Progress Energy

July 25, 2011

SERIAL: HNP-11-074

Mr. Malcolm Widmann, Region II
United States Nuclear Regulatory Commission
245 Peachtree Center Ave., NE, Suite 1200
Atlanta, GA 30303-1257

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
REACTOR AND SENIOR REACTOR OPERATOR
INITIAL EXAMINATIONS 05000400/2011302

Dear Mr. Widmann:

Enclosed is the post-examination package for the Reactor and Senior Reactor Operator Initial Examinations given at the Harris Nuclear Plant July 11, 2011, through July 20, 2011.

Included from the administration of the Written Examination are the student cover sheets, answer sheets, master examinations, an answer key, a log of applicant questions and answers, and the student seating chart. Also, pertaining to the RO Written Examination, are three post-examination comments (Question #26, #48 and #49).

If you have any questions regarding this submittal, please contact Mr. Simon Schwindt at (919) 362-3527.

Sincerely,

Scotty Scott
Superintendent – Operations Training
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HNP Licensed Operator Written Exam question #26 Post Exam Comment

Comment for question # 26 is both answers A and B are correct. In the HNP EOP users guide the bases for the 100°F/hr cooldown rate limit is stated as follows: EOPs that provide instructions for plant cooldown and depressurization to cold shutdown conditions limit the RCS cooldown rate to 100°F/hr consistent with the Tech Spec limits for Modes 1 - 3. This basis confirms answer A is correct. The stem of the question states that an EPP-009 Post LOCA Cooldown and Depressurization is in progress. The bases document for EPP-009 (ES-1.2), states that the maximum cooldown rate of 100°F/hr will preclude violation of the Integrity Status Tree thermal shock limits. FRP-P.1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK, would be the procedure entered if the Integrity Status Tree limits were violated which would also make answer B Correct. Since the stem of the question did not specify whether the basis for the limit of 457°F at 0630 or the basis for the limit in EPP-009 was desired, either answer could be considered correct based on the reference used to answer the question. EPP-009 basis document was not referenced in the development of this question and this new technical information supports accepting both answers as correct.

Attached:

HNP Written Exam question # 26
EPP-009, Post LOCA Cooldown and Depressurization Rev 18 page 12
EOP Users Guide Rev 30 page 46
ES-1.2 HP-Rev 2 page 81

26. Given the following plant conditions:
    - At 0530, RCS temperature was being maintained at 557°F with the plant in Mode 3 when a Small Break LOCA occurred
    - At 0545, RCS temperature is 550°F
    - The crew is ready to commence a cooldown to cold shutdown IAW EPP-009, Post LOCA Cooldown and Depressurization

    Which ONE of the following identifies (1) the lowest allowable temperature of the RCS at 0630 if the crew begins the MAXIMUM permissible cooldown rate AND (2) the basis for this temperature limit?

    A. (1) 457°F

       (2) to ensure that Tech Spec cooldown limits are NOT exceeded

    B. (1) 457°F

       (2) to ensure that a transition is NOT required to be made to FRP-P.1, Response to Imminent Pressurized Thermal Shock

    C. (1) 450°F

       (2) to ensure that Tech Spec cooldown limits are NOT exceeded

    D. (1) 450°F

       (2) to ensure that a transition is NOT required to be made to FRP-P.1, Response to Imminent Pressurized Thermal Shock

