Post-examination Comments

CATAWBA OCTOBER 2004

EXAM 50-413, 414/2004-301
OCTOBER 4 - 8, 2004 &
OCTOBER 13, 2004 (WRITTEN)

Licensee Submitted Post-examination Comments

[ ] Attached

[ ] None

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October 19, 2004

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Subject: Duke Energy Corporation
Catawba Nuclear Station, Unit 1 and 2
Docket No.: 50-413 and 50-414
50-413/2004-301 and 50-414/2004-301
Post-Examination Documentation

The enclosed post-examination documentation is provided in accordance with NUREG-1021, Section 501. This post-examination documentation is associated with the Catawba Nuclear Station initial written licensing examinations administered on October 13, 2004.

If you have any questions, please contact John Suptela at (803) 831-5123.

Sincerely,

Dhiaa M. Jamil

/ken

xc: with attachments

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SRO Test Question: 4 (Bank number 571.3) (attached)

Premise of the Question: The question postulates that a small break LOCA has occurred and asks for the priority of available methods to depressurize the reactor coolant (NC) system and the major concern during depressurization.

Problem: There is no correct answer to this question as written. The question was changed during discussions with the NRC to enhance the psychometric balance of the distracters. The revision to the correct answer made it incorrect.

Justification: The correct answer was changed during the exam review to read as follows:

A. 1. Pressurizer spray – PORV - Auxiliary Spray
2. ~~To prevent~~ Voiding in the upper head ~~and refilling the pressurizer to a solid water condition~~.

The primary concern during the depressurization of the reactor coolant system is to prevent the pressurizer from going solid. This condition is caused by a loss of subcooling which causes a void to be formed in the upper head. This void, if significant, can cause the pressurizer level to increase rapidly and lead to a water solid condition. The voiding is the cause, not the major concern. In fact, the ES-1.2 Bases Document states that a loss of subcooling may cause voiding to occur. The depressurization should only be stopped to avoid a water solid condition in the pressurizer, not to stop voiding in the reactor coolant system.

This change to the answer and distracter C caused the answer to deviate from the EOP bases document, which states (emphasis added):

"STEP 16 NOTE 1 : Deleted

PURPOSE:

To inform the operator that pressurizer level may increase rapidly during NC system depressurization with no NC pumps running due to voiding in the upper head region.

APPLICABLE ERG BASIS:

Without NC pumps running, there is very little flow into the upper head region. Liquid in that region remains relatively hot even though the liquid temperature in the active regions for the NC system has been significantly reduced during the NC system cooldown. As the NC system is subsequently depressurized, the hotter liquid in the upper head may flash to steam, forming an upper head void. Steam formation in the upper head will displace water into the Pzr, causing rapidly increasing Pzr level with the potential for water relief through the Pzr PORVs. The Pzr may fill with water within a

few minutes. This note informs the operator of the potential for this condition, so that NC depressurization can be stopped quickly to avoid a water solid Pzr."

The note that precedes step 16 of ES-1.2 states:

"**NOTE** The upper head region may void during NC System depressurization if NC pumps are not running. This will result in a rapidly increasing Pzr level."

By removing the portion of the answer ("*refilling the pressurizer to a water solid condition*") the correct answer was revised to become incorrect. Voiding is not a major concern, but is a cause for the major concern. Indeed, the EOP bases for step 16 goes on to state:

"KNOWLEDGE/ABILITY:

NC depressurization should not be limited or stopped due to impending loss of subcooling. If subcooling is lost during the depressurization, it will be reestablished after the depressurization is stopped, as the NC system continues to cooldown. Escalation of the Emergency classification due to loss of subcooling per this step is not warranted, since the loss of subcooling in this instance is not an indication of uncontrolled depressurization, or of inadequate injection flow."

While a loss of subcooling may cause a void in the reactor vessel, the concern is not the void itself, which may be inevitable, but rather the effect that the void will have on filling the pressurizer to a water solid condition.

In addition, the applicants noted that distracter B is "more correct" than the intended answer, "A". The ES-1.2 bases document states:

If normal spray is not available, use of one Pzr PORV has priority over auxiliary spray. Auxiliary spray is used as a last resort to minimize thermal shock to the spray nozzles.

Thermal shock to the spray nozzles is a major concern, but only if auxiliary spray flow is used. It is not a major concern if normal spray or PORVs are used to depressurize the reactor coolant system. This fact makes distracter B partially but not completely correct.

Solution: The applicants contended that there was no correct answer to this question. After review of their contention, it was determined that deleting this question from the SRO exam was appropriate.

References:

1. SRO Test Question: 4 (Bank number 571.3)
2. EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization) page 12
3. ES-1.2 Background Document step 16 pages 19-22

Bank Question: 571.3 ***Answer: A***

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1 Pt(s) Unit 2 is responding to a small break LOCA in ES-1.2, (*Post LOCA Cooldown and Depressurization)*. Step 16 of ES-1.2 requires the operators to depressurize the NC system.

Which one of the following statements correctly describes:

1. The priority for using the prescribed methods of depressurizing the NC system, and
2. The major concern during NC system depressurization?

A. **1. Pressurizer spray – PORV - Auxiliary Spray**
2. Voiding in the upper head

B. **1. Pressurizer spray – PORV - Auxiliary Spray**
2. Thermal shocking the pressurizer spray nozzles.

C. **1. PORV – Auxiliary Spray – Pressurizer Spray**
2. Voiding in the upper head

D. **1. PORV – Auxiliary Spray – Pressurizer Spray**
2. Thermal shocking the pressurizer spray nozzles.

Distracter Analysis: There is a note in ES-1.2 just prior to step 16 that states:

NOTE The upper head region may void during NC System depressurization if NC pumps are not running. This will result in a rapidly increasing Pzr level.

A. **Correct**: Right priority – right bases.

B. **Incorrect:** Thermal shocking the pressurizer nozzles is not the concern in ES-1.2.
Plausible: The priority of depressurization methods is correct. Thermal shock is a common concern in other procedures. IN addition, thermal shock would be a concern whenever pressurizer spray is used – but not the primary concern for this Note.

C. **Incorrect**: Pressurizer spray preferred over PORV and aux spray
Plausible: Partially correct – the primary concern is right.

D. **Plausible**: Pressurizer spray preferred over PORV and aux spray. Thermal shocking the pressurizer nozzles is not the concern in ES-1.2
Plausible: If the candidate thinks that thermal shocking the Pzr nozzles is the concern, then the priority of depressurization methods

makes the most sense – depressurization by using the Pzr spray system is the last priority.

Level: SRO Exam

KA: WE03 G2.1.32 (3.4 /3.8)

Lesson Plan Objective: EP2 Obj: 24

Source: MOD Ques_571.1

Level of knowledge: memory

References:
1. ES-1.2 pages 12-14
2. OP-CN-EP-EP2 pages 10-11
3. ERG Background Document ES-1.2 step 16 pages 19-22

KA W/E03 LOCA Cooldown – Depress 2.1.32 Ability to explain and apply all system limits and precautions. (3.4/3.8) (CFR: 41.10 / 43.2 / 45.12)

Objective: EP-EP2 24 Explain the Bases, including any identified knowledges/abilities, for all of the steps, notes, and cautions in EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. **Verify S/I is in service as follows:** — **GO TO Step 25.**

__ • At least one NI pump - ON

OR

__ • 1NI-9A (NV Pmp C/L Inj Isol) - OPEN

OR

__ • 1NI-10B (NV Pmp C/L Inj Isol) - OPEN

OR

• At least one ND pump on with suction aligned to either of the following:

__ • FWST

OR

__ • Containment sump.

__ 15. **Place all Pzr heaters in manual and off.**

NOTE The upper head region may void during NC System depressurization if NC pumps are not running. This will result in a rapidly increasing Pzr level.

16. **Depressurize NC System to refill Pzr as follows:**

__ a. Depressurize using maximum normal Pzr spray valve(s) until Pzr level is greater than 25% (34% ACC).

a. Perform the following:

__ 1) Depressurize using one Pzr PORV until Pzr level is greater than 25% (34% ACC).

(RNO continued on next page)

STEP 16 NOTE 1 : The upper head region may void during NC System depressurization if NC pumps are not running. This will result in a rapidly increasing Pzr level.

