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Protecting People and the Environment

Operator Licensing – Advancing into the Future

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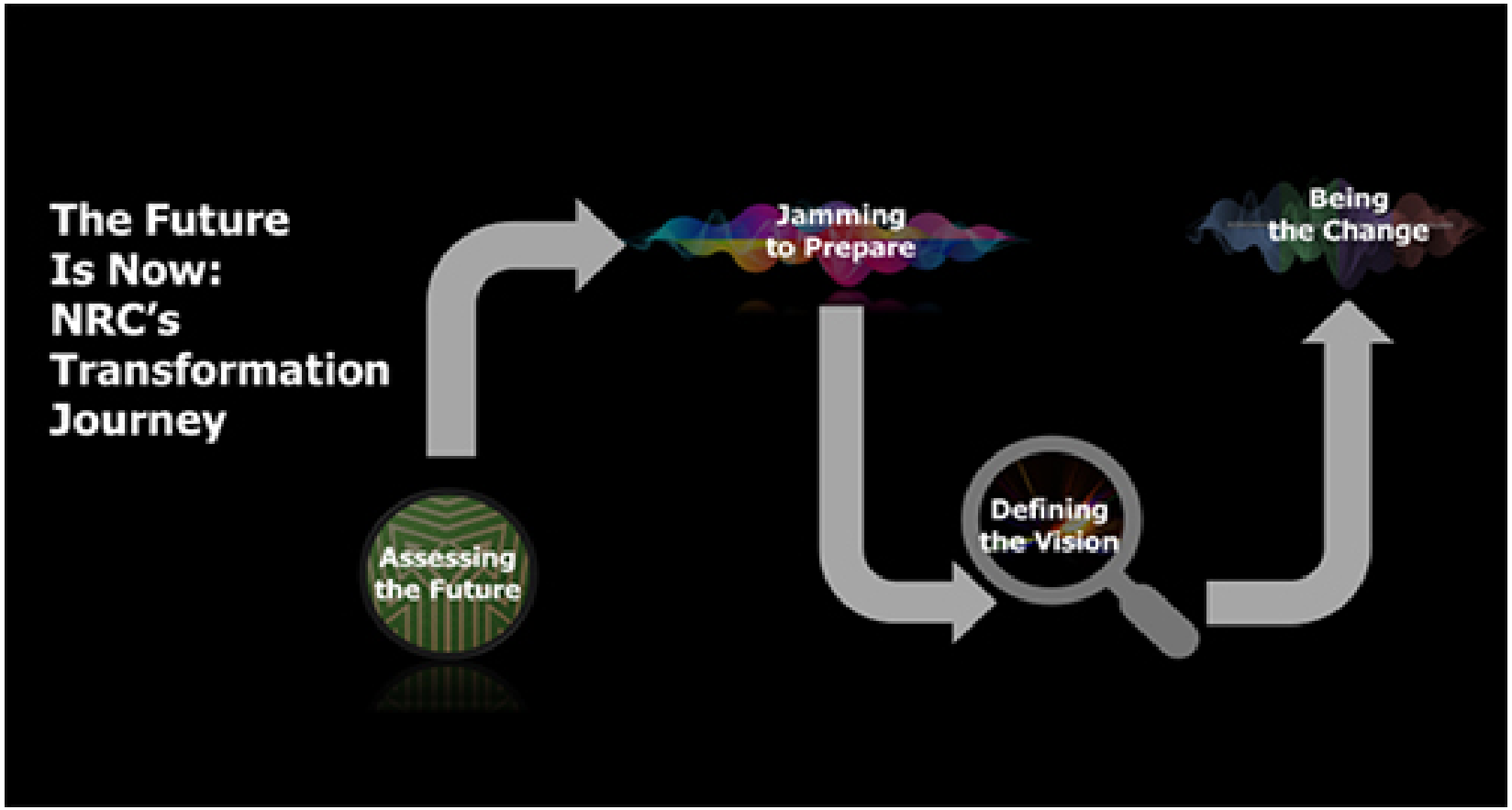
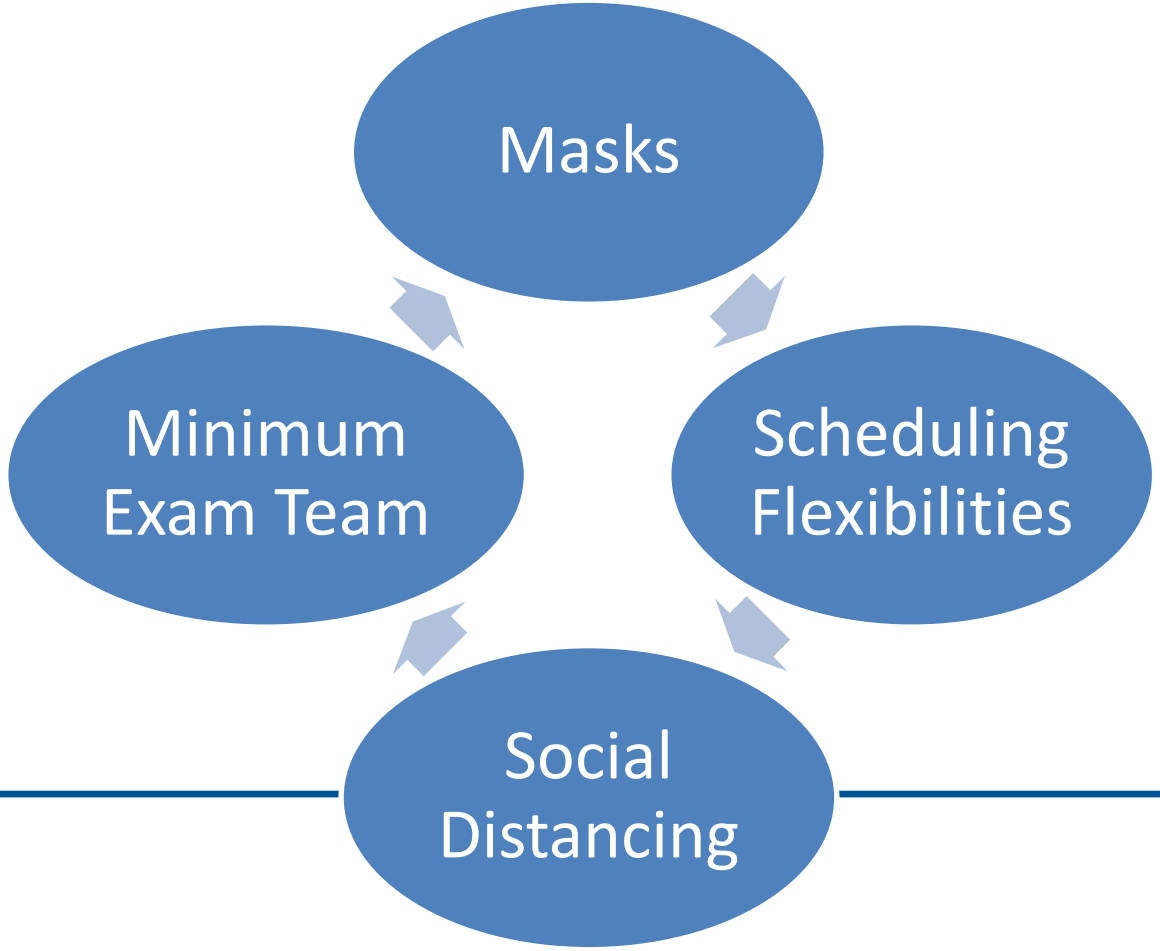
The NRC's Transformation Journey Continues

