting information" means
- Clarified that NRC reviews, not approves, grading
- Changed instructions for NRC grading review -

  An NRC examiner independently regrades every examination if there are key changes, and the NRC chief examiner performs an additional regrade of borderline examinations only

ES 5 Initial Examination, Post-Examination Activities and Other Licensing Actions

ES 5.1 Issuing Operator Licenses and Post-Examination Activities

- Minor updates made to all letter templates
- The *Notification Letter* has been renamed *Pass Letter*
- Added a statement that facility licensee is expected to use their Systems Approach to Training process to analyze and determine the need for additional training for any applicant who passed the NRC examination but had knowledge and/or performance deficiencies
- Added that if the licensing official overturns the written examination pass/fail recommendation, the official needs to line out and initial the master written examination and answer key and provide explanation of change on answer key

ES 5.1 Issuing Operator Licenses and Post-Examination Activities

- The *License Letter* has been renamed *RO License* or *SRO License*
- Deleted "RO score" from written examination documentation
- Added a new section with a revised method for calculating the quality of the submitted examination that includes clarifications for what to do with material from past NRC exams
- Deleted note regarding permissible date for re-application under 10 CFR 55.35
- Deleted instruction regarding return of reference material to the facility licensee
- Revised statement about consulting regional counsel

ES 5.2 Application Denials and Requests for Informal NRC Staff Review

- All instructions for performing an informal NRC Staff review are in OLMC-500, *Processing Requests for Administrative Reviews and Demands for Hearings (*ADAMS Accession No. ML20230A201*)*
- This examination standard still tells applicants how to request an informal NRC Staff Review

ES 5.3 Maintaining, Changing and Renewing Operator Licenses

- Changed the term *similar unit* to *comparable unit*
- Removed address from the list of items requiring a license amendment
- Clarified instructions for maintaining active operator status
- The phrase *walkthrough on-station* replaces the term *simulate* for how to demonstrate LSRO watch-standing proficiency for license reactivation purposes
- Added CPAP machine to the sample list of medical restrictions/conditions

ES 6 NRC Conducted Requalification Examinations

ES 6.X for NRC Conducted Requalification Examinations

- ES-6.1: deleted statement that the NRC encourages use of video and audio recording
- ES-6.2: Split up former ES-602 attachments and tables into the main body and separate forms.
- ES-6.3: none
- ES-6.4: added references to CPDs and SPDs

ES 7 Fuel Handling Examinations

ES 7.1 and ES 7.2 for LSRO Initial Examinations

- ES 7.1: Took out note about taking the GFE
- ES 7.2: None

ES 8 Glossary

The following words were added with definitions to the Revision 12 Glossary:

- Applicable K/A catalog
- Bank Question
- Cold plant operator licensing
- Critical Task (CT)
- Critical Performance Deficiency (CPD)
- Different units
- Performance Deficiency (PD)
- Significant control manipulations
- Significant Performance Deficiency (SPD)
- Verifiable action
- Scenario Set * revised the REV 11 definition

ES 8 Glossary

The following words were removed from the Revision 12 Glossary:

- Achievement test
- Aptitude test
- Designated nuclear control operator
- Responsible nuclear power plant experience
- Equivalent form
- Related experience
- Staff engineer

Appendices

- Appendix A: Overview of Generic Examination Topics
- Appendix B: Examples of Written Examination Topics