PURPOSE:

APPLICABLE ERG BASIS:

PLANT SPECIFIC INFORMATION:

KNOWLEDGE/ABILITY:

STEP 16 NOTE 1 : Deleted

PURPOSE:

To inform the operator that pressurizer level may increase rapidly during NC system depressurization with no NC pumps running due to voiding in the upper head region.

APPLICABLE ERG BASIS:

Without NC pumps running, there is very little flow into the upper head region. Liquid in that region remains relatively hot even though the liquid temperature in the active regions for the NC system has been significantly reduced during the NC system cooldown. As the NC system is subsequently depressurized, the hotter liquid in the upper head may flash to steam, forming an upper head void. Steam formation in the upper head will displace water into the Pzr, causing rapidly increasing Pzr level with the potential for water relief through the Pzr PORVs. The Pzr may fill with water within a few minutes. This note informs the operator of the potential for this condition, so that NC depressurization can be stopped quickly to avoid a water solid Pzr.

PLANT SPECIFIC INFORMATION:

KNOWLEDGE/ABILITY:

STEP 16: Depressurize NC System to refill Pzr as follows:

PURPOSE:

To depressurize the NC System to restore Pzr level using preferred or alternate methods for restoring Pzr level.

APPLICABLE ERG BASIS:

The combination of subcooling and Pzr level ensures that NC System conditions are under adequate operator control. Subcooling should have been established before entry to this step. If subcooling is lost during the depressurization, it will be reestablished after the depressurization is stopped as the NC System continues to cool down.

If NC pump(s) are running, normal Pzr spray is the preferred means of restoring Pzr level. Level can be restored with normal spray since S/I flow increases and break flow decreases as the NC System is depressurized.

If normal spray is not available, use of one Pzr PORV has priority over auxiliary spray. Auxiliary spray is used as a last resort to minimize thermal shock to the spray nozzles. In order to successfully initiate auxiliary spray flow, the flow through the S/I lines must first be isolated, since sufficient ΔP will not be available across the auxiliary spray line with the S/I lines open to deliver adequate spray flow.

If the charging flow control valve is not fully open, auxiliary spray flow may not be effective. In addition, auxiliary spray flow may not be effective due to the elevation differences of the pray nozzles unless charging flow to the loops is isolated and the normal PZR spray flow valves are closed. Therefore, the steps necessary for establishing auxiliary spray flow are incorporated into this step. The intent of this action is to establish an auxiliary spray flow path (e.g., open charging flow control valve, ensure the charging line isolation valves are open, isolate charging header from the loops and close the normal spray valves.)

This step is performed immediately before starting an NC pump in the next step. Transitions from other steps when Pzr level is low are also possible. For all possible entries, the NC System should be subcooled prior to NC System depressurization. Since this prior subcooling requirement ensures a small break, subcooling should be restored with continued cooldown if subcooling is lost during the depressurization.

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PLANT SPECIFIC INFORMATION:

If NV aux spray must be used, the flowrate through the regenerative heat exchanger must be considered when throttling charging flow to obtain the desired pressure response. Catawba's Regenerative Heat Exchanger (RHX) maximum flow rate is 180 GPM, per calculation CNC 1201.06-00-0010. A value of 180 GPM charging flow (which includes seal injection flow and actual RHX flow) is conservatively used in the procedure to ensure compliance with the flow limitation.

The NC pressure response to opening the Pzr spray valves may be minimal but as long as normal spray is available (capable of being opened and an operating NC pump is associated with a spray valve) the operator should continue to perform the step with normal Pzr spray and not transition to the RNO to use the Pzr PORV. When Pzr level is restored, the expectation is to close the appropriate valve used to depressurize and restore Pzr level.

KNOWLEDGE/ABILITY:

NC depressurization should not be limited or stopped due to impending loss of subcooling. If subcooling is lost during the depressurization, it will be reestablished after the depressurization is stopped, as the NC system continues to cooldown. Escalation of the Emergency classification due to loss of subcooling per this step is not warranted, since the loss of subcooling in this instance is not an indication of uncontrolled depressurization, or of inadequate injection flow.

It is not critical to maintain level above the top of the heaters. In many cases, the level (and pressure) will increase after the operator stops the depressurization until injection flow balances break flow and loss due to cooldown shrink.

SRO Test Question #21 (Bank #1197)

Premise: This question tested the applicants' knowledge of the ORAM-SENTINAL Program that is used to manage maintenance activities and establish shutdown risk states during outages. The question asked what level of administrative control is required when the risk state is ORANGE.

Problem: There are two correct answers to this question depending on the source used. NSD-415 *(Operational Risk Management (Modes 1-3) Per 10CFR50.65(a.4))* requires that a written risk management plan be in place for an ORANGE condition. A PORC review of the maintenance activity is not required unless the risk state is RED. The candidates contended that distracter "D" was also correct.

Justification: The original version of this question submitted to the NRC had included NSD-415 as a provided reference for this question. Catawba Nuclear Training does not require applicants to memorize the contents of NSD-415 and considered it appropriate to provide the reference. Through discussions with the NRC, the reference was removed from the test.

The applicants' contended that the Work Process Manual (*WPM-609 On-Line Risk Assessment Utilizing ORAM-SENTINEL*) required PORC reviews to be completed for planned entries into ORANGE conditions. The WPM had not been included in the original question because it was expected that the applicant would refer to NSD-415 for the answer. In addition, the author of this question did not recognize that the administrative guidance contained in the WPM differed with NSD-415 on this specific subject. Validation testing did not reveal this problem because NSD-415 had been provided to the pilot testers.

Removal of the NSD-415 reference material required the candidates to answer the question from memory. Some candidates answered the question based on their recollection of NSD-415 and some answered the question based on their recollection of the WPM. Both answers are considered correct in the operational context of making this decision in the plant.

The WPM is a lower-tier document to the NSD and may set more restrictive requirements. Although the question asked specifically for the requirements contained in NSD-415, the applicants/operators are not expected to memorize this document.

It should be noted that NSD-415 was revised in May of 2004 with an effective date of 7/1/04 (which was one day past the cutoff date for the reference freeze) and the new revision requires PORC approval for any planned ORANGE condition.

Solution: As a result, fundamental fairness requires that both answers "C" and "D" be accepted as correct. In the actual plant, the operators would consult the WPM to determine the administrative requirements if they were uncertain of the requirements. However, the question specifically asks for the answer contained in NSD-415. It would

be incorrect to accept "D" as the only "correct" answer because the question asks for the NSD-415 requirements. It similarly would be unfair to accept only "C" as the correct answer without providing NSD-415 as the reference source. The proper and fair solution is to accept both answers "C" and "D".

References:
1. SRO Test Question #21 (Bank #1197)
2. WPM 609 Pages 13-14
3. NSD-415 pages 13-14 rev 1
4. NSD-415 page 13 rev 2 (effective 7/1/04)

Bank Question: 1197 ***Answer: C***

1 Pt(s) Unit 1 was operating at 100% power. The ORAM-SENTINAL risk model indicates that a planned work activity places the plant in an ORANGE condition.

Which one of the following statements correctly describes the required steps to be taken to ensure risk is managed in accordance with NSD-415 (*Operational Risk Management (Modes 1-3) Per 10CFR50.65(a.4))?*

A. Work will not be scheduled until the PRA model has been modified to properly model this activity.

B. Operations and Maintenance personnel shall discuss the planned work activity to increase Operator and Maintenance awareness of the risk of the work activity.

C. There must be a written Risk Management Plan overseen by the Work Control organization.

D. This work activity is not normally allowed and will not be scheduled without Plant Operational Review Committee (PORC) approval.

Distracter Analysis:

A. **Incorrect**: This is required for WHITE conditions.
Plausible: If the applicant is not familiar with NSD-415.

B. **Incorrect**: This is required for YELLOW conditions.
Plausible: If the applicant is not familiar with NSD-415.

C. **Correct**:

D. **Incorrect**: PORC approval is required only for RED conditions.
Plausible: If the applicant is not familiar with NSD-415.

