

## **DPO Case File for DPO-2017-007**

The following pdf represents a collection of documents associated with the submittal and disposition of a differing professional opinion (DPO) from NRC employees involving Operator Licensing Written Examinations- Tier 1 Test Items.

Management Directive (MD) 10.159, "NRC Differing Professional Opinions Program," describes the DPO Program. <https://www.nrc.gov/docs/ML1513/ML15132A664.pdf>

The DPO Program is a formal process that allows employees and NRC contractors to have their differing views on established, mission-related issues considered by the highest level managers in their organizations, i.e., Office Directors and Regional Administrators. The process also provides managers with an independent, multi-person review of the issue (one person chosen by the employee). After a decision is issued to an employee, he or she may appeal the decision to the Executive Director for Operations (or the Commission, for those offices that report to the Commission).

Because the disposition of a DPO represents a multi-step process, readers should view the records as a collection. In other words, reading a document in isolation will not provide the correct context for how this issue was reviewed and considered by the NRC.

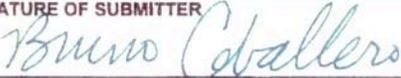
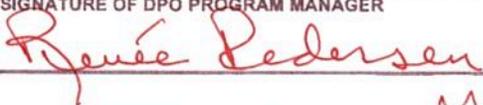
It is important to note that the DPO submittal includes the personal opinions, views, and concerns by NRC employees. The NRC's evaluation of the concerns and the NRC's final position are included in the DPO Decision.

The records in this collection have been reviewed and approved for public dissemination.

- Document 1: DPO Submittal
- Document 2: Memo Establishing DPO Panel
- Document 3: DPO Panel Report
- Document 4: DPO Decision

# **Document 1: DPO Submittal**

Document Markings...

NRC FORM 680 <small>(09-2015)                  NR_CMO 10.159</small> 		U.S. NUCLEAR REGULATORY COMMISSION		DPO Case Number <b>DPO-2017-007</b>	
<b>DIFFERING PROFESSIONAL OPINION</b>				Date Received <b>10/10/2017</b>	
Name and Title of Submitter Bruno Caballero and other examiners		Organization RII/DRS/OLB		Telephone Number (10 numeric digits) (404) 997-4608	
Name and Title of Supervisor Eugene Guthrie		Organization RII/DRS/OLB		Telephone Number (10 numeric digits) (404) 997-4551	
When was the prevailing staff view, existing decision or stated position established and where can it be found? Date <b>06/07/2017, 9/7/17</b> Where (i.e., ADAMS ML#, if applicable): <b>ML17165A579, ML17249A961</b>					
Subject of DPO Operator Licensing Written Examinations - Tier 1 Test Items					
Summary of prevailing staff view, existing decision, or stated position. (Use continuation pages or attach Word document)					
Reason for DPO, potential impact on mission, and proposed alternatives. (Use continuation pages or attach Word document)					
Do you believe the issue represents an immediate public health and safety concern?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Yes, (Explain on continuation page(s) or attach Word document).	
Is the issue directly relevant to a decision pending before the Commission?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Yes, Reference Document (i.e., ADAMS ML#)	
<input checked="" type="checkbox"/> Informal discussions took place (Identify with whom and time frame of discussions)		Extenuating circumstances prevented informal discussions			
Written Interaction: April 2017; subsequent discussion between NRR/IOLB and Region II DRS/OLB took place on August 24, 2017.					
Proposed panel members are (in priority order): 1. Craig Kontz 2. <del>James Drake</del> Jim Kellum 3. James Drake No names of potential panel members will be provided.					
When the process is complete, I would like the DPO case file: <input type="checkbox"/> Non-Public <input checked="" type="checkbox"/> Public					
SIGNATURE OF SUBMITTER 				DATE 10-10-17	
SIGNATURE OF CO-SUBMITTER (if any) 				DATE	
SCAN THE SIGNED AND DATED FORM (INCLUDE ANY CONTINUATION PAGES OR WORD DOCUMENTS) AND E-MAIL TO: <a href="mailto:DPOPM.Resource@nrc.gov">DPOPM.Resource@nrc.gov</a>					
SIGNATURE OF DPO PROGRAM MANAGER 				DATE 10/16/2017	
<input type="button" value="Delete Continuation Page"/>		<input checked="" type="checkbox"/> DPO accepted		<input type="checkbox"/> DPO returned	
				<input type="button" value="Add Continuation Page"/>	

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)

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### Summary of existing NRC decision or agency's stated position

NRR/IOLB determined that Tier 1 written examination test items that test plant system design features, interlocks, and system operation adequately test applicant knowledge of emergency and abnormal evolutions on the site-specific written exam. This determination was documented in Record of Interaction (ROI) 17-09, NUREG 1021, ES-401 Tier 1 Written Exam Test Items (ML 17165A579), and was disseminated to industry stakeholders in Operator Licensing Feedback Item 401.55 (ML17249A961).

Operator Licensing Feedback Item 401.55 included two examples of Tier 1 written examination test item topics, one for PWR K/A Abnormal Evolution "Pressurizer Pressure Control Malfunctions", and the other for BWR K/A Emergency Evolution "High Drywell Pressure", and NRR/IOLB's feedback to industry stated that written examination test items were acceptable for these Tier 1 topics, if the test item solely tested how the system worked (i.e., Tier 2, Plant Systems knowledge aspect).

### Reason for DPO

The writers of this DPO are identified on Page 17; the purpose of this DPO is to require NRR/IOLB to revise its recent policy determination for writing and assessing Tier 1 written examination test items. NRR/IOLB's position has the potential to undermine the 10 CFR 55.41 requirement that the written examination contain a representative selection of questions on the knowledge, skills, and abilities needed to perform licensed operator duties. Specifically, NRR/IOLB's policy interpretation will result in fewer questions that test the operator's knowledge of abnormal and emergency procedures, in accordance with 10 CFR 55.41(b)(10), on the site-specific written examination.

Title 10 of the Code of Federal Regulations (10 CFR) Part 55, "Operators' Licenses," requires that applicants for reactor operator (RO) and senior reactor operator (SRO) licenses pass a written examination. The regulation at 10 CFR 55.40(b) allows power reactor facility licensees to prepare the site-specific written examinations, provided that the facility licensee prepares the site-specific written examination in accordance with the criteria contained in NUREG-1021, Operator Licensing Examination Standards for Power Reactors.

In accordance with NUREG-1021, ES-401, Preparing Initial Site-Specific Written Examination, the site-specific written exam must be comprised of three parts:

- Tier 1: Emergency/Abnormal Plant Evolutions
- Tier 2: Plant Systems
- Tier 3: Generic Knowledges & Abilities

Interaction between Region II and NRR/IOLB to collaborate on clarifying the intent of Tier 1 Written Exam test items is documented in ROI 17-09 (March-June 2017 time frame). Also a teleconference was held on August 24, 2017, prior to disseminating the Operator Licensing Feedback Item 401.55 to industry stakeholders. NRR/IOLB program office Branch Chief began the teleconference by stating that opinions regarding the final resolution to ROI 17-09 (on 6-7-17) were not going to be discussed during the teleconference, and said the purpose of the phone call was to discuss enhancements for the phrasing or wording to the response to Operator Licensing Feedback Item 401.55, prior to disseminating to industry stakeholders.

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NRR/IOLB's response to Region II in ROI 17-09 (ML17165A579) stated that testing applicants' knowledge of the emergency or abnormal procedure content for Tier 1 written examination test items was *"more restrictive than currently called for by NUREG-1021, and that this was a change in policy which would require a revision or supplement to NUREG-1021."* During the 8/24/17 teleconference, Region II asked the program office to explain the difference between Tier 1 and 2 written test items. The program office staff said they did not know what the authors of NUREG-1021 intended when constructing the two tiers, and did not attempt to justify or explain the difference between the Tiers during the teleconference.

The NRR/IOLB response in both ROI 17-09 and Operator Licensing Feedback Item 401.55 included: *"Tier 1 test items don't need to reference a procedure"* and *"Tier 1 test items don't require EOP/AOP entry"*, both which may be true, depending on a test item's particular construction. However, NRR/IOLB's response did not address the fundamental question regarding the intent of Tier 1 Emergency/Abnormal Evolution test items on the plant-specific written examination, nor did it explain the intended difference between Tier 1 and Tier 2 test items.

### Impact on Agency's Mission

The impact of NRR/IOLB's policy interpretation will result in less testing of applicants' knowledge of abnormal and emergency procedures on the site-specific NRC written exam; a representative selection of 10 CFR 55.41(b)(10) may not be ensured on the NRC site-specific written examination. Although the NRC does not train operators, the NRC is responsible for testing operators after they complete their training program. Facility licensees make adjustments to their initial training program based, in part, on the NRC exam content. NRR/IOLB's policy interpretation means that the site-specific written exam will test less abnormal/emergency procedure knowledge; therefore, it is likely that licensee training programs may be inappropriately adjusted to reflect the NRR/IOLB policy determination. Actual consequences may occur when operator procedure knowledge declines, and plant events are not properly mitigated by operators because of inadequate procedure knowledge. See the DPO Section titled "Public Health and Safety Concern" for a disturbing trend identified by INPO in 2017 regarding operator knowledge of abnormal procedures. The impact of NRR/IOLB's policy determination, in turn, could affect the agency's Strategic Plan (ML14246A439), Safety Objective 1, Prevent and Mitigate Accidents and Ensure Radiation Safety, because licensed operators mitigate accidents during abnormal and emergency events.

The impetus for ROI 17-09 was actual inconsistencies in facility licensee interpretations of how to develop Tier 1 written exam test items; the ROI presented three differing viewpoints that currently exist. During the Region II 2017 Office Assessment, NRR/IOLB identified that several Tier 1 draft test items, as submitted by the facility licensee for the 2016 Brunswick NRC examination, were categorized as deficient (by the examiner) because the questions did not test applicant knowledge of emergency/abnormal procedures. The NRR/IOLB assessment (ML17095A958) concluded that NUREG-1021 did not require Tier 1 test items to test applicant knowledge of emergency/abnormal procedure content, and that the examiner's evaluation (that the draft test items did not match the intent of the K/A) was wrong.

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### Proposed Alternative

As previously documented in ROI 17-09, the submitters of this DPO propose the following alternative, including its basis, instead of NRR/IOLB's position regarding Tier 1 written test items.

- A Tier 1 written test item should, whenever possible, within the wording of the K/A statement, test the applicant's knowledge of the abnormal condition or emergency procedure *content*, for example:
  - an immediate operator action,
  - an important subsequent manual operator action, or
  - overall mitigative strategy of the off-normal or emergency procedure.
- Tier 1 test items where the stem of the question mentions an ongoing abnormal/emergency evolution, but where the test item can be answered solely using Tier 2 (Plant Systems) knowledge, contain, in a sense, "window dressing"; these test items should be assessed as K/A mismatches, but assessed as "enhancement required", in accordance with ES-401-9, Written Exam Worksheet.
- If testing knowledge of the abnormal condition or emergency procedure content is not possible given the wording of the K/A, then accept the question as meeting the K/A as long as all other aspects of the K/A are met.

The benefit of this proposed alternative is that testing procedure knowledge is promoted, there is no penalty for the exam writer, and the random sample initially drawn is preserved.

### Basis for Proposed Alternative

NRR/IOLB's response to Region II in ROI 17-09 (ML17165A579) stated that testing applicants' knowledge of the emergency or abnormal procedure content for Tier 1 written examination test items was "...more restrictive than currently called for by NUREG-1021, and that this was a change in policy which would require a revision or supplement to NUREG-1021."

Testing applicants' knowledge of EOPs and AOPs on the site-specific written exam is not a change in policy; there has always been precedence for testing applicant knowledge of EOPs and AOPs on the site-specific written examination. For example, even the original 1983 version of NUREG-1021, ES-203, Structure of Written Examination Administered to Reactor Operators – Power Reactors (ML15027A434) stated:

*"In general, the candidate must demonstrate complete knowledge and understanding of the symptoms, automatic actions, and immediate action steps specified by abnormal and emergency procedures."*

The original (1983 version) of ES-203 written exam cover page included Category 4, as shown below:

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Category Value	% of Total	Candidate's Score	% of Category Value	Category
_____	_____	_____	_____	1. Principles of Nuclear Power Plant Operation, Thermodynamics, Heat Transfer and Fluid Flow
_____	_____	_____	_____	2. Plant Design Including Safety and Emergency Systems
_____	_____	_____	_____	3. Instruments and Controls
_____	_____	_____	_____	4. Procedures - Normal, Abnormal, Emergency, and Radiological Control
_____	_____	_____	_____	TOTALS
			Final Grade _____%	

Testing applicants' knowledge of EOPs and AOPs in Tier 1 of the site-specific written exam is not more restrictive than currently called for in NUREG-1021 because the current versions of NUREG-1122, Rev. 2 and NUREG-1123, Rev. 2 (PWR & BWR Knowledge and Abilities Catalogs, respectively) Section 1.10, Emergency and Abnormal Evolutions, contain the following definition of an emergency and abnormal evolution:

**EMERGENCY EVOLUTION:** An emergency plant evolution is any condition, event, or symptom which leads to entry into the EOPs.

**ABNORMAL EVOLUTION:** An abnormal plant evolution is any degraded condition, event, or symptom not directly leading to an EOP entry condition, but nonetheless, adversely affecting a safety function.

