UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

April 15, 2020

Mr. Steven Vercelli
Site Vice President
Entergy Operations, Inc.
5485 U.S. Highway 61N
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION – NRC INSPECTION REPORT 05000458/2019015

Dear Mr. Vercelli:

On March 24, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at River Bend Station and discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance of the violation documented in this inspection report, 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 copies to the Regional Administrator, Region IV; the Director, Office of Enforcement; and the NRC Resident Inspector at River Bend Station.

If you disagree with a cross-cutting aspect assignment 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; and the NRC Resident Inspector at River Bend Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at the Agencywide Documents Access and Management System (ADAMS) http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Jason W. Kozal, Chief
Reactor Projects Branch C
Division of Reactor Projects

Docket No. 05000458
License No. NPF-47

Enclosure:
As stated

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DATE	04/10/2020	04/14/2020	04/09/2020	04/15/2020	

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000458
License Number:	NPF-47
Report Number:	05000458/2019015
Enterprise Identifier:	I-2019-015-0002
Licensee:	Entergy Operations, Inc.
Facility:	River Bend Station
Location:	St. Francisville, Louisiana
Inspection Dates:	November 11, 2019 to January 31, 2020
Inspectors:	R. Alexander, Senior Emergency Preparedness Inspector R. Deese, Senior Reactor Analyst
Approved By:	Jason W. Kozal, Chief Reactor Projects Branch C Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an NRC inspection at River Bend Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Failure to Maintain Phase 2 FLEX Equipment Consistent with NRC Order EA-12-049			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000458/2019015-01 Open/Closed	[H.14] - Conservative Bias	71152
The inspectors identified a Green, non-cited violation of NRC Order EA-12-049, in that the licensee failed to maintain strategies to maintain and restore core cooling and containment cooling capabilities following a beyond-design-basis external event. Specifically, the licensee failed to maintain the FLEX program elements such that both the N and N+1 FLEX diesel generators required to restore DC control power for the Extended Loss of All AC Power response strategy (designated EG-1 and EG-2) were nonfunctional for an extended period of time.			

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.04Q - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (2 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

(1) FLEX electrical strategy relative to the Phase 2 FLEX diesel generators (EGs), FLX-EG1 and FLX-EG2, on December 10, 2019
(2) FLEX Phase 2 reactor pressure vessel (RPV) injection and cooling strategy, including the FLEX diesel generators FLX-EG3, FLX-EG4, and FLX-EG5, on December 10, 2019

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 02.02) (2 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

(1) CR-RBS-2019-07049; for FLEX diesel generators FLX-EG1, FLX-EG2, FLX-EG3, FLX-EG4, FLX-EG5, FLX-EG6, and FLX-EG7, following identification on October 31, 2019, that their associated engine block heaters were not operating as expected
(2) CR-RBS-2019-06262, CR-RBS-2019-07004, CR-RBS-2019-07016, and CR-RBS-2019-07031; for FLEX diesel generators FLX-EG1, FLX-EG2, FLX-EG3, FLX-EG4, and FLX-EG5, following identification on October 31, 2019, and November 1, 2019, by a vendor that the engines would not remain running for more than a few seconds after starting

OTHER ACTIVITIES – BASELINE

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

(1) CR-RBS-2019-07343; following identification on October 31, 2019, that several FLEX diesel generators (FLX-EG1, FLX-EG2, FLX-EG3, FLX-EG4, and FLX-EG5) failed to continue to run for more than a few seconds after starting, the licensee characterized the issue as a Level B Adverse Condition and initiated an Adverse Condition Analysis (ACA), which was completed on December 31, 2019. The inspectors reviewed the ACA and associated corrective actions on January 8, 2020.

