Facility Post-Exam Comments and NRC Resolution

Purpose:

To accept 2 answers for Question 24 of the Three Mile Island Initial Licensing Exam.

Problem Statement:

Due to interpretation of a plausible distractor (Choice C) two answer should be considered correct because both answers would allow for entry into the Reactor Building to repair a door.

Question:

Plant conditions:

- The reactor is at 100% power with ICS in full auto
- The inner door of the Containment Personnel Airlock fails and cannot be closed
- All required Technical Specification actions are complied with

Event:

- Reactor Building entry is required to repair the inner door

Which of the following identifies the action necessary to ensure the Containment Integrity requirements are satisified?

A. The reactor must be shutdown to hot standby prior to opening the outer door.

B. The outer door may be opened provided it is immediately closed after passage.

C. The RCS must be cooled to less than 200°F, with pressure reduced to less than 500 psig prior to opening the outer door.

D. A temporary containment must be set up at the Auxiliary Building entrance from the Reactor Building prior to opening the outer door.

Answer: B

(1)

Question Explanation:

Explanation: To answer this question correctly, the examinee must know: (1) In accordance with 1101-3, CONTAINMENT INTEGRITY AND ACCESS LIMITS (Rev 94 Page 7), at least one door in each of the personnel or emergency air locks shall be closed and sealed during personnel passage through these air locks. (2) Since the Personnel Hatch inner door has failed, one door of the personnel or emergency air lock may be open for maintenance, repair or modification provided the other door of the air lock is verified closed within 1 hour, locked within 24 hours, and verified to be locked closed monthly. This action is assumed to have occurred since it is given that all Technical Specification action has been complied with. (2) With the personnel or emergency air lock door interlock mechanism inoperable, entry and exit is permissible, per Technical Specification 3.6.2.c, under the control of a dedicated individual. Therefore, if an emergency entry is required, the opening of the outer door is to be controlled by a dedicated individual.		
A.	The reactor must be shutdown to hot standby prior to opening the outer door.	INCORRECT: Plausible because some of the Containment Technical Specifications, such as building internal pressure, are dependent upon the operating status of the reactor. The operator may incorrectly believe that this Technical Specification is also dependent on the same.
B.	The outer door may be opened provided it is immediately closed after passage.	CORRECT: See above.
C.	The RCS must be cooled to less than 200°F, with pressure reduced to less than 500 psig prior to opening the outer door.	INCORRECT: Plausible because the examinee could believe that if containment integrity is not required then the outer door can be open. Incorrect because the requirement to relax containment is below 300 psig, not 500 psig.
D.	A temporary containment must be set up at the Auxiliary Building entrance from the Reactor Building prior to opening the outer door.	INCORRECT: Plausible because the examinee could believe that a temporary containment could be setup to prevent the spread of any contamination which may be in the Reactor Building. Incorrect because no procedure directs the use of temporary containment outside of the Auxiliary Building.

Intent of question:

The intent of this question is to test the knowledge of the examinee that entry into the Reactor Building to fix the inner door of the Personnel Hatch is allowed as long as the outer door is immediately closed after passage.

Case for two answers:

The question specifically asks the examinee to identify the action necessary to ensure Containment Integrity requirements are satisfied.

As noted in the question explanation, one method is to open the outer door, enter the airlock, then immediately close the door after passage.

Another method could be to shutdown and cooldown the plant to a condition where containment integrity no longer applies.

In accordance with Technical Specification 3.6.1 **all** of the following conditions must exist simultaneously for containment integrity to be required:

- RC Pressure 300 psig or greater
- RC Temperature 200F or greater

(2)

- Nuclear Fuel in Core

This is contrary to the plausibility statement for Choice C. The plausibility statement falsely states that containment integrity is not required when less than 300 psig and not 500 psig. This is incorrect because in the first part of Choice C the RC temperature is stated to be less than 200F, which would mean that Containment Integrity is not required at this point. Passage to the inner door can occur with the Containment Integrity requirements still being met.

Conclusion:

Two answers should be considered for Question 24. Both choices B and C will ensure the Containment Integrity requirements are met in accordance with Technical Specification 3.6 REACTOR BUILDING.

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Purpose:

To accept 2 correct answers for Question 79 of the Three Mile Island Initial Licensing Exam.

Problem Statement:

Due to the lack of specificity of time in the question, two answers should be considered correct because at certain times during the casualty either answer will be correct.

Question:

Event:

- Station Blackout

Current Plant Conditions:

- Neither 1D or 1E 4160V busses have been restored
- EF-P-1 is running
- OTSG Pressures:

	PSIG
'A' OTSG	1010
'B' OTSG	1010

- RCS Temperatures:

	Thot (F)	Tcold (F)
Loop A	597	543
Loop B	596	542

- RCS Pressure is 1950 psig
- Incore temperature is 563F

Which of the following identifies the status of Primary to Secondary Heat transfer and the method of controlling RCS temperature in accordance with OP-TM-EOP-012, STATION BLACKOUT?

Primary to Secondary Heat Transfer is ___(1)___; operators must ___(2)___.