Level: SRO Exam

KA: G2.2.20 (2.2/3.3)

Lesson Plan Objective: none

Source: New

Level of knowledge: memory

References:
1. NSD-415 pages 2, 13-14

KA G 2.2.20 Knowledge of the process for managing troubleshooting activities. (CFR: 43.5 / 45.13) IMPORTANCE RO 2.2 SRO 3.3

Objective: none

415.7 EVALUATION OF RISK ASSESSMENT RESULTS

ORAM-SENTINEL will provide the results of the risk assessment. The following colors are used by ORAM-SENTINEL to represent the overall plant risk assessment results. The risk levels also define the management actions needed to control the overall risk impact associated with a work evolution.

The objective of risk management is to control the temporary and cumulative risk increases from work activities such that the plant's average baseline risk is maintained within an acceptable range. This is accomplished by using the result of the risk assessment to plan and schedule maintenance such that the risk increases are limited, and to take additional actions beyond routine work controls to address situations where the temporary risk increase is above a certain threshold.

415.7.1 RISK LEVEL AND MANAGEMENT ACTION CATEGORIES

The following sections describe the risk management levels and corresponding management actions. The risk levels are designated by colors resulting from all work activities scheduled or conducted during a work window. In most cases, the overall color condition is a result of interactions of more than one SSC being removed from service concurrently. Management actions are dependent on risk levels defined below:

415.7.1.1 GREEN CONDITIONS

Risk Level-Green

Green conditions denote minimum risk. The plant is fully capable of performing the associated safety functions. Green is the baseline for the safety function assessment trees and plant transient assessment trees. No additional risk assessment actions are required from plant personnel.

Management Action-Green

Normal work controls would be employed for configurations having nominal safety significance. This means that the normal plant work control processes are followed for the work activity, and that no additional actions to address risk management actions are necessary.

Work Planning Phase – WWM reviews the scheduled risk evaluation.

Work Execution Phase – SWM/WCC SRO shall verify the work schedule and issue clearance to begin work.

415.7.1.2 YELLOW CONDITIONS

Risk Level-Yellow

Yellow conditions denote a reduced safety condition. The plant's ability to perform the associated safety function is reduced but acceptable.

Management Action-Yellow

Risk management actions for "yellow" conditions are focus on providing increased risk awareness.

Operations and Maintenance personnel shall discuss the planned work activity within their respective organizations to increase Operator and Maintenance awareness of the risk of the work activity.

415.7.1.3 ORANGE CONDITIONS

Risk Level-Orange Orange conditions denote that the key safety function is in a degraded condition, and steps shall be taken to manage this condition.

Management Action-Orange

When entering a planned activity which ORAM-SENTINEL has assessed as an orange condition, there must be a written Risk Management Plan overseen by the Work Control organization with input from other groups as necessary. This Risk Management Plan shall be developed as outlined in Appendix C.

When entering an orange condition from emergent work on back shift, Operations' SWM\WCCSRO will ensure development of a Risk Management plan to minimize the risk configuration.

Work Planning Phase – Work Control shall ensure the development of a written Risk Management Plan, including risk reduction measures (see section 415.8)

Work Execution Phase – Operations will verify the work schedule and OWPM guidance on the activities then release the work for execution. Maintenance must understand when a work activity affects risk significant SSCs, the risk level of that work and any required actions as designated in a Risk Management Plan.

415.7.1.4 RED CONDITIONS

Risk Level-Red

The key safety function is immediately and directly threatened.

Management Action-Red

Operation in a valid red condition is not normally allowed and will not be scheduled without Plant Operational Review Committee (PORC) approval and a written risk management plan. If the plant is unexpectedly placed into a red configuration, immediate remedial action is required to return the plant to a lower risk configuration.

If an unplanned entry is made into RED due to emergent conditions, Operations shall ensure a PIP is written to evaluate the conditions. Restoration of equipment should not be delayed due to conducting the risk assessment. Refer to the Critical/Complex Maintenance Process, as appropriate.

Work Execution Phase – SWM/WCC SRO shall verify the work schedule. Maintenance Teams shall be aware of the risks associated with their tasks, and shall review the Risk Management Plan including any risk reduction measures they are responsible for completing.

415.7.1.5 WHITE CONDITIONS (OVERALL)

Overall white conditions denote a PRA combination that has not been previously modeled in the ORAM-SENTINEL software. White conditions will not be planned, and must be resolved in ORAM-SENTINEL. Should a white condition result from emergent work, the SWM/WCC SRO shall contact the site ORAM-SENTINEL Expert or SAAG for immediate evaluation.

415.8 RISK MANAGEMENT PLANS

A risk management plan is an approved plan of risk reduction measures and describes actions to minimize the magnitude of risk and/or actions be taken in case of further degradation (refer to Appendix C).

Written risk management plans must be developed when the risk assessment level of "orange" or "red"(with management approval) is planned. The Work Control will oversee the development of plan and seek assistance from Engineering, Operations, Maintenance and other groups, as appropriate.

609.6.4.4 During Week T-1, O-S results are used to provide the final evaluation which would include any emergent work items added to the schedule. During Week T-1 or Week T-0 (Execution Week), any emergent work that arises is evaluated by the WWM, or AN OPERATIONS SRO ASSIGNED TO THE WCC using the O-S **RISK** assessment results before it is inserted into the execution week schedule.

609.6.5 Using O-S **RISK** Assessment Results for Releasing Work During **ON-LINE** Periods

NOTE: Refer to Limitation Statements at the beginning of Section 609.6.

NOTE: PORC approval is required for all planned entries into an Orange or Red condition. Changes made to planned activities that have been previously reviewed and approved by the PORC shall be reviewed by the PORC Chairperson to determine if a subsequent review by the PORC is required. There should be in place a written risk management plan per NSD 213. Work Control is responsible for identifying and the development coordination of Risk Management Plans; and, ensuring risk effects are integrated with on-line activities.

NOTE: If at any time an UNPLANNED RED, ORANGE or White O-S condition is entered, the OPERATIONS SRO ASSIGNED TO THE WCC will document the condition in the PIP program.

609.6.5.1 Prior to releasing a work activity to begin, the WCC SRO is responsible for verifying the work is part of the committed schedule, and is being performed at the scheduled time. If the activity is part of the schedule and being performed at the correct time and no conflicting emergent work is in progress, then no further action is required.

609.6.5.2 If new work is identified and it is EMERGENT, the work requires PRA evaluation (i.e. - PRA code is needed on WMS panel M362) which has not been performed, then return the work to the WWM to have the WCC Core Team or OWPM evaluate the work. In the absence of the WCC Core Team or OWPM, the OPERATIONS SRO ASSIGNED TO THE WCC will evaluate the work and enter an appropriate PRA code value on the M362 panel.

609.6.5.3 If the work is not included in the schedule analyzed by O-S, the WWM (or AN OPERATIONS SRO ASSIGNED TO THE WCC) will perform a "WHAT-IF' in O-S to evaluate the **RISK** associated with performing the work compared to the current schedule.

609.6.5.4 WCC SRO will use O-S **RISK** assessment results to assess the acceptability of removing equipment from service using current plant conditions. The assessment results are obtained by the WCC SRO by contacting the WWM.

a) Verify that any necessary risk management plans are available for use.
b) If the assessment results are acceptable, then the equipment being removed from service may be given Clearance to Begin.
c) If unplanned RED, ORANGE or White conditions are identified, the work will not be given clearance. The OPERATIONS SRO ASSIGNED TO THE WCC will consult with the Operations Shift Manager, the WWM, or the Operations Work Process Manager's Group for resolution per the Resolution of Conflicts (Section 609.6.6). The OPERATIONS SRO ASSIGNED TO THE WCC facilitates the conflict resolution.

609.6.5.5 If clearance provided, the WWM verifies that the O-S workstation in the WCC is updated to show the equipment is not **AVAILABLE**.

609.6.5.6 If the O-S color scheme changes, notify the Control Room SRO.

609.6.5.7 Maintenance Supervisors are responsible for notifying the WCC SRO of any potential schedule carry overs on risk coded Work Orders. WCC SRO should consider this prior to signing on any additional work and re-run risk assessment if necessary.

609.6.6 Resolution Of Conflicts

NOTE: These activities apply when changes to the current plant configuration cause unplanned RED, ORANGE or White conditions in the O-S results.