The current version of NUREG-1021 (Rev. 11), includes Form ES-401-1 (BWR Written Exam Outline) and Form ES-401-2 (PWR Written Exam Outline), these forms identify Tier 1 as "EMERGENCY and ABNORMAL PLANT EVOLUTIONS."

NRR/IOLB's policy interpretation does not ensure that the site-specific written exam tests vendor-specific (Westinghouse, Babcock & Wilcox, Combustion Engineering) EOPs, as required by NUREG-1021.

To illustrate this point, consider Westinghouse procedure ECA-2.1, Uncontrolled Depressurization of All Steam Generators, listed in the Westinghouse Owner's Group EOP list of procedures:

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<u>Designator</u>	<u>Guideline</u>
E-0	Reactor Trip or Safety Injection
ES-0.0	Rediagnosis
ES-0.1	Reactor Trip Response
ES-0.2	Natural Circulation Cooldown
ES-0.3	Natural Circulation Cooldown With Steam Void in Vessel (With RVLIS)
ES-0.4	Natural Circulation Cooldown With Steam Void in Vessel (Without RVLIS)
E-1	Loss of Reactor or Secondary Coolant
ES-1.1	SI Termination
ES-1.2	Post LOCA Cooldown and Depressurization
ES-1.3	Transfer to Cold Leg Recirculation
ES-1.4	Transfer to Hot Leg Recirculation
E-2	Faulted Steam Generator Isolation
E-3	Steam Generator Tube Rupture
ES-3.1	Post-SGTR Cooldown Using Backfill
ES-3.2	Post-SGTR Cooldown Using Blowdown
ES-3.3	Post-SGTR Cooldown Using Steam Dump
ECA-0.0	Loss of All AC Power
ECA-0.1	Loss of All AC Power Recovery Without SI Required
ECA-0.2	Loss of All AC Power Recovery With SI Required
ECA-1.1	Loss of Emergency Coolant Recirculation
ECA-1.2	LOCA Outside Containment
ECA-2.1	Uncontrolled Depressurization of All Steam Generators
ECA-3.1	SGTR With Loss Of Reactor Coolant-Subcooled Recovery Desired
ECA-3.2	SGTR With Loss Of Reactor Coolant-Saturated Recovery Desired
ECA-3.3	SGTR Without Pressurizer Pressure Control

NUREG-1021, Form ES-401-2, identifies **000040 Steam Line Rupture – Excessive Heat Transfer (W E12)** as an emergency/abnormal plant evolution topic. The “**WE12**” designator on Form ES-401-2 for this topic refers to PWR K/A Catalog Section 4.5, Westinghouse Emergency Plant Evolutions, E12: Uncontrolled Depressurization of all Steam Generators. (See PWR K/A Catalog Section 4.5 listed below, item listed on page 4.5-31.)

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<b>4.5 Westinghouse EPEs and APEs</b>	<b>4.5-1</b>
Rediagnosis	4.5-1
SI Termination	4.5-4
LOCA Cooldown and Depressurization	4.5-7
LOCA Outside Containment	4.5-9
Loss of Secondary Heat Sink	4.5-12
Degraded Core Cooling	4.5-15
Saturated Core Cooling	4.5-18
Pressurized Thermal Shock	4.5-20
Natural Circulation Operations	4.5-23
Natural Circulation with Steam Void in Vessel with/without RVLIS	4.5-25
Loss of Emergency Coolant Recirculation	4.5-28
Uncontrolled Depressurization of all Steam Generators	4.5-31
Steam Generator Overpressure	4.5-34
High Containment Pressure	4.5-37
Containment Flooding	4.5-40
High Containment Radiation	4.5-43

The intent of the 000040 Steam Line Rupture – Excessive Heat Transfer (W E12) topic is to test the applicants’ knowledge of the Westinghouse ECA-2.1 procedure. The vendor-specific AOPs and EOPs in the K/A Catalogs, and in ES-401, mirror the actual vendor procedures because the intent was to test the content of these important procedures.

Therefore, the NRR/IOLB policy determination, that applicants’ knowledge of EOPs for Tier 1 test items like this ECA-2.1 example is adequately tested using test items that test plant system design features, interlocks, and system operation, does not ensure that the site-specific written exam tests vendor-specific (Westinghouse, Babcock & Wilcox, Combustion Engineering) EOP content, which is required by NUREG-1021, ES-401.

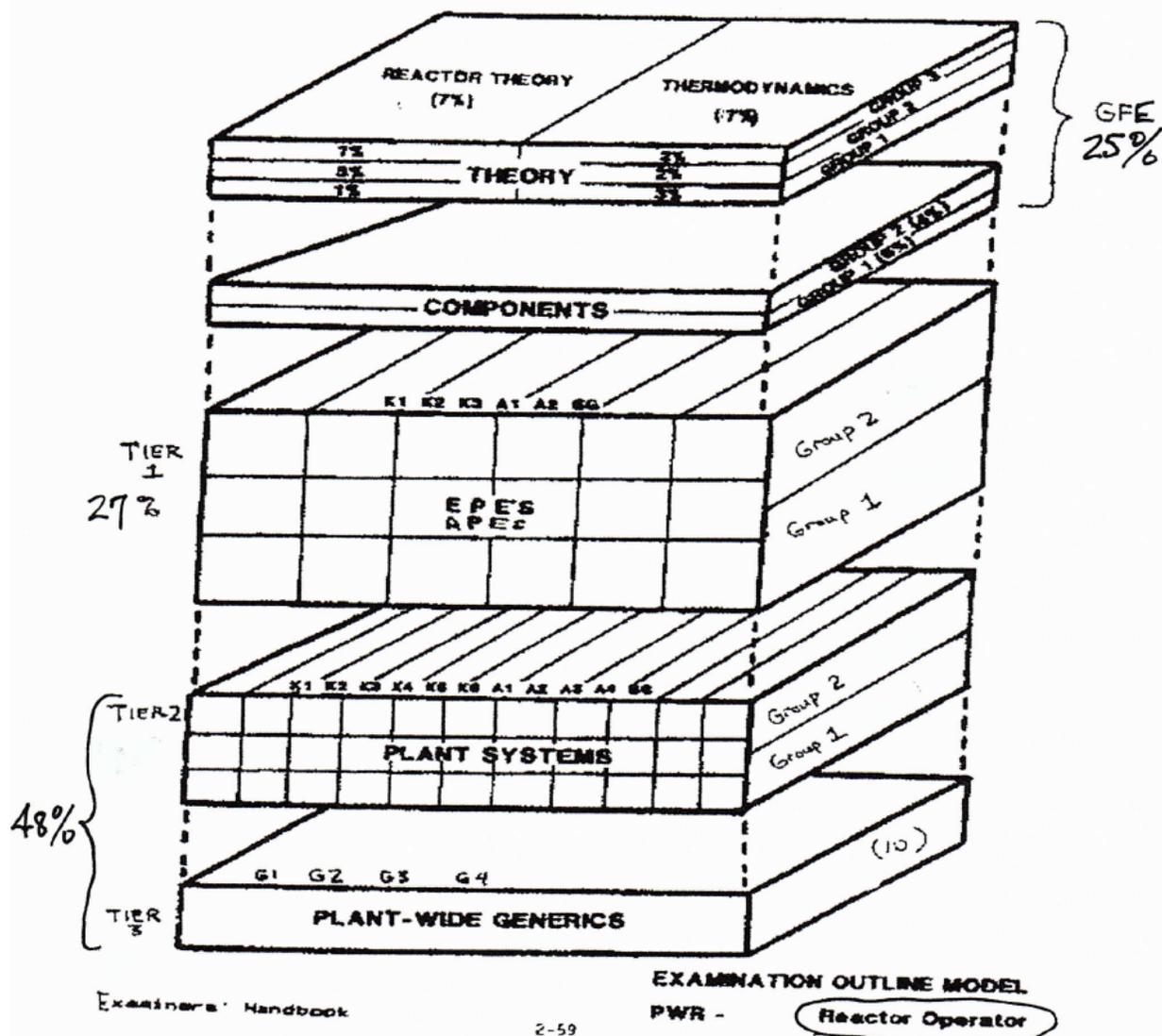
Instead, the writers of this DPO contend that the site-specific written exam Tier 1 test items, like the vendor-specific EOPs example discussed above, should, whenever possible, test the applicant’s knowledge of:

- an immediate operator action,
- an important subsequent manual operator action, or
- overall mitigative strategy associated with the emergency procedure

During the 8-24-17 teleconference with Region II, when asked to explain the difference between Tier 1 and Tier 2 site-specific written exam items, NRR/IOLB’s response was they did not know what the authors intended when constructing two Tiers, and subsequently did not attempt to justify or explain their policy determination for Tier 1 test items.

The original Examiner Standards Handbook included a graphic representation of the intended content of the generic and site-specific portions of the written examination: (see next page)

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This Examiners Standard Handbook representation depicts the middle Tier 1 “slice” as EPEs and APEs, i.e., emergency and abnormal plant evolutions. The Tier 1 “slice” is represented as a different “slice” compared to Tier 2; Tier 2 is plant systems knowledge. NRC Information Notice 88-40 (Examiners’ Handbook for Developing Operator Licensing Examinations) indicated that approximately 27% of the RO exam (40 % of the SRO exam) should normally sample emergency and abnormal plant evolutions in Tier 1. This graphical representation explained how the 10 CFR 55.41 (a) requirement for a “representative selection” was being met.

Based on the preceding discussion of historical precedence, definitions in the K/A catalogs, and ES-401 requirements for two Tiers, the writers of this DPO contend the following items:

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- Tier 2 site-specific written exam items are intended to test the applicant's knowledge of plant systems, and to a lesser degree, some procedure knowledge as it relates to A.2 K/As. The intent of Tier 2 is to test an applicant's mastery of "how the plant works."
- Tier 1 site-specific written exam items are intended to test the applicant's mastery of "how to operate the plant" in accordance with the abnormal (i.e., off-normal) and emergency operating procedures, during abnormal and emergency evolutions.

NRR/IOLB's response to Region II during the 8-24-17 teleconference was that "systems knowledge and Emergency/Abnormal procedure knowledge cannot be separated."

The writers of this DPO contend that systems knowledge and procedure knowledge can be separated. Systems knowledge includes, for example, plant system design features, interlocks, flow paths, actuation logic, and set points. Abnormal/emergency procedures knowledge includes, for example, required immediate operator actions, important subsequent actions, and overall mitigative strategy for off-normal and emergency evolutions. Consider the following "before" and "after" examples listed below, for the same Tier 1 K/A. In the "before" example, a fault inside containment causes pressure to rise above the Main Steam Trip Valve auto-isolation set point. In the "after" example, the applicants' knowledge of the overall mitigative procedure strategy is tested.

K/A:

040AK2.01

Steam Line Rupture

Knowledge of the interrelations between the Steam Line Rupture and the following:

Valves

### Before:

Unit 2 is currently heating up following a refueling outage

- RCS Tavg = 520°F
- A Steam line break occurs on the "B" SG just downstream of the steam flow venturi
- The Main Steam Trip Valves receive an automatic close signal

Which ONE of the choices below completes the following statement?

The signal that caused the Main Steam Trip Valves to close is \_\_\_\_\_.

- A. High Steam flow coincident with Lo-Lo Tavg
- B. High Steam Line Differential Pressure
- C. High Steam flow coincident with Lo Steam Pressure
- D. Intermediate Hi-Hi Containment pressure

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K/A:

040AK2.01

Steam Line Rupture

Knowledge of the interrelations between the Steam Line Rupture and the following:

Valves

**After:**

10. Unit 2 is currently heating up following a refueling outage

• RCS Tavg = 520 °F

• A Steam line break occurs on the B SG one foot downstream of the steam flow venturi.

Which of the following completes both statements?

The signal that should auto-close the Main Steam Trip Valves (MSTVs) is \_\_\_(1)\_\_\_.

In accordance with 2-E-2, Faulted Steam Generator Isolation, if the MSTVs can not be manually closed then the crew is required to close \_\_\_(2)\_\_\_ SG Non-Return Valve(s).

- A. (1) High Steam flow coincident with Lo-Lo Tavg  
(2) only the faulted
- B. (1) High Steam flow coincident with Lo-Lo Tavg  
(2) all
- C. (1) Intermediate Hi-Hi Containment pressure  
(2) only the faulted
- D. (1) Intermediate Hi-Hi Containment pressure  
(2) all

As can be seen by this example, it is not difficult to avoid testing abnormal condition procedure content, and still meet the lower level wording of a Tier 1 K/A statement. Systems knowledge and procedures knowledge form the basis for the NRC's confidence when issuing a license to an operator applicant – the NRC issues a license to an applicant who knows 1) *how the plant works* (system knowledge) and 2) *how to operate the plant*, in accordance with procedures, during abnormal/emergency situations (procedure knowledge).

During the 8-24-17 teleconference with Region II, NRR/IOLB stated that changes to the yet unpublished K/A Catalog Emergency/Abnormal Stem Statements would be made (for the future Revision 3, which was published in the Federal Register in April 2017), commensurate with the recent NRR/IOLB policy determination in ROI 17-09 and Operator Licensing Feedback Item 401.55.

The last sentence of ROI 17-09 (Recommended Action/Resolution Section) referred to the new K/A Catalog (Revision 3) industry effort. The new BWR and PWR catalogs were the result of a joint agency-industry effort, compiled of stakeholder teams with years of industry experience,

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and were published in the Federal Register in April 2017. The new catalogs, as published in the Federal Register in April 2017, included basis statements for the emergency/abnormal knowledge and ability stem statements, which were intended to provide insight for the intent of Tier 1 topics. (See Table 4 below).

