UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

December 5, 2013

Mr. Richard L. Anderson
Vice President
NextEra Energy Duane Arnold, LLC
3277 DAEC Road
Palo, IA 52324-9785

SUBJECT: DUANE ARNOLD ENERGY CENTER
EVALUATIONS OF CHANGES, TESTS, AND EXPERIMENTS AND PERMANENT PLANT MODIFICATIONS BASELINE INSPECTION REPORT 05000331/2013008

Dear Mr. Anderson:

On October 31, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications Inspection at your Duane Arnold Energy Center. The enclosed inspection report documents the inspection results, which were discussed on October 31, 2013, with Mr. Steve Huebsch, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Two NRC identified findings of very low safety significance (Green) were identified during this inspection. These findings were determined to involve violations of NRC requirements. However, because of their very low safety significance and because the issues were entered into your Corrective Action Program, the NRC is treating the issues as Non-Cited Violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the violations or significance of these NCVs you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission – Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector office at Duane Arnold Energy Center. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at Duane Arnold Energy Center.

In accordance with Title 10, Code of Federal Regulations (CFR), Part 2, Section 390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Robert C. Daley, Chief
Engineering Branch 3
Division of Reactor Safety

Docket No. 50-331
License No. DPR-49

Enclosure: Inspection Report 05000331/2013008
w/Attachment: Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-331
License No:	DPR-49
Report No:	05000331/2013008
Licensee:	NextEra Energy Duane Arnold, LLC
Facility:	Duane Arnold Energy Center (DAEC)
Location:	Palo, IA 52324-9785
Dates:	September 3 through October 31, 2013
Inspectors:	George M. Hausman, Senior Engineering Inspector (Lead) David J. Oliver II, Engineering Inspector Stuart N. Sheldon, Senior Engineering Inspector Robert A. Winter, Engineering Inspector
Approved by:	Robert C. Daley, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY

IR 05000331/2013008; 09/03/2013 – 10/31/2013; Duane Arnold Energy Center (DAEC); Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications.

This report covers a two-week announced baseline inspection on evaluations of changes, tests, and experiments and permanent plant modifications. The inspection was conducted by Region III based engineering inspectors. Two findings were identified by the inspectors. The findings were considered Non-Cited Violations (NCVs) of NRC regulations. The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Cross-cutting aspects were determined using IMC 0310, "Components Within the Cross Cutting Areas." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated June 7, 2012. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green: The inspectors identified a finding of very low safety significance and an associated NCV of Title 10, *Code of Federal Regulation*s (CFR), Part 50, Appendix B, Criterion III, "Design Control," where the licensee failed to establish measures for the selection and review for the suitability of safety-related cables with Procedure Electrical Cable Program Manual (ECPM) 4.5, "Electrical Cable Operability," Revision 2. Specifically, ECPM 4.5, Attachment 1, "Qualification of Cables in Wetted Environments," allowed for safety-related cabling that was not qualified or specifically designed for total submergence in water to be used in water filled conduits contrary to its unsuitability for this application, without suitable testing or design control measures. The licensee entered the issue into their Corrective Action Program as Action Request (AR) 01902782, "ECPM – Electrical Cable Operability," dated September 10, 2013, which suspended the use of ECPM 4.5 by quarantining the procedure until the identified discrepancies could be resolved.

  The performance deficiency was determined to be more than minor because the finding, if left uncorrected, would become a more significant safety concern. Specifically, not identifying and appropriately evaluating degraded or non-conforming conditions to properly assess the operability of cables subjected to protracted and/or extensive exposure to water could warrant not declaring a structure, system, and component (SSC) inoperable by the use of compensatory actions to maintain or enhance a degraded or non-conforming condition. This finding has a cross-cutting aspect in the area of human performance, decision-making because the licensee did not use conservative assumptions in implementing ECPM 4.5, "Electrical Cable Operability," Revision 2. Specifically, the licensee failed to perform an effective review of the consequences of their decision to include an attachment to this procedure that provided a method not previously approved for qualifying safety-related cables for submergence. [H.1(b)] (Section 1R17.1b)

- Green: The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to correct a condition adverse to quality following discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' Standby Diesel Generator (SBDG). Specifically, the licensee identified an obstruction characterized as "mud" located 8-feet from the turbine building (TB) end of conduit 1K109. As a result, the licensee failed to take corrective action to remove the water and mud from the conduit and to evaluate the mud obstruction. The licensee entered the finding into their Corrective Action Program as AR 01909315, "NRC 5059/MOD Inspection Violation of App B Criterion 16," dated October 3, 2013. The licensee has performed insulation resistance checks on the EDG power cable and obtained satisfactory results. Additionally, the licensee performed an evaluation of the mud-like material in the conduit and determined that it is likely cable pulling compound, as opposed to degraded cable jacket material. The licensee also set a date for further inspection of the conduit to April 2014, which coincides with the next EDG outage period. These corrective action items are being tracked in CR 1909315. Additionally the licensee is evaluating the frequency interval for inspecting this and other similar conduits.