609.6.6.1 The OPERATIONS SRO ASSIGNED TO THE WCC contacts appropriate **MANAGEMENT** for guidance and direction. This may include the Operations Shift Manager, the OPS Work Process Manager's Group, the Work Window Manager, and/or the Site O-S Expert.

609.6.6.2 The available options are discussed which may include:

a) Coordinate work to eliminate schedule conflicts (i.e. - wait for conflicting equipment to be returned to service prior to allowing work to begin on the component in question).
b) Have work rescheduled to eliminate the conflict.

609.6.6.3 Determine the appropriate course of action:

a) If the plant is found to be in an unacceptable ORAM-SENTINEL configuration due to equipment failure, then the Shift Work Manager will determine the best course of action to address the unacceptable configuration. If necessary, the duty Station Manager will also be contacted for guidance. Options for the Shift Work Manager's consideration are:

additional actions beyond routine work controls to address situations where the temporary risk increase is above a certain threshold.

415.7.1 RISK LEVEL AND MANAGEMENT ACTION CATEGORIES

The following sections describe the risk management levels and corresponding management actions. The risk levels are designated by colors resulting from all work activities scheduled or conducted during a work window. In most cases, the overall color condition is a result of interactions of more than one SSC being removed from service concurrently. Management actions are dependent on risk levels defined below:

415.7.1.1 GREEN CONDITIONS

Risk Level-Green

Green conditions denote minimum risk. The plant is fully capable of performing the associated safety functions. Green is the baseline for the safety function assessment trees and plant transient assessment trees. No additional risk assessment actions are required from plant personnel.

Management Action-Green

Normal work controls would be employed for configurations having nominal safety significance. This means that the normal plant work control processes are followed for the work activity, and that no additional actions to address risk management actions are necessary.

Work Planning Phase – WWM reviews the scheduled risk evaluation.

Work Execution Phase – Operations SRO assigned to the WCC shall verify the work schedule and issue clearance to begin work.

Deleted: SWM/WCC SRO

415.7.1.2 YELLOW CONDITIONS

Risk Level-Yellow

Yellow conditions denote a reduced safety condition. The plant's ability to perform the associated safety function is reduced but acceptable.

Management Action-Yellow

Risk management actions for "yellow" conditions are focus on providing increased risk awareness.

Operations and Maintenance personnel shall discuss the planned work activity within their respective organizations to increase Operator and Maintenance awareness of the risk of the work activity.

415.7.1.3 ORANGE CONDITIONS

Risk Level-Orange Orange conditions denote that the key safety function is in a degraded condition, and steps shall be taken to manage this condition.

Management Action-Orange

When entering a planned activity which ORAM-SENTINEL has assessed as an orange condition, prior Plant Operational Review Committee (PORC) is required. Planned activities that have received PORC approval in the past do not require additional PORC review. Changes made to planned activities that have been previously reviewed and approved by the PORC shall be reviewed by the PORC Chairperson to determine if a subsequent review by the PORC is required. There must be a written Risk Management Plan overseen by the Work Control organization with input from other groups as necessary. This Risk Management Plan shall be developed as outlined in NSD213 Risk Management Process.

Deleted: t

Deleted: Appendix C.

SRO Test Question #6 (Bank #705.2) (attached)

Premise of the question: This question tested the use of the application of completion time rules for subsequent multiple entries in Tech Spec LCO 3.8.1 (*AC Sources Operating*). Condition B for this LCO specifically requires an inoperable D/G to be restored to an operable condition within 72 hours. However, if a second D/G becomes inoperable while the first D/G is still inoperable, the completion time to restore the second D/G to an operable status is limited to prevent "piggy backing" of subsequent entries into the same LCO. The normal Tech Spec rules for extensions allows a 24 hour maximum extension time from the first time of entry into the LCO. Condition B also provides a separate 6 day limit for first entry into the Tech Spec. The intent of this question was to test the application of the extension time rules.

Problem: There was no correct answer to this question. The correct answer should have been that entry into mode 3 was required no later than 10/20 at 0800. This answer is 24 hours from the expiration of the 72 hours from the first entry into Tech Spec 3.8.1 condition B (0200 on 10/16 + 72 hours + 24 hours = 0200 on 10/20) plus an additional 6 hours to reach mode 3 (0200 + 6 = 0800 on 10/20). This answer was not provided.

Justification: The 24 hour extension clock started at 1100 on 10/18 when D/G 1B was declared inoperable (while D/G 1A was still inoperable). The Tech Spec rules for completion time state:

1.3 Completion Times

PURPOSE	The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.
BACKGROUND	Limiting Conditions for Operation (LCOs) specify minimum requirements for ensuring safe operation of the unit. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).
DESCRIPTION	The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the unit is in a MODE or specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the unit is not within the LCO Applicability.

If situations are discovered that require entry into more than one Condition at a time within a single LCO (multiple Conditions), the Required Actions for each Condition must be performed within the associated Completion Time. When in multiple Conditions, separate Completion Times are tracked for each Condition starting from the time of discovery of the situation that required entry into the Condition.

Once a Condition has been entered, subsequent trains, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition, unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.

However, when a subsequent train, subsystem, component, or variable expressed in the Condition is discovered to be inoperable or not within limits, the Completion Time(s) may be extended. To apply this

Completion Time extension, two criteria must first be met. The subsequent inoperability:

a. Must exist concurrent with the first inoperability; and

b. Must remain inoperable or not within limits after the first inoperability is resolved.

The total Completion Time allowed for completing a Required Action to address the subsequent inoperability shall be limited to the more restrictive of either:

a. The stated Completion Time, as measured from the initial entry into the Condition, plus an additional 24 hours; or

b. The stated Completion Time as measured from discovery of the subsequent inoperability.

The above Completion Time extensions do not apply to those Specifications that have exceptions that allow completely separate re-entry into the Condition (for each train, subsystem, component, or variable expressed in the Condition) and separate tracking of Completion Times based on this re-entry. These exceptions are stated in individual Specifications.

The author of the question incorrectly thought that the 6 day cumulative completion time listed under condition B superseded the 24 hour extension time rule. If this had been true, the correct answer would have been "B" because the 72 hour completion time for D/G 1B expired prior to the 6 day limit for first entering the LCO.

The applicants contended that the 24 hour extension time limit was not superseded by the 6 day limit. They contended that the 6 day limit was concurrent to the 24 hour extension time rule. This issue was then referred to a site expert (Mr. Lawrence Rudy) who stated that the students' contention was correct. The 24 hour extension rule remained in effect despite the additional 6 day limit in condition B. He stated that the 6 day limit applied to the "Master LCO" not to the individual condition. He also stated that when 2 Tech Spec requirements appear to conflict, the most limiting requirement applies.

Solution: The question was deleted from the NRC exam because there was no correct answer provided.

References Attached:

1. SRO Exam Question #6 (Bank #705.2)
2. Tech Spec 3.8.1 (AC Operating Sources)
3. Tech Spec Section 1.3 (Completion Times)

Bank Question: 705.2 ***Answer: B***

1 Pt(s) Unit 1 was operating at 100% power with no TSAIL entries. Given the following events and conditions:

10/16 at 0200 The DG 1A was declared inoperable.
10/18 at 1100 The DG 1B was declared inoperable.
10/18 at 1200 The DG 1A was declared to be operable.

If two offsite AC circuits remained operable throughout the sequence listed above and DG 1B is not returned to service, which one of the following statements correctly describes when the plant must be in mode 3?

REFERENCES PROVIDED: Tech Spec 3.8.1

A. 10/19 at 0800

B. 10/21 at 1700

C. 10/22 at 0800

D. 10/22 at 1700

Distracter Analysis: Tech Spec 3.8.1 condition B addresses the condition that one D/G is inoperable. This condition allows a single D/G to be inoperable for 72 hours – with an additional allowance that this condition – once entered – must be cleared within 6 days for multiple entries into this Tech Spec – which modifies the normal 24 allowable extension. This question postulates that Tech Spec 3.8.1 is entered and cleared for D/Gs 1A but that D/G 1B remains inoperable. Condition G requires the plant to be shutdown to mode 3 within 6 hours of not completing the required action in condition B.