**Table 4: Knowledge and Ability Stem Statements for Emergency and Abnormal Plant Evolutions**

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E/AK1 Knowledge of the operational implications or cause-effect relationships of the following concepts as they apply to [event]: (CFR: 41.5 / 41.7 / 45.7 / 45.8)

Basis – Lists the operationally based theoretical concepts applicable to the procedure. These items typically come from the procedure bases, PRA, OE, procedure notes and cautions.

E/AK2 Knowledge of the relationship between the [event] and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)

Basis – Lists the systems required to be monitored or operated by the procedure.

E/AK3 Knowledge of the reasons for the following responses or actions as they apply to [event]: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

Basis – Lists the reasons responses or actions taken in the procedure.

E/AA1 Ability to operate or monitor the following as they apply to [event]: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

Basis – Lists the system or components required to be monitored or operated by the procedure. EA1 may include systems from EK2.

E/AA2 Ability to determine or interpret the following as they apply to [event]: (CFR: 41.10 43.5 / 45.13)

Basis – Lists the parameters or conditions that are monitored to verify successful implementation of the procedure.

If NRR/IOLB removes or alters these basis statements for the upcoming Revision 3 K/A Catalogs, then this refutes the experience and wisdom of the industry effort, and creates an inconsistency between the operating fleet K/A catalogs and the AP-1000 K/A Catalog, NUREG-2103. (See the following pages....)

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**Table 4  
Knowledge and Ability Stem Statements for  
Emergency and Abnormal Procedures**

**Knowledge Stem Statements**

- EK 1 Knowledge of the relationship between the [event] and the following systems or components:  
(CFR: 41.8 / 41.10 / 45.3)
- EK 1 Lists the systems required to be monitored and/or operated by the procedure.*
- EK 2 Knowledge of the operational implications or cause and effect relationships of the following as they apply to [event]:  
(CFR: 41.5 / 41.7 / 45.7 / 45.8)
- EK2 Lists the operationally based theoretical concepts applicable to the procedure.. These items typically came from the procedure bases, PRA, OE, procedure notes and cautions.*
- EK 3 Knowledge of the reasons for the following actions as they apply to [event]:  
(CFR: 41.5 / 41.10 / 45.6 / 45.13)
- EK 3 Lists the actions and bases taken in the procedure.*

**Ability Stem Statements**

- EA 1 Ability to operate and/or monitor the following as they apply to a [event]:  
(CFR: 41.5 / 41.7 / 45.5 to 45.8)
- EA 1 Lists the system and/or components required to be monitored and/or operated by the procedure.
- EA 2 Ability to evaluate the following parameters and/or conditions as they apply to [event]:  
(CFR: 41.7 / 43.5 / 45.6)
- EA 2 Lists the parameters and/or conditions that are monitored to verify successful implementation of the procedure.

Note that the AP-1000 abnormal/emergency procedure numbers and titles are included on Form ES-401N-2

(See following page)

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ES-401N

2

Form ES-401N-2

ES-401N	AP-1000® Examination Outline							Form ES-401N-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
E-0, Reactor Trip or Safeguards Actuation / 1, 2, 3, 4									
ES-0.1, Reactor Trip Response / 1, 2, 3, 4									
ES-1.3, ADS Stage 1–3 Actuation Response / 3									
ES-1.4, ADS Stage 4 Actuation Response / 3									
A-313, Uncontrolled Cooldown / 4									
A-336, Malfunction of Protection and Safety Monitoring System / 7									
E-1, Loss-of-Coolant Accident / 2, 3									
A-342, Reactor Coolant Pump Malfunction / 1, 2, 3, 4									
A-337, Passive RHR Heat Exchanger Leak / 4									
A-343, Loss of Normal Residual Heat Removal / 4									
A-317, Loss of Component Cooling Water / 8									
ES-0.2, Natural Circulation Cooldown / 4									
FR-S.1, Response to Nuclear Power Generation / 1									
E-3, Steam Generator Tube Rupture / 3									
E-2, Faulted Steam Generator Isolation / 4									
A-301, Rapid Power Reduction / 1									
A-307, DAS Operations at Local Cabinets / 7									
FR-C.1, Response to Inadequate Core Cooling / 4									
A-323, Loss of 6.9-kV, 4,160-V, or 480-V Bus Power / 6									
ES-1.1, Passive Safety System Termination / 3									
A-345, Loss of Nuclear Service Water / 4									
A-329, Loss of Instrument Air / 8									
ECA-1.1, Loss-of-Coolant Accident Outside Containment / 3									
FR-H.1, Response to Loss of Heat Sink / 4									
SDP-1, Response to Loss of RCS Inventory During Shutdown / 2									
SDP-2 Response to Loss of RNS During Shutdown / 4									
K/A Category Totals:							Group Point Total:		18/6

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)

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Lastly, based on NRR/IOLB's policy interpretation, there is no need to even have separate Tier 1 and Tier 2 categories since the NRR/IOLB policy interpretation relies only on the lower wording of the K/A statement, and discounts the Tier in which the K/A was selected. It is not reasonable to assume that the authors of ES-401 arbitrarily designed two tiers that were not different. The reasonable assumption is that there was a reason for separate Tier 1 and Tier 2 categories. Tier 2 is "Plant Systems," which was meant to test the configuration of the plant systems and their design. The void is filled by Tier 1, which was meant to test how to operate the plant in accordance with plant procedures when confronted with abnormal/emergency situations that challenge safety.

Some may say that, since the site-specific written exam is not the only portion of the NRC exam that tests abnormal and emergency procedures, it doesn't matter if the quantity of test items requiring knowledge of the content of abnormal/emergency procedures is reduced.

Although the operating portion of the NRC exam does test abnormal and emergency procedure knowledge, the control room "team" and open-reference operating exam format should not be relied upon to satisfy the intent of 10 CFR 55.41(b) which requires a representative selection of the fourteen items, for each individual on a written examination.

Form ES-201-2, Examination Outline Quality Checklist, contains the following items that the facility licensee and Chief Examiner must assess for each NRC exam:

- Written Exam Item 1.c: "Assess whether the outline overemphasizes any systems, evolutions, or generic topics."
- General Item 4.b: "Assess whether the 10 CFR 55.41, 55.43, and 55.45 sampling is appropriate"
- General Item 4.e: "Check the entire exam for balance of coverage."

The Form ES-201-2 Quality Check Items (1.c, 4.b, and 4.e) will not be met because the result of NRR/IOLB's policy is that the number of site specific written exam test items that test abnormal/emergency procedure content will be lower, especially for RO exams, which leads to overemphasis of testing plant systems knowledge on the plant specific written exam.

To illustrate this point, a reactor operator (RO) written exam sample plan was reviewed to identify how many test items would test knowledge of abnormal/emergency procedure content when NRR/IOLB's policy determination was implemented. Specifically, the criteria used in this review was, unless the K/A statement wording specifically included the word "procedure", the test item was assumed to solely test a plant system design feature, interlock, or system operation aspect. The review results identified that only three of the 27 Tier 1 test items would test abnormal/emergency procedure content. Out of all three Tiers, (75 questions on the RO sample plan), a total of only NINE items would test abnormal/emergency procedure knowledge when the NRR/IOLB policy determination was implemented. This review meant that only 12% of the RO test items would be required to test abnormal/emergency procedure knowledge when NRR/IOLB's policy determination was implemented.

Based on this initial review, three additional RO written exam sample plans were independently reviewed, using the same criteria listed above, to verify the first review results.

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)

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### Percentage of 75 RO test items that would test abnormal/emergency procedure knowledge

Second Sample Plan Reviewed:	9% (7/75)
Third Sample Plan Reviewed:	10% (8/75)
Fourth Sample Plan Reviewed:	9% (7/75)

Based on these review results, implementation of NRR/IOLB's policy determination will result in less site-specific RO written exam test items that test abnormal/emergency procedure content, and is a departure from NRC Information Notice 88-40, which described the original methodology for fulfilling the 10 CFR 55.41 "representative selection" requirement for the site-specific written exam, including 10 CFR 55.41(b)(10).

To counter the opposing view that the operating test may somehow compensate for a reduced number of RO abnormal/emergency procedure test items on the site-specific written exam, during the scenario portion of the operating examination, SRO applicants' knowledge of EOPs is evaluated more so than RO applicants' knowledge of EOPs, since the SRO applicants direct RO emergency procedure actions. The site-specific written exam provides the only opportunity to evaluate knowledge of EOPs for RO applicants on an individual basis. The control room "team" and open-reference operating exam format should not be relied upon to satisfy the intent of 10 CFR 55.41(b) which requires a representative selection of the fourteen items, for each individual on a written examination.

One must look no further than pass rates on the operating portion of the examination. Pass rates on the dynamic simulator portion of the examination approach 100%. The percentage of applicants that receive satisfactory scores on more than 80% of the Systems Job Performance Measures (JPMs) also approaches 100%. The majority of operating test failures occur due to the contribution of failing scores on Administrative JPMs; citing a lower overall JPM pass rate for the purpose of justifying a reduced number of abnormal/emergency written test items is misleading because the majority of JPM Section failures occur as a result of the Administrative JPM contribution to the JPM Section failure. Therefore, although the dynamic simulator scenarios and JPMs test applicant knowledge of emergency and abnormal procedures, these sections of the operating exam do not discriminate at the same level as the site-specific RO written exam.

It is noteworthy that, during operating exam scenarios, applicants who are examined in the RO (a.k.a "operator-at-the-controls – OATC") and Balance of Plant (BOP) positions are typically provided direction from the SRO (a.k.a "control room supervisor, CRS"), who reads steps from the emergency procedures. When the SRO provides the directives, the OATC and BOP applicants then carry out the required emergency actions. This operating exam format tests the OATC and BOP applicants' ability to perform emergency actions, but it does not test the same in-depth emergency procedure knowledge that was intended to be tested in the Tier 1 portion of the site-specific written exam.

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### Public Health & Safety Concern

On September 7, 2017, NRR/IOLB published Operator Licensing Feedback Item 401.55, which means that facility licensees will likely develop Tier 1 plant-specific written test items that test less abnormal and emergency operating procedure knowledge. Facility licensees may inappropriately make adjustments to their initial license training program based, in part, on NRR/IOLB's response to Operator Licensing Feedback Item 401.55; therefore, actual consequences may occur as operator procedure knowledge continues to decline (see next paragraph) and plant events are not properly mitigated by operators due to lack of procedure knowledge. Because of NRR/IOLB's policy determination, applicant knowledge of the content of abnormal and emergency procedures, in accordance with 10 CFR 55.41(b)(10), will not be adequately tested on the site-specific written examination, prior to issuance of operator licenses.

On June 1, 2017, INPO identified operator weaknesses in the implementation of abnormal operating and off normal alarm response procedures in INPO IER 17-5, Line of Sight to the Core, (ML17171A309):

*“Reviews of noteworthy events and evaluation data indicate that weaknesses exist in implementation of abnormal operating and alarm response procedures. In the majority of these events, abnormal plant conditions satisfied the entry conditions for multiple procedures, and operators chose implementation paths that resulted in inappropriate operator responses. Gaps in knowledge of abnormal and alarm response procedures led to a perception that it was allowable to be selective concerning procedural steps. Further, several of the events revealed procedural deficiencies resulting from inadequate revisions that, in turn, led to flawed rationale by operators.”*

On March 28, 2010 at H. B. Robinson a 4KV cable fault caused a fire and damaged a transformer, and a second electrical fault and fire was caused by the operators when they inappropriately attempted to reset the generator lockout relay without first ensuring the cause of the lockout was cleared. The part of the event that is relevant to this DPO occurred while the crew was implementing the EOP response following the reactor trip; the operators came very close to losing a RCP seal, due to thermally shocking the seal, because they failed to implement Step 19 (Check RCP Seal Cooling) correctly. Specifically, the operators opened the RCP seal injection valve even though thermal barrier cooling was lost for 39 minutes coincident with no seal injection for 10 to 15 minutes. The operators complied with the procedure step for verifying that a charging pump was operating, when they made the determination that adequate seal injection existed, but did not comply with the intent of the step to verify that seal cooling had been maintained. The March 2010 H.B. Robinson event is a strong example of why testing abnormal/emergency procedure knowledge on the site-specific written exam is important. The final significance determination for the two WHITE findings was documented in NRC Inspection Report 05000261/2011008 (ML110310469).

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)

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### Summary of Concern

NRR/IOLB's policy interpretation, and subsequent communication to industry stakeholders, will result in fewer items that test applicant knowledge of abnormal and emergency procedure content on the site-specific written examination; abnormal and emergency procedures are required to be tested on the site-specific written exam in accordance with 10 CFR 55.41(b)(10). The control room "team" and open-reference operating exam format should not be relied upon to satisfy the intent of 10 CFR 55.41(b) which requires a representative selection of the fourteen items, for each individual on a written examination.

NRR/IOLB's policy interpretation does not ensure that the site-specific written exam tests vendor-specific (Westinghouse, Babcock & Wilcox, Combustion Engineering) EOPs, as required by NUREG-1021.

Facility licensees may inappropriately adjust training programs to reflect the NRR/IOLB policy determination.

