



SCENARIOS & NUREG 1021

- APPENDIX A, Generic Examination Concepts
- APPENDIX D, Simulator Testing Guidelines
- ES-301, Preparing...
- ES-302, Administering...
- ES-303, Documenting & Grading...

APPENDIX A, Generic Examination Concepts



- Atomic Energy Act require “uniform conditions” in operator licensing
- Examination Validity
 - Content Validity
 - Operational Validity
 - Discrimination Validity
- Reliability

APPENDIX D, Simulator Testing Guidelines



- Integrated Scenario Development
- Scenario Attributes
- Quantitative Attributes
- Critical Task Methodology
- Competency Descriptions



Integrated Scenario Development

- The objective is to Demonstrate
 - Knowledge of integrated plant operations
 - Knowledge of plant procedures
 - Ability to diagnose abnormal conditions
 - Ability to work in a team to mitigate plant problems using AOPs and EOPs
 - Ability to use Technical Specifications



Integrated Scenario Development

- Initial Conditions should be varied
 - Startup, Low-, Mid-, Full-power
 - Various components, instruments, controllers, annunciators out of service
 - Maintenance or surveillance activities in progress



Integrated Scenario Development

- Select and Document Events
 - Each event should relate to an objective
 - Each event should require operator action
 - Balance the severity of events
 - Use Forms ES-D-1 and 2
 - Include every operator action on ES-D-2
 - Flag critical tasks
 - Include parameters that can be verified



2006 REGION III OPERATOR LICENSING WORKSHOP

SIMULATOR SCENARIOS



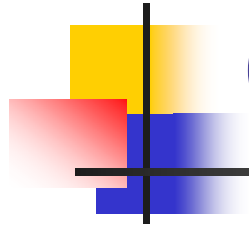
Scenario / Quantitative Attributes & Competencies

- Look at Quality Checklists
 - ES-301-4 contains 13 Qualitative Attributes to be checked
 - ES-301-5 is used to check that the correct number and type of events are included
 - ES-301-6 is used to check that each competency is examined multiple times.



Critical Task Methodology

- Critical Tasks – Safety significant tasks with clearly verifiable measure.
 - Safety Significant
 - Cue prompted
 - Measurable performance indicators
 - Performance Feedback



Competency Descriptions

- Interpret/ Diagnose Events and Conditions
- Comply With and Use Procedures
- Operate Control Boards
- Communicate and Interact
- Demonstrate Supervisory Ability
- Comply With and Use Tech. Spects.

WRITTEN EXAMINATION



R III Operator Licensing Workshop

May 3 – 4, 2006

Nick Valos

Senior Operations Engineer

PRESENTATION SUMMARY



Will discuss:

- Requirements for the Written Examination
- Developing the Written Examination Outline
- Selecting and Developing Questions
- SRO-Only Questions
- Implausible Distractors
- Post-Examination Changes – Lessons Learned



BACKGROUND: REQUIREMENTS

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



BACKGROUND: REQUIREMENTS (Cont.)

- Both the RO and SRO examinations will sample the 14 items specified in 10 CFR 55.41(b), and the SRO examination will sample the 7 additional items specified in 10 CFR 55.43(b).
- **ES-401, “Preparing Initial Site-Specific Written Examinations,” specifies the requirements, procedures, and guidelines for preparing the written examination.**



BACKGROUND: REQUIREMENTS (Cont.)

- Appendix B, “Written Examination Guidelines,” of the Examiner Standards provides background information concerning the principles and practices for developing test questions for the written exam.



BACKGROUND: REQUIREMENTS (Cont.)

- The “Knowledge and Abilities Catalog for Nuclear Power Plant Operators” provide the basis for developing content-valid licensing examinations.
 - PWRs NUREG-1122
 - BWRs NUREG-1123



BACKGROUND: REQUIREMENTS (Cont.)

- Each K/A stem statement has been linked to the applicable item number in 10 CFR 55.41 and/or 55.43.
 - When the regulatory references were added to the K/A catalogs, the goal was to have at least one link for every K/A,
 - **It was never intended to be an exhaustive cross-reference between the two documents.**



BACKGROUND: REQUIREMENTS (Cont.)

Preparing the license examination using the appropriate K/A catalog, in conjunction with the instructions in NUREG-1021, will ensure that the examination includes a representative sample of the items specified in the regulations.



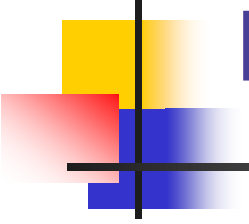
Examination Preparation: Developing the Outline

- Use Form ES-401-1 (BWR) or ES-401-2 (PWR), depending upon the facility design (skyscraper).
- **Systematically and randomly select** specific K/A statements (e.g., K1.03, A2.11, or G2.2.2) to complete each of the three tiers of the applicable examination outline:
 - Tier 1, Emergency and Abnormal Plant Evolutions,
 - Tier 2, Plant Systems, and
 - Tier 3, Generic Knowledge and Abilities

Developing the Outline (Cont.)

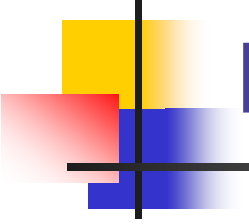


- Attachment 1 of ES-401 provides an example of an acceptable methodology for randomly selecting K/As within the defined structure of the examination outline to achieve as broad a sample as possible.



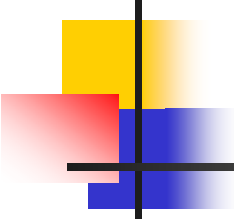
Examination Preparation: Developing the Outline (Cont.)