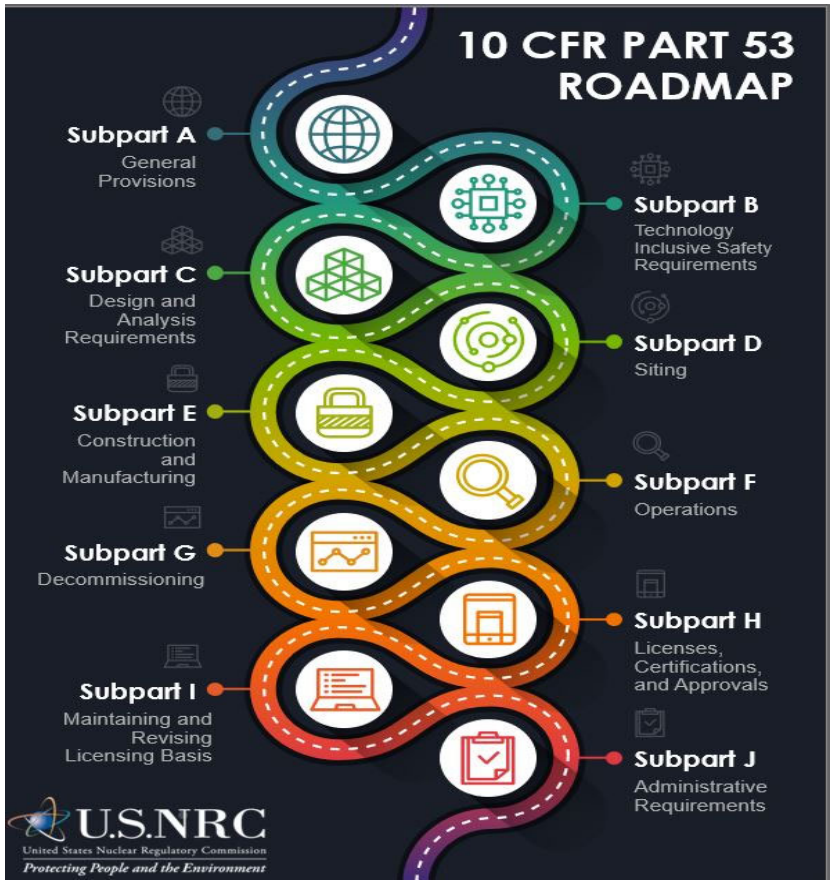


NRC's Principles of Good Regulation Continue to Guide Us

Operator Licensing Initial Exams and Requal Inspections Continued during COVID



Preparing for NRC Oversight of Advanced Reactors



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NUREG-1021 "Operator Licensing Examination Standards for Power Reactors" Revision 12

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February 2, 2022

Agenda

- Revision 12 Goals
- Administrative
- Written Examination
  - Tier 4 examples
- Operating Test Development
- Operating Test Grading
- Post-Examination Activities
- Other

Revision 12 Goals

- Improved usability
- Consistent implementation
- Exam process focus
- GFE integration
- Incorporation of experience, OLPFs, and Cold Licensing lessons learned.

Administrative

- Updated timeline
- Added guidance for prep week
- Added information on use of BOX
- Removed redundant eligibility information
- Updated and defined terms
- All medical exams have 2-year expiration
- Clarified review for re-take applications

Administrative

- Clarified and updated guidance for NRC review of exam material
- Yes/No on quality checklists instead of initials

Written Examination

- Inclusion of GFE topics
- New Tier 4
- Updates to sample plans
- List of pre-screened K/As for Tiers 1 and 2 deleted.
- Deleted “face validity”
- Added discussion on limiting use of references in a question

Written Examination

- Bank use includes questions from another facility (or NRC – GFE) bank
- For 2-part questions, both parts must be related to the K/A topic
- Integrated SRO-only guidance
- Clarified each tier type
- Deviating from approved outline

Tier 4

- Meet same criteria
  - Operationally valid
    - NRC bank questions may require revision prior to use to ensure operational validity
  - Psychometrically sound
  - Tied to reactor theory or thermodynamics
    - May be able to use questions already in facility exam banks

Tier 4 Examples

- Given the following:
  - Unit 2 at 100% power
- Subsequently:
  - The A feedwater heater normal level control valve failed closed
  - The A feedwater heater high level control valve is seized closed
- With NO operator action, reactor power will _____ and the thermal efficiency of the steam plant will _____.

A – rise, increase

B – rise, decrease

C – lower, increase

D – lower, increase

Tier 4 Examples

- Given the following:
  - The crew is preparing to perform down power from 100% to 50% power
  - RCS temperature will be maintained on program during the downpower
- As power is lowered, the crew should expect to see Tcold _____ and Tavg _____.