Tier 1 site-specific written exam items are intended, whenever possible, to test the applicant's mastery of "how to operate the plant" during abnormal and emergency evolutions, in accordance with the abnormal/emergency procedures. NRR/IOLB's communication to industry in Operator Licensing Feedback Item 401.55 means Tier 1 site-specific written exam test items will likely become an extension of Tier 2 test items. Tier 2 site-specific written exam items are intended to test the applicant's systems knowledge of "how the plant works", and to a lesser degree, some procedure knowledge as it relates to A.2 K/As.

If NRR/IOLB removes or alters the basis statements for the upcoming Revision 3 K/A Catalogs, as published in the Federal Register on April 2017, to facilitate their policy determination, then the experience and wisdom of the industry effort for the Catalogs will be lost, and an unnecessary inconsistency between the operating fleet K/A catalogs and the AP-1000 K/A Catalog, NUREG-2103 will exist.

Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test  
Items (Document Date: 10-10-17)

**Signatures**

The writers of this DPO are Region II examiners, with extensive industry training and/or operating experience, many of which previously held SRO NRC licenses.

[Name (printed) / Signature / Date]

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**Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)**

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The following pages contain important documents associated with this Differing Professional Opinion. Although these documents may be available in ADAMS, the writers of this DPO included these documents as part of the DPO.

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)



### Operator Licensing Program Feedback 9/7/17

ML17249A961

#### **401.55**

Some Tier 1, "Emergency and Abnormal Plant Evolutions," written examination questions have been categorized as deficient, and in some instances, "Unsatisfactory" as a result of the NRC Form ES-401-9 Written Examination Review process because their stated Tier 1 knowledge or abilities (K/A) statement did not reference procedures and, therefore, only required system knowledge to answer.

**Is a proposed Tier 1 written examination question deficient or unacceptable if it does not reference a procedure?**

The Knowledge and Abilities Catalogs for Nuclear Power Plant Operators (K/A Catalogs) (NUREG-1122 and -1123) state that "an emergency plant evolution is any condition, event, or symptom which leads to entry into the plant specific emergency operating procedures (EOPs)" and "an abnormal plant evolution is any degraded condition, event, or symptom not directly leading to an EOP entry condition, but, nonetheless, adversely affecting a safety function."

However, NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," does not require Tier 1 written examination questions to reference a procedure. The Tier 1 category is designated as Emergency and Abnormal Plant Evolutions, but it cannot be completely separated from Plant Systems knowledge (Tier 2 category). Systems are designed to respond to Emergency and Abnormal Plant Evolutions, including design specifications, pressures, automatic actions, etc. and, as such, a Tier 1 question can test for these items, provided the system knowledge tested relates directly to the Emergency or Abnormal Plant Evolution

selected K/A statement, i.e., it matches the K/A statement from the outline. If a question meets its specific K/A statement in its entirety, then it meets the intent of the Tier category it is within, even if it does not specifically test procedural knowledge for a Tier 1 question. For example, a question testing PWR K/A APE 027 AA2.11 - "Ability to determine and interpret RCS pressure as they [RCS Pressure] apply to the Pressurizer Pressure Control Malfunctions" - would be acceptable even if it did not test specific detailed procedural knowledge as long as the Pressurizer Pressure Control Malfunction could ultimately lead to entry into EOPs or Abnormal Operating Procedures (AOPs). Similarly, a question testing BWR K/A EPE 295024 EK2.11 - "Knowledge of the interrelations between High Drywell Pressure and Drywell Spray (RHR) Logic" - would be acceptable if it tested the operator's knowledge as to the actions required to open the interlocked closed Drywell Spray Header Isolation valves upon receipt of a Low Pressure Coolant Injection (LPCI) initiation signal even if the question's conditions did not indicate entry into the EOPs.

In summary, rating a question as an "unacceptable" or "deficient" K/A mismatch, i.e., "unsatisfactory" or in need of "enhancement," because it can be answered based on plant system knowledge as it relates to the referenced Emergency or Abnormal Plant Evolution, is not supported by NUREG-1021. Moreover, testing plant system design features, interlocks, and system operation for conditions, events, or symptoms that lead to entry into EOPs or AOPs and match the Tier 1 K/A statement is not unacceptable simply because the EOPs or AOPs were not entered. Testing plant system design features, interlocks, and system operation will in many instances test 10 CFR 55.41(10) procedural knowledges and abilities albeit without entry into the procedure.

**Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)**

01/2008	<b>OPERATOR LICENSING REPORT ON INTERACTION (ROI)</b>		Interaction No.:	
			ROI-17-09	
<b>Subject:</b>	NUREG 1021, ES-401 Tier 1 written exam test items			
<b>Type of Action:</b>	<b>Waiver:</b>	<b>Policy Interpretation:</b> X	<b>Request for HQ Action:</b>	
<b>From:</b>	Eugene F. Guthrie, Region II OL Branch Chief, OB2	<b>Date:</b>	07/28/15	
<b>Contact Person:</b>	Bruno Caballero, Sr. Operations Engineer RII, OB2			
<b>To:</b>	Nancy L. Saigado, Branch Chief NRR IOLB	<b>Proposed Due Date:</b>	06/01/17	
<b>Info.:</b>	<b>ADAMS Accession No.:</b> ML17165A579			

**Issue/Purpose:**

The purpose of this ROI is to gain agency alignment (policy interpretation) on writing and/or assessing Tier 1 written test items in accordance with ES-401-9, Written Examination Review Worksheet; this ROI presents three differing viewpoints for how Tier 1 test items are required to be written and/or assessed.

**Background:**

Section 1.10, Emergency and Abnormal Evolutions, of the PWR K/A Catalog (NUREG-1122, Rev. 2, Supplement 1), and BWR K/A Catalog (NUREG-1123, Rev. 2, Supplement 1) contain the following definitions:

- **Emergency Evolution:** An emergency plant evolution is any condition, event or symptom which leads to entry into the Emergency Operating Procedures (EOPs). (BWR and PWR Catalogs)
- **Abnormal Evolution:** An abnormal plant evolution is any degraded condition, event, or symptom not directly leading to an EOP entry condition. (PWR Catalog NUREG-1122, page 1.10).
- **Abnormal Evolution:** An abnormal plant evolution is any degraded condition, event, or symptom not directly leading to an EOP entry condition, but, nonetheless, adversely affecting a safety function. (BWR Catalog NUREG-1123, Page 1-10)

Section 1.10.1 (BWR NUREG-1123, Rev 2, Supplement 1), Table 4, K/A Statements for Emergency and Abnormal Plant Evolutions, lists the following K/A stem statements:

**Table 4  
Knowledge and Ability Stem Statements for  
Emergency and Abnormal Plant Evolutions**

E/AK1	Knowledge of the operational applications of the following concepts as they apply to the (EMERGENCY OR ABNORMAL PLANT EVOLUTION): (CFR: 41.8 to 41.10)
E/AK2	Knowledge of the interrelations between (EMERGENCY OR ABNORMAL PLANT EVOLUTION) and the following: (CFR: 41.7 / 45.8)
E/AK3	Knowledge of the reasons for the following responses as they apply to (EMERGENCY OR ABNORMAL PLANT EVOLUTION): (CFR: 41.5 / 45.6)
E/AA1	Ability to operate and / or monitor the following as they apply to (EMERGENCY AND ABNORMAL PLANT EVOLUTION): (CFR: 41.7 / 45.6)
E/AA2	Ability to determine and interpret the following as they apply to (EMERGENCY AND ABNORMAL PLANT EVOLUTION): (CFR: 41.10 / 43.5 / 45.13)

**Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)**

The Summary of Changes for the PWR K/A Catalog (PWR NUREG-1122, Rev 2, Supplement 1) state the following with respect to the Rev 2 changes for NUREG-1122:

**1.7 Revised knowledge and ability stem statements for emergency plant evolutions.**

The knowledge and ability stem statements (categories) for emergency plant evolutions were revised for consistency with the BWR catalog. This involved revising all five (5) knowledge stem statements as shown below. The changes are underlined.

- EK1. Knowledge of the operational implications of the following concepts as they apply to the (EMERGENCY PLANT EVOLUTION):  
(CFR 41.8 / 41.10 / 45.3)
- EK2. Knowledge of the interrelations between (EMERGENCY PLANT EVOLUTION) and the following:  
(CFR 41.7 / 45.7)
- EK3. Knowledge of the reasons for the following responses as they apply to (EMERGENCY PLANT EVOLUTION):  
(CFR 41.5 / 41.10 / 45.6 / 45.13)
- EA1. Ability to operate and / or monitor the following as they apply to (EMERGENCY PLANT EVOLUTION):  
(CFR 41.7 / 45.6)
- EA2. Ability to determine and interpret the following as they apply to (EMERGENCY PLANT EVOLUTION):  
(CFR 43.5 / 45.13)

NUREG-1021, Rev 10, ES-401, Section D.2 (page 6 of 50), and NUREG-1021, Rev 11, ES-401, Section D.2 (page 7 of 52), Select and Develop Questions, both state:

**2. Select and Develop Questions**

- a. Prepare the site-specific written operator licensing examination using a combination of existing, modified, and new questions that match the specific K/A statements in the previously approved examination outline (refer to Section D.1 and ES-201) and the criteria summarized below. Ensure that the questions selected for Tier 3 maintain their focus on plant-wide generic knowledge and abilities and do not become an extension of Tier 2, "Plant Systems."

NUREG-1021, Rev 10, Form ES-401-1 (BWR Written Exam Outline) and Form ES-401-2 (PWR Written Exam Outline) Tier 1 Group 1 and Tier 1 Group 2 Headers are "Emergency and Abnormal Plant Evolutions." For example:

ES-401	3	Form ES-401-2
ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)	Form ES-401-2

Consider the following Tier 1 Emergency/Abnormal Evolution K/A statement and the associated test item:

K/A:  
040AK2.01  
Steam Line Rupture  
Knowledge of the interrelations between the Steam Line Rupture and the following:  
Valves

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Unit 2 is currently heating up following a refueling outage

- RCS Tavg = 520°F
- A Steam line break occurs on the "B" SG just downstream of the steam flow venturi
- The Main Steam Trip Valves receive an automatic close signal

Which ONE of the choices below completes the following statement?

The signal that caused the Main Steam Trip Valves to close is \_\_\_\_\_.

- A. High Steam flow coincident with Lo-Lo Tavg
- B. High Steam Line Differential Pressure
- C. High Steam flow coincident with Lo Steam Pressure
- D. Intermediate Hi-Hi Containment pressure

In this test item, the fault inside containment causes pressure to rise to 17.8 psia, which auto-isolates the Main Steam Trip Valves. The test item could also be linked with the following Tier 2 (Plant Systems) knowledge and abilities statements:

**039, Main and Reheat Steam System (MRSS)**

*K4.08: Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: Interlocks on MSIV and bypass valves*

*A3.02: Ability to monitor automatic operation of the MRSS, including: Isolation of the MRSS*

On the other hand, the intent of the Tier 1 Emergency/Abnormal *Evolution* topic may be more appropriately tested in a different version of the original test item that tests the overall mitigative strategy of the Steam Line Rupture procedure (E-2) in the second portion of this question.

K/A:

040AK2.01

Steam Line Rupture

Knowledge of the interrelations between the Steam Line Rupture and the following:

Valves

10. Unit 2 is currently heating up following a refueling outage

- RCS Tavg = 520°F
- A Steam line break occurs on the B SG one foot downstream of the steam flow venturi.

Which of the following completes both statements?

The signal that should auto-close the Main Steam Trip Valves (MSTVs) is \_\_\_(1)\_\_\_.

In accordance with 2-E-2, Faulted Steam Generator Isolation, if the MSTVs can not be manually closed then the crew is required to close \_\_\_(2)\_\_\_ SG Non-Return Valve(s).

- A. (1) High Steam flow coincident with Lo-Lo Tavg  
(2) only the faulted
- B. (1) High Steam flow coincident with Lo-Lo Tavg  
(2) all
- C. (1) Intermediate Hi-Hi Containment pressure  
(2) only the faulted
- D. (1) Intermediate Hi-Hi Containment pressure  
(2) all

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Consider another Tier 1 K/A example.

**K/A:**

**022AA2.02**

**Loss of Reactor Coolant Makeup**

**Ability to determine and interpret the following as they apply to the Loss of Reactor**

**Coolant Makeup:**

**Charging pump problems**

Unit 1 is at 100%

- The "C" charging pump is running powered from the 1J emergency bus (15J7)
- The "A" charging pump (1-CH-P-1A) is in AUTO
- The "B" charging pump (1-CH-P-1B) is in AUTO

The "C" charging pump trips due to an electrical fault in the motor

Which ONE of the choices below completes the following statements?

\_\_\_(1)\_\_\_ charging pump(s) will automatically start

AND

The crew \_\_\_(2)\_\_\_ have to restore letdown.