A. (1) occurring
(2) take local-manual control of the MS-V-4's to stabilize RCS temperature

B. (1) occurring
(2) throttle open the MS-V-4's from the control room to stabilize RCS temperature

C. (1) NOT occurring
(2) take local-manual control of the MS-V-4's to cooldown RCS temperature

D. (1) NOT occurring
(2) throttle open the MS-V-4's from the control room to cooldown RCS temperature

Answer: D

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Question Explanation:

Explanation: To answer this question correctly, the examinee must know: (1) During a Station Blackout, none of the 4kV busses are available; (2) The crew must enter OP-TM-EOP-012, STATION BLACKOUT (Rev 5), which will stabilize the plant using emergency feedwater and the atmospheric dump valves; (3) The crew must interpret plant conditions to ensure natural circulation is being established which is determined by using OP-TM-EOP-010, EMERGENCY PROCEDURE RULES, GUIDES AND GRAPHS, Guide 10, NATURAL CIRCULATION (Rev 10, Page 23); (4) The crew must determine that the requirements for natural circulation are NOT met (RCS Thot - Tcold is greater than 50F); (5) Based on the OS-24, CONDUCT OF OPERATIONS DURING ABNORMAL AND EMERGENCY EVENTS, definition of Primary to Secondary heat transfer cannot be confirmed without natural circulation; (6) To establish natural circulation, the crew must lower OTSG pressure using the available means, which would be using the Atmospheric Dump Valves (ADV's) which are air operated valves; (7) In accordance with Step 3.21 of OP-TM-EOP-012 (Rev 5, Page 11) the crew must feed with EFW and open the MS-V-4's (ADV's) to maximize the cooldown; (7) The MS-V-4's are still available because they have Two Hour Instrument Air as the motive force to move them (TQ-TQ-104-C001, Rev 6, Page 14).		
A.	(1) occurring (2) take local-manual control of the MS-V-4's to stabilize RCS temperature	Incorrect Answer: (1) Plausible because the examinee will have to assess whether heat transfer is adequate. Incorrect because it is not adequate. (2) Plausible because the operators could local manual control, but they still have air so they are operable from the control room.
B.	(1) occurring (2) throttle open the MS-V-4's from the control room to stabilize RCS temperature	Incorrect Answer: (1) Plausible because the examinee will have to assess whether heat transfer is adequate. Incorrect because it is not adequate. (2) Plausible because if primary to secondary heat transfer were adequate, the MS-V-4's would be used to stabilize RCS temperature.
C.	(1) NOT occurring (2) take local-manual control of the MS-V-4's to cooldown RCS temperature	Incorrect Answer: (1) Part 1 is correct. (2) Plausible because the operators could local manual control, but they still have air so they are operable from the control room.
D.	(1) NOT occurring (2) throttle open the MS-V-4's from the control room to cooldown RCS temperature	Correct Answer: See above.

NUREG 1021, Rev 11, Appendix E, Section B Written Examination Guidelines:

The following is an excerpt from the NRC guidelines for taking the written examination:

7 – When answering a question, do *not* make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question. For example, you should not assume that any alarm has activated unless the question so states, or the alarm is expected to activate as a result of the conditions that are stated in the question. Similarly, you should assume that no operator actions have been taken, unless the stem of the question or the answer choices specifically state otherwise.

Intent of question:

The intent of this question is to test what instrument air valves will be available to use during a Station Blackout. The question puts the examinee in a scenario where the OP-TM-EOP-012, STATION BLACKOUT procedure is entered, and then the examinee must determine the status of Primary to Secondary Heat

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Transfer. The examinee must recognize that natural circulation (as defined by Guide 10 of OP-TM-EOP-010) is not occurring and then implement the procedural step which will cooldown OTSG to promote natural circulation. Due to the loss of the condenser, the MS-V-4's (Atmospheric Dump Valves) must be used.

Case for two answers:

Due to Three Mile Island plant design, the MS-V-4's are expected to be controllable from the control room for several hours.

The plant conditions indicated in the stem of the question are indicative of Phase 1 of an ELAP event. In accordance with CC-TM-118-1001 TMI diverse and Flexible Coping Strategy (FLEX), plant stability is maintained during this phase while the FLEX RCS makeup function is established. Accomplishing the FLEX RCS makeup function is assumed and time validated to occur 4 hours into the event (TM-FLEX-001 RCS Inventory Analysis for FLEX, and TECH Eval ECR15-00325 ELAP Time to Restore RCS Makeup). The MS-V-4s control in remote automatic mode initially but local control of MS-V-4s must be established within 3 hours i.e. before the 2 hr air system pressure is < 60psig, this action is assumed to occur 2 hours into the event.

Due to the nature of the Extended Loss of AC Power event and the OP-TM-EOP-012 procedure (Step 3.31) local control of the MS-V-4's must be used as the loss of AC power event progresses.

Step 3.31 reads:

IAAT two hour emergency air system pressure (IA-PI-1011 or 1012, B EDG Rm) approaches 60 psig, or control of the EF-V-30s or MS-V-4s become unreliable, then ESTABLISH local manual control of the affected valve(s).