  The performance deficiency was determined to be more than minor because the finding was associated with the Mitigating Systems' cornerstone's attribute of design control for ensuring the availability, reliability, and capability of systems that respond to Initiating Events to prevent undesirable consequences. Specifically, material characterized by the licensee as mud facilitated continual exposure to a wetted and water submergence environment of the safety-related 'A' SBDG power cables. Continual exposure to a wetted and water submergence environment could lead to cable failure. Cable failure would prevent the system from carrying out its intended safety-related function of automatically starting and connecting to its corresponding essential service bus to supply power to emergency loads in an event (i.e., a loss-of-coolant-accident (LOCA) and/or degraded/under-voltage condition). This finding has a cross-cutting aspect in the area of human performance, decision-making because the licensee did not use conservative assumptions to correct a condition adverse to quality following discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' SBDG. Specifically, the licensee failed to perform an effective review of the safety-related consequences of their decision not to complete the inspection of conduit 1K109 to ensure that no water and mud remained inside the conduit subjecting the cables to a submergence environment. [H.1(b)] (Section 4OA2.1b)

B. Licensee-Identified Violations

No violations of significance were identified.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, and Barrier Integrity

1R17 Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications (71111.17)

.1 Evaluation of Changes, Tests, and Experiments

a. Inspection Scope

The inspectors reviewed seven safety evaluations performed pursuant to Title 10, *Code of Federal Regulations* (CFR), Part 50, Section 59, to determine whether the evaluations were adequate and that prior NRC approval was obtained as appropriate. The inspectors also reviewed twenty-four screenings, where licensee personnel had determined that a 10 CFR 50.59 evaluation was not necessary. The inspectors reviewed these documents to determine if:

- the changes, tests, and experiments performed were evaluated in accordance with 10 CFR 50.59 and that sufficient documentation existed to confirm that a license amendment was not required;
- the safety issue requiring the change, tests and experiment was resolved;
- the licensee conclusions for evaluations of changes, tests, and experiments were correct and consistent with 10 CFR 50.59; and
- the design and licensing basis documentation was updated to reflect the change.

The inspectors used, in part, Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Implementation," Revision 1, to determine acceptability of the completed evaluations, and screenings. The NEI document was endorsed by the NRC in Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments," dated November 2000. The inspectors also consulted Part 9900 of the NRC Inspection Manual, "10 CFR Guidance for 10 CFR 50.59, Changes, Tests, and Experiments." The list of safety evaluations, screenings and/or applicability determinations reviewed by the inspectors is included as an Attachment to this report.

This inspection constituted seven samples of evaluations and twenty-four samples of screenings and/or applicability determinations as defined in IP 71111.17-04.

b. Findings

Failed to Establish Measures for the Selection and Review for the Suitability of Safety-Related Cables

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," where the licensee failed to establish measures for the selection and review for the suitability of safety-related cables with Procedure Electrical Cable Program Manual

(ECPM) 4.5, “Electrical Cable Operability,” Revision 2. Specifically, ECPM 4.5, Attachment 1, “Qualification of Cables in Wetted Environments,” allowed for safety-related cabling that was not qualified or specifically designed for total submergence in water to be used in water filled conduits contrary to its unsuitability for this application, without suitable testing or design control measures.

Description: On June 24, 2013, the licensee revised Procedure ECPM 4.5, “Electrical Cable Operability,” Revision 2, to include information from a licensee developed white paper that changed the procedure’s Attachment 1 to “Qualification of Cables in Wetted Environments.” Based on discussions with the licensee’s staff and a review of Action Request (AR) 01871921, “ECPM – Electrical Cable Operability,” dated May 6, 2013, the inspectors determined that the intent of the changes was to provide enhanced guidance to the Operations staff. The enhanced guidance was to assist the Operations staff in making operability decisions for safety-related cables that had been exposed to moisture and/or submergence and to address aspects of an NRC finding from the licensee’s first prompt operability determination (POD) documented in NRC Inspection Report 05000331/2012005, Section 1R15.

On October 12, 2012, during refueling outage (RFO) 23 (i.e., October 6 through November 26, 2012), the licensee performed work activity EC 275694, “Repair Cable K00081-V,” Revision 2, to replace the failed ‘A’ Standby Diesel Generator (SBDG) day tank level switch’s cable. The safety-related cable was installed in electrical conduit 1K111 located underneath the turbine building (TB) base mat between the TB’s ‘A’ SBDG day tank room and the northeast corner room (NECR) located in the reactor building. Due to the inability to replace only one cable within conduit 1K111, all cables were removed and replaced with new cables. Upon opening the TB end of conduit 1K111, entrapped water was discovered and released (approximately 80 gallons). Examination of the removed cables showed physical signs of water damage (i.e., cables were waterlogged and jacketing material degraded). In addition, further investigation by the licensee revealed that several other safety-related electrical cables that were located within conduits embedded within the TB base mat were either completely submerged or had been subjected to some amount of standing water.