- A. (1) Only B  
(2) will
- B. (1) Both A and B  
(2) will
- C. (1) Only B  
(2) will not
- D. (1) Both A and B  
(2) will not

In this test item, both charging pumps receive an auto-start signal and letdown auto-isolates when all charging pump breakers are open at the same time. This test item could also be linked with the Tier 2 (Plant Systems) knowledge and abilities statements:

**004, Chemical Volume & Control System (CVCS)**

**A3.11: Ability to monitor automatic operation of the CVCS, including: Charging/Letdown**

**K6.04: Knowledge of the effect of a loss or malfunction on the following components: Pumps**

**K4.14: Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: Control interlocks on letdown system**

On the other hand, the intent of the Tier 1 Emergency/Abnormal Evolution topic may be more appropriately tested by testing the overall mitigative strategy of the Abnormal Operating Procedure (AP-49):

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**K/A:**  
**022AA2.02**  
**Loss of Reactor Coolant Makeup**  
Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup:  
**Charging pump problems**

- Unit 1 is at 100% with the A charging pump running
- The B charging pump is available with its control switch in AUTO-AFTER-STOP
  - The C charging pump is available with its control switch in AFTER-STOP
- The following indications are noted:
- Charging flow is erratic
  - Charging discharge header pressure is erratic
  - The A charging pump motor amps are erratic
  - The A charging pump trips
  - The B charging pump automatically starts
  - The same erratic indications are noted on the charging header and the B charging pump trips after 30 seconds
- Which of the following choices describes the required actions in accordance with 1-AP-49, Loss of Normal Charging?
- A. Go to 1-AP-48, Charging Pump Cross-Connect
  - B. Perform 1-AP-49 Attachment 2, Venting Charging Pumps
  - C. Immediately start the C charging pump
  - D. Close discharge MOVs on the previously running charging pumps and then start the C charging pump

THREE different viewpoints (licensees and/or examiners) associated with writing and/or evaluating Tier 1 written exam test items are:

**VIEWPOINT #1:**

The CFR item listed under the K/A statement must also be tested for Tier 1 test items, based on the following NUREG-1021 guidance: ES-401, Section D.1.b (page 4 of 50 in Rev 10; page 5 of 52 in Rev 11)

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

- (Fourth bullet)
  - Is it possible to prepare a question at the correct license level related to the subject K/A? A question at the RO level should test one (or more) of the 14 items listed under 10 CFR 55.41(b) that the K/A is linked to, or test at a RO level as determined from the facility's learning objectives. A question at the SRO-only level should test one (or more) of the seven items listed under 10 CFR 55.43(b) that the K/A is linked to, or test at a level that is unique to the SRO job position as determined from the facility's learning objectives.

The 13 items listed in 10 CFR 55.45 (a) are:

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- (1) Fundamentals of reactor theory, including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.
- (2) General design features of the core, including core structure, fuel elements, control rods, core instrumentation, and coolant flow.
- (3) Mechanical components and design features of reactor primary system.
- (4) Secondary coolant and auxiliary systems that affect the facility.
- (5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.
- (6) Design, components, and function of reactivity control mechanisms and instrumentation.
- (7) Design, components, and function of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
- (8) Components, capacity, and functions of emergency systems.
- (9) Shielding, isolation, and containment design features, including access limitations.
- (10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
- (11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.
- (12) Radiological safety principles and procedures.
- (13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.
- (14) Principals of heat transfer, thermodynamics and fluid mechanics.

When a Tier 1 K/A statement has CFR ITEM 7 listed, for example, this means that the Tier 1 test item must be written to test the design, component, and function of control and safety systems such as an automatic feature or valve interlock, etc. The only time the Tier 1 test item is required to test the following items is ONLY if CFR ITEM 10 is listed with the Tier 1 K/A statement:

- an immediate operator action,
- an important subsequent manual operator action,
- a long-range action or overall mitigative strategy, or
- a procedure requirement

The reason why Tier 2 Plant Systems K/A statements include the A2 K/A statements (*"Ability to predict the impacts and ...use procedures to correct, control, or mitigate"*) is because this "makes-up-for" Tier 1 test items that don't test the items listed above associated with the emergency/abnormal evolution.

### VIEWPOINT #2

The 10 CFR 55.41 (a) item listed with a Tier 1 K/A statement does NOT mean that the test item must be written to test that specific CFR 55.41 item; a Tier 1 test item can be written to test ANY of the fourteen 10 CFR 55.41 (a) test items. Furthermore, as long as the stem of the question contains a situation where the crew entered an Emergency Operating Procedure or off-normal annunciator procedure or Abnormal Operating Procedure, then the test item is acceptable if it solely tests a Tier 2 Plant Systems

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)

aspect, such as:

- valve interlock
- automatic system response
- power supply arrangement
- component design
- failure mode

As long as the stem [emphasis added] of the question deals with an emergency/abnormal "evolution" then the answer choices don't necessarily have to test required operator actions listed in emergency/abnormal/off-normal annunciator procedures. The reason why Tier 2 Plant Systems K/A statements include the A2 K/A statements ("*Ability to predict the impacts and ...use procedures to correct, control, or mitigate*") is because this "makes up for" Tier 1 test items that don't test operator actions associated with the emergency/abnormal evolution.

### VIEWPOINT #3

The 10 CFR 55.41 (a) item listed with a Tier 1 K/A statement does NOT mean that the test item must be written to test the specific CFR item. A Tier 1 test item should, whenever possible, be written to test 10 CFR 55.41 (a) Item #10 as it pertains to abnormal and emergency operating procedures:

(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Test items where the stem of the question deals with an emergency/abnormal "evolution", or off-normal situation, are inappropriate Tier 1 test items, and are K/A mismatches, if the test item can be answered solely [emphasis added] with the Tier 2 (Plant Systems) knowledges or abilities such as:

- valve interlock logic
- automatic system response
- power supply arrangement
- component design, or
- equipment failure modes.

Tier 1 test items should, whenever possible, test a knowledge or ability associated with the off-normal annunciator, Abnormal Operating, or Emergency Operating Procedure. For example:

- an immediate operator action,
- an important subsequent manual operator action,
- a long-range action or overall mitigative strategy, or
- a procedure requirement.

The fact that Tier 2 Plant Systems K/A statements include the A2 K/A statements ("*Ability to predict the impacts and ...use procedures to correct, control, or mitigate*") does not mean that Tier 1 test items are allowed to become an extension of Tier 2.

Tier 1 test items where the stem contains an abnormal/emergency evolution, but where the test item can be answered solely with the Tier 2 (Plant Systems) knowledges or abilities listed above, become, in a sense, "window dressing"; these test items should be evaluated as K/A mismatches (unacceptable) in accordance with Form ES-401-9, Written Exam Review Worksheet.

### Recommended Action/Resolution

The three tiers for the site-specific written exam are:

- Tier 1: Emergency/Abnormal Evolutions (or Procedures)
- Tier 2: Plant Systems
- Tier 3: Plant-wide Generic Administrative Requirements

When writing and/or assessing Tier 1 written test items for the current versions of the K/A catalogs,

## Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)

Region II recommends viewpoint #3 because the 10 CFR 55.41 (a) requirement for "a representative selection of questions on the knowledge, skills, and abilities needed to perform licensed operator duties" may be in jeopardy when the written exam "systematic" sample is inappropriately skewed toward Tier 2 (Plant Systems) test items.

Note: It is likely this same issue may still exist when the new versions of the K/A catalogs are issued.

### Final Action/Resolution:

The Region's recommended resolutions ("viewpoints"), that would implement requirements for Tier 1 test item content beyond what is required by NUREG-1021 as discussed below, are not approved.

Viewpoint #1: "The CFR item listed under the K/A statement **must** [emphasis added] also be tested for Tier 1 test items, based on the following NUREG-1021 guidance: ES-401, Section D.1.b (page 4 of 50 in Rev 10; page 5 of 52 in Rev 11)."

**Resolution:** The Region cites as the justification for this proposal guidance from ES-401, D.1.b which states "A question at the RO level **should** [emphasis added] test one (or more) of the 14 items listed under 10 CFR 55.41(b) that the K/A is linked to ..." However, the guidance also states "or test at a level as determined from the facility's learning objectives." While the guidance encourages question content consistent with both the K/A and its listed 10 CFR 55.41, 43, and/or 45 referenced item(s), it does not require or limit the question content as proposed by the Region's viewpoint, i.e., it would be incorrect to conclude that the question content "must" test "the CFR item listed under the K/A statement."

Viewpoint #2: "... a Tier 1 test item can be written to test ANY of the fourteen 10 CFR 55.41 (a) test items. Furthermore, as long as the stem of the question contains a situation where the crew entered an Emergency Operating Procedure or off-normal annunciator procedure or Abnormal Operating Procedure, then the test item is acceptable if it solely tests a Tier 2 Plant Systems aspect ..."

**Resolution:** The Region's proposal is partially correct in that it recognizes, as discussed in the Resolution to Viewpoint #1, that Tier 1 test items "can be written to test ANY" of the 10 CFR 55.41 and/or 55.43 items. However, the BWR and PWR K/A Catalogs state that "an emergency plant evolution is any condition, event or symptom which **leads to entry** [emphasis added] into Emergency Operating Procedures (EOPs)" and "an abnormal plant evolution is any degraded condition, event, or symptom not directly leading to an EOP entry condition." Therefore, contrary to the viewpoint position, entry into an EOP or Abnormal Operating Procedure (AOP) is not required for Tier 1 test items

Viewpoint #2: "The reason why Tier 2 Plant Systems K/A statements include the A2 K/A statements ("Ability to predict the impacts and ...use procedures to correct, control, or mitigate") is because this 'makes up for' Tier 1 test items that don't test operator actions associated with the emergency/abnormal evolution."

**Resolution:** The viewpoint discussion provides no justification to support the assertion that the A2 K/A (b) statement regarding procedure use "makes up for" Tier 1 test items that don't test operator actions associated with the emergency/abnormal evolution." However, even if correct, the A2 K/A (b) statement does not support the proposal that Tier 1 test items require entry into an EOP or AOP.

Viewpoint #3: "The 10 CFR 55.41 (a) item listed with a Tier 1 K/A statement does NOT mean that the test item must be written to test the specific CFR item. A Tier 1 test item should, whenever possible, be written to test 10 CFR 55.41 (a) Item #10 as it pertains to abnormal and emergency operating procedures."

**Resolution:** The Region's proposal is partially correct in that it recognizes the test item is not required to be written, as discussed in the Resolution to Viewpoint #1, to the 10 CFR item that the K/A is linked to. However, there is no justification provided to support the view that "a Tier 1 test item should, whenever possible, be written to test 10 CFR 55.41 (a) Item #10." This assertion is contrary to the justification provided by ES-401 D.1.b (see Viewpoint #1) which promotes testing the 10 CFR item linked by the K/A. Furthermore, while the Viewpoint #1 justification recognizes question testing as determined by the facility's learning objectives in lieu of the linked 10 CFR 55.41 and 55.43 items, it does not support preferentially testing 10 CFR 55.41, Item #10, "Administrative, normal, abnormal, and emergency

**Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)**

operating procedures."

Viewpoint #3: "Tier 1 test items where the stem contains an abnormal/emergency evolution, but where the test item can be answered solely with the Tier 2 (Plant Systems) knowledges or abilities listed above, become, in a sense, "window dressing"; these test items should be evaluated as K/A mismatches (unacceptable) in accordance with Form ES-401-9, Written Exam Review Worksheet."

Resolution: Again, rating a question as an "unacceptable" K/A mismatch because it can be answered based on plant system knowledge as it relates to the referenced Emergency or Abnormal Plant Evolution, is not supported by and is contrary to the one ES-401 justification provided in support of Viewpoint #1. Moreover, testing plant system design features, interlocks, and system operation for conditions, events, or symptoms that lead to entry into EOPs or AOPs and match the Tier 1 K/A statement is not unacceptable simply because the EOPs or AOPs were not entered. Testing plant system design features, interlocks, and system operation will in many instances test 10 CFR 41.10 procedural knowledges and abilities albeit without entry into the procedure.

In summary, each of the viewpoints/proposals presented above would implement test item content requirements more restrictive than currently called for by NUREG-1021. This type of change would likely require a revision or supplement to NUREG-1021 and could result in test items previously assessed as satisfactory for conformance with the reference K/A per the existing NUREG-1021 guidance now being assessed as unacceptable due to their not requiring entry into EOPs or AOPs.

It should also be noted that the program office position regarding the procedural content of Tier 1 test items was presented in a program office assessment (ML17095A958) of the 2016 Brunswick initial examination. The assessment noted that several Tier 1 questions were categorized as deficient because the questions did not reference procedures and only required system knowledge to answer. The assessment concluded that there is nothing in NUREG-1021 that requires Tier 1 questions to reference a procedure and if a question meets its specific K/A, then it meets the intent of the Tier category it is within, even if it does not specifically test procedural knowledge for a Tier 1 question.

OGC review is not necessary since no changes to existing NUREG-1021 guidance or requirements result from the ROI resolution.

<b>Distribution:</b>	RI, RII, RIII, and RIV OLBCs and OLAs and HOIB BC		
<b>Signatures / Concurrences</b>			
<b>Originator:</b>	Eugene F. Guthrie /RA/	<b>Date:</b>	3/30/2017
<b>OGC:</b>	N/A	<b>Date:</b>	
<b>IOLB CH:</b>	Nancy L. Salgado /RA/	<b>Date:</b>	6/7/2017
<b>Distribution Completed by IOLB Secretary (Initials):</b> RVS		<b>Date:</b>	6/14/2017

**Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)**

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

June 22, 1988

NRC INFORMATION NOTICE NO. RR-40: EXAMINERS' HANDBOOK FOR DEVELOPING  
OPERATOR LICENSING EXAMINATIONS

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice provides addressees a copy of NUREG/BR-0122, "Examiners' Handbook for Developing Operator Licensing Examinations." It is expected that recipients will review the information for applicability to their facilities. However, the information contained in this information notice does not constitute NRC requirements; therefore, no specific action or written response is required.

