



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

July 13, 2016

Mr. Kelvin Henderson  
Site Vice President  
Duke Energy Carolinas, LLC  
Catawba Nuclear Station  
4800 Concord Road  
York, SC 29745

**SUBJECT: CATAWBA NUCLEAR STATION – NRC OPERATOR LICENSE EXAMINATION  
REPORT 05000413/2016301 AND 05000414/2016301**

Dear Mr. Henderson:

During the period May 16 – 19, 2016, the Nuclear Regulatory Commission (NRC) administered operating tests to employees of your company who had applied for licenses to operate the Catawba Nuclear Station. At the conclusion of the tests, the examiners discussed preliminary findings related to the operating tests and the written examination submittal with those members of your staff identified in the enclosed report. The written examination was administered by your staff on May 26, 2016.

Three Reactor Operator (RO) and seven Senior Reactor Operator (SRO) applicants passed both the operating test and written examination. One RO applicant failed the written examination. There were four post-administration comments concerning the written examination and one post-administration comment concerning the operating test. These comments, and the NRC resolution of these comments, are summarized in Enclosure 2. A Simulator Fidelity Report is included in this report as Enclosure 3.

The initial examination submittal was within the range of acceptability expected for a proposed examination. All examination changes agreed upon between the NRC and your staff were made according to NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 10.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm.adams.html> (the Public Electronic Reading Room).

If you have any questions concerning this letter, please contact me at (404) 997-4551.

Sincerely,

*/RA/*

Gerald J. McCoy, Chief  
Operations Branch 1  
Division of Reactor Safety

Docket Nos: 50-413, 50-414  
License Nos: NPF-35, NPF-52

Enclosures: 1. Report Details  
2. Facility Comments and NRC Resolution  
3. Simulator Fidelity Report

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PUBLICLY AVAILABLE       NON-PUBLICLY AVAILABLE       SENSITIVE       NON-SENSITIVE  
 ADAMS:  Yes      ACCESSION NUMBER: \_\_\_\_\_       SUNSI REVIEW COMPLETE       FORM 665 ATTACHED

OFFICE	RII:DRS	RII:DRS	RII:DRS	RII:DRS			
SIGNATURE	<b>GXG</b>	<b>MKM3 VIA EMAIL</b>	<b>AXT6 VIA EMAIL</b>	<b>SXS31 VIA EMAIL</b>			
NAME	GMCCOY	MMEEKS	ATOTH	SSHAN			
DATE	7/13/2016	7/11/2016	7/11/016	7/11/2016			
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES	YES NO	YES NO

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-413, 50-414

License No.: NPF-35, NPF-52

Report No.: 05000413/2016301, 05000414/2016301

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station, Units 1 & 2

Location: York, SC 29745

Dates: Operating Test – May 16 – 19, 2016  
Written Examination – May 26, 2016

Examiners: M. Meeks, Chief Examiner, Senior Operations Engineer  
J. A. Toth, Operations Engineer  
S. Shah, Operations Engineer

Approved by: Gerald J. McCoy, Chief  
Operations Branch 1  
Division of Reactor Safety

## SUMMARY

ER 05000413/2016301, 05000414/2016301; May 16 – 19, 2016 & May 26, 2016; Catawba Nuclear Station; Operator License Examinations.

Nuclear Regulatory Commission (NRC) examiners conducted an initial examination in accordance with the guidelines in Revision 10 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." This examination implemented the operator licensing requirements identified in 10 CFR §55.41, §55.43, and §55.45, as applicable.

Members of the Catawba Nuclear Station staff developed both the operating tests and the written examination. The initial operating test, written Reactor Operator (RO) examination, and written Senior Reactor Operator (SRO) examination submittals met the quality guidelines contained in NUREG-1021.

The NRC administered the operating tests during the period May 16 – 19, 2016. Members of the Catawba Nuclear Station training staff administered the written examination on May 26, 2016. Three RO and seven SRO applicants passed both the operating test and written examination. One RO applicant passed the operating test, but did not pass the written examination. Nine applicants were issued licenses commensurate with the level of examination administered. The issuance of a license for one RO applicant has been delayed pending final resolution of any further appeals that may impact the licensing decision.

There were five post-examination comments.

No findings were identified.