- **Other methodologies may be used, provided they are:**
 - reproducible and scrutable, and:
 - free of bias,
 - adheres to the applicable examination model,
 - minimizes the number of K/As related to any particular system or evolution (i.e., every system or evolution in the group should be sampled once before selecting a second K/A for any system or evolution), and
 - **samples at the specific K/A statement level.**



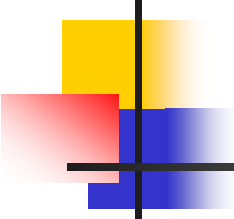
Examination Preparation: Developing the Outline (Cont.)

- Facility licensees shall describe for the NRC the process that was used to generate the examination outline and the reasons for rejecting any randomly selected K/A statements.



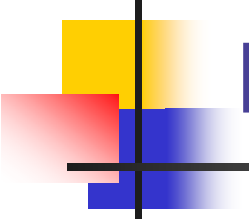
Examination Preparation: Developing the Outline (Cont.)

- Topics for the generic K/A categories in Tiers 1 and 2 (“G” columns on Forms ES-401-1 and ES-401-2)
 - Randomly selected from Section 2, “Generic Knowledge and Abilities,” of the K/A catalog
 - Must be relevant to the applicable evolution or system



Examination Preparation: Developing the Outline (Cont.)

- Tier 3 Topics shall also be selected from Section 2, “Generic Knowledge and Abilities,” of the K/A catalog.
 - Columns 1-4 represent sub-sections of Section 2 (i.e., Conduct of Operations, Equipment Control, Radiation Control, and Emergency Procedures/Plan respectively)
 - Limit SRO selections to K/As that are linked to 10 CFR 55.43.
- The intent of Tier 3 questions is to evaluate the applicants’ knowledge in areas applicable to generic plant operation **and not a specific system or procedure.**



Examination Preparation: Developing the Outline (Cont.)

- Examination authors can eliminate inapplicable or inappropriate K/A statements by:
 - 1) discarding randomly selected K/As during the outline development process, and/or
 - 2) pre-screening the entire K/A catalog to eliminate inappropriate K/As before beginning the random selection process.



OPERATOR LICENSING PROGRAM FEEDBACK



QUESTION 1:

- Clarify what you mean by "random selection."
- Does the random selection have to go all the way down to the specific K/A number?

REPLY TO QUESTION 1:



- Random means without bias or predisposition.
- **Step 4 of Attachment 1 specifically instructs that the K/A statements within each randomly selected K/A Category will also be randomly selected.**
- If you determine, when reviewing the completed outline, that one of the K/A Categories is over- or under-sampled, you should randomly select another K/A.

REPLY TO QUESTION 1: (Cont.)



- **If your question bank contains more than one question applicable to the selected K/A** and there is no appropriate basis for electing a specific question (e.g., cognitive level, discrimination validity, operational orientation) **it would be best to randomly select from among the questions rather than choose the same question every time.**



QUESTION 2:

- What do you do if your randomly selected questions identify a K/A that you know was not trained on or has been deselected for training? Do you ask it anyway or do you select another system or does it go deeper?
- Can you change a K/A if no one can write a question for it?
- What if a random K/A can not be used to prepare a discriminating question? Is it fair to replace the K/A with one that is more difficult? (Can we throw out a K/A simply because it is too hard to write a discriminatory question?)



REPLY TO QUESTION 2:

- Can systematically and randomly select another K/A category and/or statement, as applicable, if:
 - the systematic selection process identifies a K/A statement having an importance rating that is below 2.5,
 - a K/A statement that clearly does not apply to the subject facility,
 - a generic K/A statement for which it would not be possible to develop a Tier 1 or Tier 2 question, or
 - a K/A category contains no K/A statements.

REPLY TO QUESTION 2: (Cont.)



- **Failure to train on a selected K/A is not an acceptable basis for selecting another one.**
- Use Form ES-401-4, "Record of Rejected K/As," or an equivalent, to document the basis for excluding from the examination outline any K/A statements that were randomly selected.



QUESTION 3:

- The guidance in Attachment 2 of ES-401 of NUREG-1021 basically says not to suppress the following K/As (among others) from the random selection process for Tier 1 and Tier 2: 2.1.14, 2.1.33, 2.2.22, 2.2.25.
- However, when reviewing Revision 2 of the K/A Catalogs (NUREG-1122 and 1123), these generic K/As have no link to any 10 CFR 55.41 topic. They all have importance ratings of 2.5 or greater for both the RO and SRO. **Since they have no links to a 55.41 topic, can they be suppressed before random selection for the RO written outline?**



REPLY TO QUESTION 3:

- **No**, the K/As can not be suppressed before random selection for the RO written outline.
- When the regulatory references were added to the K/A catalogs, the goal was to have at least one link for every K/A, **but it was never intended to be an exhaustive cross-reference between the two documents.**
 - K/A 2.1.14 could easily be linked to 55.41(b)(10)
 - K/As 2.1.33, 2.2.22 and 25 could link to 55.41(b)(5).

REPLY TO QUESTION 3: (Cont.)



- If you happen to randomly select one of these K/As for a Tier 1 E/APE or Tier 2 system and it does not apply at your facility, then you can reject the K/A after the fact and explain it on Form ES-401-4.
- **The K/As should not be screened out in advance to remove them from all future consideration.**



QUESTION 4:

- There are two generic K/As (2.1.14 and 2.4.50) that have ONLY a link to 10 CFR 55.45 (and no link to either 55.41 or 55.43), but they are not allowed to be suppressed by the guidance in Attachment 2 of ES-401 of NUREG-1021.
- Since 10 CFR 55.45 topics are for the operating test, can these K/As be suppressed before random selection from both the RO and SRO written outlines?