Background:

The NRC staff has developed the above-mentioned handbook to improve the content validity of the operator licensing examinations. The content has been made more valid through the performance of job/task analysis focusing on the delineation of essential knowledge and abilities. Additional copies of this handbook are available for examination and copying for a fee at the Public Document Room of the Nuclear Regulatory Commission, 1717 H Street, N.W., Washington, D.C. 20555.

Discussion:

After the NRC examiners have been trained in the procedures described in NUREG/BR-0122, the format of the operator licensing examinations administered under 10 CFR 55.41 or 55.43 should reflect the sampling plans contained in the handbook. These sampling plans should incorporate the knowledge and abilities requirements contained in NUREG-1122, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors" and NUREG-1123, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors."

The new format will change the sections of the written examinations for all initial and replacement examinations. As detailed in the enclosed handbook, the reactor operator written examination should normally sample: (1) 25% of its content from the fundamentals area (reactor theory, thermodynamics, and

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**Differing Professional Opinion: Operator Licensing Written Exam Tier 1 Test Items (Document Date: 10-10-17)**

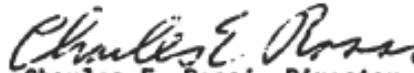
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June 22, 1988  
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component operation), (2) 48% from plant systems and plant-wide safety and administrative procedures, and (3) 27% from emergency and abnormal plant evolutions. For senior reactor operators, the written examination content should normally sample: (1) 24% from fundamentals, (2) 33% from emergency and abnormal evolutions, and (3) 43% from plant systems and plant-wide safety and administrative procedures. Candidates must obtain a score of 70% in each of the three sections and an overall score of 80% to pass the written examination.

After full implementation of the handbook, expected in the fall of 1988, NUREG/BR-0122 will provide guidance to operator licensing examiners for the development of initial and replacement written licensing examinations. The training staff at the plants may wish to become familiar with the handbook as far in advance of their examinations as possible so that there will be a maximum benefit for candidates.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

  
Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical Contact: Susan F. Shankman, NRR  
(301) 492-1053

Attachments:

1. NUREG/BR-0122, "Examiners' Handbook for Developing Operator Licensing Examinations"
2. List of Recently Issued NRC Information Notices

## **Document 2: Memo Establishing DPO Panel**

November 6, 2017

MEMORANDUM TO: Raymond K. Lorson, Panel Chairperson  
Region I

Matthew P. Emrich, Panel Member  
Office of the Chief Human Capital Officer

Charles D. Zoia, Panel Member  
Region III

THRU: Anne T. Boland, Director **/RA/**  
Office of Enforcement

FROM: Renée M. Pedersen **/RA/**  
Sr. Differing Professional Views Program Manager  
Office of Enforcement

SUBJECT: AD HOC REVIEW PANEL - DIFFERING PROFESSIONAL  
OPINION ON OPERATOR LICENSING WRITTEN  
EVALUATIONS – TIER 1 TEST ITEMS (DPO-2017-007)

In accordance with Management Directive (MD) 10.159, "The NRC Differing Professional Opinion Program;" and in my capacity as the Differing Professional Opinion (DPO) Program Manager; and in coordination with Anne Boland, Director, Office of Enforcement, Brian Holian, Acting Director, Office of Nuclear Reactor Regulation; and the DPO submitters; you are being appointed as members of a DPO Ad Hoc Review Panel (DPO Panel) to review a DPO submitted by several NRC employees.

The DPO (Enclosure 1) raises concerns about the recent policy on writing and assessing Tier 1 written examination test items. The DPO has been forwarded to Mr. Holian for consideration and issuance of a DPO Decision.

CONTACTS: Renée Pedersen, OE  
(301) 287-9426

Gladys Figueroa-Toledo, OE  
(301) 287-9497

The DPO Panel has a critical role in the success of the DPO Program. Your responsibilities for conducting the independent review and documenting your conclusions in a report are addressed in the handbook for MD 10.159 in [Section II.F](#) and [Section II.G](#), respectively. The [DPO Web site](#) also includes helpful information, including interactive flow charts, frequently asked questions, and closed DPO cases, including previous DPO Panel reports. We will also be sending you additional information that should help you implement the DPO process. Because this process is not routine, we will be meeting and communicating with all parties during the process to ensure that everyone understands the process, goals, and responsibilities.

Disposition of this DPO should be considered an important and time sensitive activity. The timeliness goal for issuing a DPO Decision is 120 calendar days from the day the DPO is accepted for review. In this case, the DPO was accepted for review on October 16, 2017. The timeliness goal for issuing this DPO Decision is February 13, 2018.

Process Milestones and Timeliness Goals for this DPO are included as Enclosure 2. The timeframes for completing process milestones are identified strictly as goals—a way of working towards reaching the DPO timeliness goal of 120 calendar days. The timeliness goal identified for your DPO task is 75 calendar days from the date of this memorandum (January 20, 2018).

Although timeliness is an important DPO Program objective, the DPO Program also sets out to ensure that issues receive a thorough and independent review. The overall timeliness goal should be based on the significance and complexity of the issues and the priority of other agency work. Therefore, if you determine that your activity will result in the need for an extension beyond the overall 120-day timeliness goal, please send an e-mail to (OD/RA) with a copy to [DPOPM.Resource@nrc.gov](mailto:DPOPM.Resource@nrc.gov) and include the reason for the extension request and a proposed completion date for your work and a proposed timeliness goal for issuance of a DPO Decision. Mr. Holian is responsible for subsequently forwarding the request for a new DPO timeliness goal to the EDO for approval.

An important aspect of our organizational culture includes maintaining an environment that encourages, supports, and respects differing views. As such, you should exercise discretion and treat this matter appropriately. Documents should be distributed on an as-needed basis. In an effort to preserve privacy, minimize the effect on the work unit, and keep the focus on the issues, you should simply refer to the employees as the DPO submitters. Avoid conversations that could be perceived as “hallway talk” on the issue and refrain from behaviors that could be perceived as retaliatory or chilling to the DPO submitters or that could potentially create a chilled environment for others. It is appropriate for employees to discuss the details of the DPO with their co-workers as part of the evaluation; however, as with other predecisional processes, employees should not discuss details of the DPO outside the agency. If you have observed inappropriate behaviors, heard allegations of retaliation or harassment, or receive outside inquiries or requests for information, please notify me.

**On an administrative note, please ensure that all DPO-related activities are charged to Activity Code ZG0007.**

We appreciate your willingness to serve and your dedication to completing a thorough and objective review of this DPO. Successful resolution of the issues is important for NRC and its stakeholders. If you have any questions or concerns, please feel free to contact me or Gladys.

We look forward to receiving your independent review results and recommendations.

Enclosures:

1. DPO-2017-007
2. Process Milestones and Timeliness Goals

cc:

B. Holian, NRR  
M. Evans, NRR  
B. McDermott, NRR  
C. Haney, RII  
B. Caballero, RII  
D. Bacon, RII  
P. Capehart, RII  
M. Meeks, RII  
D. Lanyi, RII  
M. Bates, RII  
D. Lew, RI  
S. Rutledge, OCHCO  
R. Orlikowski, RIII  
A. Boland, OE  
G. Figueroa-Toledo, OE

SUBJECT: AD HOC REVIEW PANEL - DIFFERING PROFESSIONAL OPINION ON  
OPERATOR LICENSING WRITTEN EVALUATIONS – TIER 1 TEST ITEMS  
(DPO-2017-007) DATE: November 6, 2017

ADAMS Package: ML17307A046

MEMO: ML17307A053

Enclosure 1 – ML17290A536

Enclosure 2 – ML17307A059

OE-011

<b>OFFICE</b>	OE: DPO/PM	OE: DPO/PM	OE: D
<b>NAME</b>	GFigueroa	RPedersen	ABoland
<b>DATE</b>	11/ 06 /2017	11/ 06 /2017	11/ 06 /2017

**OFFICIAL RECORD COPY**

## **Document 3: DPO Panel Report**



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
1600 EAST LAMAR BOULEVARD  
ARLINGTON, TEXAS 76011-4511

March 19, 2018

MEMORANDUM TO: Brian E. Holian, Acting Director  
Office of Nuclear Reactor Regulation

FROM: Jeffrey A. Clark, DPO Panel Chair **/RA/**  
Matthew P. Emrich, DPO Panel Member  
Charles D. Zoia, DPO Panel Member

SUBJECT: DIFFERING PROFESSIONAL OPINION PANEL REPORT ON  
OPERATOR LICENSING WRITTEN EXAMINATIONS – TIER 1  
ITEMS (DPO-2017-007)

In a memorandum, dated November 21, 2017, we were appointed as members of a Differing Professional Opinion (DPO) Ad Hoc Review Panel (DPO Panel) to review a DPO regarding Operator Licensing written examinations; Tier 1 Items. The DPO Panel has reviewed the DPO in accordance with the guidance in Management Directive 10.159, "The NRC Differing Professional Opinion Program."

The results of the DPO Panel's evaluation of the concerns raised in the DPO are detailed in the enclosed DPO Panel Report and is submitted for your consideration. Based on our review of concerns raised in the DPO, the DPO Panel made a recommendation, with two additional considerations, if implemented.

Please do not hesitate to contact us if you have any questions regarding the enclosed report.

CONTACT: Jeffrey A. Clark, RIV/DRS  
817-200-1180

Enclosure:  
DPO Panel Report

## **Statement of Issue (SOI)**

The Operator Licensing and Training Branch (IOLB) of the Office of Nuclear Reactor Regulation (NRR) determined that a test item developed for Tier 1 of the site-specific written exam matches the intent of its knowledge or ability (K/A) statement if the test item solely tests plant systems knowledge, such as a design feature, interlock, or automatic operation. IOLB determined it was inappropriate to evaluate Tier 1 test items as “enhancement required” or “inappropriate” on Form ES-401-9, Written Examination Review Worksheet, when the test item did not test knowledge of emergency or abnormal procedures. This determination was documented in Record of Interaction (ROI) 17-09, NUREG 1021, ES-401 Tier 1 Written Exam Test Items (ML17165A579); was disseminated to industry stakeholders in Operator Licensing Feedback Item 401.55 (ML17249A961); and was communicated during an operator licensing examiner training session conducted by IOLB staff on October 19, 2017.

Based on the Panel’s review of the Differing Professional Opinion (DPO) submittal and associated references, and interview and follow-up discussion with the submitters, we determined the following issue was expressed:

Some NRC staff are concerned that the IOLB policy determination conflicts with the purpose of Tier 1 test items to test emergency and abnormal operating procedural knowledge on the site-specific Reactor Operator (RO) written examination, which is required in accordance with 10 CFR 55.41 (b)(10). The staff members contend that the number of RO questions that test abnormal and emergency procedures on the site-specific written exam should not be reduced because the operating exam does not test individual applicant’s procedure knowledge to the same extent as the written exam because:

- Dynamic scenarios are administered in a “team,” open-book environment where the SRO reads or directs emergency/abnormal operating procedure steps to RO applicants, and systems Job Performance Measures (JPMs) are administered by directing the applicant to perform a task in accordance with a specific procedure.

These staff members are concerned that the IOLB policy determination precludes the Chief Examiner from evaluating a Tier 1 test item as “enhancement required” on Form ES-401-9, when the proposed test item does not test abnormal or emergency procedure knowledge *relevant to the K/A statement wording*, which would ensure overall exam balance of coverage for abnormal and emergency operating procedures.

## **Panel Review Summary and Recommendation**

In response to DPO Case Number DPO-2017-007, its associated summary of concern (SOI), and after careful consideration of input obtained through independent research, interviews with the DPO submitters, and interviews with personnel from the IOLB, the DPO Panel offers the following recommendations:

1. A Chief Examiner (CE) should not be prohibited from assessing written examination questions as “enhancement required” for any reasonable situation, since it is the Chief Examiner’s responsibility to ensure balance of coverage throughout the entire exam, as stated on Form ES-201-2, Item 4.e. Enhancements may be assessed per Form ES-401-9 of NUREG-1021, in the opinion of the CE, if the submitted question does not test a relevant concept of the applicable abnormal or emergency operating procedure, or if the question’s link to the specified knowledge and ability (K/A) statement of the test item is weak. Amplifying information is discussed below for how procedural “relevance” can be determined. If the only flaw for a test item being assessed is its link to a “relevant” procedure, then the question should not be assessed as “unsatisfactory.”
2. If recommendation #1 is implemented, IOLB should determine how to promulgate this policy change regarding the assessment of Tier 1 questions to both agency and industry stakeholders. Additionally, IOLB should consider coordinating with the staff at the Technical Training Center (TTC) to include appropriate modifications to the examiner training course (G-107).
3. If recommendation #1 is implemented, IOLB should also assess the necessity of changes to NUREG-1021, “Operator Licensing Examination Standards for Power Reactors.” The DPO Panel does not recommend any substantive changes to the current revision of NUREG-1021, as the current guidance supports recommendation #1. However, the next revision of NUREG-1021 may include clarifying guidance or examples providing the basis for the assessment of Tier 1 written exam questions (similar to what was included in previous revisions regarding SRO only written exam questions).