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA5 Operator Licensing Examinations

##### a. Inspection Scope

The NRC evaluated the submitted operating test by combining the scenario events and Job Performance Measures (JPMs) in order to determine the percentage of submitted test items that required replacement or significant modification. The NRC also evaluated the submitted written examination questions (Reactor Operator (RO) and Senior Reactor Operator (SRO) questions considered separately) in order to determine the percentage of submitted questions that required replacement or significant modification, or that clearly did not conform with the intent of the approved knowledge and ability (K/A) statement. Any questions that were deleted during the grading process, or for which the answer key had to be changed, were also included in the count of unacceptable questions. The percentage of submitted test items that were unacceptable was compared to the acceptance criteria of NUREG-1021, "Operator Licensing Standards for Power Reactors."

The NRC reviewed the licensee's examination security measures while preparing and administering the examinations in order to ensure compliance with 10 CFR §55.49, "Integrity of examinations and tests."

The NRC administered the operating tests during the period May 16 – 19, 2016. The NRC examiners evaluated four RO and seven SRO applicants using the guidelines contained in NUREG-1021. Members of the Catawba Nuclear Station training staff administered the written examination on May 26, 2016. Evaluations of applicants and reviews of associated documentation were performed to determine if the applicants, who applied for licenses to operate the Catawba Nuclear Station, met the requirements specified in 10 CFR Part 55, "Operators' Licenses."

The NRC evaluated the performance or fidelity of the simulation facility during the preparation and conduct of the operating tests.

##### b. Findings

No findings were identified.

The NRC developed the written examination sample plan outline. Members of the Catawba Nuclear Station training staff developed both the operating tests and the written examination. All examination material was developed in accordance with the guidelines contained in Revision 10 of NUREG-1021. The NRC examination team reviewed the proposed examination. Examination changes agreed upon between the NRC and the licensee were made per NUREG-1021 and incorporated into the final version of the examination materials.

The NRC determined, using NUREG-1021, that the licensee's initial examination submittal was within the range of acceptability expected for a proposed examination.

Three RO applicants and seven SRO applicants passed both the operating test and written examination. One RO applicant passed the operating test but did not pass the written examination. Two RO applicants and seven SRO applicants were issued licenses.

One RO applicant passed the operating test, but passed the written examination with overall scores between 80% and 82%. This applicant was issued a letter stating that they passed the examination and issuance of their license has been delayed pending any written examination appeals that may impact the licensing decision for their application.

Copies of all individual examination reports were sent to the facility Training Manager for evaluation of weaknesses and determination of appropriate remedial training.

The licensee submitted one post-examination comment concerning the operating test and four post-examination comments concerning the written examination. A copy of the final written examination and answer key, with all changes incorporated, may be accessed not earlier than July 10, 2018, in the ADAMS system (ADAMS Accession Number(s) ML16166A099 and ML16166A102). A full copy of the licensee's post-examination comments may be accessed in the ADAMS system as ML16166A106.

#### 40A6 Meetings, Including Exit

##### Exit Meeting Summary

On May 24, 2016, the NRC examination team discussed generic issues associated with the operating test with K. Henderson, Site Vice President, and members of the Catawba Nuclear Station staff via telephone.

On June 28, 2016, the NRC examination team discussed the results of the examination with A. Honeggar, Operations Training Manager, and members of the Catawba Nuclear Station staff via telephone. The examiners asked the licensee if any of the examination material was proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTARY INFORMATION

## KEY POINTS OF CONTACT

### Licensee personnel

K. Alcorn, Operations Training Supervisor (ILT)  
S. Andrews, Senior Nuclear Engineer  
C. Bigham, Organizational Effectiveness Director  
B. Boyette, NRC Exam Developer  
R. Exley, ILT Lead Instructor  
B. Haynes, Assistant Operations Manager (Training)  
K. Henderson, Site Vice President  
A. Honeggar, Operations Training Manager  
W. Jarman, Assistant Operations Manager (Shift)  
B. Leonard, Training Manager  
R. Miller, NRC exam developer  
T. Simril, Plant Manager  
S. Tripi, Operations Training Supervisor (NLOCT/exam development)  
B. Webster, Operations Training Supervisor (LOCT)

### NRC personnel

A. Hutto, Senior Resident Inspector

## FACILITY POST-EXAMINATION COMMENTS AND NRC RESOLUTIONS

A complete text of the licensee's post-examination comments can be found in ADAMS under Accession Number ML16166A106.