REPLY TO QUESTION 4:

- No, these K/As that have ONLY a link to 10 CFR 55.45 can not be suppressed before random selection from both the RO and SRO written outlines.
- The fact that a K/A statement begins with "ability to..." and is linked only to 55.45 does not mean that it should not or can not be used to develop a written examination question.
 - Many of the "ability to..." statements do reference 55.41 and/or 55.43 items as well as those from 55.45;
 - similarly, many of the "knowledge of..." statements are linked to 55.45, as well as 55.41 and/or 55.43.

REPLY TO QUESTION 4: (Cont.)



- **The stated links are not exhaustive and other links are possible.** Moreover, if you refer to Sections 3 and 4 of the K/A catalog, each system has four ability categories and each E/APE has two ability categories that make up a significant portion of the written examination sample.
- Ability statements lend themselves to higher cognitive level questions and are not only for use on the operating test. **They should not be screened out in advance, but considered, rejected, and explained case-by-case on Form ES-401-4.**



Selecting and Developing Questions

- Between 50 and 60 percent of the questions on the RO examination shall be written at the comprehension / analysis level.
- The SRO examination, overall, could exceed 60 percent because the K/A categories emphasized on the SRO-only examination are generally consistent with the higher cognitive levels.



Selecting and Developing Questions (Cont.)

- No more than 75 percent of the questions for the examination directly shall be from the facility licensee's or **any other written examination question bank** without significant modification.
- Write at least 10 new questions (i.e., 8 for the RO examination and 2 for the SRO-only) at the comprehension/analysis level.
- **Significantly modify** the remaining questions by changing at least one pertinent condition in the stem and at least one distractor.



SRO-Only Questions

- What are they?
- What are the requirements?



SRO-Only Questions (Cont.)

- K/As for the 25 question SRO examination are normally drawn from those K/A statements that are specifically linked to 10 CFR 55.43(b).
 - All Category A2, AA2, and EA2 statements (column A2)
 - Many Section 2 Generics (column G)
- Exception – All K/A categories related to fuel handling equipment are eligible for selection.



SRO-Only Questions (Cont.)

- The fact that a K/A is linked to both 55.41 and 55.43 does not mean that the K/A cannot be used to develop an SRO-only question, nor does it exclude the K/A from sampling on the RO examination.
- **K/A statements linked to 10 CFR 55.41(b) topics may used if the question evaluates knowledge and abilities at a level that is unique to the SRO job position.**



SRO-Only Questions (Cont.)

- Similarly, questions associated with topics in 10 CFR 55.43(b) can be acceptable for the RO examination if they are supported by documented RO learning objectives derived from the RO job task analysis at the site.
[Reference 10 CFR 55.41(a)]
- The fact that a facility licensee expects its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities **does not mean that they can no longer be used as the basis for "SRO-level" questions.**



SRO-Only Questions (Cont.)

- For example, both 10 CFR 55.41(b)(10) and 55.43(b)(5) require emergency operating procedure (EOP) knowledge, but 10 CFR 55.43(b)(5) requires the "SRO-level" questions to evaluate the additional knowledge and abilities necessary for "assessment of facility conditions and selection of appropriate procedures during ... emergency situations."



SRO-Only Questions (Cont.)

- Questions that evaluate the knowledge of specific bases for EOPs (e.g., G 2.4.18) and/or the operational implications of EOP cautions (e.g., G 2.4.20), but not the higher level "assessment and selection" knowledge, would generally not be valid "SRO-level" questions because they are applicable only to 10 CFR 55.41(b)(10).



SRO-Only Questions (Cont.)

- However, questions that evaluate knowledge of the parameters and logic used to assess the status of EOP safety functions (e.g., G 2.4.21) would generally be considered valid "SRO-level" questions even if the facility licensee's SAT-based program has identified this additional 10 CFR 55.43(b)(5) knowledge as an RO job requirement.



SRO-Only Questions (Cont.)

- The fact that a particular K/A does not reference 55.41 or 55.43 does not, in and of itself, disqualify the K/A from testing on the RO or SRO written examination.

When the NRC revised NUREGs-1122 and 1123 to incorporate cross-references to specific items in 10 CFR 55, the primary purpose was to establish at least one regulatory connection for every K/A.



Case Study: RO or SRO?

Unit 1 is responding to a LOCA using E-1 (Loss of Reactor or Secondary Coolant) that occurred 25 minutes ago.

- The following conditions exist:
- RWST Level = 45%
- Containment pressure = 1.5 psig
- Containment Radiation = 600 mR/Hour
- Containment Recirc Sump Minimum Recirc Level Lights - NOT Lit
- East RHR Pump Compartment Sump Annunciator – Lit
- Aux Building area radiation monitors are in alarm

Which ONE of the following actions are required?

- A. **Transition to ECA-1.2 (LOCA Outside Containment) to address the RHR leakage.**
- B. Transition to FR-Z.3 (Response to High Containment Radiation Level) to address high Containment Radiation.
- C. Transition to ECA-1.1 (Loss of Emergency Coolant Recirculation) to address the loss of recirculation capability.
- D. Remain in E-1 (Loss of Reactor or Secondary Coolant) but shutdown the Containment Spray Pumps.



Answer: SRO- Only

Its associated with
10CFR55.43(b)(5), "Assessment of
facility conditions and selection of
appropriate procedures during
normal, abnormal, and emergency
situations."

SRO-Only Questions - Summary



- Use common sense – an SRO-Only question should be related to the job that an SRO does.
- An RO question should be related to the job that an RO does, even though you may expect an RO to know certain SRO material.

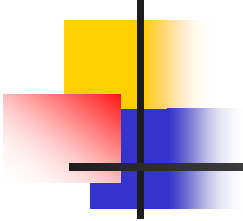


IMPLAUSIBLE DISTRACTORS

Will talk about:

- **Where implausible distractors are addressed in the Examiner Standards.**
- **How to identify implausible distractors.**
- **How prevalent are implausible distractors in submitted exams.**
- **Categories of implausible distractors (i.e., what to look out for).**
- **Examples of implausible distractors.**

WHAT IS AN IMPLAUSIBLE DISTRACTOR?