### **Supporting Information**

The information below provides the basis from which the DPO Panel arrived at the recommendation outlined above. Based on the summary of concern outlined in the DPO, the DPO panel analyzed the applicable sections of the current revision of NUREG-1021 related to written examination construction and evaluation. As a result of this analysis, the DPO Panel noted the following:

1. Per ES-401 of NUREG-1021, Revision 11 (underlined text indicates emphasis added):

“The content of the written licensing examinations for ROs and SROs is dictated by 10 CFR 55.41, “Written Examination: Operators,” and 10 CFR 55.43, “Written Examination: Senior Operators,” respectively. Each examination shall contain a representative selection of questions concerning the knowledge and abilities (K/As) and skills needed to perform duties at the desired license level. Both the RO and SRO examinations will sample the 14 items specified in 10 CFR 55.41(b), and the SRO examination will also sample the 7 additional items specified in 10 CFR 55.43(b).”

“Except as noted in Section D.1.b of this examination standard, NUREG-1122, “Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors,” and

NUREG-1123, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors," available in the Agencywide Documents Access and Management System (ADAMS), provide the basis for developing content-valid operator licensing examinations. Each K/A stem statement has been linked to an applicable item number in 10 CFR 55.41 and/or 10 CFR 55.43. Preparing the license examination using the appropriate K/A catalog, in conjunction with the instructions in this NUREG-series report, will ensure that the Examination includes a representative sample of the items specified in the regulations."

*Conclusion: Following the sample plan methodology as described in NUREG-1021 (and the applicable K/A catalog) ensures that the NRC written exam meets the content requirements as outlined in the items from 10CFR55.41 and 10CFR55.43.*

2. From 10 CFR 55.41:

"(b) The written examination for an operator for a facility will include a representative sample from among the following 14 items, to the extent applicable to the facility.

- (1) Fundamentals of reactor theory, including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.
- (2) General design features of the core, including core structure, fuel elements, control rods, core instrumentation, and coolant flow.
- (3) Mechanical components and design features of the reactor primary system.
- (4) Secondary coolant and auxiliary systems that affect the facility.
- (5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.
- (6) Design, components, and functions of reactivity control mechanisms and instrumentation.
- (7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
- (8) Components, capacity, and functions of emergency systems.
- (9) Shielding, isolation, and containment design features, including access limitations.
- (10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
- (11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.
- (12) Radiological safety principles and procedures.
- (13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.
- (14) Principles of heat transfer thermodynamics and fluid mechanics."

*Note: Items 1 and 14 from the above list are not part of the site-specific NRC licensing examination as they are covered on the Generic Fundamentals Exam.*

3. From 10 CFR 55.43:

"(b) The written examination for a senior operator for a facility will include a representative sample from among the following seven items and the 14 items specified in § 55.41 of this part, to the extent applicable to the facility:

- (1) Conditions and limitations in the facility license.

- (2) Facility operating limitations in the technical specifications and their bases.
- (3) Facility licensee procedures required to obtain authority for design and operating changes in the facility.
- (4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions.
- (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
- (6) Procedures and limitations involved in initial core loading, alterations in core configuration, control rod programming, and determination of various internal and external effects on core reactivity.
- (7) Fuel handling facilities and procedures.”

#### 4. Sample plan methodology / Knowledge and Ability (K/A) Stem Links:

The site-specific written exam sample plan (or exam outline) is divided into 3 distinct Tiers:

Tier 1 → Emergency and Abnormal Plant Evolutions

Tier 2 → Plant Systems

Tier 3 → Generic K/A Categories

As can be observed from Table 1, a properly constructed exam outline (per the requirements of ES-401 and Form ES-401-1) is designed to include K/A stem statements that are linked to all of the items (55.41(b)(2) through 55.41(b)(13)) required by regulation for a Reactor Operator written examination AND all of the items (55.43(b)(1) through 55.43(b)(7)) for a Senior Reactor Operator written examination.

Following the above (which was taken directly from NUREG-1021; ES-401), the K/A catalogs “provide the basis for developing content-valid operator licensing examinations” AND “each K/A stem statement has been linked to an applicable item number in 10 CFR 55.41 and/or 10 CFR 55.43.” With that in mind, consider the following 10 CFR 55.41 and 10 CFR 55.43 links for the K/A statements associated with Tier 1 (Emergency and Abnormal Plant Evolutions) questions on the exam outline (Table 1) {Bold Italics added for emphasis}:

- Reactor Operator
  - (5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.
  - (6) Design, components, and functions of reactivity control mechanisms and instrumentation.
  - (7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
  - (8) Components, capacity, and functions of emergency systems.
  - (9) Shielding, isolation, and containment design features, including access limitations.
  - (10) Administrative, normal, abnormal, and emergency operating procedures for the facility.***
- Senior Reactor Operator
  - (1) Conditions and limitations in the facility license.

- (2) Facility operating limitations in the technical specifications and their bases.
- (3) Facility licensee procedures required to obtain authority for design and operating changes in the facility.**
- (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.**

From the two lists above, only item (10) for the Reactor Operator, and items (3) and (5) for the Senior Reactor Operator specifically mention “procedures.” The **blue-shaded** blocks on Table 1 indicate the K/A stem statements associated with these items for the **Tier 1** section of the exam outline. As highlighted on Table 1, the K/A categories with 10 CFR links to items that refer to “procedures” are K1, A2, and G.

Conversely, the 10 CFR links associated with **Tier 2** questions that refer to “procedures” (blocks highlighted in **green** on Table 1) only include the ‘G’ K/A category. An exception to this observation is the ‘A2’ category, which consists of K/A stem statements that specifically call out procedure selection as part of the required knowledge and ability of the applicant (see example below):

*“Ability to (a) predict the impacts of the following on the RHR/LPCI: INJECTION MODE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations.”*

Based on these observations, The DPO Panel believes that Tier 1 questions in the K1, A2, and G categories should have some procedural aspect associated with them in order to appropriately test the 10 CFR item(s) they are linked to, and be in conformance with the existing regulation. While not explicit (i.e. shall), disregarding the 10 CFR links listed in the K/A stem statements risks not testing in a manner to ensure all of the CFR 55.41 and 10 CFR 55.43 items are sampled.

5. From NUREG-1123 (underlined text indicates emphasis added):

*“...The K/A’s were linked to their applicable 10CFR55 item numbers. SRO level K/A’s were identified by 10CFR55.43 item numbers.” (Taken from NUREG-1123 abstract)*

*“The linkage of K/A’s to the 10 CFR 55.41, 43, and 45 requirements was done to help ensure that the examinations include a representative sample from among the applicable items...” (Taken from NUREG-1123, Rev. 2, Supp.1 – Summary of Significant Changes)*

*“...All knowledge and abilities (K/A’s) in this catalog are directly linked by item number to 10 CFR 55.”*

These statements agree with ES-401, which states that, “Each K/A stem statement has been linked to an applicable item number in 10 CFR 55.41 and/or 10 CFR 55.43.”

Also, from NUREG-1123 related to the Knowledge and Ability Stem Statements for Emergency and Abnormal Plant Evolutions:

**“Table 4  
Knowledge and Ability Stem Statements for  
Emergency and Abnormal Plant Evolutions**

- E/AK1 Knowledge of the operational implications of the following concepts as they apply to the (EMERGENCY OR ABNORMAL PLANT EVOLUTION):  
**(CFR: 41.8 to 41.10)**
- E/AK2 Knowledge of the interrelations between (EMERGENCY OR ABNORMAL PLANT EVOLUTION) and the following:  
(CFR: 41.7 / 45.8)
- E/AK3 Knowledge of the reasons for the following responses as they apply to (EMERGENCY OR ABNORMAL PLANT EVOLUTION):  
(CFR: 41.5 / 45.6)
- E/AA1 Ability to operate and / or monitor the following as they apply to (EMERGENCY AND ABNORMAL PLANT EVOLUTION):  
(CFR: 41.7 / 45.6)
- E/AA2 Ability to determine and interpret the following as they apply to (EMERGENCY AND ABNORMAL PLANT EVOLUTION):  
**(CFR: 41.10 / 43.5 / 45.13)**

*Note: Similar statements are found related to the structural layout of the exam outline and associated K/A stem statement links to 10 CFR 55 for PWR written examinations in NUREG-1122, Revision 2, Supplement 1, and the Advanced Reactor designs (AP-1000 and ABWR) in NUREG-2103 and 2104. Also refer to Tables 2, 3, and 4 (highlighted in the same manner as described above for Table 1) for a comparison of the related K/A stem statement links to 10 CFR 55 for each of the K/A categories that comprise the exam outlines for the additional reactor designs.*

6. From NUREG-1021, Appendix B (underlined text indicates emphasis added):

*“Failing to focus on testing the individual operator’s cognitive abilities (i.e., comprehension, problem-solving, and decision-making) or paying insufficient attention to the operator’s fundamental understanding of job content (e.g., systems, components, and procedures) may ultimately place job performance at risk of gradual degradation.”*

*Conclusion: The random and systematic sampling process used when generating the exam outline in accordance with ES-401 of NUREG-1021 ensures that the written examination is content valid. The job content (for the written examination) that is being tested per existing regulation are those items identified in 10 CFR 55.41 and 55.43. The K/A catalogs link to the knowledges and abilities prescribed in 10 CFR 55 in a specific manner (refer to Tables 1 and 2.) Failing to ensure that written exam questions developed for NRC examination test applicants to meet the intent of the 10 CFR 55 links, creates a risk that all of the 10 CFR 55 items may not be sampled appropriately, and therefore the validity inference that our process was designed to have may become skewed. For example, for those Tier 1 K/A categories previously mentioned, if there was not a procedural aspect for questions in categories K1, K2 (PWR), A2, and G, then the exam may overemphasize plant systems and under-emphasize plant procedures. The chief examiner’s quality assurance checks, per Form ES-201-2 items 4.b and 4.e, specifically direct verifying that the 10 CFR 55.41, 43, and 45 sampling is appropriate and exam coverage is balanced (see the form on the next page.)*

7. From NUREG-1021, ES-201 (underlined text indicates emphasis added):

*“There are no minimum or maximum limits on the number or scope of changes the NRC may direct the facility licensee to make to its proposed examinations, provided that they are necessary to make the examinations conform with established acceptance criteria or to attain an appropriate level of examination difficulty.”*

*Conclusion: The Chief Examiner is responsible for ensuring that the 10CFR55.41, 55.43, and 55.45 sampling is appropriate and exam coverage is balanced for the entire exam. Thus, if the Chief Examiner believes that the licensee’s proposed exam under-emphasizes procedural knowledge, it is not only prudent, but required by the QA checklist in ES-201 for the Chief Examiner to ensure that this issue is corrected prior to approving the exam for administration. This may be performed by either providing “unsatisfactory” or “enhancement required” comments to the licensee via Form ES-401-9.*

### **Final Conclusion**

From the information outlined above, the DPO panel recommends that IOLB partially implement the proposed alternative outlined in the DPO submittal, by implementing the above recommendation. Due to the current guidance in the K/A catalogs and NUREG-1021, the panel also feels that a Chief Examiner would be justified in asking a facility licensee to enhance Tier 1 written examination questions to test a procedural concept in K/A categories K1, K3 (PWR only), A2, and G as relevant to the respective K/A statement, or any other situation where the exam coverage becomes skewed. This approach helps ensure that NRC site-specific written examinations reflect the “representative sample” of 10CFR55 items required by regulation, exams will not over-emphasize plant systems knowledge, or under-emphasize plant procedural knowledge. Test items that appropriately solicit knowledge of plant system operation/response, or design associated with an emergency or abnormal event in categories K2, K3 (BWR only), and A1, should be deemed satisfactory if their K/A statement was met with no other psychometric flaws.

Facility:		Date of Examination:		
Item	Task Description	Initials		
		a	b*	c**
W R I T T E N	1. a. Verify that the outline(s) fit(s) the appropriate model in accordance with ES-401 or ES-401N.			
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 or ES-401N and whether all K/A categories are appropriately sampled.			
	c. Assess whether the outline overemphasizes any systems, evolutions, or generic topics.			
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.			
S I M U L A T O R	2. a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.			
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity, and ensure that each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and that scenarios will not be repeated on subsequent days.			
	c. To the extent possible, assess whether the outline(s) conforms with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D and in Section D.5, "Specific Instructions for the 'Simulator Operating Test,'" of ES-301 (including overlap).			
W A L K T H R O U G H	3. a. Verify that the systems walkthrough outline meets the criteria specified on Form ES-301-2: (1) The outline(s) contains the required number of control room and in-plant tasks distributed among the safety functions as specified on the form. (2) Task repetition from the last two NRC examinations is within the limits specified on the form. (3) No tasks are duplicated from the applicant's audit test(s). (4) The number of new or modified tasks meets or exceeds the minimums specified on the form. (5) The number of alternate-path, low-power, emergency, and radiologically controlled area tasks meets the criteria on the form.			
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1: (1) The tasks are distributed among the topics as specified on the form. (2) At least one task is new or significantly modified. (3) No more than one task is repeated from the last two NRC licensing examinations.			
	c. Determine whether there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.			
G E N E R A L	4. a. Assess whether plant-specific priorities (including probabilistic risk assessment and individual plant examination insights) are covered in the appropriate exam sections.			
	b. Assess whether the 10 CFR 55.41, 55.43, and 55.45 sampling is appropriate.			
	c. Ensure that K/A importance ratings (except for plant specific priorities) are at least 2.5.			
	d. Check for duplication and overlap among exam sections and the last two NRC exams.			
	e. Check the entire exam for balance of coverage.			
	f. Assess whether the exam fits the appropriate job level (RO or SRO).			
<div style="border: 1px solid red; padding: 2px; display: inline-block;">Printed Name/Signature</div>		Date		
a. Author	_____	_____		
b. Facility Reviewer (*)	_____	_____		
c. NRC's Chief Examiner (#)	_____	_____		
d. NRC Supervisor	_____	_____		
<p>* Not applicable for NRC-prepared examination outlines.                  # The independent NRC reviewer initials items in column "c"; the chief examiner's concurrence is required.</p>				