### Item

Question 17, K/A W/E11EG2.4.20

### Comment

The licensee recommends that that two correct answers ("A" and "B") be accepted for this this question as both answers are correct based on conflicting information contained within a procedure note and the Operations governing document for EP/AP implementation.

1. EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation) contains a note which states "An invalid SPDS orange path may briefly exist between opening NS suction valve from sump and starting NS pump. FR-Z.1 should not be entered unless NS pump fails to start."
2. The purpose of this note is to prevent a crew from needlessly transitioning to a CSF procedure while attempting to restore the ability to align for Cold Leg Recirculation.
3. The signal generated is actually valid as the logic for this condition is met due to the alignment specified by this procedure (see attached logic diagram).
4. OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) states that an SPDS signal is only "invalid" if caused by an instrument malfunction or computer related failure (see attached note). Since this document governs all Emergency and Abnormal Procedures, this guidance would apply to ECA-1.1.
5. Operations Department management has determined that the orange SPDS signal that is generated is technically VALID, however current wording of the note in ECA-1.1 states to consider it invalid. Ultimately the reason for the note is to ensure that an unnecessary transition to FR-Z.1 is not made. A procedure change request has been generated to modify this note (in ECA-1.1), to remove the term "invalid", in order to eliminate the conflict discovered during this exam.

### NRC Resolution

The licensee's recommendation was rejected.

The NRC recognized the licensee's contention that conflicting guidance existed between the NOTE in EOP ECA-1.1 and the referenced NOTE in the administrative procedure OMP 1-7. The OMP 1-7 NOTE is included in a section that details generic "rules of usage" for implementation of the critical safety function determination process. Specifically, the NOTE is listed before a step that details how operators are required to "validate" the critical safety function status before transitioning to any Critical Safety Function (CSF) procedure. A later bulleted step states, "If a valid red path is encountered ..." and then provides the applicable guidance to the operators on how to transition to the applicable CSF procedure.

Therefore, correct application of the NOTE in ECA-1.1 before step 7.d. would be to recognize that the momentary "invalid" orange path should not be used as a directive to transition to the orange path CSF procedure. This NOTE in ECA-1.1 is specific to the conditions in that procedure and takes precedence over any general "rules of usage" guidance provided in

administrative conduct-of-operations procedures. Furthermore, the stem of the first part question statement directs the applicant to answer the question statement “Per ECA-1.1,” and not as a general question, or per OMP 1-7. This statement strongly ties the first part question statement to the ECA-1.1 procedure steps, NOTES, and CAUTION statements in opposition to any other procedural guidance that may not be considered exclusively internally consistent.

There are other cases in the Westinghouse emergency operating procedures where specific NOTES or CAUTIONS override more general usage guidance. For example, in Catawba emergency operating procedure EP/1/A/5000/E-3, “Steam Generator Tube Rupture,” there is a CAUTION statement at step 8 RNO that stated: “NC T-Cold indication in ruptured loop may cause an invalid Integrity Status Tree condition.” This statement is very similar to the NOTE listed in ECA-1.1 in that it applies only to a specific condition during performance of a specified procedure; that is, performance of this particular procedure at this step may result in an “invalid” critical safety function status.

The NRC acknowledges that the facility licensee has initiated its processes for enhancing the clarity and consistency of the procedural guidance in question.

However, as given, Question 17 has only one technically correct answer, and the NRC determined that no change to the official answer key was warranted in accordance with NUREG-1021.

#### Item

Question 28, K/A 003K5.02

#### Comment

The licensee recommends that this question be removed from the exam as no correct answer to part 1 is listed.

1. Part 1 of this question is technically correct concerning the loss of a Reactor Coolant Pump with no other plant transient in progress.
2. With the given conditions, a Reactor trip will occur based on P-8 (Single Loop Loss of Flow Reactor Trip > 48%) resulting in a fluctuation of all S/G levels.
3. Post exam simulator analysis revealed that the identified S/G level (1C) would actually begin to shrink first and at a faster rate but not to a lower level when compared with other S/Gs.
4. The question did not specify a detailed time frame for analysis. “Initially” is open to interpretation as the applicable S/G level varies considerably within a relatively short period of time (as compared to other S/G levels).
5. The listed answer is technically incorrect. The other available answer is also technically incorrect as S/G swell will not occur.