INSTRUCTIONS	RESPONSE NOT OBTAINED
10. Initiate RCS Cooldown To Cold Shutdown:	
☐ a. Maintain cooldown rate in RCS cold legs - LESS THAN 100° F/HR	
☐ b. Check RHR system - OPERATING IN SHUTDOWN COOLING MODE	☐ b. GO TO Step 10f.
☐ c. Cooldown using RHR.	
☐ d. Dump steam from intact SG(s) to supplement cooldown and cool SG(s).	
☐ e. GO TO Step 11.	
f. Check all of the following to determine if steam can be dumped to condenser:	f. Dump steam from intact SGs at using any of the following (listed in order of preference):
☐ • Check any intact SG MSIV - OPEN	☐ 1) SG PORVs
☐ • Check condenser available (C-9) light (BPLB 3-3) - LIT	☐ 2) Locally operate SG PORVs using OP-126, "MAIN STEAM, EXTRACTION STEAM, AND STEAM DUMP SYSTEMS", Section 8.2.
☐ • Steam dump control system - AVAILABLE	☐ 3) TDAFW pump
	☐ GO TO Step 11.
☐ g. Transfer steam dump to steam pressure mode using OP-126, "MAIN STEAM, EXTRACTION STEAM AND STEAM DUMP SYSTEM", Section 5.3.	
☐ h. Dump steam from intact SGs to condenser using condenser steam dumps.	

6.19 Tech Spec Cooldown and Pressure/Temperature Limits

EOPs that provide instructions for plant cooldown and depressurization to cold shutdown conditions limit the RCS cooldown rate to 100° F/HR consistent with the Tech Spec limits for Modes 1 - 3. This limit conflicts with the Tech Spec limit in Mode 4 of 50° F/HR. Use of the less restrictive 100° F/HR limit in Mode 4 is acceptable for implementation of the EOPs even though it does not comply with Tech Spec. Justification for use of the 100° F/HR limit and non-compliance with Tech Specs is documented in Engineering Evaluation PCR-5275 and the response to AR 00022701. The justification is based in part on the fact that in Mode 4, Pressure-Temperature limits to protect vessel integrity have been developed for the 100° F/HR cooldown rate as well as the 50° F/HR used as the Tech Spec limit. The RCS pressure limit for any given RCS temperature are slightly lower for the 100° F/HR case but well above those (actually near the PRZ SRV setpoint) expected to be present during an operator controlled RCS cooldown. HNP has decided to use the more restrictive limit in Mode 4 to provide more operational flexibility when LTOPS is placed in service. (References 2.2.3.4 and 2.2.3.24)

PCR-5275 also evaluated when it was necessary to place LTOPS in service during EOP implementation. The evaluation found that it is not necessary to enable LTOPS or rack out all but one CSIP breaker during cooldown related EOPs except the Natural Circulation Procedures EPP-005, 006, and 007. In these three procedures, it is necessary to comply with these Tech Spec limits. In the event of a LOCA, SGTR, or secondary side break in which cooldown to cold shutdown is performed in accordance with the EOPs, the plant operations staff may elect to enable LTOPs and rack out the CSIP breaker even though this is not explicitly directed in the procedures. However, the operators must have control of RCS temperature and pressure to warrant performance of these actions.

6.20 Determining RCS Temperature and Cooldown Rate

When monitoring RCS cooldown rates, use cold leg temperature. When RHR is in the shutdown cooling mode AND RCPs are stopped, use RHR HX outlet temperature to determine cooldown rates. These are consistent with the temperature indications to be used as outlined in GP-007, Attachment 1.

In determining the RCS cooldown rate, the cold leg temperature change over the last 60 minutes must always be considered (Reference 2.2.2.5). For example, assume at the initiation of an accident the RCS cold leg temperature is 555° F. Thirty minutes into the accident, the EOPs direct a 100° F/Hr cooldown be commenced. The lowest cold leg temperature at this time is 455° F. Since a decrease of 100° F has already occurred, the operator must wait thirty more minutes to initiate the cooldown. However, implementation of other EOP actions should continue as allowed by the rules of usage discussed in Section 5.3.7.

STEP: Initiate RCS Cooldown To Cold Shutdown

PURPOSE: To begin or continue a controlled RCS cooldown to cold shutdown temperature using a preferred or alternate method with a specified maximum cooldown rate

BASIS:

The objective of a controlled cooldown is to reduce the overall temperature of the RCS coolant and metal to reduce the need for supporting plant systems and equipment required for heat removal. The maximum cooldown rate of 100°F/hr will preclude violation of the Integrity Status Tree thermal shock limits. The preferred steam release path is to the condenser to conserve inventory; however, atmospheric release is the stated alternative. If RCS temperature and pressure are below certain limits, the RHR System may be in service and should be used to cool down the RCS to cold shutdown.