The basis for this step, in accordance with the OP-TM-EOP-0121, STATION BLACKOUT BASIS DOCUMENT is:

If motive air is not available for the event duration, manual operation will be required. EF-V-30's and MS-V-4's are provided from 2 hour air and are DC powered.

Based on the NRC guidelines for the written exam, and because the emergency air system pressure was not a given condition, each examinee could make a different assumption for the time period in which the question is asked.

It is plausible that as a result of Station Blackout and the existence of a 2-hour air bottle and DC power that an examinee would believe that the question was asking for a condition right after the station blackout, as noted during the exam review.

It is also plausible that as a result of the Station Blackout and the procedure/basis document as written that the examinee believed that at some point that the MS-V-4's must be controlled locally due to the loss of air. During phase 1 of FLEX the 2-hour air pressure would approach 60 psig and MS-V-4 operation would be transferred from the control room to a local operator.

In accordance with ES-403, D, 1, b, this type of error should be considered as "a question with an unclear stem that confused the applicants or did not provide all the necessary information". The stem of the

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question should have contained information which made it clear that the intent was to test on control of the MS-V-4's prior to their 2-hour air bottles depleting.

In addition, the question should not be considered to have conflicting information as to cause the question to be deleted. At one time period in the event, choice C is clearly correct. At another time in the event, choice D is clearly correct. There is no period of time in which both answers can be considered correct.

Choices "A" and "B" are incorrect at all times due to the conditions in Guide 10 of OP-TM-EOP-010 which denote the requirements for natural circulation which are not met in this question.

Conclusion:

Question 79 of the TMI ILT NRC exam should be considered to have two correct answers based on question construction and NRC exam guidance on valid written exam assumptions as noted in NUREG 1021, Rev 11.

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Purpose:

To declare Question 80 technically incorrect on the Three Mile Island Initial Licensing Exam.

Problem Statement:

The term "Technical Specification action times" used in the above question is not technically correct. The question should have used the term "procedurally required action times".

Question:

Plant Conditions:

- Reactor power is 100% with ICS in full auto

Event:

- OP-TM-AOP-023, "A" DC SYSTEM FAILURE has been entered due to a complete loss of 'A' DC Distribution System

What Technical Specification action times must be met if the loss of 'A' DC Distribution System cannot be restored within the next 2 hours?

Place the Unit in HOT SHUTDOWN within the next ___(1)___, and COLD SHUTDOWN within an additional ___(2)___.

A. (1) 6 hours
   (2) 24 hours

B. (1) 6 hours
   (2) 36 hours

C. (1) 8 hours
   (2) 24 hours

D. (1) 8 hours
   (2) 36 hours

Answer: B

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Question Explanation:

Explanation: To answer this question correctly, the examinee must know: (1) In accordance with OP-TM-AOP-0231, "A" DC SYSTEM FAILURE BASIS DOCUMENT (Rev 10 Page 1), standard tech spec 3.8.4.c states that in modes 1, 2, 3, or 4 if the DC distribution system is inoperable for reasons other than inoperable battery charger or inoperable battery, operability must be restored within 2 hours or the unit must be placed in hot shudown within the next 6 hours. (2) The RNO of Step 4.13 intiates this shutdown if DC power cannont be restored within 2 hours.		
A.	(1) 6 hours (2) 24 hours	INCORRECT: Plausible because these are the times for HOT SHUTDOWN and COLD SHUTDOWN in Technical Specification 3.0.1, which could be entered if the EDM cannot determin battery operability within 8 hours. Incorrect because in this case the standard tech spec applies because "A" DC is completely de-energized.
B.	(1) 6 hours (2) 36 hours	CORRECT: See above.
C.	(1) 8 hours (2) 24 hours	INCORRECT: Plausible because many Technical Specifications will put the Unit in an 8 hour Tech Spec. Incorrect because OP-TM-AOP-0231 says the Standard Tech Spec applies.
D.	(1) 8 hours (2) 36 hours	INCORRECT: Plausible because many Technical Specifications will put the Unit in an 8 hour Tech Spec. Incorrect because OP-TM-AOP-0231 says the Standard Tech Spec applies.

Analysis:

Three Mile Island has customized technical specifications which contain action times for when components are inoperable. In the past TMI has applied Standard Technical Specification action times when our custom technical specifications did not exist for a given condition.

In the OP-TM-AOP-023, "A" DC SYSTEM FAILURE procedure part of the Standard Technical Specification timeclock is applied when the "A" DC System is lost for greater than two hours.

This condition is not covered by the Three Mile Island Technical Specifications, so the Three Mile Island procedure writers based actions in the AOP on Standard Technical Specifications.

The Standard Technical Specification 3.8.4D requires the plant to be in HOT STANDBY in 6 hours and HOT SHUTDOWN in 12 hours.

As written, the examinee is asked to determine the Technical Specification action time for a loss of the "A" DC distribution system. The correct set of times is not a Technical Specification action time, but rather a procedurally drive action time, where the first time (6 hours to HOT SHUTDOWN) is driven by Standard Technical Specifications and the second time (additional 36 hours to COLD SHUTDOWN) is a conservative decision built into the procedure.