On April 18, 2013, the licensee completed Root Cause Evaluation (RCE) 01824467-02 “Wetted Cables within Embedded Circuits,” Revision 3, to evaluate the cause(s) of water intrusion into inaccessible buried electrical conduits. In response to the above mentioned findings and the RCE, the licensee created an action to revise the ECPM to include a new attachment to ECPM 4.5 that previously existed in the form of a white paper developed to generically support engineering evaluations of cables that had undergone degradation as a result of being exposed to water. The inspectors determined that during the development of the paper, the licensee drew the conclusion that the issuance of NUREG 1955, “Safety Evaluation Report Related to the License Renewal of Duane Arnold Energy Center,” which includes an Aging Management Program (AMP) for the monitoring of inaccessible cables, constituted the use of the AMP alone as means to maintain the design and licensing basis of cables that were discovered to be exposed to and/or submerged in water. The white paper makes reference to excerpts from numerous NRC generic communications and the licensee’s AMP for inaccessible cable monitoring to draw the conclusion that cables may be, in effect, qualified for submergence by their inclusion in the licensee’s AMP. The inspectors determined that this implied conclusion constituted an adverse change to the licensee’s procedures that served to provide a decision basis for making immediate operability decisions. The change could ultimately lead the licensee to conclude that cables that

were not designed to reside in a wetted and/or submerged environment are fully operable without further engineering evaluation.

On September 10, 2013, in response to the inspectors concerns during the inspection, the licensee entered the issue into their Corrective Action Program as AR 01902782, "ECPM – Electrical Cable Operability," dated September 10, 2013, which suspended the use of ECPM 4.5 by quarantining the procedure until the identified discrepancies could be resolved.

Analysis: The inspectors determined that the licensee's failure to establish measures for the selection and review for the suitability of safety-related cables with Procedure ECPM 4.5, "Electrical Cable Operability," Revision 2, was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control" and was a performance deficiency. Specifically, ECPM 4.5, Attachment 1, "Qualification of Cables in Wetted Environments," allowed for safety-related cabling that was not qualified or specifically designed for total submergence in water to be used in water filled conduits contrary to its unsuitability for this application, without suitable testing or design control measures. The change contained language that allowed the facility to either accept a degraded condition as-is or to qualify cables by crediting the use of the licensee's AMP for continual underwater duty, thus preventing a full engineering evaluation to assess the extent of the degradation from exposure to such an environment.

The inspectors determined that the performance deficiency was more than minor because the finding, if left uncorrected, would become a more significant safety concern. Specifically, not identifying and appropriately evaluating degraded or non-conforming conditions to properly assess the operability of cables subjected to protracted and/or extensive exposure to water could prevent not declaring a structure, system and component (SSC) inoperable or the use of compensatory actions to maintain or enhance a degraded or non-conforming condition.

In accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Table 2, the inspectors determined that the finding affected the Mitigating Systems' cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, for the Mitigating Systems' cornerstone. The performance deficiency affected the design or qualification of a mitigating SSC; however, the SSC maintained its operability or functionality as applicable. Therefore, the inspectors answered "yes" to the Mitigating Systems' Screening Question A.1 in Exhibit 2 and screened the finding as having very low safety significance (Green).

This finding has a cross-cutting aspect in the area of human performance, decision-making because the licensee did not use conservative assumptions in implementing Procedure ECPM 4.5, "Electrical Cable Operability," Revision 2. Specifically, the licensee failed to perform an effective review of the consequences of their decision to include an attachment to this procedure that provided a method not previously approved for qualifying safety-related cables for submergence. (H.1(b))

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established for the selection and review for suitability of application of materials, parts, and equipment that are essential to the safety-related functions of the structures, systems and components (SSCs). These design control

measures shall provide for the verifying or checking the adequacy of design, such as by the performance of a suitable testing program and where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying of checking processes, it shall include suitable qualifications testing of a prototype unit under the most adverse design conditions. Design control measures shall be applied to items such as the compatibility of materials and the delineation of acceptance criteria for inspections and tests.

Contrary to the above, from June 24 to September 10, 2013, the licensee failed to establish measures for the selection and review for the suitability of safety-related cables with Procedure ECPM 4.5, "Electrical Cable Operability," Revision 2. Specifically, ECPM 4.5, Attachment 1, "Qualification of Cables in Wetted Environments," allowed for safety-related cabling that was not qualified or specifically designed for total submergence in water to be used in water filled conduits contrary to its unsuitability for this application, without suitable testing or design control measures.

This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy because it was of very low safety significance and was entered into the licensee's Corrective Action Program as AR 01902782, "ECPM – Electrical Cable Operability," dated September 10, 2013. The licensee's immediate corrective actions included suspending the use of ECPM 4.5, by quarantining the procedure until the identified discrepancies could be resolved. (NCV 05000331/2013008-01, Failed to Establish Measures for the Selection and Review for the Suitability of Safety-Related Cables).

.2 Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed 13 permanent plant modifications that had been installed in the plant during the last three years. This review included in-plant walkdowns for portions of the Emergency Diesel Generator B and the Hydrogen Supply System. The modifications were selected based upon risk significance, safety significance, and complexity. The inspectors reviewed the modifications selected to determine if:

- the supporting design and licensing basis documentation was updated;
- the changes were in accordance with the specified design requirements;
- the procedures and training plans affected by the modification have been adequately updated;
- the test documentation as required by the applicable test programs has been updated; and
- post-modification testing adequately verified system operability and/or functionality.

The inspectors also used applicable industry standards to evaluate acceptability of the modifications. The list of modifications and other documents reviewed by the inspectors is included as an Attachment to this report.