71153 – Follow-up of Events and Notices of Enforcement Discretion

Event Follow-up (IP Section 03.01) (1 Sample)

(1) Following the simultaneous failure of multiple FLEX diesel generators during vendor testing in late October 2019, NRC Region IV initiated a Management Directive 8.3 evaluation of the information known at the time to assess the need for a reactive follow-up inspection. While the risk assessment placed the issue below the threshold for a reactive inspection, because of the lack of certainty around the causes of the failures to start, lack of clear exposure times, possible generic implications, uncertainty surrounding the operator FLEX training program, and the unexpected nature of the initial failure of all FLEX power support systems, NRC Region IV determined that the associated issues should be reviewed under the baseline inspection program.

The inspectors reviewed the circumstances surrounding the FLEX diesel engine and diesel makeup pump initial failures to operate and operator training on FLEX equipment. The inspectors also evaluated the licensee's interim corrective actions and the current status of the affected FLEX equipment while on site December 9-12, 2019, and via in-office review January 6-17, 2020.

INSPECTION RESULTS

Failure to Maintain Phase 2 FLEX Equipment Consistent with NRC Order EA-12-049			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000458/2019015-01 Open/Closed	[H.14] - Conservative Bias	71152
The inspectors identified a Green, non-cited violation of NRC Order EA-12-049, in that the licensee failed to maintain strategies to maintain and restore core cooling and containment cooling capabilities following a beyond-design-basis external event. Specifically, the licensee failed to maintain the FLEX program elements such that both the N and N+1 FLEX diesel generators required to restore DC control power for the Extended Loss of All AC Power response strategy (designated EG-1 and EG-2) were nonfunctional for an extended period of time.			
Description: As part of the licensee's Phase 2 strategies in compliance with NRC Order EA-12-049, "Order to Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012, River Bend Station (RBS) committed to the guidance described in NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, and employs different diesel engines (known as FLX-EGs or EGs) as primary and backup (N and N+1) elements for their			

Phase 2 FLEX strategies. The licensee generally described its strategies to meet NRC Order EA-12-049 initially in its Final Integrated Plan, dated September 29, 2015, (ADAMS Accession No. ML15279A345) and maintains the program and strategies in EN-OP-201-07, "River Bend Station FLEX Program Document," Revision 2. The RBS Phase 2 FLEX strategies include:

- EG-1 and EG-2 (N and N+1) are 200-kW engines to be deployed within 8 hours of the Extended Loss of All AC Power (ELAP) event to repower battery chargers, in order to recharge Division 1 batteries and ensure DC control power for FLEX instrumentation and key safety relief valve and reactor core isolation cooling system operations. These EGs are critical to restore the Phase 2 core and containment cooling strategies in response to an ELAP event.

- EG-3 and EG-4 (N and N+1) are 500-kW engines to be deployed to repower suppression pool cooling pumps, thereby re-establishing RPV injection via the residual heat removal loop “C” (as part of the Phase 2 core cooling strategy).

- EG-5 (N) is also a 500-kW engine to be deployed to power the installed FLEX Pump 1, which supplies water from the standby service water (SSW) ponds to the suppression pool cooling heat exchanger (as part of the Phase 2 core and containment cooling strategies). [Note that the N+1 option for this strategy to provide suppression pool cooling heat exchanger cooling water to and from the SSW ponds uses the diesel-driven FLEX Makeup Pump 2, independent of the FLEX Pump 1/EG-5 combination.]

As authorized by NEI 12-06, Section 11.1, Quality Attributes, the equipment associated with these FLEX strategies is procured as commercial grade equipment with design, storage, maintenance, testing, and configuration controlled as outlined in various sections of the NEI 12-06 document. As such, the equipment associated with FLEX strategies is generally not required to be procured, tested, or otherwise maintained in accordance with the quality requirements of 10 CFR Part 50 (e.g., Appendix B, Section 50.65, Maintenance Rule, etc.).