Technical Specification 3.7 UNIT ELECTRICAL POWER SYSTEM does not apply for a complete loss of "A" DC therefore does not have any action times associated with such a condition. In addition, there is no

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legally binding document that requires Three Mile Island to comply with any Standard Technical Specifications.

Conclusion:

The term "Technical Specification action times" is not technically accurate when referring to any actions that Three Mile Island must take if a complete loss of the "A" DC distribution were to occur. The examinees were asked to identify the "Technical Specification action times" but were given choices with times that were not part of the Three Mile Island Technical Specifications. In addition, the second time is not even required by Standard Technical Specifications, but rather a conservative decision driven by the procedure. Question 80 is not technically accurate and should be deleted from the Three Mile Island Initial Licensing Exam.

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Purpose:

To change the answer to question 88 of the Three Mile Island Initial Licensing Exam.

Problem Statement:

Due to new information provided during the post exam review, the correct answer for question 88 should be changed to 'C'.

Question:

Sequence of Events:

- An In-service Test (IST) performed on AH-E-1A, Reactor Building Air Handling Unit 1A, showed an air flow rate of 24530 cfm, which is less than the minimum flow rate allowed by the IST Acceptance Criteria.
- Subsequent testing performed under a complex troubleshooting plan had shown:
  - Fan performance appeared to have leveled out at the lower flow rate.
  - Engineering evaluations concluded that there will be no further degradation of flow rate.

(1) AH-E-1 must be declared ___(1)___.
(2) What, if any, Technical Specification time clock must be entered?

A. (1) Degraded but Operable
   (2) No Technical Specification time clock

B. (1) Degraded but Operable
   (2) 30 day AP 1038 timeclock for Three Train Safe Shutdown Systems Degraded

C. (1) Inoperable
   (2) No Technical Specification time clock

D. (1) Inoperable
   (2) 7 day time clock

Answer: D

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Question Explanation:

To answer this question correctly, the examinee must know: (1) From OP-AA-108-104, TECHNICAL SPECIFICATION COMPLIANCE, the definition of INOPERABLE is when an SSC is considered to be INOPERABLE when it is not capable of meeting all of the requirements of the Technical Specification, ATR, TRM, ISFSI, or ODCM definition for OPERABILITY; (2) Even though Engineering has determined that the fan will not degrade further, this does not make the pump anything other than INOPERABLE because it is still lower than the minimum flow rate allowed by technical specifications. (2) Technical Specification 3.3.2 allows one train of the following systems to be out of service for 72 hours: Makeup and Purification, Decay Heat, RB Emergency Cooling, RB Spray, BWST level instrumentation, or cooling water systems for 72 hours; one of the exceptions to this is that one reactor building cooling fan and associated cooling unit shall be permitted to be out of service for seven days (Technical Specification 3.3.3). (3) AH-E-1A is powered from 1A ES MCC, AH-E-1B is powered from 1B ES MCC, and AH-E-1C is powered from 1C ESV (1107-5, Rev 155 Page 13). 1C ESV is normally powered from the 1S 480V bus. (4) AH-E-1A is the 'A' side ES cooling fan, and AH-E-1B and AH-E-1C are 'B' side ES fans. (5) In accordance with OP-TM-823-250, AH-E-1A, AH-E-1B, AH-E-1C COOLING FAN FLOW TESTING, Attachment 7.1 Step 4, the miniumum flowrate is 25,000 cfm. (6) The UFSAR Section 6.3 (Rev 21, Page 6.3-2) assumes 25,000 cfm for each unit in accident analysis.		
A.	(1) Degraded but Operable (2) No Technical Specification time clock	INCORRECT: (1) Plausible because the term degraded only applies when the equipment is OPERABLE. The examinee may believe that the equipment is not INOPERABLE because the SSC will not degrade any further, but since it is below the technical specification value that the SSC is degraded but operable. (2) Plausible because no technical specification would be entered if the equipment was degraded but operable.
B.	(1) Degraded but Operable (2) 30 day AP 1038 timeclock for Three Train Safe Shutdown Systems Degraded	INCORRECT: (1) Plausible because the term degraded only applies when the equipment is OPERABLE. The examinee may believe that the equipment is not INOPERABLE because the SSC will not degrade any further, but since it is below the technical specification value that the SSC is degraded but operable. (2) Plausible because some systems have a 30 day AP 1038 timeclock. AP 1038 is considered part of Technical Specifications. Incorrect because Reactor Building Ventilation is not one of those systems.
C.	(1) Inoperable (2) No Technical Specification time clock	INCORRECT: (1) Correct Answer. (2) Plausible because if AH-E-1B or AH-E-1C were inoperable, then no technical specification time clock would be entered. In accordance with OP-TM-823-000, REACTOR BUILDING HEATING AND VENTILATION SYSTEM (Rev 10 Page 7), with two of three RB air coolers operable, one from each ES power train, the requirements of TS 3.3.1.3 are satisfied.
D.	(1) Inoperable (2) 7 day time clock	CORRECT: See above.