This inspection constituted 13 permanent plant modification samples as defined in IP 71111.17-04.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution

.1 Routine Review of Condition Reports

a. Inspection Scope

The inspectors reviewed 22 corrective action process documents that identified or were related to 10 CFR 50.59 evaluations and permanent plant modifications. The inspectors reviewed these documents to evaluate the effectiveness of corrective actions related to permanent plant modifications and evaluations of changes, tests, and experiments. In addition, corrective action documents written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problems into the corrective action system. The list of specific corrective action documents that were sampled and reviewed by the inspectors are listed in the Attachment to this report.

b. Findings

Failed to Ensure the SBDG Power Cables Were Not Submerged

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to correct a condition adverse to quality following discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' SBDG. Specifically, the licensee identified an obstruction characterized as "mud" located 8-feet from the TB end of conduit 1K109. As a result, the licensee failed to take corrective action to remove the water and mud from the conduit and to evaluate the mud obstruction.

Description: Following the discovery of water in the TB end of conduit 1K111 (Reference Section 1R17.1b), the licensee performed an Apparent Cause Evaluation (ACE) 01812795-00, "Water Damaged SR [Safety-Related] Cables in the TB Floor at Elevation 734'," dated October 16, 2012. The ACE included an investigation into how the cables became wetted and submerged and an extent of condition evaluation. The licensee's extent of condition evaluation determined that five conduits sequentially numbered 1K108 through 1K112 imbedded in the TB's concrete base mat contained water in sufficient quantity to submerge cables within the conduits. All five conduits were associated with the 'A' SBDG. The licensee also determined that five conduits (i.e., 2K231 through 2K235) associated with the 'B' SBDG were also affected in the same manner.

On October 16, 2012, conduit 1K109 was opened from the NECR end located in the reactor building and approximately 1 to 2 gallons of water was removed.

On March 7, 2013, the TB end of conduit 1K109 was opened and 27 gallons of water was removed from the first 8-feet of the conduit. As a result, AR 01854812, "Found Water in 1K109," dated March 7, 2013, was issued which stated that "Further inspection and pumping was not possible due to the conduit being obstructed beyond 8-feet by mud." The licensee did not elaborate on the obstruction that was characterized as "mud" nor was a detailed engineering evaluation performed as a result of the discovery. The cables contained in conduit 1K109 were the 3-phase output power cables for the 'A' SBDG.

Although, not all water and mud was removed from electrical conduit 1K109, the licensee closed AR 01854812. The AR closure was based on the associated POD. The inspectors found that the licensee considered the cables contained in conduit 1K109 to be initially operable but non-conforming. The POD reflected the most recent discovery of water (i.e., March 7, 2013) and the satisfactory (i.e., greater than minimum acceptable) insulation resistance measurements that were taken over one year earlier (i.e., January 2012). The inspectors' subsequent review of the associated POD identified that the licensee concluded that all cables associated with both SBDGs were considered fully operable based on their inclusion into the AMP. The licensee credited the use and actions of the AMP to justify operability for both the 'A' and 'B' SBDGs. However, this does not meet the expectations and the requirements of the NRC as identified in Information Notice 2010-26, NUREG-1801, "Generic Aging Lessons Learned (GALL) Report" and Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants."

Information Notice 2010-26, "Submerged Electrical Cables," dated December 2, 2010, stated the following:

- "*The NRC expects licensees to identify conditions that are adverse to quality for cables, such as long-term submergence in water. Upon discovery of a submerged condition, the licensee should take prompt corrective actions to restore the environment to within the cable's design specifications, immediately determine the operability of the cable(s) to perform its intended design function, and determine the impact of the adverse environment on the design life of the cable.*"

- "*Cables not designed or qualified for, but exposed to, wet or submerged environments have the potential to degrade. Cable degradation increases the probability that more than one cable will fail on demand because of a cable fault, lightning surge, or a switching transient. Although a single failure is within the plant design basis, multiple failures of this kind would be challenging for plant operators. Also, an increased potential exists for a common-mode failure of accident mitigating system cables if they are subjected to the same environment and degradation mechanism for which they are not designed or qualified for.*"

NUREG 1801, "Generic Aging Lessons Learned (GALL) Report," Revision 2, Appendix A, "Quality Assurance for Aging Management Programs," stated the following:

- "*The license renewal applicant must demonstrate that the effects of aging on structures and components (SC) subject to an aging management review (AMR) will be managed in a manner that is consistent with the current licensing basis (CLB) of the facility for the period of extended operation. Therefore, those aspects of the AMR process that affect the quality of safety-related SCs are*

subject to the quality assurance (QA) requirements of Appendix B to 10 CFR Part 50."

The inspectors verified that the licensee did not have any safety-related cables installed at DAEC that were qualified for submergence. As a result, the inspectors determined that as of March 7, 2013, the licensee failed to take appropriate corrective action to remove all water and mud from electrical conduit 1K109 to restore the environment for conduit 1K109 to within the cables' design specifications and to determine the resultant impact on the cable's design life following exposure to the water and mud submergence. Therefore, the inspectors concluded that the licensee failed to correct a condition adverse to quality following discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' SBDG. The licensee entered this finding into their Corrective Action Program as AR 01909315, "NRC 5059/MOD Inspection Violation of App B Criterion 16," dated October 3, 2013. The licensee has performed insulation resistance checks on the EDG power cable and obtained satisfactory results. Additionally, the licensee performed an evaluation of the mud-like material in the conduit and determined that it is likely cable pulling compound, as opposed to degraded cable jacket material. The licensee also set a date for further inspection of the conduit to April 2014, which coincides with the next EDG outage period. These corrective action items are being tracked in CR 1909315. Additionally the licensee is evaluating the frequency interval for inspecting this and other similar conduits.