ACTIONS:

- Determine if RHR System is in service
- Initiate RCS cooldown to cold shutdown
- Maintain RCS cooldown rate in RCS cold legs less than 100°F/hr
- Use RHR System
- Dump steam to the condenser using normal steam dump system
- Dump steam to the atmosphere using SG PORVs

INSTRUMENTATION:

- RCS hot leg temperatures indication
- RCS cold leg temperatures indication
- Steam dump valves to condenser position indication
- SG PORVs position indication
- Plant specific RHR System instrumentation which includes valve position and pump status indication

CONTROL/EQUIPMENT:

- Steam dump valves to condenser switches
- SG PORVs switches
- Plant specific RHR System controls which include valve and pump controls

26. Given the following plant conditions:
    - At 0530, RCS temperature was being maintained at 557°F with the plant in Mode 3 when a Small Break LOCA occurred
    - At 0545, RCS temperature is 550°F
    - The crew is ready to commence a cooldown to cold shutdown IAW EPP-009, Post LOCA Cooldown and Depressurization

    Which ONE of the following identifies (1) the lowest allowable temperature of the RCS at 0630 if the crew begins the MAXIMUM permissible cooldown rate AND (2) the basis for this temperature limit?

    A.✓ (1) 457°F

    (2) to ensure that Tech Spec cooldown limits are NOT exceeded

    B. (1) 457°F

    (2) to ensure that a transition is NOT required to be made to FRP-P.1, Response to Imminent Pressurized Thermal Shock

    C. (1) 450°F

    (2) to ensure that Tech Spec cooldown limits are NOT exceeded

    D. (1) 450°F

    (2) to ensure that a transition is NOT required to be made to FRP-P.1, Response to Imminent Pressurized Thermal Shock

Feedback

Plausibility and Answer Analysis

In determining the RCS cooldown rate, the cold leg temperature change over the last 60 minutes must always be considered to ensure TS limits are not exceeded so the lowest temperature at 0630 with a 100°F CD will be 457°F.

A. Correct

B. Incorrect — *Plausible since the lowest allowed temperature is 457°F, but it is to ensure TS limits are not exceeded.*

C. Incorrect — *Plausible since if a cooldown rate of 100°F per hour over 45 minutes is performed 450°F will be the resulting temperature, but the cold leg temperature change over the last 60 minutes must always be considered to ensure TS limits are not exceeded.*

D. Incorrect — *Plausible since if a cooldown rate of 100°F per hour over 45 minutes is performed 450°F will be the resulting temperature, but the cold leg temperature change over the last 60 minutes must always be considered to ensure TS limits are not exceeded.*

Notes

BW/E08; W/E03 LOCA Cooldown - Depress. / 4

WE03EG2.1.32 Ability to explain and apply system limits and precautions.
(CFR: 41.10 / 43.2 / 45.12)

Importance Rating:	3.8 4.0
Technical Reference:	EOP Users Guide, Rev. 30, Page 46; EPP-009 Step 10 Page 12 Rev. 18
References to be provided:	None
Learning Objective:	EOP-LP-3.5 Objective 4
Question Origin:	OIT Dev Bank EOP-3.5-R5
Comments:	None
Tier/Group:	T1G2

HNP Licensed Operator Written Exam question #48 Post Exam Comment

Comment for question 48 is that it should be deleted from the exam. The question was unclear as to what power supply was reenergized. An assumption could be made that it was the output of the charger which is correct or the input to the chargers from the motor control centers that are reenergized by the Emergency Diesel Generators following a loss of off-site power. In addition, the stem of the question is worded such that if the correct answer, a single charger, is selected the question is not grammatically correct. The use of "lose" vice lose(s) in the stem would require the correct answer to be plural to be grammatically correct. The lack of clarity and the grammatical incorrectness of the stem lead to confusion among the applicants.