Definitions: **Plausible, Implausible**

Source: **Merriam Webster's Collegiate Dictionary - Tenth Edition**

plausible: **reasonable, appearing worthy of belief**

implausible: **provoking disbelief**

Examples:

- **NY Yankees not winning their Division Title**
- **Red or White Sox winning World Series more than once in a century**
- **Impossibility: Sox and Cubs in a World Series together**



WHY LOOK AT IMPLAUSIBLE DISTRACTORS?

ASSESSMENT OF IMPLAUSIBLE DISTRACTORS IN WRITTEN EXAMS

<u>Plant</u>	<u>Total # of Q</u>	<u># of Q w/ID</u>	<u># of Q w/ >1 ID</u>
A	100	10	5
B	100	19	1
C	100	10	5
D	100	26	8
E	100	9	3
F	100	6	1
G	100	8	4
H	100	19	11
Totals	800	107	38
%		13.4%	4.8%

Thus, on average, approximately:

- 13 questions per exam had at least 1 implausible distractor (ID).
- 5 questions per exam had at least 2 ID, and thus made the question Unacceptable.



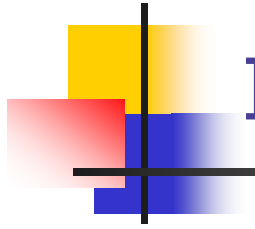
SUBJECTIVITY

Some **SUBJECTIVITY** is involved in determining whether a distractor is plausible or not.

GUIDELINES:

- Put yourself in the position of a license candidate (with his expected knowledge, abilities, and training)
- **Remember:**
What is implausible to someone with 30 years of nuclear power plant experience, may not be implausible to one who has just gone through license training

ROAD SIGNS TO IDENTIFY



IMPLAUSIBLE DISTRACTORS

- **Distractor requires minimal knowledge of plant response**
- **Trivial distractor – inclusion of relatively unimportant information**

TECHNIQUES TO MAKE DISTRACTORS MORE PLAUSIBLE

- **Include common misconceptions**
- **Make distractors relatively similar**



EXAMPLE OF IMPLAUSIBLE DISTRACTOR [FROM THE EXAMINER STANDARDS - APPENDIX B]

Which of the following will cause the RHR pumps to start during a design basis LOCA?

- A. low drywell pressure
- B. high reactor water level
- C. high drywell pressure**
- D. MSIVs in the NOT OPEN position

Distractors A, B, and D are implausible, considering minimal knowledge of the plant response to a loss of coolant accident.



EXAMPLE OF TECHNIQUE TO MAKE DISTRACTORS MORE PLAUSIBLE – INCLUDE COMMON MISCONCEPTIONS [FROM THE EXAMINER STANDARDS - APPENDIX B]

The following question was based upon a common misconception about loss of subcooling margin:

During a small break LOCA with a resultant loss of subcooling margin, why are the reactor coolant pumps (RCPs) secured?

- a. to prevent pump damage resulting from operation under two-phase conditions
- b. to prevent core damage resulting from rapid phase separation upon subsequent loss of RCS flow**
- c. to reduce RCS pressure by removing the pressure head developed by the RCPs
- d. to remove the heat being added to the RCS by the operating RCPs



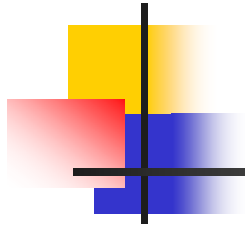
ES-401

ES-401-9 (R8, S1)

Written Examination Form Review Worksheet

Instructions

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



ES-401

ES-401-9 (Rev 9) Review Worksheet

Written Examination Form

Instructions

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



EXAMPLES OF IMPLAUSIBLE DISTRACTORS

Seven (7) Categories Identified:

- **Requires Minimal Plant Knowledge (Majority)**
- **Fails Common Sense Test**
- **“Double Distractors” [1 of 2 Taken Twice] With 2 Distractors Having LOD = 1**
- **Physics Not Correct**
- **Distractors Conflict With Information In Question Stem**
- **Distractors Not Independent From Each Other**
- **Use of a Distractor About a Plant Process That Does Not Exist**

Case Study 1:



Requires Minimal Plant Knowledge

Given the following conditions:

- Condenser pit flooding on Unit 1 caused an automatic turbine/reactor trip.
- Safety Injection actuated due to a small break LOCA.
- Bus 11 is deenergized.
- **RCS pressure is stable at 1725 psig.**
- RCS temperature is 370°F.
- 11 SG level is 13% NR and rising.
- 12 SG level is 48% NR and stable.
- AFW flow is 50 gpm to 11 SG only.
- 1ES-1.1 "Post-LOCA Cooldown and Depressurization" is in progress.

What method for cooldown should be selected?

- A. Dump steam to the condenser from both SGs.
- B. Dump steam to the condenser from 12 SG only.
- C. Place RHR in service per SOI-4, "Residual Heat Removal System."**
- D. Dump steam from both SG PORVs.

NRC Comment:

Distractor C is not plausible to place the RHR system in service with RCS pressure at 1725 psig.

Case Study 2:



Fails Common Sense Test

Given the following conditions:

- Fuel handling is in progress in Containment and the Spent Fuel Pool (SFP).
- **Radiation Monitor R-5 SPENT FUEL POOL AREA MONITOR fails LOW**
- All other radiation monitors are operable.

What is the impact of this failure?