A – rise, rise

B – rise, lower

C – lower, rise

D – lower, lower

Tier 4 Examples

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

Operating Test Development

- Administrative JPM clarification
- Avoid excessive use of simplistic JPMs
- Each JPM must have 2 critical steps
  - At least one verifiable action, not both
- Relocated requirement for new/modified alternate path JPM

Operating Test Development

- Low power scenario not required for each exam
- Clarified events/malfunctions
- I/C before the major event counting again afterwards
- I/C after the major event is not an abnormal event

Operating Test Development

- Critical Task methodology
  - Reference facility list
  - Tasks for mitigating significant safety challenges
    - Actions directly lead to one or more safety function restored
    - Tasks with EOP-directed actions essential to event overall mitigative strategy
    - Actions to prevent challenge to plant safety
  - Also include prevention of inappropriate actions creating challenge to plant safety

Operating Test Development

- Critical Task methodology (con't)
  - What is a challenge to plant safety?
    - Conditions warranting emergency depressurization initiation
    - Conditions resulting in orange/red path critical safety functions
    - Conditions warranting transition to functional recovery guidelines
    - Conditions adversely impacting implementation of EOPs essential to mitigative strategy for event

Operating Test Development

- Provided guidance on measurable performance criteria bounding conditions
- SROs can be tested in BOP position
- Clarification on manual control of automatic function and examples provided

Operating Test Grading

- Added performance deficiency definition
  - An observed action or inaction OR a statement of understanding or intent related to an
    - Operational or administrative task
    - Procedure or process implementation
    - Communication
  - Demonstrates a lack of ability/understanding as outlined by established standard for operator performance

Operating Test Grading

- Added significant performance deficiency
  - Only identified post-scenario
  - RPS/ESF actuation
  - Unplanned EAL entry/escalation to Alert or SAE
  - >10% unplanned power change
  - 2-point deduction

Operating Test Grading

- Critical performance deficiency
  - Must meet CT methodology
  - 1 CPD = 3-point deduction
  - >1 CPD = failure of the scenario portion of the operating test

Operating Test Grading

- If a second rating factor assigned, it must be in a different competency area
- Clarification to rating factors to assist in consistent use
- If applicant corrects an originally incorrect TS determination during follow-up questioning (and time limits not yet expired), do not penalize applicant for original incorrect TS call

Post-Examination Activities

- Facilities use SAT to determine additional training for applicants passing the examination but with knowledge/performance deficiencies
- ES 5.2 tells applicant how to request informal NRC staff review
  - Specific instructions for NRC performance of review moved

Other

- Minor revisions to NRC administered requalification examinations
- Minor revisions to LSRO initial examinations
- Added terms to the Glossary
- Removed unnecessary terms from the Glossary
- Appendix A still covered generic examination topics
- Appendix B covers examples of written examination questions

Questions?

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Changing to NUREG-1021 Revision 12