#### NRC Resolution

The licensee’s recommendation was rejected.

The first part question statement specifically asks that applicant to determine whether the initial Steam Generator (S/G) water level trend in the idle reactor coolant loop will be of the S/G level “shrink[ing] lower” or “swell[ing] higher” as compared to the other S/G levels in the reactor

coolant loops with operating reactor coolant pumps. The given time frame in the question is specified as "... initially ... after the 1C NC [reactor coolant] pump trips." Therefore, the question is asking the applicant to determine the initial 1C S/G level trend immediately after the 1C NC pump trips, as compared to the operating loop S/G level trends.

As detailed in the simulator traces provided by the facility licensee, immediately after the 1C NC pump trips, the 1C S/G level begins to lower below the other loops' S/G levels. There is a short period where the other loops' S/G levels begin to increase (swell), just before the reactor trip occurs. For a time period of approximately 16 seconds after the NC pump trips, the 1C S/G level is lower, and lowering faster, than the other S/Gs. Therefore, the simulator data clearly demonstrates that the initial 1C S/G level trend after the 1C NC pump trips is characterized by 1C S/G level "shrink[ing] lower."

Therefore, as given, Question 28 has only one technically correct answer, and the NRC determined that no change to the official answer key was warranted in accordance with NUREG-1021.

#### Item

Question 50, K/A 063A1.01

#### Comment

The licensee recommends that question 50 be deleted from the exam due to not having enough information in the stem of the question in order to answer it correctly.

1. The stem of the question states that battery 1EBA is supplying AC vital bus 1ERPA through inverter 1EIA without a battery charger connected. Even though this would be the lineup if a battery charger were to fail, it does not provide a complete load profile for this battery. 1EBA would be supplying 1EDA and Panelboard 1EPA as well as other loads (see system drawing).
2. The question stem also states that only the voltage range of 125 VDC to 120 VDC is taken into account. Battery discharge tests in the plant suggest that the battery would only be in this voltage range for mere seconds (see 1EBA discharge test data sheet).
3. Due to the short duration of being in the specified voltage range and the unknown load profile for the specific battery listed, it is the opinion of CNS that there is not enough information to answer this question correctly and it should be deleted from the exam.

#### NRC Resolution

The licensee's recommendation was accepted.

During the development of this question, the facility licensee and the NRC agreed upon adding a plant-specific battery and a plant-specific bus to the question stem as follows: "Vital battery 1EBA is supplying 1ERPA through inverter 1EIA without a battery charger on line." The intent of this editorial modification was to simplify the electrical plant line-up in question for the applicants. The question then asks the applicants to determine the trend of battery current flow and battery discharge rate as battery terminal voltage decreased from 125 VDC to 120 VDC.

However, as detailed by the licensee, the actual electrical line-up is more complicated than intended by the exam writers and reviewers. In actuality, the isolated battery 1EBA would be supplying various other loads that are not supported by the question stem.

Therefore, the question unintentionally presented an unclear stem that did not provide all of the necessary information needed to elicit the correct answer. Furthermore, given the additional complexity of the electrical circuit to be analyzed in order to answer the question (albeit unintentionally), it is arguable whether the question as given would be operationally valid as a test item from the standpoint of the reactor operator job requirements.

Therefore, the NRC agreed with the facility licensee, and deleted Question 50 from the written examination in accordance with NUREG-1021 ES-403 section D.1.b.

### Item

Question 75, K/A G2.4.43

### Comment

The licensee recommends that the Exam Key be changed to list the correct answer as "C" (approved exam listed "D" as correct answer).

1. Several CNS procedures list the sound powered phone circuit power supply for each unit, but omit information concerning a permanent cross-tie installed per NSM 50307.
2. Post exam review identified conflicting information concerning split versus cross-tied power supplies.
3. CNS Engineering staff has verified that a previously installed modification tied sound powered phone circuits together ensuring availability from the opposite unit following a loss of one unit's essential "B" train power (see attached email and NSM).
4. Per the listed conditions, the emergency sound power phone circuit will be available, via Unit 2 power supply. Answer "D" is technically incorrect. Answer "C" is technically correct.