- A. Fuel handling in the SFP and Containment must be stopped.
- B. Fuel handling in the SFP ONLY must be stopped.
- C. The SFP must be evacuated.**
- D. None provided R-28 NEW FUEL PIT AREA CRITICALITY MONITOR is operable.

NRC Comment:

Distractor C is not plausible to require a SFP evacuation on a failed low radiation monitor.

Case Study 3:

“Double Distractors” [1 of 2 Taken Twice] With 2 Distractors Having LOD = 1

A Large Break LOCA (DBA) has occurred approximately 5 minutes ago. Which ONE of the following describes the expected conditions of the pumps?

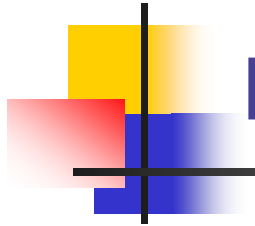
- A. SI and RHR pumps running and injecting into the RCS, **CS pumps OFF**
- B. SI pumps running and injecting into the RCS, RHR pumps running, **CS pumps OFF**
- C. SI pumps running and injecting into the RCS, RHR and CS pumps running
- D. SI and RHR pumps running and injecting into the RCS, CS pumps running

NRC Comment:

Distractors A and B are not plausible that the CS pumps would be OFF during a DBA large break LOCA.

NOTE: Questions with “Double Distractors” [1 of 2 Taken Twice] that have 2 distractors that are easily eliminated (i.e., LOD = 1) lend themselves to having 2 implausible distractors.

Case Study 4:



Physics Not Correct

Torus water temperature rises from 75 ° F to 95 ° F over several weeks due to summer heat.

Which of the following describes **the effect of the rise in torus water temperature?**

- A. **The INCREASE in torus airspace** would result in LOWER post-LOCA peak drywell pressure.
- B. **The DECREASE in torus water level** would result in LOWER available NPSH for the ECCS pumps.
- C. The DECREASE in torus airspace would result in HIGHER post-LOCA peak drywell pressure.
- D. The INCREASE in torus water level would result in HIGHER available NPSH for the ECCS pumps.

NRC Comment:

Distractors A and B are not plausible that an increase in torus water temperature would cause a decrease in torus water level or an increase in torus airspace (since almost everyone knows that water expands when heated).

Case Study 3.



Distractors Conflict With Information In Question Stem

The plant is operating at 100% power.

A failure of the governor/pressure regulator occurs **which causes the turbine control valves to fully open.**

Which one of the following RPS functions will scram the reactor?

- A.** Main Steam Isolation Valve Closure
- B. APRM flux - Upscale
- C. Low RPV water level
- D. Turbine Control Valve Closure**

NRC Comment:

Distractor D is not plausible that turbine control valve closure would cause the reactor scram, since the question stem states that the turbine control valves have failed open.



Distractors Not Independent From Each other

A fully qualified Radiation Worker was escorting a male visitor with no previous exposure through the Reactor Building when they inadvertently walked through a High radiation area.

Assuming no previous exposure, RP personnel read the dosimeters for the individuals and calculated that they received the following radiation exposure:

- Chest 800 mrem
- Hands 1060 mrem
- Eye Lens 510 mrem
- Internal 550 mrem

Which, if any, exposure limit has been exceeded?

- A. Both exceeded Federal TEDE limits.**
- B. Both exceeded administrative TEDE limits.
- C. The male visitor exceeded the federal TEDE limit.
- D. The fully qualified Radiation Worker exceeded the federal TEDE limit.**

NRC Comment:

Distractor D is not plausible because it is a subset of distractor A (i.e., if distractor A were correct, then distractor D would also be correct).

Case Study 7:

Use of a Distractor About a Plant Process That Does Not Exist

IMD is about to commence a surveillance test, with the following:

- The surveillance test will cause a TECH SPEC-REQUIRED plant instrument to be INOPERABLE for the duration of the test
- Performance of the surveillance test does NOT require an LCO ACTION entry

Which ONE of the following describes a CRS required action, PRIOR to IMD beginning the surveillance test?

- A. **Direct the RO to hang an Adverse Condition Monitoring Tag on the annunciator window associated with the instrument.**
- B. Direct IMD to hang an Equipment Status Tag (EST) on the instrument, and the RO to hang a Miniature EST in the Control Room.
- C. Identify the Technical Specification required action in the event the instrument is still INOPERABLE when the Short Duration Time Clock (SDTC) expires.
- D. Identify the Maximum Out of Service Time (MOST) for the instrument and direct IMD to notify the control room if the test is still in progress within 30 minutes of the MOST.

NRC Comment:

Distractor A is not plausible to direct hanging an **Adverse Condition Monitoring Tag (i.e., a tag that does not exist)**. Suggest changing distractor A to "Initiate a Degraded Equipment Log (DEL) entry for the instrument."



POST-EXAMINATION CHANGES LESSONS LEARNED

MAJOR TYPES OF POST-EXAM QUESTION CHANGES

1. Question construction problems:

- **Question stem does not sufficiently define the initial conditions**
- **Question worded such that two answers are correct**
- **“Transient question” that requires knowledge of how we reached the present conditions in order to answer the question**

2. Reference material - Wrong or insufficient

Case Study 1:



QUESTION CONSTRUCTION – Question stem does not sufficiently define the initial conditions

The following conditions exist:

- Unit 1 is at 100% power and stable.
- Steam Generator Level Controls are in AUTOMATIC.
- Steam Generator #12 Steam Flow Channel 1 is selected to the Steam Generator Level Control System.

A blown fuse causes Steam Generator #12 Steam Flow Channel 1 to fail off-scale low.

Which ONE of the following describes the expected plant response? (Assuming no operator action)

The Steam Generator Level Control system will ...

