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

October 11, 2012

EA-12-153

Mr. Kelvin Henderson
Site Vice President
Duke Energy Carolinas, LLC
Catawba Nuclear Station
4800 Concord Road
York, SC 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION - FINAL SIGNIFICANCE DETERMINATION OF ONE WHITE FINDING AND ONE GREEN FINDING AND NOTICE OF VIOLATION (NRC INSPECTION REPORT 05000413/2012010 AND 05000414/2012010) AND ASSESSMENT FOLLOW-UP LETTER

Dear Mr. Henderson:

This letter provides you the final significance determination of the Unit 1 preliminary Yellow finding and Unit 2 preliminary Greater than Green finding discussed in NRC Inspection Report (IR) 05000413, 414/2012009. These findings involved an incorrect modification to Unit 1 generator protective relaying that resulted in an inoperable offsite power supply to both Unit 1 and Unit 2.

At your request, a Regulatory Conference was held on September 11, 2012, to discuss your views on these findings. A copy of the slide presentation made by Duke Energy Carolinas, LLC (DEC) was included in the meeting summary issued on September 17, 2012 (ADAMS Accession number ML12261A223). During the meeting, DEC presented its assessment of the significance of these findings, and the corrective actions taken to resolve them, including the root cause evaluation of the findings. Additional information provided by DEC at the conference and our evaluation are summarized in Enclosure 2. The significant differences between DEC's risk characterization and the NRC's significance determination involved consideration of whether a single unit loss of offsite power (LOOP) could possibly result in a loss of power to the other unit and the likelihood of offsite power recovery. A summary of the changes made to NRC's significance determination for these findings discussed in NRC IR 05000413, 414/2012009 is contained in Enclosure 3.

After considering the information developed during the inspection and the information you provided at the Reglulatory Conference, the NRC has concluded that these findings are appropriately characterized as White, a finding of low to moderate safety significance, for Unit 1 and Green, a finding of very low safety significance, for Unit 2. As discussed in Enclosures 2 and 3, the NRC's final determination incorporated several adjustments to the risk estimate as discussed by DEC at the conference. These adjustments resulted in a decrease in the risk estimate from that documented in NRC Inspection Report (IR) 05000413, 414/2012009 (the

NRC's preliminary risk estimate). However, the NRC concluded that an adjustment to the Human Error Probability (HEP) for recovering offsite power from the opposite unit was not warranted due to the complexity of the operator actions, and the potential stress level for plant operators during a station blackout condition. This factor contributed significantly to the NRC's final risk estimate, and together with the additional adjustments resulted in a final significance determination of White for Unit 1, and Green for Unit 2.

You have 30 calendar days from the date of this letter to appeal the staff's determination of significance for these findings. Such appeals will be considered to have merit only if they meet the criteria given in the IMC 0609, Attachment 2. An appeal must be sent in writing to the Regional Administrator, Region II, 245 Peachtree Center Ave., NE; Suite 1200; Atlanta, GA 30303-1257.

The NRC has also determined that the Unit 1 inoperable offsite power supply was a violation of Technical Specification 3.8.1, Conditions A and C, as cited in the enclosed Notice of Violation (Notice). In accordance with the NRC Enforcement Policy, the Notice is considered an escalated enforcement action because it is associated with a White finding. The Unit 2 inoperable offsite power supply was a violation of Technical Specifications 3.8.1 and 3.8.2; however, due to the very low safety significance this violation is characterized as a non-cited violation (NCV) consistent with Section 2.3.2 of the NRC Enforcement Policy. The circumstances of these violations were described in detail in NRC IR 05000413, 414/2012009.

The NRC has concluded that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence, and the date when full compliance was achieved is already adequately addressed on the docket in the information presented by DEC at the Regulatory Conference. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect your corrective actions or your position.