In late September 2019, RBS attempted to run EG-5 as part of planned surveillance testing for FLEX Pump 1, but during this test EG-5 failed to continue running beyond a few seconds after starting. The licensee entered technical requirements manual action statement for EG-5 being nonfunctional (N capability), with a requirement to return EG-5 to functional within 90 days. On October 31, 2019, a local vendor for RBS conducted troubleshooting on EG-5 and found that the engine failed to continue running more than 5-6 seconds after starting and tripped on overvoltage. The vendor was able to get this engine (EG-5) to continue to stay running after only one additional start attempt. Per local vendor’s recommendation, RBS attempted to run the other four FLEX EGs with the vendor onsite, and experienced the following:

- EG-1 and EG-2 (battery chargers): After starting, these engines both promptly tripped on high coolant temperature. Through extensive troubleshooting, the vendor determined that these engines experienced a failure of a temperature switch that provided false high coolant temperature to the engine controllers. The vendor was able to restore functionality of the engines by bypassing the faulty temperature switch (in both engines), since the engines included a redundant coolant temperature probe that provided indication and trip functions to the EG controllers.

- EG-3 and EG-4 (power for suppression pool cooling pump): These engines ran for 5-6 seconds after starting, then tripped on an overspeed condition (runaway). The vendor did not identify any failures with the coolant temperature switches as seen on EG-1 and EG-2 and was able to get these engines to continue to stay running after 4 or 5 additional start attempts.

Vendor maintenance completion documents attributed the issues experienced with the five FLEX EGs to the failure to run the engines more frequently (about once per month). The last time the five FLEX EGs were run was in early June 2019, as part of the 6-month preventative maintenance activities.

The licensee entered the issue into its corrective action program (Condition Report CR-RBS-2019-07343) and initiated an Adverse Condition Analysis, which was completed in late December 2019. The licensee's cause analysis determined there were three causal factors associated with the recent FLEX EG failures:

1. The digital control panels initially installed on FLEX-EG1, 2, 3, 4, and 5 were not suitable for the requirements of the FLEX program. (All five EG controllers were replaced with a different make/model from the original by a local vendor in January 2019).

2. The failure of installed equipment to maintain engine block temperatures warm enough to start properly on the first attempt led to FLEX-EG1, 2, 3, 4, and 5 tripping after their initial start, requiring additional starts. A possible contributor to this failure to remain running after the initial start is the preventative maintenance frequency being based on EPRI guidelines (every 6 months) instead of the vendor recommendations (every two weeks).

3. FLEX generators are Commercial Grade equipment that come equipped with components intended to protect the engine that can fail, causing false trip signals. The original engine coolant temperature switch in EG-1 and EG-2 experienced a stuck contact, which fed the control panel a false high temperature trip, shutting down the generators soon after start.

Further, the cause analysis determined that EG-1 and EG-2 were nonfunctional due to the failure of the temperature switch, which occurred at some point after the successful testing in June 2019 and before the condition was identified by the vendor in late October 2019. However, the licensee determined that EG-3, EG-4, and EG-5, while difficult to start and maintain running, were never nonfunctional during the period.

In reviewing the licensee's cause analysis, the inspectors determined that while the licensee's analysis found that EG-3, EG-4, and EG-5 were never nonfunctional, the procedural guidance in place at the time the equipment was found in the degraded state would not have driven operators to take all actions necessary to ensure engines started and remained running without further consultation and guidance from operations supervision. The lack of guidance would have at least delayed, and more likely prevented, the initiation of RPV makeup and suppression pool cooling functions in a timely manner, further challenging the mitigating strategies implementation.

Additionally, the inspectors determined that while the second causal factor acknowledged that the licensee’s preventative maintenance frequency of 6 months was not in line with vendor

recommendation, the cause analysis did not identify that the initial evaluation developing the preventative maintenance strategy failed to identify this issue. Specifically, NEI 12-06, Section 11.5.2.a, states, "Periodic testing and frequency should be determined based on equipment type and expected use. Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified." However, in reviewing the preventative maintenance basis document established for the RBS FLEX EGs, the inspectors determined that while the licensee developed a preventative maintenance strategy that justified an extension of the testing frequency from 3 months to 6 months, it appears the justification was based on generic vendor engine data (as opposed to the actual engines procured for RBS; Ref. EC-RBS-44959, Revision 1), and did not consider the specific vendor recommendations to run the engines once every 2 weeks (for EG-1 and EG-2); and once every month (for EG-3, 4 and 5).