- A. initially lower feed flow and then slowly return #12 SG level to approximately program level.
- B. automatically transfer the # 12 FW Regulating Valve Controller to Manual to maintain the current valve position.**
- C. initially raise feed flow and then slowly return #12 SG level to approximately program level.
- D. lower feed flow to #12 SG to 0 pph, resulting in a Reactor Trip.

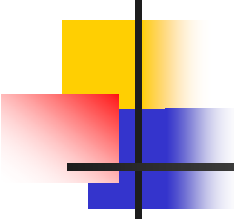
Case Study 1: Comment and Resolution



QUESTION CONSTRUCTION – Question stem does not sufficiently define the initial conditions

- **The stem of the question did not designate whether the fuse was upstream or downstream of the square root extractor (SRE) for Steam Flow.**
- If the applicant assumed blown fuse was downstream of the SRE for Steam Flow, then answer “B” was correct.
- If the applicant assumed that the blown fuse was upstream, then answer “D” was correct.
- Wound up accepting both answers “B” and “D”.

Case Study 2:



QUESTION CONSTRUCTION – Question worded such that two answers are correct

During a Station Blackout what indication(s) are available to determine when Battery No. 1 is approaching a full discharged condition?

- A. ***ONLY*** Voltage indication for Battery No. 1 can be used.
- B. **EITHER** Voltage or Amperage indications for Battery No. 1 can be used.
- C. **ONLY** Amperage indication for Battery No. 1 can be used.
- D. **EITHER** Voltage, Amperage, CR annunciator, or Frequency indications for Battery No. 1 can be used.

Original correct answer: B

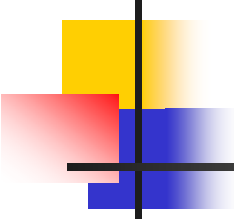
Case Study 2: Comment and Resolution



QUESTION CONSTRUCTION – Question worded such that two answers are correct

- The intent of the question was that the candidate recognized that both Voltage (in the Station Blackout EOP) and Amperage (in an EOP Supplement procedure) indications are available to diagnose a battery problem that could result in loss of the battery.
- However, at least one of the candidates argued that since the Station Blackout EOP uses only voltage to indicate that action must be taken to prevent a battery from becoming dangerously discharged, answer "A," "ONLY Voltage indication for Battery No. 1 can be used," should also be considered correct.
- Upon review of the question and the facility comment it was decided to accept both A and B as correct answers.

Case Study 3:



QUESTION CONSTRUCTION – “Transient question” that requires knowledge of how we reached the present conditions in order to answer the question

Given the following:

- The plant is at 100% power.
- AFW Pump B is running for a surveillance test in progress.
- Annunciator AFW PUMP B LOW OIL PRESS alarms.

What is the expected operator response for this condition?

- A. Trip AFW Pump B, and go to procedure “Auxiliary Feedwater System” (Normal Operating Procedure).
- B. Trip AFW Pump B, and go to “Abnormal Auxiliary Feedwater System Operation” (AOP).*
- C. Verify the Auxiliary Lube Oil Pump is running, and go to “Auxiliary Feedwater System” (Normal Operating Procedure).
- D. Verify the Auxiliary Lube Oil Pump is running, and go to “Abnormal Auxiliary Feedwater System Operation” (AOP).**

Case Study 3: Comment and Resolution

QUESTION CONSTRUCTION – “Transient question” that requires knowledge of how we reached the present conditions in order to answer the question

- An applicant argued that since the stem provides no information as to whether the aux lube oil pump starts and the alarm clears, and knowing the Auxiliary Feedwater (AFW) Pump is being run only for testing, it would be correct to trip the AFW pump.
- Without information about the current oil pressure value and trend, an operator could not make a valid decision as to whether the AFW Pump should be tripped or not.
 - However, neither the question stem nor answer “D” provided information as to whether oil pressure recovered.
 - Therefore, it is equally reasonable to assume oil pressure has not recovered. Thus, it would also be correct to trip the AFW pump (answer “B”).
- Upon review of the question and the facility comment it was decided to accept both B and D as correct answers.



Case Study 4: REFERENCE MATERIAL - Wrong or insufficient

During a Large Break LOCA, all ECCS flow is assumed to bypass the core until the completion of the Blowdown Phase. During the Refill Phase immediately following blowdown, the ECCS flow is directed to the

- A. *cold legs AND reactor vessel simultaneously to refill the core from the top and bottom at the same time.*
- B. reactor vessel ONLY as complete core uncover occurs during blowdown and core injection is the most effective cooling method.
- C. **cold legs ONLY to refill the core barrel and start the recovery of the core from the bottom up.**
- D. cold legs AND hot legs simultaneously to ensure either SI or Accumulator injection will pass through the core on the way to the break.

Original correct answer: C



Case Study 4: Comment and Resolution

REFERENCE MATERIAL - Wrong or insufficient

- There are conflicting references regarding this question. One reference stated that refill is accomplished by the accumulators (Cold Legs).
- However, another gives a timeline showing that RHR is injecting (to the reactor vessel) during the refill stage. Based on these conflicting references, the site recommended accepting both answers "A" and "C".
- After reviewing the comment, the NRC agreed that distractor "A" was a correct answer. However, if "A" is a correct answer, "C" cannot be accepted as a correct answer.
- Distractor "C" allows ECCS injection ONLY to the cold legs. Since the reference material indicated there would be RHR injection occurring into the upper plenum, then distractor "C" must be an incorrect answer.

Case Study 5:

QUESTION MUST REFLECT ACTUAL PLANT RESPONSE

The plant is operating at 100% Rx power when a failure of Cooling Tower Pump A has caused condenser vacuum to degrade. The Loss of Condenser Vacuum procedure has been entered. A rapid power reduction was ordered by the SRO.

Following the power reduction, and reactor trip, condenser pressure stabilized at 15" Hg.