Based on the final significance of a White finding, the NRC determined the performance of Unit 1 to be in the Regulatory Response Column of the NRC's Reactor Oversight Process Action Matrix beginning second quarter of 2012. Therefore, we will perform a supplemental inspection using Inspection Procedure 95001, Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area, when you have notified us of your readiness to review the actions taken to address the performance issue. The objectives of the supplemental inspection are to 1) provide assurance that the root causes and contributing causes of risk-significant performance issues are understood; 2) provide assurance that the extent of condition and extent of cause of risk-significant performance issues are identified; and 3) provide assurance that the licensee's corrective actions for risk-significant performance issues are sufficient to address the root and contributing causes and prevent recurrence. This letter supplements, but does not supersede, the mid-cycle letter issued on March 4, 2012.

For administrative purposes, this letter is issued as NRC Inspection Report 05000413/2012010 and 05000414/2012010. Accordingly, AVs 05000413/2012009-01 and 05000414/2012009-02 are updated consistent with the regulatory positions described in this letter. Therefore, AV 05000413/2012009-01, Failure to Provide Vendor with Accurate Design Information, is updated as VIO 05000413/2012009-01 with a safety significance of White and a cross-cutting aspect in the area of Human Performance [H.2(c)] and AV 05000414/2012009-02, Unit 2 Offsite Power

Circuits Inoperable Due to Improper Unit 1 Zone G Modification, is updated as NCV 05000414/2012009-02 with a safety significance of Green and no cross-cutting aspect assigned because it is covered by the cross-cutting aspect for Unit 1.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Victor M. McCree
Regional Administrator

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

Enclosures:
1. Notice of Violation
2. NRC Resolution of Licensee Regulatory Conference Points
3. NRC Model Changes Description

cc w/encls: (See page 4)

Circuits Inoperable Due to Improper Unit 1 Zone G Modification, is updated as NCV 05000414/2012009-02 with a safety significance of Green and no cross-cutting aspect assigned because it is covered by the cross-cutting aspect for Unit 1.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

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Regional Administrator

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ADAMS: ☐ Yes ACCESSION NUMBER:_____ ☐ SUNSI REVIEW COMPLETE ☐ FORM 665 ATTACHED

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SIGNATURE	JHB /RA/	CWR /RA/	JBB /RA/	BMK /RA/		RPC /RA/	LDW /RA/
NAME	JBartley	CRapp	JBaptist	BKlukan		RCroteau	LWert
DATE	10/02/2012	10/02/2012	10/02/2012	10/02/2012		10/02/2012	10/04/2012
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICE	RII:ORA						
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NAME	VMcCree						
DATE	10/09/2012						
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OFFICIAL RECORD COPY DOCUMENT NAME: G:\DRPII\RPB1\CATAWBA\SDPS AND SERP\CATAWBA EA-12-153 FINAL ACTION.DOCX

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Letter to Kelvin Henderson from Victor M. McCree dated October 11, 2012

SUBJECT: CATAWBA NUCLEAR STATION - FINAL SIGNIFICANCE DETERMINATION OF ONE WHITE FINDING AND ONE GREEN FINDING AND NOTICE OF VIOLATION (NRC INSPECTION REPORT 05000413/2012010 AND 05000414/2012010) AND ASSESSMENT FOLLOW-UP LETTER

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NOTICE OF VIOLATION

Duke Energy Carolinas, LLC
Catawba Nuclear Station
Unit 1

Docket No.: 50-413
License No.: NPF-35
EA-12-153

During an inspection completed on June 18, 2012, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> Unit 1 Technical Specification (TS) 3.8.1 requires, in part, that two qualified circuits between the offsite transmission network and the Onsite Essential Auxiliary Power System shall be operable when operating in MODES 1, 2, 3 or 4.
>
> TS 3.8.1, Condition A requires that with one offsite circuit inoperable, restore the offsite circuit to operable status within 72 hours.
>
> TS 3.8.1, Condition C requires that with two offsite circuits inoperable, restore one offsite circuit to operable status within 24 hours.
>
> Contrary to the above, from July 23, 2011, until November 11, 2011, when operating in MODE 1, one qualified circuit between the offsite transmission network and the Onsite Essential Auxiliary Power System was inoperable and not restored within 72 hours, and from November 11, 2011, until April 4, 2012, when operating in MODES 1, 2, 3, or 4, two qualified circuits between the offsite transmission network and the Onsite Essential Auxiliary Power System were inoperable and one offsite circuit was not restored to an operable status within 24 hours.