Attached:
HNP Written Exam question #48
OP-156.01 Rev 31 Attachment 1 DC Electrical System Checklist

48. Given the following:
    - The unit is operating at 100% power
    - A Fire in Aux Bus 1E1 occurs, resulting in the loss of Aux Bus E

    Which ONE of the following describes the battery charger(s) that temporarily lose power and will automatically be re-energized?

    A. 1A-SA and 1B-SA

    B. 1A-SB and 1B-SB

    C. 1A-SA or 1B-SA

    D. 1A-SB or 1B-SB

COMPONENT NUMBER	COMPONENT DESCRIPTION	POSITION	CHECK	VERIFY
	RAB 286 (continued)			
	MCC 1B21-SB			
1B21-SB-1CR	Batt Chgr 1A-SB 125 Volt	ON	______	______
	MCC 1B31-SB			
1B31-SB-3CL	Batt Chgr 1B-SB 125 Volt	ON	______	______
	PP-1E213			
1E213-23	1B-SB Battery Cell Charger	ON	______	______
	PP-1B211-SB			
PP-1B211-SB-13	Supply to DP-1B-SB Transducer	ON	______	______
	1EE-531 B - Train Battery Chargers Transfer Panel			
1EE-E536	MTS-1	NEUTRAL	______	______
1EE-E537	MTS-2	NORMAL 1B21-SB SUPPLY TO 1A-SB	______	______
1EE-E538	MTS-3	NORMAL 1B31-SB SUPPLY TO 1B-SB	______	______
	Battery Charger 1A-SB			
N/A	AC Input	ON/OFF*	______	______
N/A	DC Output	ON/OFF*	______	______
N/A	Normal/Equalize	NORMAL	______	______
	Battery Charger 1B-SB			
N/A	AC Input	ON/OFF*	______	______
N/A	DC Output	ON/OFF*	______	______
N/A	Normal/Equalize	NORMAL	______	______

*These breakers may be ON or OFF due to the alternating operations of chargers. Circle correct position.

48. Given the following:
    - The unit is operating at 100% power
    - A Fire in Aux Bus 1E1 occurs, resulting in the loss of Aux Bus E

Which ONE of the following describes the battery charger(s) that temporarily lose power and will automatically be re-energized?

A. 1A-SA and 1B-SA

B. 1A-SB and 1B-SB

C. 1A-SA or 1B-SA

D.✓ 1A-SB or 1B-SB

Feedback

Plausibility and Answer Analysis

Item directly evaluates a loss of AC power to the DC distribution system by evaluating the knowledge of the power supply to the safety rated battery chargers. The safety rated battery chargers are powered from seperate 480v MCC's off of each 6.9kv safety bus. A-SA and B-SB 6.9kv safety busses are supplied from Aux busses D and E, respectively. A loss of Aux bus E will result in a loss of the B-SB safety bus until it is re-energized by its EDG.

A. Incorrect. *Plausible because the loss of Aux bus E will cause a loss of a safety bus but will ONLY result in the loss of B-SB safety battery chargers which does not include the 1A-SA battery charger.*

B. Incorrect. *Plausible because the loss of Aux bus E will cause a loss of a safety bus but will ONLY result in the loss of B-SB safety battery chargers which does not include the 1A-SB battery charger.*

C. Incorrect. *Plausible because the loss of Aux bus E will cause a loss of a safety bus but will ONLY result in the loss of B-SB safety battery chargers which does not include the 1A-SA battery charger.*

D. Correct.

Notes

062 A.C. Electrical Distribution

062K3.03 Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following: DC system
(CFR: 41.7 / 45.6)

Importance Rating:	3.1 4.2
Technical Reference:	OP-156.01, Rev. 31, Page 101, 105, 107
References to be provided:	None
Learning Objective:	DC Power Objective 9
Question Origin:	2008 North Anna Bank
Comments:	None
Tier/Group:	T2G1