A. **Incorrect**: Must be in mode 3 before 10/21at 1700
Plausible: This is 72+6 hours from when the Tech Spec 3.8.1 was entered for the 1A D/G.

B. **Correct**: The limiting LCO is the 2nd entry into Tech Spec 3.8.1 caused by the 1B D/G. The extension times are not applicable because the SRO cannot extend the individual LCO.

C. **Incorrect**: Must be in mode 3 before 10/21at 1700
Plausible: This is 6 days from when Tech Spec 3.8.1 was first entered (for the 1A D/G). This extension would be allowable as long as the LCO on the 1B D/G is not shorter (which it is). This

extension replaces the standard 24-hour extension period of subsequent train, component or variable inoperability.

D. **Incorrect**: Must be in mode 3 before 10/21at 1700
Plausible: This would be the required action time 72 + 24 + 6 hrs – which allows a 24 hour extension from when the Tech Spec was first entered for the 1A D/G. The 24-hour extension period is allowable under circumstances where the individual LCO continues to be extended based on multiple entries from unrelated components.

Level: SRO Exam

KA: G2.1.12 (2.9/4.0)

Lesson Plan Objective: DG-DG3 10

Source: MOD Ques_705

Level of knowledge: comprehension

References:
1. OP-MC-DG-EPQ pages 21-23
2. Tech Spec 3.8.1
3. Tech Spec 1.3 pages 1-2

KA G 2.1.12 Ability to apply technical specifications for a system. (CFR: 43.2 / 43.5 / 45.3)
IMPORTANCE RO 2.9 SRO 4.0

Objective DG-DG3 40: Given a set of specific plant conditions and access to reference materials, determine the actions necessary to comply with Tech Specs/SLCs.

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources—Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE*:

a. Two qualified circuits between the offsite transmission network and the Onsite Essential Auxiliary Power System; and

b. Two diesel generators (DGs) capable of supplying the Onsite Essential Auxiliary Power Systems;

AND

The automatic load sequencers for Train A and Train B shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND	

(continued)

*For each Unit, the Completion Time that the 'A' EDG can be inoperable as specified by Required Action B.4 may be extended beyond the "72 hours and 6 days from discovery of failure to meet the LCO" up to 168 hours as part of the NSWS system upgrades. System upgrades include maintenance and modification activities associated with replacement of portions of the train 'A' NSWS piping via modification CE-71424. Upon completion of the pipe replacement and system restoration this footnote is no longer applicable.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore offsite circuit to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the offsite circuit(s). AND	1 hour AND Once per 8 hours thereafter
	B.2 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable. AND	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	B.3.1 Determine OPERABLE DG is not inoperable due to common cause failure. OR	24 hours
	B.3.2 Perform SR 3.8.1.2 for OPERABLE DG. AND	24 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.4 Restore DG to OPERABLE status.	72 hours* AND 6 days* from discovery of failure to meet LCO
C. Two offsite circuits inoperable.	C.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND C.2 Restore one offsite circuit to OPERABLE status.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features 24 hours

(continued)

*For each Unit, the Completion Time that the 'A' EDG can be inoperable as specified by Required Action B.4 may be extended beyond the "72 hours and 6 days from discovery of failure to meet the LCO" up to 168 hours as part of the NSWS system upgrades. System upgrades include maintenance and modification activities associated with replacement of portions of the train 'A' NSWS piping via modification CE-71424. Upon completion of the pipe replacement and system restoration this footnote is no longer applicable

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One offsite circuit inoperable. AND One DG inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems—Operating," when Condition D is entered with no AC power source to any train. ---------- D.1 Restore offsite circuit to OPERABLE status. OR D.2 Restore DG to OPERABLE status.	 12 hours 12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. One automatic load sequencer inoperable.	F.1 Restore automatic load sequencer to OPERABLE status.	12 hours
G. Required Action and associated Completion Time of Condition A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours
H. Three or more AC sources inoperable.	H.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each offsite circuit.	7 days
SR 3.8.1.2	----------NOTES---------- 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. ---------- Verify each DG starts from standby conditions and achieves steady state voltage $\geq$ 3740 V and $\leq$ 4580 V, and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.3	----------NOTES---------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. ---------- Verify each DG is synchronized and loaded and operates for $\geq$ 60 minutes at a load $\geq$ 5600 kW and $\leq$ 5750 kW.	31 days
SR 3.8.1.4	Verify each day tank contains $\geq$ 470 gal of fuel oil.	31 days
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	31 days
SR 3.8.1.6	Verify the fuel oil transfer system operates to transfer fuel oil from storage system to the day tank.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves in $\leq$ 11 seconds voltage of $\geq$ 3740 V and frequency of $\geq$ 57 Hz and maintains steady-state voltage $\geq$ 3740 V and $\leq$ 4580 V, and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	184 days
SR 3.8.1.8	Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate offsite circuit.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	----------NOTE---------- If performed with the DG synchronized with offsite power, it shall be performed at a power factor $\leq$ 0.9. ---------- Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is $\leq$ 63 Hz; b. Within 3 seconds following load rejection, the voltage is $\geq$ 3740 V and $\leq$ 4580 V; and c. Within 3 seconds following load rejection, the frequency is $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	18 months
SR 3.8.1.10	Verify each DG does not trip and generator speed is maintained $\leq$ 500 rpm during and following a load rejection of $\geq$ 5600 kW and $\leq$ 5750 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.11 ----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes the emergency bus in $\leq$ 11 seconds, 2. energizes auto-connected shutdown loads through automatic load sequencer, 3. maintains steady state voltage $\geq$ 3740 V and $\leq$ 4580 V, 4. maintains steady state frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz, and 5. supplies auto-connected shutdown loads for $\geq$ 5 minutes.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	----------NOTE---------- All DG starts may be preceded by prelube period. ----------	
	Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and:	18 months
	a. In ≤ 11 seconds after auto-start and during tests, achieves voltage ≥ 3740 V and ≤ 4580 V;	
	b. In ≤ 11 seconds after auto-start and during tests, achieves frequency ≥ 58.8 Hz and ≤ 61.2 Hz;	
	c. Operates for ≥ 5 minutes; and	
	d. The emergency bus remains energized from the offsite power system.	

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.13 ~~NOTE~~ ~~This Surveillance shall not be performed in MODE 1 or 2.~~	
Verify each DG's automatic trips are bypassed on actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal except: a. Engine overspeed; b. Generator differential current; c. Low - low lube oil pressure; and d. Voltage control overcurrent relay scheme.	18 months
SR 3.8.1.14 NOTES ~~1.~~ Momentary transients outside the load and power factor ranges do not invalidate this test. ~~2. This Surveillance shall not be performed in MODE 1 or 2.~~	
Verify each DG operating at a power factor $\leq$ 0.9 operates for $\geq$ 24 hours loaded $\geq$ 5600 kW and $\leq$ 5750 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.15 ----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 1 hour loaded ≥ 5600 kW and ≤ 5750 kW or until operating temperature is stabilized. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts and achieves, in ≤ 11 seconds, voltage ≥ 3740 V, and frequency ≥ 57 Hz and maintains steady state voltage ≥ 3740 V and ≤ 4580 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.16 ----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- Verify each DG: a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power; b. Transfers loads to offsite power source; and c. Returns to standby operation.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.17	----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by: a. Returning DG to standby operation; and b. Automatically energizing the emergency load from offsite power.	18 months
SR 3.8.1.18	Verify interval between each sequenced load block is within the design interval for each automatic load sequencer.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.19 ----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. energizes the emergency bus in ≤ 11 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage ≥ 3740 V and ≤ 4580 V, 4. achieves steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies auto-connected emergency loads for ≥ 5 minutes.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.20 ----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify when started simultaneously from standby condition, each DG achieves, in ≤ 11 seconds, voltage of ≥ 3740 V and frequency of ≥ 57 Hz and maintains steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	10 years

1.0 USE AND APPLICATION

1.3 Completion Times

PURPOSE

The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.

BACKGROUND

Limiting Conditions for Operation (LCOs) specify minimum requirements for ensuring safe operation of the unit. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).

DESCRIPTION

The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the unit is in a MODE or specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the unit is not within the LCO Applicability.