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February 1, 2022

Changing to REV 12

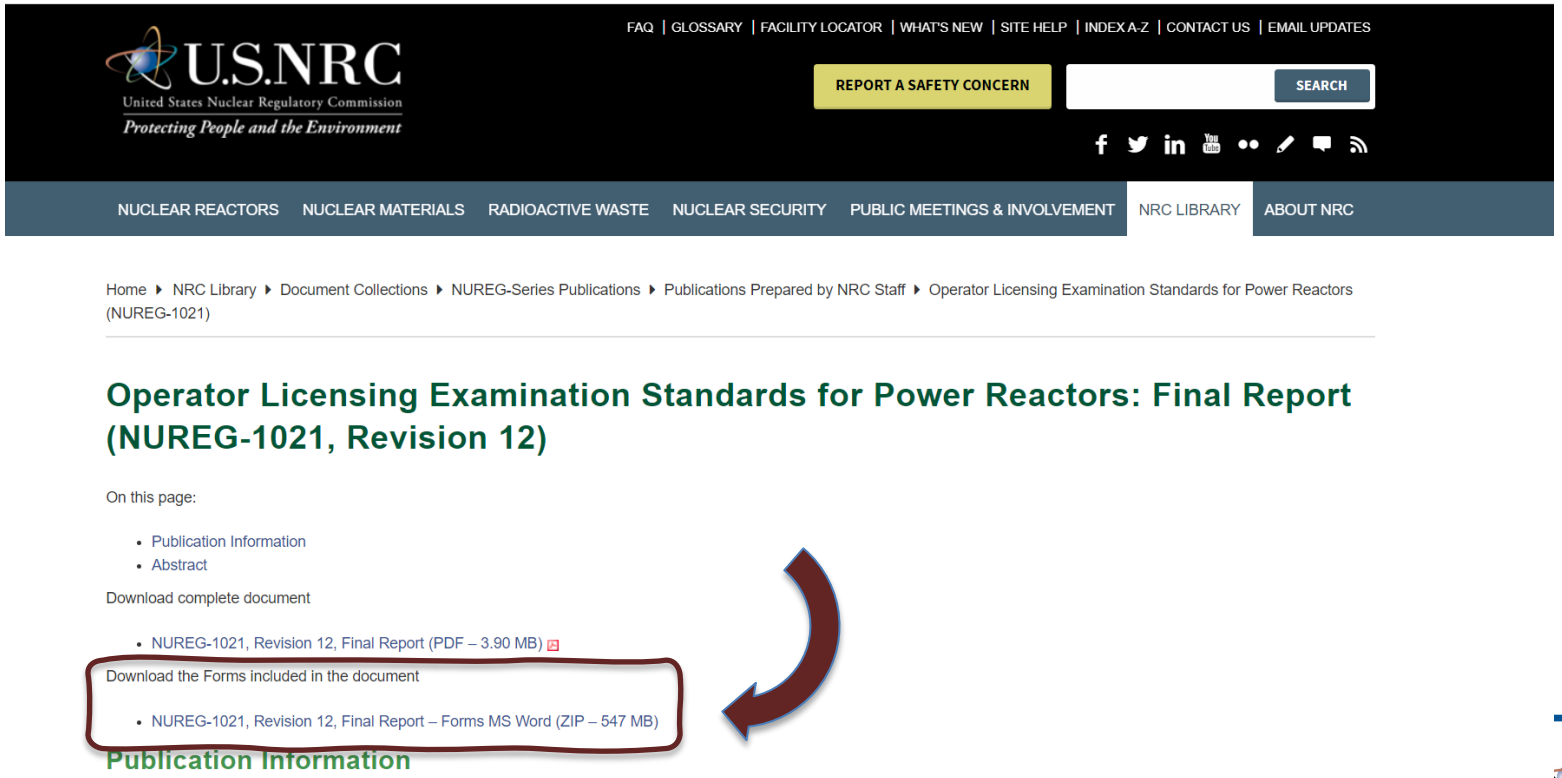
- Implementing Revision 12
- Getting Revised Forms and Checklists
- Operator Licensing Program Feedback (OLPFs or FAQs)
- NRC Form 398
- Other resources
- NRC Assessment of Changes
- Common Questions

When to Use REV 12

- Use for development, administration and grading of examinations scheduled for administration on or after March 17, 2022
- Use some guidance now for non-examination purposes (license amendments, waivers/excusals/deferrals, etc.)

Forms and Checklists

- Many changes
- Download REV 12 word-based versions:



Updated OLPFs

- OLPFs updated to reference NUREG-1021, Revision 12 sections
  - Fixed broken hyperlinks to references on the public website.
  - Reformatted and revised some question/answers for clarity
  - Deleted question/answers that were redundant or no longer relevant
  - Archived question/answers that were no longer relevant but provide historical value, such as the reason for guidance in NUREG-1021

- On the NRC OL public website you can find:
  - OLPFs categorized for Revision 11 examination standards
  - OLPFs categorized for Revision 12 examination standards
  - Archived OLPFs
  - Record of Changes for this effort

NRC Forms 398 and 396

- Interim instructions for NRC Form 398
- Update to NRC Form 398 coming this year
- NRC Form 396

Other Resources

- OLPFs: General Questions No. 60 and 61
- NUREG-1021 Crosswalk (ML20325A254)
- Training on Changes (ML21305A914)
- Comments on Draft Revision 12 and NRC reponse (ML21211A578)

Assessment of Rev 12 Changes

- Generic Fundamentals questions on scores
- Critical Tasks using Revision 12 criteria
- Critical and Significant Performance Deficiency grading
- Eligibility under ACAD 10-001 Revision 2
- Operator Performance in Plant
- Ease-of-use of examination standards

Common Questions

- Q: Can Revision 2 of the BWR/PWR K/A catalogs still be used with Revision 12?
  - A: Yes (if requested to use Rev 2)
- Q: For SRO-I in the ATC/BOP position, can you still substitute the reactivity manipulation with an additional I/C malfunction?
  - A: Yes, while they are in the ATC/BOP position

Common Questions (cont.)