Analysis: The inspectors determined that the licensee's failure to correct a condition adverse to quality following discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' SBDG was contrary to 10 CFR Part 50, Appendix B, Criterion XVI and was a performance deficiency. Specifically, the licensee identified an obstruction characterized as "mud" located 8-feet from the TB end of conduit 1K109. As a result, the licensee failed to take corrective action to remove the water and mud from the conduit and to evaluate the mud obstruction.

The performance deficiency was determined to be more than minor because the finding was associated with the Mitigating Systems' cornerstone's attribute of design control for ensuring the availability, reliability, and capability of systems that respond to Initiating Events to prevent undesirable consequences. Specifically, material characterized by the licensee as mud facilitated continual exposure to a wetted and water submergence environment of the safety-related 'A' SBDG power cables. Continual exposure to a wetted and water submergence environment will lead to cable failure. Cable failure would prevent the system from carrying out its intended safety-related function of automatically starting and connecting to its corresponding essential service bus to supply power to emergency loads in an event (i.e., a loss-of-coolant-accident (LOCA) and/or degraded/under-voltage condition).

In accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected the Mitigating Systems' cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, for the Mitigating Systems' cornerstone. The performance deficiency affected the design or qualification of a mitigating SSC; however, the SSC maintained its operability or functionality as applicable. Therefore, the inspectors answered "yes" to the Mitigating Systems' Screening Question A.1 in Exhibit 2 and screened the finding as having very low safety significance (Green).

This finding has a cross-cutting aspect in the area of human performance, decision-making because the licensee did not use conservative assumptions to correct a condition adverse to quality following discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' SBDG. Specifically, the licensee failed to perform an effective review of the safety-related consequences of their decision not to complete the inspection of conduit 1K109 to ensure that no water and mud remained inside the conduit subjecting the cables to a submergence environment. (H.1(b))

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected.

Contrary to the above, as of October 31, 2013, the licensee failed to correct a condition adverse to quality regarding discovery of water and mud in safety-related electrical conduit 1K109 associated with the 'A' SBDG. Specifically, the licensee identified an obstruction characterized as "mud" located 8-feet from the TB end of conduit 1K109. As a result, the licensee failed to take corrective action to remove the water and mud from the conduit and to evaluate the mud obstruction.

This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy because it was of very low safety significance and was entered into the licensee's Corrective Action Program as AR 01909315, "NRC 5059/MOD Inspection Violation of App B Criterion 16," dated October 3, 2013. The licensee has performed insulation resistance checks on the EDG power cable and obtained satisfactory results. Additionally, the licensee performed an evaluation of the mud-like material in the conduit and determined that it is likely cable pulling compound, as opposed to degraded cable jacket material. The licensee also set a date for further inspection of the conduit to April 2014, which coincides with the next EDG outage period. These corrective action items are being tracked in CR 1909315. Additionally the licensee is evaluating the frequency interval for inspecting this and other similar conduits. (NCV 05000331/2013008-02, Failed to Ensure the SBDG Power Cables Were Not Submerged).

4OA6 Meetings

.1 Exit Meeting Summary

On October 31, 2013, the inspectors presented the inspection results to Mr. Steve Huebsch and other members of the licensee staff. The licensee personnel acknowledged the inspection results presented and did not identify any proprietary content.

.2 Interim Exit Meeting Summary

On September 20, 2013, the inspectors presented the preliminary inspection results to Mr. Richard L. Anderson and other members of the licensee staff. The licensee personnel acknowledged the inspection results presented and did not identify any proprietary content. The inspectors confirmed that all proprietary material reviewed during the inspection was returned to the licensee staff.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

R. Anderson, Site Vice-President
T. Anderson, Maintenance Manager (Acting)
R. Bierman, Design Engineering
D. Davidson, Procedures Supervisor
M. Davis, Licensing/Emergency Preparedness (EP) Manager
J. Dubois, Program Engineering Manager
M. Fairchild, Program Engineer Motors and Cables
S. Haller, Design and Project Engineering Manager
G. Holt, Configuration Management Supervisor
S. Huebsch, Engineering Supervisor (Mechanical) Design
K. Kleinheinz, Engineering Director
B. Lawrence, Balance-of-Plant (BOP) Systems Engineering Supervisor
B. Murrell, Licensing (Inspection Lead)
M. Ogden, Systems Engineering
K. Peveler, Nuclear Oversight (NOS) Manager (Acting)
G. Pry, Plant General Manager
J. Quimby, Programs Supervisor
J. Santiago, Design Engineering Supervisor
K. Smith, Engineering Administration Support
E. Sorenson, Programs Engineering Supervisor
L. Swenzinski, Licensing (50.59 Program Owner)
R. Wheaton, Operations Director

Nuclear Regulatory Commission

L. Haeg, Senior Resident Inspector
R. Murray, Resident Inspector

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000331/2013008-01	NCV	Failed to Establish Measures for the Selection and Review for the Suitability of Safety-Related Cables. (Section 1R17.1b)
05000331/2013008-02	NCV	Failed to Ensure the SBDG Power Cables Were Not Submerged. (Section 4OA2.1b)

Closed

05000331/2013008-01	NCV	Failed to Establish Measures for the Selection and Review for the Suitability of Safety-Related Cables. (Section 1R17.1b)
05000331/2013008-02	NCV	Failed to Ensure the SBDG Power Cables Were Not Submerged. (Section 4OA2.1b)

Discussed

None.