HNP Licensed Operator Written Exam question #49 Post Exam Comment

Comment for question #49 is both answers 'A' and 'B' are correct because insufficient information is provided in the stem of the question to determine when the DC load shed occurs. The assumption was made that the stem of the question was asking the operator to determine the effect on safety battery life as our station procedures are implemented. In accordance with site procedures and the Station Blackout Coping Analysis, our 125VDC Class 1E batteries are rated to last for 4 hours at rated load (Calc 8S44-P-101 STATION BLACKOUT COPING ANALYSIS REPORT section 7.2.2.1) and the DC load shed occurs within 60 minutes following the loss of AC power (EOP-EPP-001 LOSS OF AC POWER TO 1A-SA AND 1B-SB BUSES).If the DC load shed to half rated load occurs instantaneously (concurrent with the loss of AC power), battery life would extend to greater than twice rated life, which would make 'A' correct. If the DC load shed to half rated capacity occurs at time +60 minutes (as assumed in Calculation E4-0006 SAFETY BATTERIES 1A-SA & 1B-SB LOAD PROFILE DETERMINATION (LOCA/SBO) section 4.2.2.4), then 25% of battery capacity would be used prior to loads being reduced to 50%. This would leave 3 hours of rated capacity life remaining. Following the load shed, this would extend remaining battery life to greater than 6 hours. Battery life cannot be greater than 8 hours because of the 60 minutes at rated capacity already used. Therefore, answer 'B' would be correct.

Attached:
HNP Written Exam question #49
Calculation E4-0006 Rev 2 page 6
8S44-P-101 Rev 8 page 7-5 thru 7-7

49. Given the following plant conditions:
    - A loss of AC power has occurred
    - 125 VDC battery 1A-SA is currently loaded at rated load

    DC load shedding has been performed to reduce the battery load to half of rated load.

    How long will the battery be available to supply the remaining loads?

    A. More than 8 hours

    B. More than 6 hours but less than 8 hours

    C. More than 4 hours but less than 6 hours

    D. up to 4 hours

4.2.1.8 Include a summary of the equipment loading for each DC circuit during each of the significant load periods as Attachments D, G, J & M.

4.2.2 Assumptions

4.2.2.1 With the exception of the indicating lights used in the Sequencer operation and the Transfer and Auxiliary Transfer Panels, which were conservatively analyzed, all non-green indicating lights are assumed to be on. Furthermore, lights associated with MOV's will have both red and green indicating lights energized.

4.2.2.2 Control room evacuation will not occur concurrent with a LOCA or SBO; therefore, relays required to permit transfer of controls from the main control board to the auxiliary control room are not considered.

4.2.2.3 During an SBO, in accordance with Table 1 of Reference 2.14, all three (3) flow isolation valves fed from DP-1A2-SA (AF-V116SAB-1, AF-V117SA-1 AND AF-V118SA-1) are normally in their required coping position (open), upon loss of AC power, and are not assumed to operate. Therefore, this loading has been deleted from the circuit 6 first minute SBO load profile.

4.2.2.4 During an SBO event, Reference 2.13 directs that both ESS panels' feeder breakers (circuit no. 8 on 125V DC panels DP-1A-SA and DP-1B-SB) be manually opened. This analysis conservatively assumes that they are opened at 60 minutes after the initiation of the SBO event.

4.2.2.5 During an SBO event, Reference 2.13, directs that circuits 10, 11, 12 and 18 on both panels DP-1A-SA and DP-1B-SB be opened. This analysis conservatively assumes that they are opened at 60 minutes after the initiation of the SBO event.

4.2.2.6 For conservatism, during an SBO event, the diesel generator field winding will be flashed during both the entire first and last minute of the battery load profile.