- Q: Are GFE questions from the bank treated as bank questions?
  - A: Yes, though in most cases, the bank GFE question will likely need to be modified in order to meet NUREG-1021 criteria for a SAT written examination question. If the bank question is "significantly modified" (IAW ES-4.2) then it would not be a bank question.

Any Questions?

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Operator Licensing Operating Experience

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Requalification Inspections

- Extra operator on dynamic scenarios
- Reactivation for Refueling
- Alternate Path JPMs

Extra Operator in Scenarios

§ 55.59 Requalification.

(a)(2)(ii) The operating test will require the operator or senior operator to demonstrate an understanding of and the ability to perform the actions necessary to accomplish a comprehensive sample of items specified in § 55.45(a) (2) through (13) inclusive to the extent applicable to the facility.

§ 55.45 Operating tests.

(a)(13) Demonstrate the 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.

Link to NRC Operator Licensing Feedback (IP.15):
https://www.nrc.gov/docs/ML2200/ML22004A209.pdf

Reactivation for Refueling

NUREG-1021:

If a facility licensee needs to reactivate an SRO license as an LSRO (strictly for the purpose of supervising refueling activities), the operator must complete one shift under direction performing refueling activities, as discussed above, and the facility licensee must ensure that the operator is administratively restricted from performing full SRO duties.

NUREG-1262, Questions 253, 278, 287, and 289

Alt. Path JPMs – Common Challenges

- Directing the operator to perform an alternate path in the cue.
- The alternate path is expected based on cue or initial condition.
- Providing alt. path handouts at the beginning of the JPM
- Crediting Admin JPMs as Alt Path

Alt. Path JPM Goal

- OLPF 3.2.3 “the goal is to assess the applicant's response to a situation that is not as it should be or is somehow different from what the applicant might have expected based on the initiating cue for the task.”

Initial Examinations

- JPM Task Standards
- Tiers and Written Question Focus
- NRC Form Instructions

JPM Task Standards

- “The task standard is the predetermined qualitative or quantitative outcome (or both) against which task performance will be measured.”

- “The critical steps are the task steps that the applicant must perform correctly (i.e., accurately, in the proper sequence, and at the proper time) to accomplish the task standard.”

Task Standard Examples

- Task Standard: “The examinee will complete the unfinished portion of the daily log procedure.”
  - ALL unfinished portions of the procedure should be marked critical.

- Task Standard: “Identify all errors.”
  - Non-specific.

- Task Standard: The examinee will attempt to raise Drive Water Differential Pressure (D/P) in response to the failure of a control rod to withdraw. The operating Control Rod Drive (CRD) pump will trip. The examinee will be required to start the standby CRD pump in order to successfully raise Drive Water D/P.

Tiers and Written Question Focus

- OLPF 4.1.17 (401.55)
- NUREG-1021 Rev. 12, ES 4.2

Tiers 2-4

- Tier 2: knowledge of plant systems, components, and/or their interrelations.
- Tier 3: plant-wide generic K/As
- Tier 4: operationally valid knowledge of reactor theory and/or thermodynamics.

Tier 1

- Tier 1: how to safely operate the plant during emergency and abnormal conditions.
  - information contained in the site's procedures, including alarm response procedures, AOPs, EOPs, and their associated bases documents;
  - diagnosis that leads to selection of the procedures that should be used to respond to the evolution;
  - the progression of an event; and
  - the assessment of the integrated plant response to emergency or abnormal situations crossing several plant systems or safety functions, or both.

Tier 2 Question

Pressure control valve (Service Air Pressure Reducing Station) goes fully ____(1)_____when Plant Air Receiver pressure drops to below 100 psig to maintain ____(2)_____ Air Header Pressure.

