



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 E LAMAR BLVD
ARLINGTON, TX 76011-4511

December 30, 2014

EA-13-233

Mr. Michael R. Chisum
Site Vice President
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-0751

**SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC SUPPLEMENTAL
INSPECTION REPORT 05000382/2014011**

Dear Mr. Chisum:

Prior to May 26, 2013, your staff failed to establish an adequate test program to demonstrate that the train B emergency diesel generator ventilation exhaust fan would perform satisfactorily in service. This performance deficiency resulted in a failure to identify that the exhaust fan could not perform its function because it disengaged from the fan motor in April 2013. Consequently, the train B emergency diesel generator was determined to be inoperable for a period of 30 days, exceeding the Technical Specification 3.8.1 allowed outage time of 72 hours.

On December 19, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Waterford Steam Electric Station, Unit 3. Based on the results of this inspection, documented in NRC Inspection Report 05000382/2013008 on January 30, 2014, and the final significance determination documented in NRC Inspection Report 05000382/2014009 on March 28, 2014, the NRC assigned a White finding Action Matrix input to the mitigating systems cornerstone in the fourth quarter of 2013.

In response to this Action Matrix input, the NRC informed you that a supplemental inspection using Inspection Procedure 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," would be required. On September 9, 2014, you informed the NRC that Waterford Steam Electric Station, Unit 3, was ready for the supplemental inspection.

On October 10, 2014, the NRC completed an on-site inspection and discussed the results with you and other members of your staff. On November 20, 2014, the NRC completed the supplemental inspection and discussed the results of this inspection with Mr. C. Rich, Director, Regulatory and Performance Improvement, and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC performed this supplemental inspection to determine if (1) the root and contributing causes for the significant issues were understood, (2) the extent of condition and extent of cause for the identified issues were understood, and (3) your completed or planned corrective actions were sufficient to address and prevent repetition of the root causes and contributing causes.

The NRC determined that your staff's evaluation identified that the primary root cause of the White finding was that the importance of monitoring emergency diesel generator exhaust fan differential pressure was not previously recognized. Specifically, emergency diesel generator operating procedures did not require the emergency diesel generator exhaust fan differential pressure to be monitored commensurate with its safety significance. The NRC also determined that your staff identified appropriate corrective actions to revise the emergency diesel generator system operating and surveillance testing procedures to include monitoring of the ventilation exhaust fan flow indications. However, the NRC determined that your staff's extent of cause evaluation did not include a review of operating and testing procedures for other safety-related systems to determine whether vulnerabilities exist similar to the deficiency found with the emergency diesel generator procedures. Your staff also determined that the exhaust fan failed because of a reduction in the amount of stress supportable by the threaded connection of the fan hub due to reworking the threads, as well as an increase in the amount of stress on the threads due to an engineering change that modified the connection by adding set screws. However, the NRC determined that your staff's extent of cause evaluation did not include an assessment of reworked threaded connections or changes in configurations of fastening components in other safety-related systems. Based on these determinations, the NRC concluded that the inspection objective involving extent of cause was not met.

The NRC has determined that completed or planned corrective actions were insufficient to address this performance issue. Specifically, the extent of cause review was insufficient. Therefore, the White finding will remain open and continue to receive consideration as an Action Matrix input until we can verify that all inspection objectives have been met. In order to meet the inspection objectives, the extent of cause review should be modified and revised as needed. You or your staff should notify the NRC of your readiness for a re-inspection when this and any other associated actions have been completed.

No NRC-identified or self-revealing findings were identified during this inspection. However, inspectors documented a licensee-identified Severity Level IV violation in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or the significance of the NCV, 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, U.S. Nuclear Regulatory Commission, Region IV, 1600 E. Lamar Blvd, Arlington, TX 76011-4511; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Waterford Steam Electric Station, Unit 3.