If situations are discovered that require entry into more than one Condition at a time within a single LCO (multiple Conditions), the Required Actions for each Condition must be performed within the associated Completion Time. When in multiple Conditions, separate Completion Times are tracked for each Condition starting from the time of discovery of the situation that required entry into the Condition.

Once a Condition has been entered, subsequent trains, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition, unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.

However, when a subsequent train, subsystem, component, or variable expressed in the Condition is discovered to be inoperable or not within limits, the Completion Time(s) may be extended. To apply this

(continued)

1.3 Completion Times

DESCRIPTION (continued)

Completion Time extension, two criteria must first be met. The subsequent inoperability:

a. Must exist concurrent with the first inoperability; and

b. Must remain inoperable or not within limits after the first inoperability is resolved.

The total Completion Time allowed for completing a Required Action to address the subsequent inoperability shall be limited to the more restrictive of either:

a. The stated Completion Time, as measured from the initial entry into the Condition, plus an additional 24 hours; or

b. The stated Completion Time as measured from discovery of the subsequent inoperability.

The above Completion Time extensions do not apply to those Specifications that have exceptions that allow completely separate re-entry into the Condition (for each train, subsystem, component, or variable expressed in the Condition) and separate tracking of Completion Times based on this re-entry. These exceptions are stated in individual Specifications.

The above Completion Time extension does not apply to a Completion Time with a modified "time zero." This modified "time zero" may be expressed as a repetitive time (i.e., "once per 8 hours," where the Completion Time is referenced from a previous completion of the Required Action versus the time of Condition entry) or as a time modified by the phrase "from discovery . . ." Example 1.3-3 illustrates one use of this type of Completion Time. The 10 day Completion Time specified for Conditions A and B in Example 1.3-3 may not be extended.

(continued)

Lawrence J Rudy
10/14/2004 02:09 PM

To: Gary L Daniels/Gen/DukePower@DukePower
cc:
Subject: Test Question

Regarding Question 705.2, I cannot agree with the contractor's stated answer to this question for the following reasons:

1. I can find no evidence that the existence of a master LCO clock can be used to override the provisions of the Completion Time Extension concept of TS 1.3.

2. It seems inconceivable to me that one could make a case for an effective 6-day completion time under these conditions. The 6-day master LCO clock is utilized for those cases where one can flip-flop between inoperabilities in different Conditions and the 6 days represents a limit as to when the LCO must be finally met.

3. Section 1.3 of TS states that when applying Completion Time Extensions, the total Completion Time for the subsequent inoperability shall be limited to the **more restrictive** of either:

   a. The stated Completion Time, as measured from the initial entry into the Condition, plus 24 hours, or

   b. The stated Completion Time as measured from discovery of the subsequent inoperability.

Using this logic, I calculate the answer to the test question as:

10/16 @ 0200 plus 72 hours (Completion Time of TS 3.8.1 Required Action B.4) plus 24 hours (Completion Time Extension) plus 6 hours (Completion Time of TS 3.8.1 Required Action G.1), which equates to 10/20 @ 0800 for being in Mode 3. I don't think that the 6-day master LCO clock is intended to allow for more inoperability than would be allowed by the Completion Time Extension concept (i.e., allowing you to remain in TS 3.8.1, Condition B for 6 days). Also, I find no evidence that the Completion Time Extension concept is only to be applied for those LCOs where no master LCO clock exists.

4. I don't think you can apply the Master LCO concept when you are only within a single Condition, as these clocks are associated with multiple Conditions (i.e., there are no LCOs for which a Master LCO clock is only contained within a single Condition).

5. Also, as a general rule, when two TS requirements appear to conflict, I would apply the most limiting one, which in this case is the Completion Time Extension concetp, not the master LCO clock.

SRO Test Question #7 (Bank #1143)

Premise: This question tested the operators' ability to apply the table in step 18.c of EOP FR-P.1 (*Response to Imminent Thermal Shock Condition*) and determine if cold leg accumulators should be isolated in step 18.d.

Problem: The reference material did not include the required table in step 18.c of FR-P.1 (on page 20) as stated in the reference package. Instead, the preceding page of this procedure was provided (page 19) containing steps 18.a and b was provided. Page 19 did not provide sufficient information to allow proper a determination of the action in step 18.d.

Justification: Step 18.c of FR-P.1 requires the operator to compare current reactor vessel level indication to the following table:

Number of NC Pumps On	Required "REACTOR VESSEL D/P"			
	TRN A With NC Pump 1A		TRN B With NC Pump 1C	
	On	Off	On	Off
4	80%	N/A	80%	N/A
3	60%	32%	60%	32%
2	45%	20%	45%	20%
1	35%	14%	35%	14%

If RVLIS indicates that the required reactor vessel D/P for the NC pump running configuration is sufficient, then cold leg accumulators shall be isolated in step 18.d. It is not appropriate for operators to memorize the specific conditions in this table.

The original question, as submitted to the NRC, provided step 18 of FR-P.1 in its entirety. This consisted of pages 19 and 20 of this procedure. Through discussions with the NRC, page 19 (step 18.a/b) identified to be removed as a reference because the NRC felt it was not required to answer the question. Instead, page (page 20) was inadvertently removed from the reference package (in place of page 19) immediately prior to the examination. As a result, the candidates did not have access to the required table and could not make a proper judgment regarding the isolation of cold leg accumulators from memory.

Solution: This question was deleted from the examination because of the problem with the reference package. It was considered to be inappropriate to expect the students to answer this question from memory.

References:

1. SRO Test Question #7 (Bank #1143)
2. EP/1/A/5000/FR-P.1 step 18 pages 19, 20.

Bank Question: 1143 ***Answer: C***

1 Pt(s) Unit 1 was operating at 100% power when a steam line rupture occurred. Given the following events and conditions;

- The operators transitioned from E-0 (*Reactor Trip or Safety Injection*) to FR-P1 (*Response to Imminent Thermal Shock Condition*) due to a red path.
- NCPs 1A and 1B were tripped due to high vibration
- The operator reached step 18 of FR-P.1, which requires isolating the cold leg accumulators.
- Given the following parameters:

Time	**0200**	**0205**	**0210**	**0215**
Pzr Pressure (psig)	750	700	650	600
NC Subcooling (°F)	+50	+75	+60	+40
RVLIS D/P indication				
Train A (%)	21	22	22	22
Train B (%)	35	37	47	57

Which one of the following selections correctly describes:
1. The earliest time that the CLAs can be isolated, and
2. The reason why the CLAs should be isolated?

References Provided: FR-P.1 step 18 page 20

A. **0205 – to prevent injecting CLA water into the reactor vessel and increasing the thermal stress on the vessel.**

B. **0205 – to prevent injecting the CLA nitrogen bubble into the reactor, creating a gas bubble in the vessel head region.**

C. **0210 - to prevent injecting CLA water into the reactor vessel and increasing the thermal stress on the vessel.**

D. **0210 - to preserve CLA volume as a source of borated water to prevent re-criticality during cooldown.**

Distracter Analysis:

A. **Incorrect**: Cannot isolate the train B accumulators because D/P is < 45% and the 1C NCP is operating.
Plausible: Partially correct – the reason is a valid reason.

B. **Incorrect**: Cannot isolate the train B accumulators because D/P is < 45% and the 1C NCP is operating.
Plausible: Partially correct – the reason is a valid reason.

C. **Correct**:

D. **Incorrect**: The reason for isolating the CLAs is not the correct reason.
Plausible: Can take operator action to isolate both CLAs at 0210.

Level: SRO Exam

KA: APE 040 G2.1.32 (3.4/3.8)

Lesson Plan Objective: TA-PTS 16

Source: Mod Ques_372

Level of knowledge: comprehension

References:
1. FR-P.1 pages 19-22
2. FR-P.1 Bases Document page 20
3. OP-CN-TA-PTS page 23

KA APE 040 Steam Line Rupture - Excessive Heat Transfer - G 2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Objective: TA-PTS 16 Describe the reasons for requiring safety injection termination and/or cold leg accumulator isolation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. (Continued)

c. Verify RVLIS indication adequate as follows: __ c. **RETURN TO** Step 15.