Finally, the inspectors determined that while the third causal factor acknowledged the temperature switch failure on EG-1 and EG-2 resulted in the inability of the engines to run, the cause analysis did not identify that, when the engine controllers were replaced in January 2019 with a different make and model of controller, there was a missed opportunity to identify a potential failure mechanism/vulnerability introduced for the new brand and style of controllers with these engines. NEI 12-06, Section 11.5.2.c states, "existing work control processes may be used to control maintenance and testing. (e.g., PM program, surveillance program, vendor contracts, and work orders)." However, the inspectors found that since the FLEX equipment was procured and maintained as Commercial Grade, the licensee's process (i.e., Procedure EN-DC-115) did not require RBS to complete any significant engineering evaluations to assess for potential new failure mechanisms when these components were replaced. This decision was documented in Condition Report CR-RBS-2018-03879, CA-3, which stated, in part, that since the engine controllers were not specific performance requirements or options delineated in the original engineering design documentation, a formal engineering change was not required. Additionally, the vendor contract associated with the controller replacement activities did not stipulate any specific return to service/post-modification testing requirements. The inspectors also found that Procedure EN-DC-117, "Post Modification Testing and Special Instructions," had instructions and testing philosophy that, if implemented, likely would have identified the vulnerability associated with leaving the temperature switch installed along with the temperature probe. Instead the licensee relied exclusively on the vendor and its knowledge of the engines and the controllers when changing out and testing the equipment. As such, only after the temperature switches failed on EG-1 and EG-2 did this failure mechanism/vulnerability reveal itself; specifically, the original controller required both the temperature switch for trip function and temperature probe for alarm function, while the new controller only needed the temperature probe for trip and alarm functions. The inspectors also noted that the same failure could have developed on EG-3, EG-4, and/or EG-5, given the same new controller and change-out process had been used.

Corrective Actions: In addition to the initial corrective actions completed by the local vendor to re-establish functionality of five FLEX EGs, the licensee's corrective actions developed out of the cause analysis included:

1. Vendor permanently disabled the temperature switch (which failed on EG-1 and EG-2) as an input signal for the EG controllers on all five FLEX EGs.

2. Entergy fleet action to evaluate the use of engine trip and/or alarm bypass switches on FLEX equipment for use during beyond design basis events.

3. Enhancement to the FLEX EG "hard cards" (i.e., operating instructions associated with FLEX Support Guidelines) noting that FLEX equipment may require multiple start attempts under various environmental circumstances.

4. Establishment of a preventative maintenance frequency which ensures functionality of the FLEX equipment.

5. Establishment of method(s) to ensure engine block heaters are energized when needed while maximizing their reliability and effectiveness.

Corrective Action References: Condition Reports CR-RBS-2019-07343 and CR-RBS-2020-01311

Performance Assessment:

Performance Deficiency: The inspectors identified that the licensee failed to maintain strategies to maintain and restore core cooling and containment cooling capabilities following a beyond-design-basis external event. Specifically, the licensee failed maintain the FLEX program elements such that both the N and N+1 FLEX diesel generators (EGs) required to restore DC control power for the ELAP response strategy (designated EG-1 and EG-2) were nonfunctional for an extended period of time.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee's maintenance strategy established for the FLEX EGs failed to fully consider vendor recommendations such that two of the five FLEX EGs were nonfunctional for up to a 5-month period.