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather, that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

10 CFR 50.59 EVALUATIONS

Number	Description or Title	Date or Revision
99-014	RWCU Return Isolation Valve Stroke Time Limit	March 17, 1999
9238	Temp Mod for 'B' Feed Reg Valve Manual Control	September 17, 2010
9484	Revision of 5059EVAL022769	March 1, 2011
9761	Allowance to Move Unchanneled Fuel Assemblies in SFP	July 19, 2011
10368	LPCI Loop Select Recirc A>B Replacement During RFO 213	August 17, 2012
10444	Incorporation of GNF2 Fuel into the SFP Criticality Analysis	July 3, 2012
10486	Digital Upgrade for the MSR Drain Tank Level Control	July 17, 2012

10 CFR 50.59 SCREENINGS

Number	Description or Title	Date or Revision
9091	Essential Bus Degraded Voltage Relay Replacement	February 27, 2010
9105	SEP 304 (Boron Injection Using RWCU)	March 3, 2011
9183	Revise Procedure OI 442 Circulating Water System	August 23, 2010
9187	5059 Screening for OI 856.1 Revision	August 24, 2010
9194	STP 3.6.1.3-06 (ASME In-Service Valve Testing) PCR00394988	August 25, 2010
9195	50.59 Screening for OI 304.2A14 Revision	August 25, 2010
9207	CAL-273-017 Calculation Reconstitution	September 1, 2010
9222	Change Biodiesel Ref Document & Limit in STP 3.8.1-10	September 11, 2010
9337	Revise Q200 Data Sheets for RHR SDC SPC Pump Suction Valves	August 11, 2010
9394	OI 324 (SDG System), PCR00598839	December 3, 2010
9432	CV1065B Pneumatic Override/Delta Pressure Indication/Upstream Pressure Indication	January 3, 2011
9458	Diesel Fire Pump Battery Relocation Screening	January 19, 2011
9801	Moving Section of AOP 149 to New AOP 435	July 18, 2011
9863	Restore Hydrogen Supply System After Fire	September 25, 2012
9864	Revise OI 149 to Allow Pressurizing RHR with Cond Serv Water from Torus Area	August 13, 2011
10081	MOV2010 and V19-0048: Pressure Locking Modification	December 14, 2011
10197	DCR to Revise CAL-E08-004, Main AC Electrical	February 2, 2012

10 CFR 50.59 SCREENINGS

Number	Description or Title	Date or Revision
	Distribution Analysis	
10260	Screening for the Replacement of Cables in Conduit 1K111	February 28, 2012
10284	Temp Mod to Jumper Rectifier Switch on B SBDG	March 21, 2012
10367	LPCI Loop Select Recirc A>B Replacement	January 24, 2013
10675	Screening for Mod to Replace All Cables in Conduit 2K231	January 2, 2013
10691	Screening for Modification To Use a Spare Cable in 1K111 Place of the Failed Cable 1G0034-G in Conduit 1K110	December 11, 2012
10938	OI 149 – RHR System, PCR01856662	June 3. 2013
10955	OI 324.1 - TSC/DAC SDG System, PCR01869861	June 19. 2013

CALCULATIONS

Number	Description or Title	Date or Revision
CAL-E08-002	Battery Charger Sizing	1
CAL-E08-008	125Vdc System Battery Sizing, Voltage Drop, Short Circuit, Coordination and Charger Sizing	1
CAL-E95-006	4.16kV Essential Bus Degraded Voltage Setpoint Calculation	6
CAL-M11-008	Separation Distance for Hydrogen Supply System	0
CAL-M93-050	GL89-10 Maximum Thrust Analysis for MOV2312	3
HI-2115034	Criticality Evaluation of Spent Fuel Racks at DAEC with Boral Degradation	1

CORRECTIVE ACTION PROGRAM DOCUMENTS (ARs) ISSUED DURING INSPECTION

Number	Description or Title	Date or Revision
01901526	Tracking of Wetted Cables	September 4, 2013
01901571	Revise Electrical Cable Program Manual	September 4, 2013
01901913	NRC Questions on ECPM 4.5 Attachment 1	September 5, 2013
01902705	Conflict in the Intent for ECPM SECT 4.5	September 9, 2013
01902782	ECPM – Electrical Cable Operability	September 10, 2013
01904828	72.48 Prescreen for EC27302 Potentially Inadequate	September 18, 2013
01904920	TS Bases 3.3.5.1 Change	September 18, 2013
01905009	ECPM 4.6 Appears to Allow Wetted Cables to Remain As Is	September 18, 2013
01905012	Timeliness of Inspecting and Dewatering Conduit 2K221	September 18, 2013
01905185	Review Corrective Actions on Conduits	September 19, 2013
01905204	Evaluation 99-014 Does Not Meet Expectations	September 19, 2013
01905276	Inadequate Reference for CAL-M93-050	September 19, 2013
01905386	Penetration Cover on Top of 1C-94 is Slightly Warped	September 19, 2013
01909315	NRC 5059/MOD Inspection Violation of App B Criterion 16	October 3, 2013
01917237	Cable 1A0311-D is in a Wetted Environment	November 1, 2013