M. Chisum

- 3 -

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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 component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Troy W. Pruett, Acting Director
Division of Reactor Projects

Docket No.: 50-382
License No.: NPF-38

Enclosure:
Inspection Report 05000382/2014011
w/Attachment: Supplemental Information

cc w/encl: Electronic Distribution

M. Chisum

- 3 -

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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 component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Troy W. Pruett, Acting Director
Division of Reactor Projects

Docket No.: 50-382
License No.: NPF-38

Enclosure:
Inspection Report 05000382/2014011
w/Attachment: Supplemental Information

cc w/encl: Electronic Distribution

Distribution:
See next page

ADAMS ACCESSION NUMBER: **ML14364A412**

<input checked="" type="checkbox"/> SUNSI Review By: CHY		ADAMS <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Publicly Available <input type="checkbox"/> Non-Publicly Available	<input checked="" type="checkbox"/> Non-Sensitive <input type="checkbox"/> Sensitive	Keyword: NRC-002
OFFICE	SPE:DRP/E	C:DRP/E	D:DRP		
NAME	CYoung/dch	RLantz	TPruett		
SIGNATURE	<i>/RA/</i>	<i>/RA/</i>	<i>/RA/</i>		
DATE	11/28/14	12/30/14	12/30/14		

OFFICIAL RECORD COPY

Letter and Inspection Report to Mr. Michael Chisum from Mr. Troy Pruett, dated December 30, 2014

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC SUPPLEMENTAL INSPECTION REPORT 05000382/2014011

DISTRIBUTION:

Regional Administrator (Marc.Dapas@nrc.gov)
Deputy Regional Administrator (Kriss.Kennedy@nrc.gov)
Acting DRP Director (Troy.Pruett@nrc.gov)
Acting DRP Deputy Director (Jason.Kozal@nrc.gov)
DRS Director (Anton.Vegel@nrc.gov)
DRS Deputy Director (Jeff.Clark@nrc.gov)
Senior Resident Inspector (Frances.Ramirez@nrc.gov)
Resident Inspector (Chris.Speer@nrc.gov)
WAT Administrative Assistant (Linda.Dufrene@nrc.gov)
Branch Chief, DRP/E (Greg.Werner@nrc.gov)
Senior Project Engineer, DRP/E (Cale.Young@nrc.gov)
Project Engineer, DRP/E (Jim.Melfi@nrc.gov)
Public Affairs Officer (Victor.Dricks@nrc.gov)
Public Affairs Officer (Lara.Uselding@nrc.gov)
Project Manager (Michael.Orenak@nrc.gov)
Branch Chief, DRS/TSB (Geoffrey.Miller@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)
ACES (R4Enforcement.Resource@nrc.gov)
Regional Counsel (Karla.Fuller@nrc.gov)
Congressional Affairs Officer (Jenny.Weil@nrc.gov)
Technical Support Assistant (Loretta.Williams@nrc.gov)
RIV Congressional Affairs Officer (Angel.Moreno@nrc.gov)
RIV/ETA: OEDO (Cayetano.Santos@nrc.gov)
ROPAssessment.Resource@nrc.gov
ROPReports

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket No.: 05000382
License No.: NPF-38
Report No.: 05000382/2014011
Licensee: Entergy Operations, Inc.
Facility: Waterford Steam Electric Station, Unit 3
Location: 17265 River Road
Killona, LA 70057
Dates: October 6 through November 20, 2014
Inspector: C. Young, Senior Project Engineer
Approved By: Troy W. Pruett
Acting Director
Division of Reactor Projects

SUMMARY

IR 05000382/2014011; 10/06/2014 – 11/20/2014; Waterford Steam Electric Station, Unit 3; Supplemental Inspection – Inspection Procedure (IP) 95001

This supplemental inspection was conducted by a senior inspector from the NRC's Region IV office. No findings were identified. One Severity Level IV licensee-identified violation is documented in this report. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using NRC Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using NRC Inspection Manual Chapter 0310, "Aspects Within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Mitigating Systems