### NRC Resolution

The licensee's recommendation was accepted.

During written exam development, the technical reference used to support Question 75 was Note 1 of Enclosure 4.9, "Emergency Communications," of procedure OP/1/A/6100/020, which stated:

The emergency sound powered phone circuit receives backup, emergency power from the "B" train essential switchgear. If the "B" Train essential switchgear is de-energized concurrent with a loss of offsite power, the emergency sound powered phone circuit will be inoperable.

Accordingly, the exam writers wrote an operationally valid question that provided a loss of the "B" train essential switchgear concurrent with a loss of offsite power in the stem, in order to test the application of this plant condition to the availability of the emergency sound powered phone circuit.

However, as detailed by the facility licensee, there was an installed plant modification (NSM 50307) that was identified during post-exam review that provides for a permanent cross-tie installation for the emergency sound powered phone circuit. The existence of this electrical cross-tie negates the technical accuracy of the referenced procedural NOTE used in the question development. This newly discovered technical information supports a change in the question answer key from “D” to “C.” There is no other conflicting information in the question stem or distractors.

Therefore, the NRC agreed with the facility licensee, and changed the answer for Question 75 from “D” to “C” in accordance with NUREG-1021 ES-403 section D.1.b.

### Item

Job Performance Measure “F,” Shift Operating Condenser Circulating Water Pumps

### Comment

The licensee recommends that step 7 be changed to remove the “Critical Step” designation.

1. The as submitted JPM F (Shift Operating RC (Condenser Circulating Water) Pumps by placing 1D RC Pump in service and securing 1B RC Pump) step 7 is labeled as a critical step.
2. The purpose of securing the pump by closing its discharge valve is to prevent exposing the pump suction line from the discharge pressure of the remaining running pumps. In this case that would be RC pumps 1A, 1C, and 1D.
3. If the step for closing the discharge valve were not performed and the 1B RC pump were secured by just depressing the OFF pushbutton, then the discharge valve would automatically close in approximately 50 seconds. This would allow the discharge pressure of the remaining running pumps to be introduced to the suction of the 1B RC pump for those 50 seconds.
4. According to the engineering department (Mike Classe – Manager Nuclear Engineering), the maximum discharge pressure of any running pump would be from the 2C RC pump (~66 PSIG at an operating temperature of 105-110 degrees F).

The suction piping for this system is Pipe Spec 150.4 seen in the chart (provided by the licensee). For a conservative temperature of 200 degrees F, the maximum design pressure for the suction piping would be 215 PSIG. Therefore, having the suction piping subjected to design discharge pressure for a short duration of time is of no major consequence, and should therefore not be credited as a critical step. The critical part of securing 1B RC pump is to depress the OFF pushbutton and verify the discharge valve is closed, and therefore step 8 of the JPM should remain the critical step.

### NRC Resolution

The licensee’s recommendation was accepted.

As described in the facility licensee’s recommendation, there are no adverse consequences to subjecting the suction piping to pump discharge pressure for a short period of time. Therefore, this newly discovered technical information supports changing the designation of JPM step 7 from “critical” to “non critical.” Based on the design of the JPM, the interlock between the discharge valve closing resulting in an automatic pump trip was defeated; however, the interlock

between manually tripping the pump causing an automatic closure of the discharge valve was not defeated. As a result of this newly discovered technical information, the NRC determined that manually securing the RC pump remained a critical step in successfully completing the JPM overall, but manually closing the discharge valve before manually securing the RC pump was evaluated as not being a critical step in the JPM.

Therefore, the NRC agreed with the licensee to change the designation of JPM step 7 to non-critical in accordance with NUREG-1021, and all of the applicants' performance on this JPM was evaluated accordingly.

## **SIMULATOR FIDELITY REPORT**

Facility Licensee: Catawba Nuclear Station

Facility Docket No.: 50-413, 50-414

Operating Test Administered: May 16 – 19, 2016

This form is to be used only to report observations. These observations do not constitute audit or inspection findings and, without further verification and review in accordance with Inspection Procedure 71111.11 are not indicative of noncompliance with 10 CFR 55.46. No licensee action is required in response to these observations.

No simulator fidelity or configuration issues were identified.