A. (1) open
   (2) Instrument

B. (1) closed
   (2) Instrument

C. (1) open
   (2) Service

D. (1) closed
   (2) Service

Tier 1 Question

Plant is operating at rated thermal power.
A leak has occurred on an air system in the plant.
CRS enters the Loss of Instrument Air AOP, section, Instrument Air Pressure Lowering.

Pressure control valve (Service Air Pressure Reducing Station) goes fully closed when Plant Air Receiver pressure drops to below 100 psig to maintain ____(1)_____ Air Header Pressure.

If Header Pressure cannot be MAINTAINED > ___(2)___ psig, the Mode Switch should be placed in SHUTDOWN.

A. (1) Instrument
   (2) 90

B. (1) Instrument
   (2) 80

C. (1) Service
   (2) 90

D. (1) Service
   (2) 80

Tier 2 Question

Which one of the following would cause a Safety Parameter Display System (SPDS) Critical Safety Function (CSF) box to turn RED?

A. Drywell temperature of 137°F

B. Suppression Pool Level of 19' 3"

C. Suppression Pool Temperature of 95°F

D. Primary Containment temperature of 110°F

Tier 1 Question

The shift has entered AOP X, Inadvertent Opening Safety Relief Valve.

The Critical Safety Function (CSF) display has just changed to the SPDS indication screen show below.

(1)Average Suppression Pool Temperature ____.

(2)What procedure is required to be entered next?

A. (1) is low confidence data on SPDS.
   (2) Reactor Scram.

B. (1) is low confidence data on SPDS.
   (2) Primary Containment Control.

C. (1) has exceeded an SPDS alarm setpoint.
   (2) Reactor Scram.

D. (1) has exceeded an SPDS alarm setpoint.
   (2) Primary Containment Control.

NRC Form Instructions

NRC FORM 396
(09-2021)

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATION OF MEDICAL EXAMINATION BY FACILITY LICENSEE (Instructions)

Enter **NAME OF APPLICANT** as it appears on NRC Form 398 or **NAME OF OPERATOR** as it appears on the NRC issued License, **DOCKET NUMBER** and **DATE OF MOST RECENT BIENNIAL MEDICAL EXAMINATION.** If the time since the applicant's initial medical examination exceeds 24 months before an initial licensing action is completed, the applicant must be reexamined by a physician and a new NRC Form 396 must be submitted. If, during the term of the license, an operator develops a permanent physical or mental condition that causes the operator to fail to meet 10 CFR 21 that can be mitigated by requesting a license restriction, the facility licensee shall notify the NRC within 30 days of learning of the diagnosis by submitting an NRC Form 396. 10 CFR 55.25 requires a submission for only permanent conditions. Do not submit temporary conditions for which an operator is being administratively held by your facility. Per 10 CFR 55.55, NRC Operator license renewals (NRC Form 396 and NRC Form 398) shall be submitted at least 30 days prior to the license expiration date.

Enter **ADDRESS OF APPLICANT/OPERATOR**

Enter **NAME OF FACILITY(IES)** and **FACILITY DOCKET NUMBER(S)** - Use Check Box to indicate 050-XXX or 052-XXX.

Use **Check Box** to indicate which **Guidance Document** (ANSI 3.4, 15.4 or other) was used to determine the applicant's physical condition. If other is checked, include the title of the document.

SECTION A - MEDICAL EXAM INFORMATION - Enter **PHYSICIAN'S PRINTED NAME, PHYSICIAN'S CERTIFICATION DATE, LICENSE NUMBER, AND STATE OF LICENSURE**. (Indicate MD or DO following printed name). Physicians Certification Date = Date of physician's final certification of applicant/operator's medical suitability (including recommended license conditions) and/or the date of the physician's certification of an required medical status update (Check Box 7).

License Conditions - Check the applicable boxes to request license condition(s).

Box 1 - NO RESTRICTIONS - Physical and mental condition and general health meet the minimum requirements, without exception.

Box 2 - CORRECTIVE LENSES SHALL BE WORN WHEN PERFORMING LICENSED DUTIES - Corrective lenses must be worn to meet the minimum requirements for vision.