CORRECTIVE ACTION PROGRAM DOCUMENTS (ARs) REVIEWED

Number	Description or Title	Date or Revision
00577243	Apparent Error in RX Vessel Reduced Pass Tensioning Calc	September 1, 2010
00579943	B Feed Reg Valve CV-1621 Failed Open Unknown Reason	September 15, 2010
01620627	CV1956A Compensatory Measure	February 16, 2011
01658748	Update UFSAR Include New Fuel Handling Accident In SFP	June 8, 2011
01683450	Configuration Control Clearance and 50.59 Applicability	September 2, 2011
01723779	50.59 Evaluation Needed for EC274941	January 12, 2012
01747242	50.59 Screening for TM12-003 Not Review By TRB	March 21, 2012
01812795	Water Damaged SR Cables in the TB Floor at Elevation 734'	October 16, 2012
01848199	Ground Water Leakage In/Near J0433	February 13, 2013
01849158	Not Able to Pump Water Out of 2K221	February 18, 2013
01850234	ECPM – Electrical Cable Operability	February 21, 2013
01851599	Junction Box J0433 is Severely Corroded	February 26, 2013
01854259	Water Found in Conduit 1K110	March 6, 2013
01854446	WOs for SBDG Conduit Inspections Rescheduled	March 7, 2013
01854812	Found Water in 1K109	March 7, 2013
01871921	ECPM – Electrical Cable Operability	May 6, 2013
01904524	Moisture Found During 2A207 Conduit Inspection WO40247903-04	September 17, 2013
01904650	Obtaining Cable Megger Readings	September 17, 2013
01904955	Standby Transformer: Found Water in Embedded Conduits	September 18, 2013
01904965	Standby Transformer Wet Cables IR Results	September 18, 2013
01905017	Found Gedney Plug in Conduit 2A206	September 18, 2013
01905073	Tritium Identified in 2 of 3 Conduit Samples	September 18, 2013

DRAWINGS

Number	Description or Title	Date or Revision
BECH-E004	Single Line Meter and Relay DG and 4.16kV System	29
BECH-E106<003>	DG ACB 152-311 Control Scheme	10
M015-006<1>	Schematic Diagram – DG	19
M015-006<1A>	DG 1G21 Start Circuit	9
M015-006<4>	DG Relay Detail	14
M015-015<2>	3-Line Schematic	16
M015-015<3>	3-Line Schematic	17

MODIFICATIONS

Number	Description or Title	Date or Revision
6652	Equivalent Change Evaluation TIS4388B, Nitrogen Purge Vaporizer 1 E-73 Low Steam Temp	August 23, 2006
147857	EMA A79026, TIS4388B, N_2 Purge Vaporizer 1 E-73 Low Steam Temp	0
155905	EDG Replacement	7
156051	Essential Bus Degraded Voltage Relay Replacement	7
249768	CV1621 – Install Alternate Method of Control to Close Valve	0
270578	Setpoint Changes To Provide Alarms EAL HU1.9 and HA1.7	1
273553	HPCI Velan Steam Trap DT2237 Replacement	5
274463	Generator Voltage Rectifier Replacement	9
275694	Repair Cable K00081-V	2
275798	LPCI Loop Select Barton Replacement	7
277335	Replace Stem in MOV2312	1
277653	Conduit 2K231Cable Replacements	7
277792	Cable 1G0034-G Cable Replacement	3

OTHER DOCUMENTS

Number	Description or Title	Date or Revision
- - - - - - - -	Consolidated Results of Insulation Resistance Readings of Low Voltage Cables	N/A
- - - - - - - -	Slideshow Presentation to PHC Regarding Alternatives for Submerged Cables	N/A
- - - - - - - -	50.59 Resource Manual	1
- - - - - - - -	Cross-Disciplinary Review Determination Worksheet for PCR01871921	May 29, 2013
- - - - - - - -	Planned Inspection Schedule of SR Cables Embedded in the RX and TBs	September 4, 2013
- - - - - - - -	Updated Planned Inspection Schedule of SR Cables Embedded in the RX and TBs	September 16, 2013
- - - - - - - -	White Paper Response from Cable Engineer to NRC Discussing Cables Currently Known to or Have Been at Some Time Exposed to Water	September 16, 2013
2012-007	UFSAR Change - Cycle 24 Design Objectives and Changes	June 22, 2012
156051 Sup 3.	Vendor Manual: Instructions for Type 27N High Accuracy Under-Voltage Relay	7
ARP 1C06A	“A” RWS Pit Lo Level	65
ECPM SECT 2.0	Electrical Cable Scoping and Population	2
ECPM SECT 4.1	Cable Aging Management Review	0
ECPM SECT 4.5	Electrical Cable Operability	2
ECPM SECT 4.6	Test and Inspection Data Review and Trending	0
ECN 1748-12	Clarification of ECN1748-05	0
IE-77-1624	Letter to NRC Regarding EDG Degraded Voltage TS Change to Table 3.2-B	August 30, 1977
LRAP-E003	DAEC License Renewal Project Aging Management Program Basis Document Inaccessible Cables	9