During the rapid downpower, what was the fastest allowable rate of power reduction, **and assuming condenser pressure remains constant, what would RCS temperature be after the reactor trip?**

- A. 60%/Hr and 532 degrees F
- B. 300%/Hr and 532 degrees F**
- C. 60%/Hr and 535 degrees F
- D. *300%/Hr and 535 degrees F*

Original correct answer: B

Case Study 5: Comment and Resolution

QUESTION MUST REFLECT ACTUAL PLANT RESPONSE

- Facility Recommendation: Change correct answer to D.
- By design, the turbine bypass valve does control main steam header pressure at 900 psia (531.95 degrees F at saturation). However, pressure losses between the main steam header and the steam generators, along with efficiency losses in the steam generators, resulted in a stable Tave of slightly less than 535 degrees F.
- **In accordance with Appendix E of NUREG 1021, Rev. 9, the candidates were instructed to answer all questions based on actual plant operation, procedures, and references, and that if they believed the answer would be different based on simulator operation or training references, they should answer based on the actual plant.**
- Data from actual 1998, 2004, and 2005 reactor trips were used to verify that for the conditions given in the stem of the question, actual RCS temperature (Tave) stabilizes at approximately 535 degrees F. **The correct answer was changed to "D" to reflect actual plant response.**



WRITTEN EXAMINATION

THE END



ADMINISTRATIVE ISSUES



Correspondence w/ Region III

- IAW 10 CFR 55.5, Communications, applications made by Region III licensees must be sent to the Regional Administrator in Region III. To expedite receipt of the documents, please address the envelope to the Regional Administrator, but add an attention to:
H. Peterson, Chief, Operations Branch
Division of Reactor Safety.



ADDRESSEE ONLY

- Please do NOT label the envelope “ADDRESSEE ONLY” unless you desire the envelope to be opened by Mr. Caldwell only.
- NO ONE ELSE is permitted to open an “addressee only” envelope except the named addressee.



NRC Form 398

- Requalification time is NOT required to be documented in item 13.e. on the NRC Form 398 for a license renewal application.
- We are planning to clarify the instructions for this; the OMB clearance for the form is coming due for renewal and will be out for public comment.



NRC Form 398

- As stated on the instructions to the NRC Form 398, all applicants must complete items 1-10, 18, and 19, plus any changes since the applicant's last application. For re-applications and upgrade applications, item 11, Education, only needs to be completed if the individual is updating information from the individual's last application. As noted earlier, we currently have a window of opportunity to clarify the instructions on the form.



NRC Form 398

- The NRC Form 398 is signed by the facility's senior management representative on site and the training coordinator. The training coordinator can be the facility training director/manager, operations supervisor, or other individual who is designated by the licensee as the facility's training coordinator.



NRC Form 396

- It is not necessary to submit a “duplicate” NRC Form 396 when submitting a renewal application that would also result in a restriction change on the current license.



NO SOLO

- “No Solo” restrictions for RO and SRO licensed individuals would meet the intent of the wording as stated in NUREG 1021, Revision 9, ES-605.C.3.c. even if the individual does not have the updated “No Solo” wording on his/her license.



MEDICAL ASSISTANCE

- The NRC web page has been updated to answer recent medical questions and can be located at the end of the OL feedback listing for general topics:

<http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/olfeedback.pfd>.



ELECTRONIC COMMUNICATION

- Electronic communication with the NRC is discussed in 10 CFR 55.5, Communications, and guidance can be found at:

<http://www.nrc.gov/site-help/eie/html>.



Part 55 Docket Numbers

- An individual is assigned a "55" docket number when that individual applies to take a generic fundamentals examination. The only exceptions are non-power and Limited SRO individuals who are assigned "55" docket numbers when the NRC receives the license application.



Part 55 Docket Numbers

- The “55” docket number assigned to an individual does not change, even though license numbers might change.



WAIVERS

- Examination, including GFE, and medical waivers may be requested at the time the NRC Form 398 is completed. Eligibility and other waivers may be submitted by the facility senior management representative on site prior to completing a Form 398. If there is any question or doubt that a prospective applicant meets the eligibility guidelines or requirements, we encourage the facility to resolve the question (with a letter to the Region) before the individual enters the license training program; the waiver can later be formally documented on the NRC form 398.



ATTACHMENT 71111.11

LICENSED OPERATOR
REQUALIFICATION PROGRAM



REQUIREMENTS

- Facility licensees are required to have a Commission-approved operator requalification program that must meet the requirements of 10 CFR 55.59(c).



10 CFR 55.59(c) COMPONENTS

- 1) Schedule (<24 months)
- 2) Lectures
- 3) On-the-job Training
- 4) Evaluation
- 5) Records
- 6) Alternative Training Programs
- 7) Non-Power Reactor Training



10 CFR 55.59(c) ALLOWANCE

- In Lieu of:
 - 2) Lectures
 - 3) On-the-job Training, and
 - 4) Evaluation
- The NRC may approve a program developed by using a systems approach to training.



MORE REQUIREMENTS

- Facility licensees are required to have a Commission-approved operator requalification program that must meet the requirements of 10 CFR 55.59(c).
- The Commission may approve a program developed by using a systems approach to training (SAT), as defined in 10 CFR 55.4.



10 CFR 55.4 DEFINITIONS

- Systems Approach to Training means:
 - Systematic analysis of jobs
 - Learning Objectives established
 - Training design and implementation based on training objectives
 - Evaluation for mastery of objectives
 - Evaluation & revision based on performance of operators



STILL MORE REQUIREMENTS

- Facility licensees are required to have a Commission-approved operator requalification program that must meet the requirements of 10 CFR 55.59(c).
- The Commission may approve a program developed by using a systems approach to training (SAT), as defined in 10 CFR 55.4.
- In accordance with 10 CFR 55.59(a), each licensed individual must successfully complete the requalification program and pass an annual operating test and a comprehensive written examination administered at the end of each requalification cycle, not to exceed 24 months in duration.