Box 3 - HEARING AID SHALL BE WORN WHEN PERFORMING LICENSED DUITES - Hearing aid must be worn to meet the minimum requirements.

Box 4 - SHALL TAKE MEDICATION AS PRESCRIBED TO MAINTAIN MEDICAL QUALIFICATIONS - Meets the minimum medical requirements only by taking prescribed medication(s).

Box 5 - SHALL USE THERAPEUTIC DEVICE(S) AS PRESCRIBED TO MAINTAIN MEDICAL QUALIFICATIONS - Meets the minimum medical requirements only by using a therapeutic device (e.g., CPAP and Spinal Cord Stimulator).

Box 6 - SOLO OPERATION IS NOT AUTHORIZED - Another individual, capable of summoning help must be present when the operator is performing licensed duties. Check the applicant/operator's license type.

Box 7 - SHALL SUBMIT MEDICAL STATUS REPORT EVERY 3, 6 , 12 or Other Months - Medical condition that requires more frequent monitoring than the two (2) years required by 10 CFR 55.21. If Other is checked, include the requested time frame. Indicate the date that the Medical Status Requirement was added or removed (MM/DD/YYYY).

Box 8 - SHALL NOT PERFORM LICENSED DUTIES REQUIRING A RESPIRATOR - Respiratory or integumentary (skin) condition.

Box 9 - OTHER RESTRICTIONS OR EXCEPTION - Other license condition(s) necessary to mitigate identified medical or psychological issue(s) that do not meet minimum

NRC Form Instructions

- Form 396
- Form 398
- Electronic Submittals
  - How to Request a Digital Certificate
  - How to Obtain and Enroll a Digital Certificate
  - How to Submit Operator Licensing Documents via EIE

COVID-19 Lessons

- Safety Measures
- Options for the unexpected

Options for the Unexpected

- Delay Written or Op Test
- New Exam
- Not Observed

Questions

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Part 53 and Operator Licensing

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February 2, 2022

Agenda

- Part 53 Goals
- Current Operator Licensing
- Proposed Licensing Process Changes
- Certification of Operators
- Simulators
- Staffing
- Guidance Documents Under Development

Part 53 Goals

- Risk-informed
- Technology inclusive
- Flexible
- Performance-based

The following presentation discusses preliminary rule language related to staffing, training, personnel qualifications, and human factors under Subpart F to Part 53. This language has not yet been reviewed and approved through the rulemaking process and is therefore subject to change.

Current Operator Licensing

- Part 55
  - SAT based training program – NRC approved
  - Very technology specific – large light water
  - TMI requirements
  - NUREG-1021 examination program
  - Vendor technology-based K/A catalog
  - Stable program based on operating experience

Proposed Licensing Process and Changes

- Based on Part 55 language
- NRC-approved SAT based training program
- Facility developed; NRC approved examination standards
  - Based on facility-specific JTA

Certification of Operators

- Currently evaluating
- Stringent safety criteria must be met
- SAT-Based, NRC approved training program
- NRC approved examination standards
  - Based on JTA
- Facility certification vs NRC license

Simulators

- Full-scope may not be required
- Allow use of partial scope
- Sufficient scope and fidelity
- Use recent core load or intended load (under construction)
- Fidelity for control manipulations
- Commission approval
- Promptly correct discrepancies or justify

Staffing

- Facility-developed staffing plan
  - Include required numbers of ROs and SROs (or certified operators if applicable) for all modes
  - Based on HFE analysis and assessments
  - STA or comparable role based on design and operation of facility

Guidance Under Development

- Exam Program Review and Approval
  - Both initial and continuing
  - Both licensed and certified
- Training Program Review and Approval
  - Both initial and continuing
  - Both licensed and certified
  - May also be used for Part 55 for Commission approval
- Staffing

Conclusion

- All operator qualification programs SAT-based
- Examination programs based on psychometrics
- NRC review and approval of programs
- Regular public meetings
  - https://www.nrc.gov/pmns/mtg
- Draft rule language will be published at later date
- Preliminary rule language
  - Agencywide Document Access and Management System (ADAMS) Accession No. ML21267A006
  - https://www.nrc.gov/reading-rm/adams.html

Questions?