The NRC staff performed this supplemental inspection in accordance with IP 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation associated with the inoperability of the train B emergency diesel generator due to the failure of the train B emergency diesel generator ventilation exhaust fan in April 2013. The NRC staff previously characterized this issue as having low to moderate safety significance (White), as documented in NRC Inspection Report 05000382/2014009. During this supplemental inspection, the inspector determined that the licensee identified the primary root cause of the issue to be that the importance of monitoring emergency diesel generator exhaust fan differential pressure was not previously recognized. Specifically, emergency diesel generator operating procedures did not require the emergency diesel generator exhaust fan differential pressure to be monitored commensurate with its safety significance. This resulted in a failure of the fan not being detected in a test run of the emergency diesel generator during which the failure occurred. The train B emergency diesel generator was determined to be inoperable for a period of 30 days until the condition was identified and repaired. The inspector also determined that the licensee completed corrective actions to revise the emergency diesel generator system operating and surveillance testing procedures to include monitoring of the available ventilation exhaust fan flow indications. However, the inspector determined that the licensee's extent of cause evaluation did not include a review of operating and testing procedures for other safety systems to determine whether vulnerabilities exist similar to the deficiency found with the emergency diesel generator procedures. Additionally, the inspector identified that the licensee's extent of cause evaluation did not include a review of the contributing causes that were identified in the root cause evaluation, as required by licensee Procedure EN-LI-118, "Root Cause Evaluation Process," Revision 18. The contributing causes were associated with an engineering modification to the configuration of the fan hub connection as well as a maintenance activity affecting the threaded connection.

As a result of these concerns, the White finding associated with the emergency diesel generator exhaust fan failure will not be closed at this time. No additional findings were identified during this inspection.

Licensee-Identified Violations

A Severity Level IV violation that was identified by the licensee has been reviewed by the inspector. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and associated corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

4. OTHER ACTIVITIES

40A4 Supplemental Inspection (95001)

.01 Inspection Scope

This inspection was conducted in accordance with Inspection Procedure 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation of a White finding, which affected the mitigating systems cornerstone in the reactor safety strategic performance area. The inspection objectives were to:

- provide assurance that the root causes and contributing causes of risk-significant performance issues are understood;
- provide assurance that the extent of condition and extent of cause of risk-significant performance issues are identified; and
- provide assurance that the licensee's corrective actions for risk-significant performance issues are sufficient to address the root and contributing causes and to prevent recurrence.

The licensee entered the Regulatory Response Column of the NRC's Action Matrix in the fourth quarter of 2013 as a result of one inspection finding of low to moderate safety significance (White). The finding was associated with a failure to identify and perform adequate testing on the train B emergency diesel generator exhaust fan to demonstrate that the exhaust fan would perform satisfactorily in service. A failure of the train B emergency diesel generator (EDG) ventilation exhaust fan resulted in a period of inoperability of the train B EDG of 30 days. On April 25, 2013, the train B EDG exhaust fan failed when the fan hub became disengaged from the hub sleeve during surveillance testing of the train B EDG, resulting in the fan being uncoupled from the fan motor. This condition was not discovered until May 22, 2013, following a subsequent surveillance test of the B EDG on May 20, 2013, during which the room temperatures were noted to be higher than normal. Following troubleshooting and repairs to the fan, the train B EDG was restored to an operable status on May 26, 2013. The finding was characterized as having low to moderate (White) safety significance based on the results of a detailed risk analysis performed by an NRC senior reactor analyst, as discussed in NRC Inspection Report 05000382/2013008.

The licensee staff informed the NRC staff on September 9, 2014, that they were ready for the supplemental inspection. In preparation for the inspection, the licensee performed a root cause evaluation under Condition Report CR-WF3-2013-2530. Revision 3 of the root cause evaluation report, dated September 11, 2014, was provided to the inspector for review. The licensee also performed a Pre-NRC 95001 Inspection Snapshot Assessment, which was completed in August 2014.