Table 1: K/A Stem Statement Links to 10CFR55.41 and 10CFR55.43 (NUREG-1123)

		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*
Tier 1	Group 1	41.8 to 41.10	41.7	41.5	N/A			41.7	41.10 and 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.8 to 41.10	41.7	41.5	N/A			41.7	41.10 and 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
Tier 2	Group 1	41.2 to 41.9	41.7	41.7	41.7	41.5	41.7	41.5	41.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.2 to 41.9	41.7	41.7	41.7	41.5	41.7	41.5	41.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
*Generic K/As as outlined in ES-401, Section D.1.b (see "G" column above)												
	Conduct of Operations	Equipment Control	Radiation Control	Emergency Procedures / Plan								
Tier 3 (Generic K/A's only)	41.1, 41.2, 41.5, 41.7, 41.10, 43.2, 43.5, 43.6, 43.7	41.5, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5	41.11, 41.12, 41.13, 43.4	41.6, 41.7, 41.10, 41.12, 43.1, 43.2, 43.5								

Table 2: K/A Stem Statement Links to 10CFR55.41 and 10CFR55.43 (NUREG-1122)

		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*
Tier 1	Group 1	41.8, 41.10	41.7	41.5, 41.10	N/A			41.7	41.7, 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.8, 41.10	41.7	41.5, 41.10	N/A			41.7	41.7, 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
Tier 2	Group 1	41.2 to 41.9	41.7	41.7	41.7	41.5	41.7	41.5	41.5, 43.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.2 to 41.9	41.7	41.7	41.7	41.5	41.7	41.5	41.5, 43.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
*Generic K/As as outlined in ES-401, Section D.1.b (see "G" column above)												
	Conduct of Operations	Equipment Control	Radiation Control	Emergency Procedures / Plan								
Tier 3 (Generic K/A's only)	41.1, 41.2, 41.5, 41.7, 41.10, 43.2, 43.5, 43.6, 43.7	41.5, 41.6, 41.7, 41.10, 43.2, 43.1, 43.2, 43.3, 43.5, 43.6	41.11, 41.12, 41.13, 43.4	41.6, 41.7, 41.10, 41.12, 43.1, 43.2, 43.5								

Table 3: K/A Stem Statement Links to 10CFR55.41 and 10CFR55.43 (NUREG-2103)

		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*
Tier 1	Group 1	41.8, 41.10	41.5, 41.7	41.5, 41.10	N/A			41.5, 41.7	41.7, 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.8, 41.10	41.5, 41.7	41.5, 41.10	N/A			41.5, 41.7	41.7, 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
Tier 2	Group 1	41.2 to 41.9	41.7	41.7	41.7	41.7	41.7	41.5	41.5, 43.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.2 to 41.9	41.7	41.7	41.7	41.7	41.7	41.5	41.5, 43.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
*Generic K/As as outlined in ES-401, Section D.1.b (see "G" column above)												
	Conduct of Operations	Equipment Control	Radiation Control	Emergency Procedures / Plan								
Tier 3 (Generic K/A's only)	41.1, 41.2, 41.5, 41.7, 41.10, 43.1, 43.2, 43.5, 43.6, 43.7	41.5, 41.6, 41.7, 41.10, 43.2, 43.1, 43.2, 43.3, 43.5, 43.6	41.11, 41.12, 41.13, 43.4	41.6, 41.7, 41.10, 41.12, 43.1, 43.2, 43.5								

Table 4: K/A Stem Statement Links to 10CFR55.41 and 10CFR55.43 (NUREG-2104)

		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*
Tier 1	Group 1	41.8 to 41.10	41.7	41.5	N/A			41.7	41.10, 43.5	N/A		41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.8 to 41.10	41.7	41.5				41.7	41.10, 43.5			41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
Tier 2	Group 1	41.2 to 41.9	41.7	41.7	41.7	41.5	41.7	41.5	41.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
	Group 2	41.2 to 41.9	41.7	41.7	41.7	41.5	41.7	41.5	41.5	41.7	41.7	41.5, 41.6, 41.7, 41.10, 43.1, 43.2, 43.3, 43.5
*Generic K/As as outlined in ES-401, Section D.1.b (see "G" column above)												
	Conduct of Operations	Equipment Control	Radiation Control	Emergency Procedures / Plan								
Tier 3 (Generic K/A's only)	41.1, 41.2, 41.5, 41.7, 41.10, 43.1, 43.2, 43.5, 43.6, 43.7	41.5, 41.6, 41.7, 41.10, 43.2, 43.1, 43.2, 43.3, 43.5, 43.6	41.11, 41.12, 41.13, 43.4	41.6, 41.7, 41.10, 41.12, 43.1, 43.2, 43.5								

DIFFERING PROFESSIONAL OPINION PANEL REPORT ON OPERATOR LICENSING  
WRITTEN EXAMINATIONS – TIER 1 ITEMS (DPO-2017-007) – MARCH 19, 2018

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## **Document 4: DPO Decision**



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

April 27, 2018

MEMORANDUM TO: Bruno L. Caballero, Senior Operations Engineer  
Operations Branch 2  
Division of Reactor Safety  
Region II

Daniel M. Bacon, Senior Operations Engineer  
Operations Branch 1  
Division of Reactor Safety  
Region II

David R. Lanyi, Senior Operations Engineer  
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Region II

Michael K. Meeks, Senior Operations Engineer  
Operations Branch 1  
Division of Reactor Safety  
Region II

FROM: Brian E. Holian, Acting Director /RA/  
Office of Nuclear Reactor Regulation

SUBJECT: DIFFERING PROFESSIONAL OPINION INVOLVING  
OPERATOR LICENSING WRITTEN EXAMINATIONS – TIER 1  
ITEMS (DPO 2017-007)

On October 10, 2017, in accordance with Management Directive 10.159, "The NRC Differing Professional Opinions Program," you submitted a differing professional opinion (DPO) involving operator licensing written examinations (DPO-2017-007). Specifically, your DPO raises concerns that the recent policy determination made by NRR staff for writing and assessing Tier 1 written examination test items has the potential to undermine the 10 CFR 55.41 that the

CONTACT: Trent L. Wertz, NRR  
301-415-1568

written examination should contain a representative selection of questions on the knowledge, skills, and abilities needed to perform licensed operator duties. Specifically, the policy interpretation will result in fewer questions that test the operator's knowledge of abnormal and emergency procedures. The purpose of this memorandum is to respond to your DPO.

On January 21, 2017, a DPO Ad Hoc Review Panel (the Panel) was established and tasked to meet with you, review your DPO submittal, and issue a DPO report, including conclusions and recommendations to me regarding the disposition of the issues presented in your DPO. On March 19, 2018, after reviewing the applicable documents, completing internal interviews of relevant individuals and completing their deliberations, the Panel issued their report to me.

On April 19, 2018, I talked to you by telephone to discuss the Panel's report and to get your insights and comments. On April 25, 2018, you provided me additional insights into your concerns and your thoughts for resolving the issue.

In order to make a decision with regard to your DPO, I reviewed your DPO submittal, the Panel's report, met with the headquarters operator licensing staff, talked with you, and then re-considered your comments to me. In addition, on April 26, 2018, I discussed these issues with the DPO Panel Chair

#### Statement of Concern

The Operator Licensing and Training Branch (IOLB) of the Office of Nuclear Reactor Regulation (NRR) determined that a test item developed for Tier 1 of the site-specific written exam matches the intent of its knowledge or ability (K/A) statement if the test item solely tests plant systems knowledge, such as a design feature, interlock, or automatic operation. IOLB determined it was inappropriate to evaluate Tier 1 test items as "enhancement required" or "inappropriate" on Form ES-401-9, Written Examination Review Worksheet, when the test item did not test knowledge of emergency or abnormal procedures. This determination was documented in Record of Interaction (ROI) 17-09, NUREG 1021, ES-401 Tier 1 Written Exam Test Items (ML17165A579); was disseminated to industry stakeholders in Operator Licensing Feedback Item 401.55 (ML17249A961); and was communicated during an operator licensing examiner training session conducted by IOLB staff on October 19, 2017.

Based on the Panel's review of the Differing Professional Opinion (DPO) submittal and associated references, and interview and follow-up discussion with the submitters, the panel determined the following issue was expressed:

Some NRC staff are concerned that the IOLB policy determination conflicts with the purpose of Tier 1 test items to test emergency and abnormal operating procedural knowledge on the site-specific Reactor Operator (RO) written examination, which is required in accordance with 10 CFR 55.41 (b)(10). The staff members contend that the number of RO questions that test abnormal and emergency procedures on the site-specific written exam should not be reduced because the operating exam does not test individual applicant's procedure knowledge to the same extent as the written exam because:

- Dynamic scenarios are administered in a "team," open-book environment where the SRO reads or directs emergency/abnormal operating procedure steps to RO applicants, and systems Job Performance Measures (JPMs) are administered by directing the applicant to perform a task in accordance with a specific procedure.

These staff members are concerned that the IOLB policy determination precludes the Chief Examiner (CE) from evaluating a Tier 1 test item as “enhancement required” on Form ES-401-9 when the proposed test item does not test abnormal or emergency procedure knowledge *relevant to the K/A statement wording*, which would ensure overall exam balance of coverage for abnormal and emergency operating procedures.

### Panel Recommendations

The Panel concluded and recommended the following:

1. A CE should not be prohibited from assessing written examination questions as “enhancement required” for any reasonable situation, since it is the Chief Examiner’s responsibility to ensure balance of coverage throughout the entire exam, as stated on Form ES-201-2, Item 4.e. Enhancements may be assessed per Form ES-401- 9 of NUREG-1021, in the opinion of the CE, if the submitted question does not test a relevant concept of the applicable abnormal or emergency operating procedure, or if the question’s link to the specified knowledge and ability (K/A) statement of the test item is weak. Amplifying information is discussed below for how procedural “relevance” can be determined. If the only flaw for a test item being assessed is its link to a “relevant” procedure, then the question should not be assessed as “unsatisfactory.”
2. If recommendation #1 is implemented, IOLB should determine how to promulgate this policy change regarding the assessment of Tier 1 questions to both agency and industry stakeholders. Additionally, IOLB should consider coordinating with the staff at the Technical Training Center (TTC) to include appropriate modifications to the examiner training course (G-107).
3. If recommendation #1 is implemented, IOLB should also assess the necessity of changes to NUREG-1021, “Operator Licensing Examination Standards for Power Reactors.” The DPO Panel does not recommend any substantive changes to the current revision of NUREG-1021, as the current guidance supports recommendation #1. However, the next revision of NUREG-1021 may include clarifying guidance or examples providing the basis for the assessment of Tier 1 written exam questions (similar to what was included in previous revisions regarding SRO only written exam questions).

After considering all the information, I essentially agree with the recommendations provided by the DPO panel. They have thoroughly and conscientiously endeavored to address your well-thought out and articulated concerns. I have the following comments/clarifications to the recommendations.

Regarding Recommendations 1 and 3, I directed my staff to revise the Operator Licensing Program Feedback response (Question 401.55) to clarify that CEs are allowed to make reasonable changes for balance of coverage throughout the examination. I agree that Tier 1 test items should, when relevant, test abnormal/emergency procedure knowledge. However, when there is a proper balance in the overall exam, not having a Tier 1 question tie to a procedure is not basis to remove it from the test. I considered the amplifying information referenced in Recommendation 1 and find there is no need to revise the current guidance that written examination questions should, but are not required to, test one of the 10 CFR 55 written examination items that the K/A is linked to, or to a facility learning objective. This is, in part,

because the linkage of K/A items to 10 CFR 55 written examination items does not represent an exhaustive list. I have assigned the above task to DIRS, NRR, to be completed by June 30, 2018.

Regarding Recommendation 2, the acknowledgement that CEs may request enhancements to written examination items, including the failure to test a "relevant" procedural concept will be promulgated through a revision to ROI 17-09 and an update to Question 401.55 on the Operator Licensing Program Feedback webpage. This action is also assigned to DIRS, NRR, to be completed by June 30, 2018.

A summary of the DPO will be included in the Weekly Information Report (when the case is closed) to advise interested employees of the outcome.

Thank you for raising your DPO and for your active participation in the DPO process. An open and thorough exploration of how we carry out our regulatory processes is essential to keeping these programs effective. Your willingness to raise concerns with your colleagues and managers and ensure that your concerns are heard and understood is admirable and vital to ensuring a healthy safety culture within the Agency.

Enclosure:

DPO Panel report, dated March 19, 2018

cc: R. Lorson, NRR  
M. Evans, NRR  
A. Boland, OE  
G. Figueroa-Toledo, OE  
C. Haney, RII  
C. Miller, NRR  
M. Johnson, OEDO

SUBJECT: DIFFERING PROFESSIONAL OPINION INVOLVING OPERATOR LICENSING  
WRITTEN EXAMINATIONS – TIER 1 ITEMS (DPO 2017-007)  
DATED APRIL 27, 2018

**ADAMS Accession No. Pkg: ML18117A132; DPO: ML18117A079; Enclosure: ML18079A001**

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DATE	4/27/18

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