OTHER DOCUMENTS

Number	Description or Title	Date or Revision
LRTR-EMIF	DAEC License Renewal Project Electrical Manhole Inspection Frequency	0
LRTR-ESAM	DAEC License Renewal Project Sampling for Electrical Aging Management Programs	2
OI 324	SBDG Operation	104
ACE01812795-03	Water Damaged SR Cables in the TB Floor at EL. 734'	April 18, 2013
RCE01824467-02	Report for Wetted Cables Within Embedded Circuits	3
RFP 210	RPV Reassembly	35
STP 4.3.1-01	Fuel Storage Facilities K-Infinity Limit Checks	May 31, 2012
WO40052886-01	1P022D-M, Megger All Three Phases for Cable Test	November 17, 2010
WO40052887-01	1P089B-M, Megger All Three Phases for Cable Test	November 17, 2010
WO40052888-01	1P089C-M, Megger All Three Phases for Cable Test	November 17, 2010
WO40052889-01	Megger Test Results for 1P099B-M	November 20, 2010
WO40188157-02	Megger Cables 2B4204-A/2V008-A/IT0012-A	October 23, 2012
WO40188157-04	Megger Cables 2B4210-D/2D2118-A/2G0025-A	October 23, 2012
WO40188157-10	Megger Cables 2D2112A-2B4207E-2G023C-2B42410A-2A0411K (Div. 2)	October 26, 2012
WO40188157-11	Megger Cables in 2K231 (Div. 2)	November 11, 2012
WO40192650-01	SUS10.00, Inspect TB Floor Conduit 2K218 for Water	February 12, 2013
WO40192650-02	SUS11.01, Inspect TB Floor Conduit 2K221 for Water	February 18, 2013

OPERABILITY EVALUATIONS

Number	Description or Title	Date or Revision
- - - - - - - -	POD for Cable in Embedded Conduit Non-Conformance in Reference to CR1820633-01	0
2012-10-15.POD	POD for A and B EDG SR Cables in the TB Floor at EL 734'	0

PROCEDURES

Number	Description or Title	Date or Revision
ACP 102.10	Prep, Review & Processing of USFAR Change Requests	17
ACP 103.2	10 CFR 50.59 Screening Process	41
ACP 103.3	50.59 Evaluation Process	30
ACP 103.13	DAEC Engineering Change Process	17
ACP 106.1	Procedure Preparation, Revision, Review, and Approval (DAEC, Supplement to AD-AA-100-1004)	79
ACP 1210.7	Electrical and I&C Aging Management Programs	3
ACP 1210.8	Electrical Cables and Connections Inspection Procedure	0
EN-AA-203-1001	Operability Determinations/Functionality Assessments	12

LIST OF ACRONYMS USED

AC	Alternating Current
ACB	Air Circuit Breaker
ACE	Apparent Cause Evaluation
ACP	Administrative Control Procedure
ADAMS	Agencywide Documents Access And Management System
AOP	Abnormal Operating Procedure
AR	Action Request
ARP	Alarm Response Procedure
ASME	American Society of Mechanical Engineers
BOP	Balance-of-Plant
CAL	Calculation
CFR	Code of Federal Regulations
DAC	Data Acquisition Center
DAEC	Duane Arnold Nuclear Center
DCR	Design Change Request
DG	Diesel Generator
DPR	Demonstration Power Reactor
DRP	Division of Reactor Project
DRS	Division of Reactor Safety
EAL	Emergency Action Level
EC	Engineering Change
ECN	Engineering Change Notice
ECPM	Electrical Cable Program Manual
EDG	Emergency Diesel Generator
EL	Elevation
EMA	Engineered Maintenance Action
EP	Emergency Preparedness
GL	Generic Letter
HA1	Hostile Alert
HPCI	High Pressure Coolant Injection
HU1	Hostile Unusual Event
I&C	Instrumentation and Control
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Inspection Report
kV	kilo-Volt
LLC	Limited Liability Company
LOCA	Loss-of-Coolant-Accident
LPCI	Low Pressure Coolant Injection
MOV	Motor Operated Valve
MSR	Moisture Separator Reheater
NCV	Non-Cited Violation
NECR	Northeast Corner Room
NEI	Nuclear Energy Institute
NOS	Nuclear Oversight
NRC	Nuclear Regulatory Commission
NUREG	NRC Technical Report Designation
OA	Other Activities
OI	Operation Instruction

PARS	Public Available Records System
PCR	Procedure Change Request
PHC	Plant Health Committee
POD	Prompt Operability Determination
RCE	Root Cause Evaluation
RFO	Refueling Outage
RHR	Residual Heat Removal
RPV	Reactor Pressure Vessel
RWCU	Reactor Water Cleanup
RWS	River Water Supply
RX	Reactor
SBDG	Standby Diesel Generator
SDC	Shutdown Cooling
SDG	TSC Standby Diesel Generator
SDP	Significance Determination Process
SEP	Station Emergency Procedure
SFP	Spent Fuel Pool
SPC	Suppression Pool Cooling
SR	Safety-Related
SSC	Structure, System, and Component
STP	Surveillance Test Procedure
SUS	Startup System
TB	Turbine Building
TIS	Temperature Indicating Switch
TM	Temporary Modification
TRB	Technical Review Board
TS	Technical Specifications
TSC	Technical Support Center
UFSAR	Updated Final Safety Analysis Report
Vdc	Volts Direct Current
WO	Work Order

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Sincerely,

/RA

Robert C. Daley, Chief
Engineering Branch 3
Division of Reactor Safety

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