Significance: The inspectors assessed the significance of the finding using Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” Using the Mitigating Systems Exhibit 2, Section E, the inspectors determined that the issue was not associated with NRC Order EA-12-051 (spent fuel pool instrumentation) or Order EA-13-109 (hardened containment vent system). However, the inspectors determined that the issue did involve a failure, unavailability, or degradation of equipment credited for use in satisfying the requirements of Order EA-12-049 (FLEX) that would result in a complete loss of the ability to maintain or restore core cooling or containment capabilities for an exposure period greater than the out of service time allowed in the licensee’s FLEX final integrated plan. Specifically, the failures experienced could be attributed to the licensee's development of the preventative maintenance strategy for the five FLEX EGs, where the licensee failed to completely consider the engines' specific vendor recommendations relative to testing frequency, contrary to the requirements of NEI 12-06, Revision 0, Section 11.5.2, to which RBS is committed. Further, EG-1 and EG-2 (N and N+1 strategy elements) were also determined to be nonfunctional due to a failed temperature switch, which prevented the engines from continuing to run after starting and could not have been reasonably recovered by operator action. Both EG-1 and EG-2 were last satisfactorily tested in early June 2019, and were discovered nonfunctional on October 31, 2019, (approximately 5 months). However, per NEI 12-06, Revision 0, as

implemented in the licensee's technical requirements manual, if only the N FLEX element is nonfunctional, then the required action is to restore within 90 days; but, since the N and N+1 FLEX elements were nonfunctional, the required action was to begin actions within 24 hours to restore the function of at the least N capability within 72 hours. As such, the screening tool required that a senior reactor analyst complete a detailed risk evaluation to assess the significance of this performance deficiency.

The senior reactor analyst performed a detailed risk evaluation which yielded an estimate of the total increase in core damage frequency of this finding to be 7.0E-7/year. In this evaluation, the analyst assumed the exposure time of the nonfunctionality of FLEX diesel generators EG-1, EG-2, EG-3, EG-4, and EG-5 was 77 days. This time was estimated using the “T/2” method described in Section 2.0, “Exposure Time Modeling,” of Volume 1 of the RASP Handbook, “Risk Assessment of Operational Events,” Revision 2. Since the time of actual failures could not be determined due to the nature of the failure mechanism (reported by the vendor as not running the diesel generators often enough), the exposure time was estimated to be one-half of the time period starting from the last successful functional operation of the diesels in early June 2019 until they were made functional in early November 2019.

Additionally, the analyst assumed that FLEX diesel generators EG-1, EG-2, EG-3, and EG-4 were unable to be recovered. EG-1 and EG-2 were assumed to be nonrecoverable because the analyst judged the nominal level of station knowledge of the FLEX diesel generators was not sufficient to troubleshoot and eliminate the problem. EG-3 and EG-4 were assumed to be nonrecoverable because the experience and procedures for recognizing and overcoming the degradation made success unlikely. EG-5 was assumed to be recoverable with a nonrecovery probability of 2.2E-2, which was derived from a SPAR-H human reliability analysis, which assumed extra time for diagnosis and high stress and low experience and training for diagnosis and action.

Also, the analyst assumed that the licensee’s station blackout (SBO) diesel generator (DG) was unavailable. For ELAP scenarios, operators would declare an ELAP, and FLEX diesel generators EG-1 and EG-2 would be used prior to deploying and using the SBO diesel generator. Because of the time required to deploy EG-1 and discover its failure, and then deploy EG-2 and discover its failure, the analyst assumed not enough time would be available to attempt to use the SBO diesel generator. For hurricane, seismic, and high wind analyses, the SBO diesel generator was assumed to be lost, as this machine sits exposed to the elements out in the licensee’s protected area and would be vulnerable to these external events.

Using SPAR model RIVER-BEND-RICK-UPDATE3, modified from Version 8.56, run on SAPHIRE Version 8.2.1, the increase in core damage frequency from internal events was estimated to be 4.5E-7/year. This modified model reflected that FLEX equipment was part of the as-operated plant and that emergency diesel generators were unable to be recovered after one hour. Using the same SPAR model, the increase in core damage frequency was estimated for high winds (2.2E-8/year), hurricanes (8.6E-9/year), and seismic events (1.8E-8/year).