4.2.2.7 6.9kV and 480V switchgear breaker spring charging motor inrush current will last for less than ½ second. However, the spring charging motor is conservatively made to operate at its inrush current for the subsequent time period after breaker operation which has a duration of typically more than ½ second. If the time period when the inrush current is occurring is longer than the running time of the spring charging motor, it is conservatively assumed that the motor current will be the inrush current for the entire time period. If the inrush current time period is shorter than the running time of the spring charging motor, the subsequent time period(s) after the spring charging begins, will utilize the steady state spring charging motor current until the sum of the inrush and steady state current time periods is equal to or greater than the spring charging motor running time.

4.2.2.8 Random Loads

a. The breakers for 1A1 XFMR and 1B1 XFMR are not required since they

Loss of normal seal injection coupled with loss of CCW seal cooling during a SBO will result in RCP seal failure and consequent RCS leakage of approximately 25 gpm per RCP. Additionally, without the availability of the ASI system, there is no means of reactor coolant inventory makeup during a SBO event. Though these factors are evaluated as acceptable as stated herein, they do significantly limit the ability of the plant to cope with a SBO condition.

The Quality Class B (SBO) Alternate Seal Injection and Dedicated Shutdown Diesel Generator (DSDG) systems installed by EC 70350 provide a diverse and redundant means of providing RCP seal cooling and reactor coolant makeup during a SBO event. This significantly improves the ability of HNP to maintain RCS cooling and RCS inventory control safety functions during a SBO event. Though the leakage conditions and scenario conclusions made in NUMARC 87-00 and herein will remain as the bounding criteria for Reactor Coolant Inventory Loss, the defense in depth enhancement provided by the ASI and DSDG are credited with significantly improving the capabilities of HNP to cope with a SBO event.

7.2.2 Battery Capacity

7.2.2.1 Summary

The capacity of the HNP 125VDC Class 1E batteries to support decay heat removal during a station blackout for the four hour coping duration was checked by calculation E4-0008 [Reference 9.4.2]. It was concluded that the two Class 1E battery systems have adequate capacity, with a 10% design margin, to power the coping loads with load stripping within the first 60 minutes of SBO. Attachment 3 of EOP-EPP-001 [Reference 9.3.1.1] presents the load shed list.

The capacity of the HNP 125VDC non-Class 1E battery to support a station blackout for the four hour coping duration was checked by calculations E4-0009 and E4-0010 [References 9.4.3 and 9.4.4]. It was concluded that the 125VDC non-Class 1E battery has adequate capacity, with an 8% design margin, to power the coping loads with load stripping within the first 60 minutes of SBO. Attachment 3 of EOP-EPP-001 [Reference 9.3.1.1] presents the load shed list.

7.2.2.2 Class 1E Batteries

Progress Energy (formerly CP&L) Battery Calculation E4-0008, *125VDC Battery Sizing and Battery/Panel Voltages for Station Blackout* [Reference 9.4.2], utilizes the methodology contained in IEEE-STD-485, *Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations* [Reference 9.1.3.1]. This calculation was used as the basis of the SBO Class 1E battery capacity check.

Following the practice used in IEEE-485, an aging factor of 1.25 was used to account for the drop in battery capacity at end of life. A temperature factor of 1.04 was used to check the battery for a worst case operating temperature of 70°F. HNP Operations Surveillance Test Procedure OST-1021 [Reference 9.3.3.9] provides assurance that the battery room temperature is maintained at or above 70°F.

The calculation used a design margin factor of 1.10 (i.e, 10%). Justification for use of this design margin was presented to the NRC in References 9.2.5 and 9.2.6. The calculation concluded that both HNP Class 1E battery systems have adequate capacity, with load stripping within the first 60 minutes of SBO, to meet the requirements of the 4 hour coping period.

The NRC SBO SSER [Reference 9.1.2.8] stated that a 10% design margin is required to compensate for less than optimum operating conditions, recent discharge, accuracy in identifying all small DC loads (indicating lights, relays, solenoids, etc.) and the inaccuracy in reading the discharge curve. Progress Energy (formerly CP&L) committed in Reference 9.2.6 that the Class 1E battery design margin for SBO will not be less than 10%.