INSPECTION BASES

- The inspection evaluates licensed operator performance in mitigating the consequences of events. Poor licensed operator performance results in increased risk through increased operator recovery rates and increased personnel-induced common-cause error rates.



LEVEL OF EFFORT

- A biennial review of the licensed operator requalification program will be conducted by a regional specialist at the facility licensee's site. The level of effort includes in-office review of tests that may be performed by the regional specialist. Depending on availability, resident staff members may assist the regional specialist during the biennial review.



INSPECTION OBJECTIVES

- To verify that the facility licensee's requalification program for licensed reactor operators and senior reactor operators ensures safe power plant operation by adequately evaluating how well the individual operators and crews have mastered the training objectives, including training on high-risk operator actions with senior reactor analyst's input.



MORE INSPECTION OBJECTIVES

- To assess the facility licensee's effectiveness in evaluating and revising the requalification program for licensed operators based on their operational performance, including requalification examinations.



STILL MORE INSPECTION OBJECTIVES

- To assess the facility licensee's effectiveness in ensuring that the individuals who are licensed to operate the facility satisfy the conditions of their licenses as specified in 10 CFR 55.53.



AND THE LAST INSPECTION OBJECTIVE

- To supply regional management with the information necessary to assess the performance of the facility licensee's licensed operator requalification program and determine the need for additional inspections or NRC-conducted examinations.



INSPECTION COMPOSITION

- For biennial reviews, the inspection should include at least one qualified operator licensing examiner with expertise relevant to the plant being evaluated. Normally, an inspection would include individuals with operations backgrounds and individuals with plant-specific knowledge. For quarterly reviews, the resident staff uses applicable portions of this procedure.



SAMPLE SELECTION

- When selecting sample areas to inspect within the licensed operator requalification process, a risk-informed, performance-based regulatory approach should be considered in which risk insights, engineering analysis and judgment, including the principle of defense-in-depth and the incorporation of safety margins, and performance history are used.



MORE SAMPLE SELECTION

- No specific number of comprehensive written examination or operating test samples is recommended. Rather, the inspector should choose as many examples as warranted to ensure a sufficient basis for evaluating the effectiveness of the licensee's requalification program.



FACILITY OPERATING HISTORY

- Assess operator performance since the last requalification program evaluation (inspection or examination) to determine if performance deficiencies have been addressed through the requalification training program.



LICENSEE REQUALIFICATION EXAMINATIONS

- Assess the adequacy of the facility licensee's written examinations and operating tests for requalification.

LICENSEE ADMINISTRATION OF REQUALIFICATION EXAMINATIONS



- Observe examinations and tests in progress and interview personnel to assess the facility licensee's effectiveness in conducting written examinations and operating tests to ensure operator mastery of the requalification training program content.



LICENSEE TRAINING FEEDBACK SYSTEM

- Assess the effectiveness of the facility licensee's process for revising and maintaining its licensed operator continuing training program up to date, including the use of feedback from plant events and industry experience information.



LICENSEE REMEDIAL TRAINING PROGRAM

- Assess the adequacy and verify the effectiveness of the remedial training conducted since the last requalification examinations and the training planned for the current examination cycle to ensure that it addresses weaknesses in licensed operator or crew performance identified during training and plant operations.

CONFORMANCE WITH OPERATOR LICENSE CONDITIONS



- Review the facility licensee's program for maintaining active operator licenses and ensuring the medical fitness of its licensed operators. Assess the facility and operator licensees' compliance with the requirements for maintaining license conditions in accordance with 10 CFR 55.53.



WRITTEN EXAMINATIONS and OPERATING TEST RESULTS

- For each requalification cycle, review the number of applicants and the pass/fail results of written examinations, individual operating tests and simulator operating tests.



CONFORMANCE with SIMULATOR REQUIREMENTS

- Assess the adequacy of the facility licensee's simulation facility for use in operator licensing examinations and for satisfying experience requirements as prescribed in 10 CFR 55.46. Assess the effectiveness of the facility licensee's process for continued assurance of simulator fidelity with regard to identifying, reporting, correcting, and resolving simulator discrepancies via a corrective action program.



MINIMUM UNIFORM CONDITIONS

- Requalification examinations should be comprised of written and operating tests (JPM and simulator) sections.
- To maintain written examination reliability, there should be a sufficient number of items to test the range of content and reduce sampling error, e.g., min of 30 - 40 items.
- Written examinations may have flexible formats (multiple choice, short answer) but 50-60 percent of items must be written at higher cognitive levels (understanding and application). (Note: short answer items must be objectively scored).

MINIMUM UNIFORM CONDITIONS Continued



- No test items shall be direct look-ups as explained in ES-602.
- Duplication of items (written, JPMs and scenarios) between and among crews in the same training program cannot exceed 50 percent for any examination (written, JPM, and simulator examinations).
- The JPM set shall consist of 50-60 percent alternate paths.



MINIMUM UNIFORM CONDITIONS Continued

- Scenario sets shall be 50 percent different between and among crews.
- Test banks should be used in the mix of bank, revised, and new item development.
- Operating tests shall be objectively graded with clearly defined pass and fail criteria. Note: No grading category such as a “pass with remediation.”
- Validation processes should be explained and defined with discussion of pitfalls.



MINIMUM UNIFORM CONDITIONS Continued

- All items must adhere to psychometric attributes as stated in the Standards.
- Timely retake examinations to be administered and which do not repeat any items originally failed.
- All licensee requalification programs shall have security agreements in place for instructors and students.