Question History:

Question 88 is a modified question from ILT Exam 16-01. Question 88 has the same premise that a Technical Specification required component did not meet its IST acceptance criteria and a Technical Specification LCO should be entered. OP-TM-823-250, AH-E-1A, AH-E-1B, AH-E-1C COOLING FAN FLOW TESTING is the only surveillance that tests the minimum flow rate on which to base this question.

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Question Flaw:

When developing this question, the exam author read the procedure to ensure it tested AH-E-1A in the manner which would clearly identify that AH-E-1A is inoperable. The exam author did not take note in the answer explanation that the surveillance procedure must be run in COLD SHUTDOWN or HEATUP/COOLDOWN mode.

3.3 Prerequisites

3.3.1 **VERIFY** one of the following:

- Reactor in Cold Shutdown. ____
- Reactor is in Heatup/Cooldown mode **and** Engineering has concurred that RB temperature supports AH-E-1A/B/C testing. ____

In addition the exam author failed to note that the listed Technical Specification only applies then the reactor is critical.

3.3 EMERGENCY CORE COOLING, REACTOR BUILDING EMERGENCY COOLING AND REACTOR BUILDING SPRAY SYSTEMS

Applicability
Applies to the operating status of the emergency core cooling, reactor building emergency cooling, and reactor building spray systems.

Objective
To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building emergency cooling and reactor building spray systems.

Specification

3.3.1 The reactor shall not be made critical unless the following conditions are met:

Case to Accept 'C' as the correct answer:

Due to required mode of reactor operation when this AH-E-1A surveillance must be run, the only acceptable answer for question 88 is to declare AH-E-1A inoperable, but that no technical specification time clock applies.

While it was not the intent of the exam author to test this knowledge, the question (as written) only has one correct answer and therefore should not be deleted.

Conclusion:

The answer for question 88 should be changed to "C" due to a newly discovered technical information that the examinees provided during the exam review. The question, as written, only has one correct answer and that answer is technically correct.

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Purpose:

To correct the technical specification call in Scenario #2 for the dropped control rod. The administered scenario did not have all of the technical specifications which should be entered in the scenario guide.

Scenario Sequence of Events:

1. Dropped control rod in group 7 rods
2. OP-TM-AOP-062, INOPERABLE ROD is entered
3. Rod is recovered

Scenario Guide Technical Specification call:

- **3.5.2.2** – Operation with inoperable rods:
    - **c.** If within one hour of determination of an inoperable rod as defined in Specification 4.7.1, and once per 12 hours thereafter, it is not determined that a one percent delta k/k hot shutdown margin exists combining the worth of the inoperable rod with each of the other rods, the reactor shall be brought to the HOT SHUTDOWN condition within 6 hours until this margin is established.

Correct Technical Specification call:

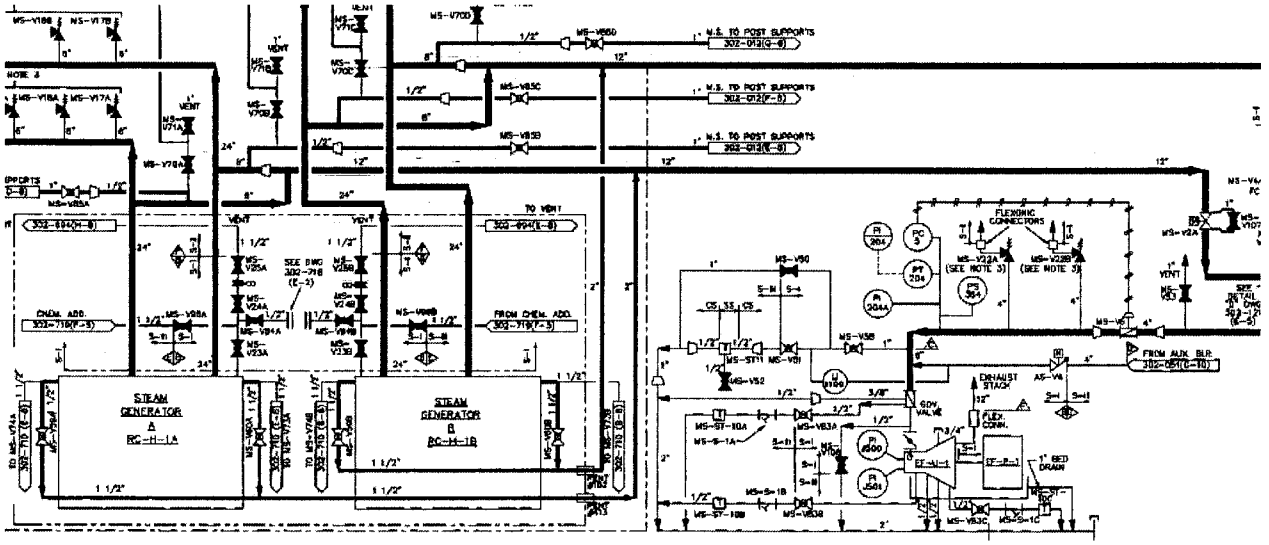
In addition to 3.5.2.2.C, the scenario guide should have the following identified technical specification calls:

- **3.5.2.2** –
    - **d.** Following the determination of an inoperable rod as defined in Specification 4.7.1, all rods shall be exercised within 24 hours and exercised weekly until the rod problem is solved.
    - **e.** If a control rod in the regulating or safety rod groups is declared inoperable per 4.7.1.2, and cannot be aligned per 3.5.2.2.f, power shall be reduced to $\leq$ of the thermal power allowable for the reactor coolant pump combination within 2 hours, and the overpower trip setpoint shall be reduced to $\leq$ 70% of the thermal power allowable within 10 hours. Verify the potential ejected rod worth (ERW) is within the assumptions of the ERW analysis and verify peaking power limits per the COLR have not been exceeded within 72 hours.
    - **f.** If a control rod in the regulating group is declared inoperable per Specification 4.7.1.2, operation may continue provided that within 1 hour the rods in the group are positioned such that the rod that was declared inoperable is maintained within allowable group average position limits of Specification 4.7.1.2.
    - **g.** If the inoperable rod in Paragraph "e" above is in groups 5, 6, or 7, the other rods in the group may be trimmed to the same position. Normal operation of 100 percent of the thermal power allowable for the reactor coolant pump combination may then continue provided that within 1 hour the rod that was declared inoperable is maintained within allowable group average position limits in 3.5.2.5.

Conclusion:

The NRC should grade Scenario #2 to all the above (3.5.2.2 c, d, e, f, and g).

Purpose: Determine if there is any safety significance of MS-V-2A being kept open during a main steam line break on the "A" OTSG inside the Containment Building. MS-V-2A is the steam supply from the "A" once-through steam generator to the steam driven emergency feedwater pump (EF-P-1) and the main condenser.



Analysis: The purpose of EOP-010 Rule 3 "Excessive Heat Transfer" is to terminate the excessive primary-to-secondary heat transfer caused by either an overfeed condition or a faulted once-through steam generator (OTSG). In the case of a faulted "A" OTSG in the Reactor Building, Phase 1 and Phase 2 isolations are procedurally required. This type of steam leak is unisolable, with none of the feedwater or steam isolation valves in Rule 3 preventing the entire contents of the OTSG from being released inside containment. Therefore, the overcooling event is only terminated upon the boiling of all remaining contents within the OTSG (e.g., 0" level on Start-up Range level instruments).

In this casualty, all feedwater to the faulted OTSG must be terminated to prevent continued uncontrolled cooling of the Reactor Coolant System. This is accomplished by ensuring main feedwater (FW-V-16A, FW-V-17A, FW-V-5A, FW-V-92A) and emergency feedwater (EF-V-30A and EF-V-30D) are all closed. Since all feedwater valves were successfully closed, overcooling was terminated when contents of the "A" OTSG were emptied regardless of MS-V-2A position. Therefore, failure to close MS-V-2A has no safety consequence for this casualty mitigation.

Phase 1 Isolation:

OTSG A	OTSG B
___ MS-V-1A	___ MS-V-1C
___ MS-V-1B	___ MS-V-1D
___ FW-V-16A	___ FW-V-16B
___ FW-V-17A	___ FW-V-17B
___ FW-V-5A	___ FW-V5B
___ FW-V-92A	___ FW-V-92B
___ MS-V-3D	___ MS-V-3A
___ MS-V-3E	___ MS-V-3B
___ MS-V-3F	___ MS-V-3C
___ MS-V-4A	___ MS-V-4B

If Open for minimum FW Nozzle flow

___ FW-V-85A (Turb Bldg 322')	___ FW-V-85B (Interm Bldg 322')

Phase 2 Isolation:

OTSG A	OTSG B
___ EF-V-30A	___ EF-V-30B
___ EF-V-30D	___ EF-V-30C
___ MS-V-2A	___ MS-V-2B

Post-Exam Comment Resolution

Summary

Exelon submitted post-exam comments on four written exam questions (Q# 24, 79, 80 and 88). Exelon also submitted two comments on Operating Test Scenario #2, recommending a correction to the required Tech Spec actions for Event 4 and to clarify a non-critical aspect of the critical task for Event 6. The NRC reviewed the proposed exam changes and agreed with the licensee comments. Two correct answers were accepted for written exam questions 24, 79, and 88. Question 80 was determined to be technically incorrect and was deleted from the exam. Comments regarding Scenario #2 were determined to be appropriate. Scenario #2 was changed accordingly.

Written Exam Question #24

Facility Recommendation:

Accept both Choice B (the key answer) and Choice C (a distractor) as correct answers.

NRC Comment Resolution:

Question #24 has two, and only two, correct answers. The key was changed to accept both Choice B and Choice C as correct answers.

Pass-Fail Statistics:

3 of 6 applicants missed this question. Choice B, the key answer, was selected by 3 applicants. Choice C, a distractor choice, was selected by the other 3 applicants. No applicant asked for any clarification of this question during exam administration.

Discussion:

The question asks the applicant to identify the action necessary to ensure Containment Integrity requirements are met when the initial conditions include a failed inner airlock door that cannot be closed and when a reactor building entry is required to repair that inner door.