The analyst visited the River Bend site on February 18–19, 2020, to review the results of the licensee’s fire probabilistic risk analysis (PRA) risk evaluation and judged the licensee had a fire PRA capable of adequately evaluating the fire risk associated with the finding. Through review of the top 5 risk-significant fire scenarios from the licensee’s fire PRA for the condition,

the analyst estimated the increase in core damage frequency from fire events was 2.0E-7/year. The analyst assumed the increase in core damage frequency from internal and external flooding events was not risk-significant because the likelihood of internal and external flooding events that would lead to an ELAP scenario, thereby relying of the FLEX diesel generators, was extremely low.

Combining the internal and external events results, the total increase in core damage frequency from this performance deficiency was estimated to be 7.0E-7/year, or very low safety significance (Green). Dominant core damage sequences were station blackout events that were mitigated by Division III equipment.

Cross-Cutting Aspect: H.14 - Conservative Bias: Individuals use decision making-practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe in order to proceed, rather than unsafe in order to stop. Specifically, the inspectors determined that the licensee's process in developing the preventative maintenance strategy focused on generic guidance (EPRI template) and generic engine data (from a different make/model of EGs), and failed to consider the vendor information for the actual FLEX equipment procured for River Bend Station. Further, while the licensee procedure did not require the station to conduct a failure modes or other in-depth engineering analysis when the controllers were replaced in January 2019 (because the FLEX equipment is procured and maintained as Commercial Grade), the procedure did not prohibit further analysis, and if implemented likely would have identified that the redundant controller input was a vulnerability in preventing the engine(s) from operating.

Enforcement:

Violation: NRC Order EA-12-049, Attachment 2, states, in part, "Licensees or construction permit holders shall develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment and [spent fuel pool] cooling capabilities following a beyond-design-basis external event." River Bend Station describes its strategies to meet the NRC Order in EN-OP-201-07, "River Bend Station FLEX Program Document," Revision 2, Section 5.2; describes the equipment used to support these strategies in Table 2 (Section 5.3.1); describes the overall preventative maintenance strategy and frequency for the FLEX equipment in Table 3 (Section 5.3.3), and states in Section 2.2 that NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, was used to develop the overall station strategies to meet NRC Order EA-12-049. NEI 12-06, Revision 0, Section 11.5.2.a, states, "Periodic testing and frequency should be determined based on equipment type and expected use. Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified." Further, NEI 12-06, Revision 0, Section 11.5.2.c, states, "Existing work control processes may be used to control maintenance and testing (e.g., PM Program, surveillance program, vendor contracts, and work orders)."

Additionally, Procedures EN-DC-115, "Engineering Change Process," and EN-DC-117, "Post Modification Testing and Special Instructions," established the requirements for completing formal engineering changes (including those for Commercial Grade equipment), and the process for conducting post-modification tests on equipment.

Contrary to the above, from September 29, 2015, through December 17, 2019, the licensee failed to maintain guidance and strategies to maintain or restore core and containment

cooling capabilities following a beyond-design-basis external event. Specifically, the licensee failed to maintain the FLEX program elements such that the N and N+1 diesel generators (FLX-EG1 and FLX-EG2) required to restore DC control power as part of the Phase 2 strategies were nonfunctional for an extended period of time.