This violation is associated with a White Significance Determination Process finding.

The NRC has concluded that information regarding the reasons for the violation, the corrective actions taken or planned to correct the violations and prevent recurrence, and the date when full compliance was achieved is already adequately addressed on the docket and in the information presented by DEC at the September 11, 2012, Regulatory Conference. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response "Reply to a Notice of Violation EA-12-153," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS). To the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 11th day of October 2012

NRC Resolution of Licensee Regulatory Conference Points

At the Regulatory Conference, DEC highlighted its assumptions used in determining the risk associated with the two findings, and the differences between its risk calculations and those performed by the NRC as part of the Significance Determination Process (SDP). The paragraphs below provide a summary of the technical differences and the NRC's bases for incorporating DEC's assumptions into the NRC's final SDP.

1. DEC Input – DEC noted that the NRC used 0.579 as a factor in the Phase 3 analysis representing the proportion of time that when a LOOP occurs that it affects the opposite unit, and included weather and grid related causes. The factor that DEC used was 3E-3. DEC justified the lower value because 1) the type and design of equipment that causes the consequential LOOP is the same type of equipment as that which causes a single unit LOOP to become "double", 2) "plant-centered event" as defined in NUREG/CR – 6890, Reevaluation of Station Blackout Risk at Nuclear Power Plants, involved equipment installed in the plant vice switchyard (Zone G modification was installed in the electrical rooms adjacent to the ETA and ETB switchgears), and 3) the data doesn't support a relatively "high" value, as all of the remaining dual unit events are switchyard centered, i.e., number of plant centered events in the event database is zero.

   NRC Resolution – The NRC eliminated the contribution from weather-related and grid-centered LOOPs because these events would be present in both the base and non-conforming cases. This reduced the factor to a value of 0.2. The NRC agreed that the factor was potentially less than 0.2, although not as low as the DEC factor, and subsequently performed sensitivity analyses for lower values of the multi-unit factor (i.e., 0.1 and 0.05) with a result of ΔCDF of 9E-6 for the 0.05 value. The NRC did not agree with the characterization of the data made by DEC, due to (1) the sparseness of the data, and (2) the fact that the changes in the Unit 1 generator protective relaying represent an increase in the likelihood of loss of offsite power not captured in the data.

2. DEC Input – DEC noted that the NRC used 0.1 as a value for the Human Error Probability (HEP) for recovering offsite power from the opposite unit, assuming that power availability had been unaffected by the LOOP event. DEC pointed out that this number was 2.5 times higher than the value used in their model and was in part based on the use of an "extreme stress" performance shaping factor versus the "high stress" that DEC assumed.

   NRC Resolution – The NRC reviewed the procedures that would be used in a station blackout condition and performed walkdowns of the operations necessary to restore power to the affected unit. Particular focus was applied to understanding the indications available, the complexity of the operator actions necessary, and the potential "stress level" for a station blackout condition with 2 hours to core damage (during high pressure sequences). No adjustment to the NRC value was made.

3. DEC Input – DEC noted that the NRC Phase 3 results had cutsets that proceeded to core damage despite the fact that the Standby Shutdown Facility (SSF) had succeeded.

NRC Resolution – The NRC discussed with Idaho National Labs and determined that it was assumed that if either offsite or onsite power had not been restored within 24 hours such that the safety systems could be recovered, core damage occurred. The NRC concluded that in this particular instance that additional credit was appropriate to represent the probability that the SSF could avert core damage, even though offsite power had not been recovered. The NRC validated the design function of the SSF for up to 72 hours. The NRC solved the SSF fault tree (4E-2), verified the results were commensurate with DEC's results (6E-2), and applied the factor to only those cutsets where the SSF had succeeded, but core damage had still resulted.