The original correct answer (B) states that the "outer door may be opened provided it is immediately closed after passage". This is correct because the TMI Tech Specs Bases specifically states the following: "Entry and exit is allowed to perform repairs on the affected air lock component. ... If the inner door is the one that is operable, however, then a short time exists when the containment boundary is not intact (during access through outer door). The ability to open the OPERABLE door, even if it means the containment boundary is temporarily not intact, is acceptable due to the low probability of an event that could pressurize the containment during the short time in which the OPERABLE door is expected to be open. After each entry and exit the OPERABLE door must be immediately closed."

Choice C, originally a distractor, is also a correct answer to the question because it establishes conditions where the Containment Integrity Tech Spec would be no longer applicable. Choice C states, "The RCS must be cooled to less than 200°F, with pressure reduced to less than 500 psig prior to opening the outer door." Technical Specification 3.6.1 states that Containment Integrity shall be maintained whenever all three of the following conditions exist:

- Reactor coolant pressure is 300 psig or greater.

(18)

- Reactor coolant temperature is 200 degrees F or greater.
- Nuclear fuel is in the core.

Although Choice C also includes "with pressure reduced to less than 500 psig", the relevant fact included in this choice is that RCS temperature is less than 200°F and therefore the plant conditions requiring Containment Integrity are no longer met. The outer door and the inner door can both be open with these conditions and still be in technical specification compliance because Containment Integrity is not required with RCS temperature < 200°F.

The licensee's distractor justification for Choice C, regarding being less than 500 psig, was originally assumed to make the choice incorrect, because Containment Integrity is also not required below 300 psig, but not 500 psig. However, the Containment Integrity requirement per specification 3.6.1 requires all conditions to be met, so with temperature reduced below 200°F, the 500 psig information is not relevant.

The NRC reviewed whether being at a condition of < 200°F and < 500 psig was within TMI operating procedures, system limitations, and other technical specification limitations. Typically, in accordance with the TMI Operating Procedure 1102-11, Plant Cooldown, once RCS Temperature is below 290°F, operators would initiate action to depressurize the RCS to less than 250 psig and then initiate DHR cooling. So if the plant is less than 200°F, RCS pressure would be less than 270 psig (see Enclosure 4, Figure 1A of 1102-11).

Additionally, Operating Procedure 1102-11 states in Limits and Precautions 2.1.1 to maintain RCS pressure and temperature below and to the right of TS Curve, PZR Surge Line Limit and PORV Actuation curves at all times. In this case all RCS parameters less than 200°F and 500 psig would meet that requirement, therefore although 500 psig at 200°F is not a typical set of parameters, these parameters are bounded by procedural and technical specification limits. The PORV LTOP Tech Spec setting per Tech Spec 3.1.12 is 592 psig or in all cases greater than 500 psig.

The NRC agrees with the licensee position that Choice C is an acceptable correct answer, because Containment Integrity is not required < 200°F and because operating at less than 200°F with the corresponding 500 psig limitation are within the plant cooldown procedural and technical specification LTOP limits.

References:

- Technical Specification 3.6, Reactor Building, Amendment 278 (Sections 3.6.1, 3.6.12, and the associated TS bases).
- Operating Procedure 1102-11, Plant Cooldown, Rev 156 (Section 2.1 Subsection 1, Section 3.2.9 Caution, Enclosure 2 – Page 9 of 13 regarding placing NDTT auto/off switch in auto to enable the low pressure overpressure protection, and Enclosure 4)

Written Exam Question #79

Facility Recommendation:

Accept both Choice D (the key answer) and Choice C (a distractor) as correct answers.

NRC Comment Resolution:

Question #79 has two, and only two, correct answers. The key was changed to accept both Choice C and Choice D as correct answers.

Pass-Fail Statistics:

1 of 2 SRO applicants missed this question. Choice D, the key answer, was selected by 1 SRO applicant. Choice C, a distractor choice, was selected by the other SRO applicant. Neither SRO applicant asked for any clarification of this question during exam administration.

Discussion:

The question asks applicants to determine whether Primary to Secondary Heat Transfer is occurring during a Station Blackout (SBO) and how operators are to control RCS Temperature in accordance with OP-TM-EOP-012, STATION BLACKOUT.

The original Key Answer D states that heat transfer is not occurring and that operators will throttle open the MS-V-4's (the Atmospheric Steam Dump valves) from the control room to cooldown RCS temperature. This is a correct answer because the procedure requires the operator to open the MS-V-4's, while feeding the steam generators in order to establish heat transfer conditions.

Distractor Choice C is also correct because it states that heat transfer is not occurring and the operators will take local-manual control of the MS-V-4's to cooldown RCS temperature. Both Choice C and Choice D are correct answers because the procedure directs opening the MS-V-4's, but allows operating the valves from the control room or locally. Step 3.31 of the station blackout procedure states, "*IAAT* [IF AT ANY TIME] *two hour emergency air system pressure (IA-PI-1011 or 1012, B EDG Rm) approaches 60 psig, or control of the EF-V-30s or MS-V-4s become unreliable, then ESTABLISH local manual control of the affected valves.*" The question stem does not provide a timeline or provide current status of instrument air, and current time in the event cannot be inferred from information in the question stem. One could reasonably assume an event time of shortly after initiation of SBO (less than 2 hours into the event) or an event time at more than 2 hours from initiation of the blackout. Therefore both answers are correct.