__ • **IF** all NC pumps are off, **THEN** verify "REACTOR VESSEL LR LEVEL" - GREATER THAN 61%.

__ • **IF** at least one NC pump is on, **THEN** verify "REACTOR VESSEL D/P" - GREATER THAN REQUIRED D/P FROM TABLE BELOW:

Number of NC Pumps On	Required "REACTOR VESSEL D/P"			
	TRN A With NC Pump 1A		TRN B With NC Pump 1C	
	On	Off	On	Off
4	80%	N/A	80%	N/A
3	60%	32%	60%	32%
2	45%	20%	45%	20%
1	35%	14%	35%	14%

__ d. Dispatch operator to restore power to all CLA discharge isolation valves. **REFER TO** Enclosure 4 (Power Alignment for CLA Valves).

__ e. Maintain NC pressure greater than CLA pressure until the CLAs are isolated or vented.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. (Continued)

f. **WHEN** power is aligned, **THEN**:

1) Close all of the following valves:

__ • 1NI-54A (C-Leg Accum A Disch Isol)

__ • 1NI-65B (C-Leg Accum B Disch Isol)

__ • 1NI-76A (C-Leg Accum C Disch Isol)

__ • 1NI-88B (C-Leg Accum D Disch Isol).

1) Perform the following:

a) Vent any CLA which cannot be isolated as follows:

__ (1) Open 1NI-47A (C-Leg Accum N2 Sup Cont Isol).

__ (2) Place breaker 1CB-1 (behind 1MC-6) (Key #11) to "ON".

(3) Open the valve for the CLA(s) to be vented:

__ • 1NI-50 (C-Leg Accum A N2 Supply Isol)

__ • 1NI-61 (C-Leg Accum B N2 Supply Isol)

__ • 1NI-72 (C-Leg Accum C N2 Supply Isol)

__ • 1NI-84 (C-Leg Accum D N2 Supply Isol).

__ (4) Close 1NI-47A (C-Leg Accum N2 Sup Cont Isol).

__ (5) Open 1NI-83 (C-Leg Accums N2 Vent Ctrl) to depressurize the affected CLA(s).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. (Continued)

(6) **WHEN** CLA(s) is vented, **THEN**:

__ 1. Close 1NI-83 (C-Leg Accums N2 Vent Ctrl).

2. Close valve(s) previously opened:

__ • 1NI-50 (C-Leg Accum A N2 Supply Isol)

__ • 1NI-61 (C-Leg Accum B N2 Supply Isol)

__ • 1NI-72 (C-Leg Accum C N2 Supply Isol)

__ • 1NI-84 (C-Leg Accum D N2 Supply Isol).

__ 3. Place breaker 1CB-1 (behind 1MC-6) to "OFF".

b) **IF** CLA(s) cannot be vented, **THEN** perform the following:

__ • Consult station management for further actions.

__ • **GO TO** Step 19.

__ 2) Notify dispatched operator to remove power from all CLA isolation valves. **REFER TO** Enclosure 4 (Power Alignment for CLA Valves).

RO Test Question #41 (Bank #1154)

Premise: The question postulated that the plant was conducting a waste gas release and asked for a valid indication that 1WG-160 (Waste Gas Release) had closed during the release. The author's intent was to test that applicants understood that the closure of 1WG-160 caused a loss of flow alarm on 1EMF-50.

Problem: The applicants' contended that distracter "C" is correct. Distracter "C" stated that 1EMF-36 (*Unit Vent Gas Hi Rad*) had annunciated. If this EMF had annunciated, it would have caused 1WG-160 to automatically close thereby terminating the release. Further review by the Training Staff indicated that the loss of flow alarm on 1EMF-50 is blocked when 1WG-160 is closed. This was verified by discussions with the responsible system engineer (Brian Woolweber). Therefore, "B" is not the correct answer.

Justification: The test development team had considered "C" to be incorrect because they were thinking that this condition caused the termination of the release but was not a direct valid indication that the release had been terminated. In fact, this cause and effect relationship is not relevant. If an operator noted that 1EMF-36 had tripped, they would consider it to be a valid indication that 1WG-160 had closed. It would be the cause of that action. It is operationally valid to accept "C" as a correct answer.

However, if the cause of the loss of flow to 1EMF-50 were 1WG-160 closing, then the loss of flow alarm on 1EMF-50 would be disabled. The fact that the loss of flow alarm on 1EMF-50 is disabled when 1WG-160 is closed makes "C" the only correct answer.

Solution: Change the correct answer from "B" to "C".

References:
1. RO Test Question #41 (Bank #1154)
2. OP/1/B/6100/010X 1RAD-1 B/3, C/4, F/3
3. OP/1/B/6100/010Y 1-RAD-2 A/2, D/5
4. OP-CN-WE-WG lesson plan page 6

Bank Question: 1154 ***Answer: B***

1 Pt(s) Unit 1 is operating at full power and Unit 2 is refueling. The 'C' waste decay tank is being released in accordance with an approved gaseous waste release permit.

Which one of the following alarms are valid indications that the release control valve 1WG-160 has closed to terminate the release?

A. 1RAD-1; B/3 (EMF-41 Aux Bldg Vent Hi Rad) alarms.

B. 1RAD-1; F/3 (EMF-50 Waste Gas Disch Loss of flow) alarms.

C. 1RAD-2; A/2 (1EMF 36 Unit Vent Gas Hi Rad) alarms.

D. 1RAD-2;D/5 (1EMF 35/36/37 Unit Vent Loss of Flow) alarms.

Distracter Analysis: When 1WG-160 closes due to EMF-50 trip 2 alarm, it cuts off flow to EMF-50 causing a low flow alarm.

A. **Incorrect**: 1WG-160 closing does not affect EMF-41.
Plausible: EMF-41 monitors the waste gas areas for radiation.

B. **Correct**:

C. **Incorrect**: This alarm does not confirm that 1WG-160 closed.
Plausible: EMF-36 provides a trip signal to close 1WG-160.

D. **Incorrect**: 1WG-160 closing does not affect unit vent flow.
Plausible: If the candidate confuses EMF-50 and EMF-36. EMF 35/36/37 provide trip signals to 1WG-160.

Level: RO Exam

KA: SYS 071A4.05 (2.6*/2.6*)

Lesson Plan Objective: WE-WG SEQ 4

Source: New

Level of knowledge: comprehension

References:
1. OP-CN-WE-WG page 6
2. OP/1/B/6100/010X 1RAD-1; F/3 - 1RAD-2 A/2 - 1RAD-2 D/5 - 1RAD-2 C/4 - 1RAD-1 B/3

K/A SYS 071A4.05: Ability to manually operate and/or monitor in the control room: Waste gas decay tanks, including valves, indicators and sample lines. 2.6*/2.6* (CFR: 41.7 / 45.5 to 45.8)

Objective WE-WG-4: Describe the automatic action associated with the following EMFs related to termination of a waste gas release:

- WG Disch Monitor (EMF 50)
- Unit Vent Particulate Monitor (EMF-35)
- Unit Vent Gaseous Monitor (EMF-36)
- Unit Vent Iodine Monitor (EMF-37)

B/3

EMF-41 AUX BLDG VENT HI RAD

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints).

ORIGIN: EMF-41 beta scintillation detector.

PROBABLE CAUSE:
1. Radioactive spill/leak in the auxiliary building.
2. PZR degas to the Sample Hood during shutdown.

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS:
1. **IF** EMF-41 > $1x10^6$CPM, conduct a site assembly per RP/0/A/5000/010 (Conducting A Site Assembly or Evacuation).
2. Verify filter trains on both units are in service.
3. Ensure that all Control Room doors are closed and that a positive pressure is being maintained.
4. **IF** PZR degas is in progress during shutdown on either unit, perform the following:
   - 4.1 Ensure the applicable valves are closed:
     - Unit 1
       - 1NM-6A (Pzr Stm Smpl Line Cont Isol)
       - 1NM-7B (Pzr Smpl Hdr Cont Isol)
     - Unit 2
       - 2NM-6A (Pzr Stm Smpl Line Cont Isol)
       - 2NM-7B (Pzr Smpl Hdr Cont Isol)
   - 4.2 Notify Chemistry to secure the PZR degas.
5. Monitor 12-points via VA graphic to determine location of activity.
   - 5.1 Reference next page for EMF point inputs.
6. Monitor activity levels for EMF-35, 36 and 37.
7. Refer to AP/1/A/5500/10 (Reactor Coolant Leak).