NRC Model Changes Description

A number of changes to the NRC Catawba SPAR model were made and post-processing factors applied in order to adjust for various conservatisms in the original Phase 3 analysis presented in NRC Inspection Report (IR) 05000413,414/2012009. The following corrections, which DEC either had made to their analysis prior to the Phase 3 assessment or were subsequently made, are applicable to both units unless specifically stated otherwise:

- Anticipated Transient without Scram (ATWS) – The NRC SPAR model did not correctly reflect the risk from ATWS under the condition of the Zone G modification. When offsite power was lost due to the performance deficiency, results were obtained which reflected core damage due to reactor protection system failures when that electrical system would be de-energized due to the event. The NRC eliminated these invalid cutsets from consideration.

- Safety System Test & Maintenance (T & M) Unavailability – DEC observed that performance of both Unit 1 and Unit 2 component cooling water (CCW) systems had significantly improved in the past 5-7 years and the T&M numbers being used in both the NRC and their own models were overly conservative. This issue had potential risk impact because this T&M term was present in many of the NRC cutset results. The potential scope of this concern was expanded to potentially include other risk-significant systems, specifically emergency diesel generators (EDG), Raw Water, turbine driven auxiliary feedwater pump, and the SSF. During the early 2000 time frame, CCW heat exchanger fouling was causing Catawba's CCW unavailability numbers to be ~ 2E-2, and the site specific data for both NRC and DEC were based on this. The licensee subsequently did a modification and changed their testing protocol that eliminated any on-line maintenance to the heat exchangers. After reviewing the data provided, the NRC agreed that additional credit for the testing protocol modification was justifiable and the T&M values for CCW were decreased by a factor of 2.

- Non-quantified Accident Scenarios – For Unit 1, the NRC identified that specific accidents were not correctly modeled. In particular, if a loss of offsite power were to occur with either a 1) stuck open primary relief valve, 2) loss of normal service water, 3) loss of component cooling water, or 4) a small break loss of coolant accident, the model would not transfer to the LOOP event tree and correction of this modeling issue would have taken significant effort. (This issue was not applicable to Catawba Unit 2 because the accident sequences required to be evaluated were limited due to the electrical cross-connections.) The NRC obtained values from the DEC risk assessment for these sequences and added them to the NRC SDP Phase 3 results for Windows C & E.

- Large Early Release Frequency(LERF) – The NRC SPAR model did not have an ability to quantify LERF and these manual calculations could not be performed quickly enough to support the prompt issuance of a Phase 3 risk analysis. Subsequent to the Phase 3 analysis, the analyst identified both high pressure and low pressure scenarios in each of the accident sequences and applied LERF multipliers of 0.8 and 0.3, respectively. The basis for the LERF multiplier for high pressure sequences was DEC's MAAP thermal-hydraulic analysis, and the low pressure LERF multiplier was present in NUREG/CR-6427, Assessment of the DCH Issue for Plants with Ice Condenser Containments. With

the compounding effects of lower contribution to core damage frequency due to the factors described previously, and the LERF multipliers, the overall Unit 1 and Unit 2 results decreased by one order of magnitude.

- Emergency Diesel Generator Run Failures – The NRC noted that many of the cutsets resulting in core damage had EDG run failures present. This was expected as run failures are approximately one order-of-magnitude more likely than start failures. However, for EDG failures that occur several hours following the start of the event, these would not contribute to an early radiological release to the public. Either the Protective Action Recommendations would have already been implemented by state/local authorities or the unit would be in a lower energy state by this time and less capable of causing a release. Consequently, an adjustment factor for EDG run failures that occur in the first 1 hour based on data from NUREG/CR-6928 (0.55 for a single EDG failure, and 0.30 where 2 EDGs failed for independent reasons) was applied. These factors were applied post processing to high pressure core damage sequences where EDG run failures were present in order to correctly adjust the LERF results.