In particular, Program Document EN-OP-201-07, Table 3, indicates that the preventative maintenance strategy for Portable 200-kW diesel generators FLX-EG1 and FLX-EG2, and Portable 500-kW diesel generators FLX-EG3, FLX-EG4 and FLX-EG5, includes a "Functional Test and Inspection" at a 6-month frequency. However, the vendor manual for FLX-EG1 and FLX-EG2 (John Deere PowerTech Plus 6068 OEM Diesel Engines), Section 20, states, in part, "to assure that your engine will deliver efficient standby operation when needed, start engine and run at rated speed (with 50 percent – 70 percent load) for 30 minutes every 2 weeks." Further, the vendor manual for FLX-EG3, FLX-EG4 and FLX-EG5 (Detroit Diesel Series 60 engines), Section 8.1, states that engines maintained as standby power sources should perform a monthly load test at least 35 percent of the unit's full rated output.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On March 24, 2020, the inspectors presented the NRC inspection results to Mr. S. Vercelli, Site Vice President, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04Q	Procedures	RBS-FSG-002	Alternate RCIC Suction Source	2
		RBS-FSG-003	Alternate Reactor Vessel Cooling	3
		RBS-FSG-004	ELAP DC Bus Load Shed and Management	3
		RBS-FSG-005	Initial Assessment and FLEX Equipment Staging	9
		RBS-FSG-007	Loss of DC Control Power	4
		RBS-FSG-012	Alternate Containment Cooling and Hydrogen Control	4
71111.15	Corrective Action Documents	CR-RBS-	2017-0492, 2018-05376, 2019-06262, 2019-07004, 2019-07016, 2019-07031, 2019-07049	
	Corrective Action Documents Resulting from Inspection	CR-RBS-	2019-07826, 2020-01311	
	Miscellaneous	E808-0100	Energenius Installation and Operation Manual NRG12-10, NRG24-10, and NRG22-10 (Battery Charger)	0
		K129-0103	Kim HotStart Installation Instructions CB, HB, SB Model Engine Block Heater	0
		WT-WTRBS-	2017-00222	
	Procedures	ADM-0096	Risk Management Program Implementation and On-Line Maintenance Risk Assessment	329
		OSP-0031	Log Report - Outside Area	110
		OSP-0043	Freeze Protection and Temperature Maintenance	40
71152	Corrective Action Documents	CR-RBS-	2018-03879, 2019-07049	
		CR-RBS-2019-07343, CA-3	Adverse Condition Analysis: FLEX Equipment Trend	12/31/2019
	Corrective Action Documents Resulting from Inspection	CR-RBS-	2020-00841, 2020-01000	
	Engineering Changes	EC-ECH-48478	Entergy Phase 2 FLEX Equipment Optimization	0
		EC-RBS-44959	FLEX Basis	1
	Miscellaneous		Vendor Manual: Detroit Diesel Series 40/50/60 Engine Operator's Guide (FLX-EG3, FLX-EG4, & FLX-EG5)	05/2003

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Vendor Manual: John Deere PowerTech Plus 6080 OEM Diesel (FLX-EG1 & FLX-EG2)	2018
			PM Basis Template: EN FLEX Generator - 1000 kW or Less-Diesel Driven	11/21/2014
		057-253	Deep Sea Electronics DSE 7310 MKII & DSE 7320 MKII Operator Manual	4
		C830-0100	Operator Guide InteliLite NT Operator Guide	02/16/2017
		G971-0110	GENERAC Installation and Operating Manual Industrial Diesel Liquid Cooled Engines	0
	Procedures	EN-DC-115	Engineering Change Process	27
		EN-DC-117	Post Modification Testing and Special Instructions	14
		EN-LI-102	Corrective Action Program	38
		EN-LI-118	Causal Analysis Process	30
		EN-OP-201-07	River Bend Station FLEX Program Document	2
	Work Orders	WO 00505270	FLX-EG5 & EG4 CONTROL PANEL DISPLAY FAILS TO TURN ON/ REPAIR	07/31/2018
		WO 52825289	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG1	12/04/2018
		WO 52838470	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG2	12/04/2018
		WO 52855550	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG1	06/07/2019
		WO 52855562	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG5	06/08/2019
		WO 52855569	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG2	06/04/2019
		WO 52855570	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG4	06/04/2019
		WO 52855574	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG3	06/07/2019
		WO 52883966	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG2	11/12/2019
		WO 52884373	FLEX STANDBY PM- 6 MONTH FUNCTIONAL TEST - FLX-EG1	11/12/2019

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71153	Procedures	AOP-0050	Station Backout	62
		AOP-0065	Extended Loss of AC Power	4
		EOP-0001	Emergency Operating Procedure - RPV Control	29
		EOP-0003	Emergency Operating Procedure - Secondary Containment and Radioactive Release Control	18
		EOP-0004	Emergency Operating Procedure - Contingencies	17