SUPPLEMENTARY ACTIONS:
1. Notify Radiation Protection personnel of this alarm.
2. Attempt to isolate leak if one exists.
3. Refer to SLC 16.7-10.
4. Refer to RP/0/A/5000/01 (Classification of Emergency).

REFERENCES:
1. CNM-1346.05-33
2. CN-1577 Series
3. CN-1211.00-358
4. MM CE-61117
5. MM CE-61118
6. NSM CN11352

NOTE: Inputs to EMF-41 are listed on the following page.

CONTINUED ON THE NEXT PAGE

C/4

EMF-50 WASTE GAS DISCH HI RAD

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints).

ORIGIN: EMF-50 beta scintillation detector (low range).

PROBABLE CAUSE:
1. Inadvertent opening of 1WG-160 (WG Decay Tank Outlet to Unit Vent Control).
2. Error in release rate calculations.

AUTOMATIC ACTIONS: 1WG-160 (WG Decay Tank Outlet to Unit Vent Control) closes.

IMMEDIATE ACTIONS:
1. Notify personnel making release at the Waste Gas Panel of this alarm.
2. Verify that 1WG-160 (WG Decay Tank Outlet to Unit Vent Control) closes, per computer points C1D3042 and C1D3043.
3. Monitor activity levels for EMF-35, 36 and 37.

SUPPLEMENTARY ACTIONS:
1. Notify Radiation Protection personnel of this alarm.
2. Monitor Unit Vent EMFs 35, 36 and 37 for high activity levels.

NOTE: Prior to opening 1WG-160, its controller must be reset by running it back to zero.

REFERENCES: CNM-1346.05-33

PANEL: 1RAD-1

F/3

EMF-50 WASTE GAS DISCH LOSS OF FLOW

SETPOINT: Flow less than normal.

ORIGIN: 0WGFT5940

PROBABLE CAUSE:

1. Waste gas release being initiated.
2. Waste gas release nearing completion (low shutdown waste gas decay tank pressure).
3. Line blockage.
4. Closed valve in sample flow path.
5. Flow switch failure.

NOTE: When 1WG-160 (WG Decay Tank Outlet to Unit Vent Control) is closed, alarm is defeated.

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS:

1. **IF** waste gas release is in progress, notify the operator at the Waste Gas Panel that this annunciator is in alarm.
2. Monitor 1WG-160 (WG Decay Tank Outlet To Unit Vent Control) position (C1D3042 and C1D3043).
3. Dispatch an operator to verify positions of the following manual valves:
   - 1WG-140 (WG Disch Monitor Inlet) (AB-594, KK-51, Rm 500)
   - 1WG-309 (WG Disch Monitor Inlet Isol) (AB-594, KK-49, Rm 500)
   - 1WG-142 (WG Disch Monitor Outlet) (AB-597, KK-51, Rm 500)

SUPPLEMENTARY ACTIONS:

1. **IF** the cause for the alarm **CANNOT** be determined and corrected, perform the following:
   1.1 Notify Radiation Protection personnel of this alarm.
   1.2 Issue work request to initiate corrective maintenance.
2. Refer to SLC 16.11.

REFERENCES:

1. CNM-1346.05-33
2. CNEE-0153-04.03
3. CN-1567-1.1
4. NSM CN-60056

1EMF 36 UNIT VENT GAS HI RAD

A/2

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints).

ORIGIN: 1EMF-36 beta scintillation detector (low range).

PROBABLE CAUSE:
1. High gaseous activity from one of the combined ventilation system discharges to the unit vent.
2. PZR degas to the Sample Hood during shutdown.

NOTE:
1. When VC/YC is taken to "LOCAL", this trip of the unfiltered exhaust fans is bypassed.
2. Various other VA equipment receiving run permissives from the unfiltered fans also stop.
3. EMF-41 is inoperable when the VA System is shutdown.

AUTOMATIC ACTIONS:
1. The following Auxiliary Building Ventilation System components stop:
   - ABUXF-1A and ABUXF-1B which shutdown their respective supply units ABSU-1A and ABSU-1B.
2. The Fuel Pool Ventilation (VF) System aligns to the "FILTER" mode.
3. 1VQ-10 (VQ Fans Disch To Unit Vent) closes.
4. 1WG-160 (WG Decay Tank Outlet To Unit Vent Control) closes.

IMMEDIATE ACTIONS:
1. Verify automatic actions occur.
2. **IF** PZR degas is in progress during shutdown, perform the following:
   2.1 Ensure the following valves are closed:
   - 1NM-6A (Pzr Stm Smpl Line Cont Isol)
   - 1NM-7B (Pzr Smpl Hdr Cont Isol)

   2.2 Notify Chemistry to secure the PZR degas.

CONTINUED ON THE NEXT PAGE

1EMF 35/36/37 UNIT VENT LOSS OF FLOW

D/5

SETPOINT: 3.7 scfm

ORIGIN: 1EMF-35, 36, 37 sample flow switch.

PROBABLE CAUSE:
1. Line blockage of torn paper in the particulate detector.
2. Pump/motor fault.
3. Flow switch failure.
4. 1EMF-54 (HH) Unit Vent Gamma (HI-HI Range) Trip 1 in alarm.
5. Loss of power to MCC 1MXX.

AUTOMATIC ACTIONS: The gas sample pump trips.

IMMEDIATE ACTIONS: Verify the automatic action occurs.

SUPPLEMENTARY ACTIONS:
1. Notify the RP Shift Group of this alarm
2. Verify 1MXX-F05F (Unit Vent Rad Mon 1EMF-35, 36, 37 Sample Pump Motor) (TB-594, 1L-34) is closed.
3. **IF** the cause of the alarm **CANNOT** be determined **AND** corrected, issue a work request to initiate corrective action.
4. **WHEN** the condition causing the alarm has been corrected, restart the gas sample pump motor.
5. **IF** power has been lost to MCC 1MXX **AND** the sample pump will **NOT** restart, cycle 1MXX-F05F (Unit Vent Rad Mon 1EMF-35, 36, 37 Sample Pump Motor) (TB-594, 1L-34) after power has been restored.
6. Refer to SLCs 16.11-7, Tables 16.11-5 and 16.11-6.
7. During accident conditions, have the Operations TSC representative notify the RP Dose Assessment Coordinator of this alarm.

REFERENCES:
1. CNM-1346.05-33
2. NSM CN-60056

8. Waste gas disch
   a) Waste gas (6) tanks are in two banks
      1) One bank isol. for disch.
      2) One bank in service
   b) Waste gas disch. flow control valve (WG-160) trips closed following a Trip 2 signal from any of the following EMF's: (Obj. #4)
      1) WG Disch Monitor (EMF 50)
      2) Unit Vent Particulate Monitor (EMF-35)
      3) Unit Vent Gaseous Monitor (EMF-36)
      4) Unit Vent Iodine Monitor (EMF-37)
   c) To reopen WG-160, Controller must be run to zero, then re-open vlv.
   d) All releases made from WGDT "C"
9. Waste Gas Drains
   a) Waste gas decay tanks and shutdown tanks can be drained or pumped:
      1) Recycle Holdup Tank (RHT) (if fission gases involved)
      2) WEFT Sump B (if no fission gases involved)
      3) A gas trap is provided in the line to prevent gas leakage from the system.
   b) Hydrogen recombiner drains to WEFT sump B (Gas trap provided)
   c) WG compressor drain to WEFT sump B (Gas trap provided)
10. Shutdown Tanks
   a) "A" Receives discharge from relief valves of other tanks.
   b) "B" is used to store nitrogen for shutdown.

B. Instrumentation and Control
1. Indications
   a) Waste Gas Processing Panel
      1) Gas Decay Tank press. (6)
      2) Shutdown tank press. (2)
      3) Separator level (2)
      4) VCT purge flow (Unit 1 and 2)
      5) WG Rad. monitor (2 channels)
      6) Unit vent rad monitor