EC 70350 installs a Quality Class B (SBO) alternate power feed to power the Safety Related battery chargers. This alternate feed is supplied from MCC 1D23 which is supplied from normal feed bus 1D2-7B or its alternate feed from the DSDG which is completely independent of the plant AC Distribution System or other plant support systems. Though the availability of these alternate charger feeds will not alter the 4-hour coping duration as demonstrated in Calculation E4-0008, "125VDC 1E Battery Sizing and Battery/Panel Voltages For Station Blackout" (Reference 9.4.2), the defense in depth enhancement they provide significantly improves the capabilities of HNP to cope with a SBO event.

7.2.2.3 Non-Class 1E Batteries

Certain equipment listed in Table 1, that is required for coping, draw power from the non-Class 1E 125VDC battery. The non-Class 1E battery calculations utilized the methodology contained in IEEE-STD-485. Progress Energy (formerly CP&L) has not made a commitment to provide a 10% design margin in the non-Class 1E batteries. Progress Energy (formerly CP&L) maintains that a 0% design margin for non-Class 1E batteries is adequate for SBO.

Calculations E4-0009, *125VDC Non-1E Battery Load Data and Duty Cycle* [Reference 9.4.3] and E4-0010, *125VDC Non-1E Battery Sizing and Battery/Panel Voltages* [Reference 9.4.4] were used as the basis of the SBO non-Class 1E 125VDC battery check. The calculations used an aging factor of 1.25 to account for the drop in battery capacity at end of life, a temperature factor of 1.04 to check the battery for a worst case operating temperature of 70°F and a design margin factor of 1.08 (i.e, 8%). The calculation concluded that the 125VDC non-Class 1E battery has adequate capacity, with load stripping within the first 60 minutes of SBO, to meet the requirements of the 4 hour coping period.

7.2.2.4 Strippable Loads

NUMARC 87-00, Section 4.2.1(6) requires that plant procedures should identify individual loads that need to be shed from the plant DC buses (both Class 1E and non-Class 1E) for the purpose of conserving DC power. The 125VDC battery calculations [References 9.4.2, 9.4.3, and 9.4.4] indicate that load stripping of the 125VDC safety and non-safety battery loads are required during SBO. EOP-EPP-001 [Reference 9.3.1.1] identifies the loads required to be stripped and the load stripping sequence (i.e., loads required to be stripped within the first 60, and 90 minutes of SBO).

7.2.3 Compressed Air

7.2.3.1 Summary

There are no requirements for compressed air to assure containment isolation or to cope with SBO.

49. Given the following plant conditions:
    - A loss of AC power has occurred
    - 125 VDC battery 1A-SA is currently loaded at rated load

DC load shedding has been performed to reduce the battery load to half of rated load.

How long will the battery be available to supply the remaining loads?

A.✓ More than 8 hours

B. More than 6 hours but less than 8 hours

C. More than 4 hours but less than 6 hours

D. up to 4 hours

Feedback

Plausibility and Answer Analysis

Reducing the discharge rate on a battery increases the battery capacity in a non-linear function such that decreasing the discharge rate by half, increases the capacity by more than double.

A. Correct.

B. Incorrect. Plausible since the discharge rate has been halved, so it would appear that the capacity would be doubled, but it is a non-linear relationship.

C. Incorrect. Plausible since the discharge rate has been halved, so it would appear that the capacity would be doubled, but it is a non-linear relationship.

D. Incorrect. Plausible since the battery is rated for 4 hours, but at a discharge halving the discharge rate would increase the capacity.

Notes

063 DC Electrical Distribution

063A1.01Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: Battery capacity as it is affected by discharge rate
(CFR: 41.5 / 45.5)

Importance Rating:	2.5 3.3
Technical Reference:	GFES - No Reference supplied
References to be provided:	None
Learning Objective:	DC Power Objective 8
Question Origin:	Bank OIT Exam Bank DCP (02A) 1
Comments:	None
Tier/Group:	T2G1