In reviewing Station Blackout Procedure, OP-TM-EOP-012, the NRC determined that both answers are technically correct. The procedure states to open the MS-V-4's to establish heat transfer. The event timeline and instrument air status would determine the method / location used. The question stem fails to provide an event timeline or instrument air status.

References:

- OP-TM-EOP-012, Station Blackout, Rev 5 (Steps 3.21 and 3.31)
- OP-TM-EOP-0121, Station Blackout Basis Document, Rev 2 (Bases for Steps 3.21 and 3.31)

Written Exam Question #80

Facility Recommendation:
Delete the question.

NRC Comment Resolution:
Question #80 is technically incorrect. None of the answer choices are correct. The key was changed to delete Question #80 from the exam.

Pass-Fail Statistics:
Both of the SRO applicants selected Distractor Choice A as the correct answer for this question. Neither SRO applicant asked for any clarification of this question during exam administration.

Discussion:

The question asks what Technical Specification action times must be met if the loss of "A" DC Distribution System cannot be restored within the next 2 hours.

Key Answer B states, "*Place the Unit in HOT SHUTDOWN within the next 6 hours, and COLD SHUTDOWN within an additional 36 hours.*" This answer was based on the Response Not Obtained (RNO) column for Step 4.13 of Procedure OP-TM-AOP-023, "A" DC SYSTEM FAILURE, which directs the operator to initiate a reactor shutdown to be in Hot Shutdown within 6 hours IAW 1102-4, Power Operation. The step also directs operators to initiate 1102-11, Plant Cooldown to be in Cold Shutdown within an additional 36 hours. These action time requirements are procedurally driven, and are not Technical Specification actions. TMI Technical Specification 3.7, Unit Electric Power System does not address the DC distribution systems. Additionally OP-TM-AOP-0231, "A" DC System Failure Basis Document states, for Step 4.13, that the step provides conservative guidance for the decision to shut down and cool down, and is based upon Standard Technical Specification 3.8.4. However, TMI has not implemented Standard Technical Specifications and the shutdown requirements in the actual standard tech spec do not match the answer given. Standard Tech Spec 3.8.4 does require the plant to be in Hot Standby (MODE 3) within 6 hours, and to Hot Shutdown (MODE 4), rather than to Cold Shutdown, within 12 hours.

After reviewing the TMI Technical Specifications, procedure OP-TM-AOP-023, "A" DC SYSTEM FAILURE, and NUREG-1430 Standard Technical Specification 3.8.4, the NRC has determined the question should be deleted, based on it not being technically accurate and based on the question inappropriately asking the applicant for "Technical Specification action times" that must be met.

References:
- OP-TM-AOP-023, "A" DC System Failure, Rev 7 (Steps 4.13)
- OP-TM-AOP-0231, "A" DC System Failure Basis Document, Rev 8 (Bases for Step 4.13)
- NUREG-1430, Standard Technical Specifications, Babcock and Wilcox Plants, Rev 4 (Volume 1, TS 3.8.4 and Volume 2, TS 3.8.4 bases)
- Technical Specification 3.7, Unit Electric Power System

Written Exam Question #88

Facility Recommendation:

Change answer from Choice D (the key answer) to Choice C (a distractor).

NRC Comment Resolution:

Question #88 has one, and only one, correct answer. The key was changed to show Choice C as the correct answer.

Pass-Fail Statistics:

Both SRO applicants selected Choice C, a distractor choice, as the correct answer for this question. Neither SRO applicant asked for any clarification of this question during exam administration.

Discussion:

The question asks SRO applicants to determine the operability of AH-E-1A, Reactor Building Air Handling Unit 1A after reviewing surveillance test results and what, if any Technical Specification time clock must be entered.

Key Answer D states the fan must be declared inoperable and a 7 day tech spec time clock must be entered. This was identified as the correct answer based on TMI Technical Specification 3.3.3.c, which states, *"One reactor building cooling fan and associated cooling unit shall be permitted to be out-of-service for seven days."*

The question stem did not indicate current plant condition. Given that the only information provided relates to completion of in-service testing on the fan, it is reasonable to assume the plant is in a condition that would support testing of the fan. Per Test Procedure OP-TM-823-250, the necessary prerequisite plant condition must be either the Reactor in Cold Shutdown or the Reactor in Heatup/Cooldown mode with Engineering concurrence. TS 3.3.3.c, upon which the key answer was based, is only applicable in when the unit is critical, during startup or power operations. TS 3.3.3.c does not apply in the Modes in which the fan testing would be performed. Based on this, the only correct answer for the question is Distractor Choice C, which states the fan must be declared inoperable and that no Technical Specification time clock must be entered. Therefore, the key answer was changed from Choice D to Choice C.

References:

- OP-TM-823-250, AH-E-1A, AH-E-1B, AH-E-1C Cooling Fan Flow Testing (Prerequisite Step 3.3.1)
- Technical Specification 3.3, Emergency Core Cooling, Reactor Building Emergency Cooling and Reactor Building Spray Systems