The inspector reviewed the licensee's root cause evaluation in addition to other evaluations conducted in support of the root cause evaluation. The inspector reviewed corrective actions that were taken or planned to address the identified causes. The inspector also held discussions with licensee personnel to determine whether the root and contributing causes as well as the contribution of safety culture components were understood, and whether corrective actions taken or planned were appropriate to address the causes and preclude repetition.

.02 Evaluation of the Inspection Requirements

02.01 Problem Identification

- a. Determine whether the evaluation documented who identified the issue (i.e., licensee-identified, self-revealing, or NRC-identified) and under what conditions the issue was identified.

The licensee's evaluation documented that the failure of the train B EDG ventilation exhaust fan was identified on May 22, 2013, through the licensee's troubleshooting efforts that were prompted by an abnormally high room temperature while the train B EDG was operating on May 20, 2013. The high room temperature was evident to licensee personnel stationed at the EDG while it was being operated. An alarm in the control room for high temperature in the train B EDG room also alerted plant operators to the high temperature condition. The issue was therefore self-revealing. The inspector determined that the licensee's evaluation adequately documented who identified the issue and under what conditions the issue was identified.

- b. Determine whether the evaluation documented how long the issue existed and prior opportunities for identification.

The licensee's evaluation included a determination of when the exhaust fan failure occurred. Based on a detailed historical review of parameters including EDG room temperature, exhaust fan motor current, and exhaust fan differential pressure, the licensee concluded that the fan failure had occurred at the start of the previous operation of the train B EDG on April 25, 2013. Therefore, the issue had existed for 27 days prior to identification. The testing of the train B EDG on April 25, 2013, during which the fan failure occurred was a prior opportunity for identification of the issue. The failure was not identified at the time it occurred due to inadequate monitoring of exhaust fan operating indications while in service. The operating and testing procedures associated with the EDG system had never required operators to monitor these indications. The inspector determined that the licensee's evaluation was adequate with respect to identifying how long the issue existed and prior opportunities for identification.

- c. Determine whether the evaluation documented the plant-specific risk consequences, as applicable, and compliance concerns associated with the issue.

The licensee's evaluation included a plant-specific risk-based safety significance evaluation of the issue. The licensee determined that the train B EDG exhaust fan failure resulted in the train B EDG being in an inoperable condition during the time that

the failed condition of the fan existed, and that this condition resulted in the plant being without one of its sources of emergency AC power required by the plant's technical specifications for greater than the outage time allowed by the technical specification. The licensee's risk evaluation concluded that the overall risk significance of the issue was of low to moderate (White) significance, which was consistent with the result of the NRC's significance determination process for the White finding as discussed in NRC Inspection Report 05000382/2013008. The inspector concluded that the licensee appropriately documented the risk consequences and compliance concerns associated with the issue.

d. Findings

No findings were identified.

02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

a. Determine whether the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The inspectors determined that the licensee conducted a root cause evaluation in which three primary evaluation methods were used: Failure Mode Analysis, Fault Tree Analysis, and Why Staircase. The licensee's evaluation identified one root cause and three contributing causes associated with this issue. The root cause was identified to be that the importance of monitoring EDG exhaust fan differential pressure was not previously recognized. Specifically, EDG operating procedures did not require the EDG exhaust fan differential pressure to be monitored commensurate with its safety significance. The contributing causes identified by the licensee's evaluation were associated with an engineering modification to the configuration of the fan hub connection as well as a maintenance activity affecting the threaded connection. These issues are further discussed in Section 02.02.b below. The inspector concluded that the licensee evaluated the issue using a systematic methodology to identify the root and contributing causes.

b. Determine whether the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's evaluation determined that the significance of the exhaust fan failure was increased due to the failure to identify the problem at the time it occurred during testing of the EDG system, resulting in an extended period of inoperability of the EDG. The licensee determined that the failure was not detected because available indications of ventilation exhaust flow on the plant monitoring computer and local fan differential pressure were not being monitored while the equipment was being operated. The licensee concluded that the system operating and testing procedures did not direct personnel to monitor these indications.

The licensee's evaluation also included the development of a detailed timeline of events that contributed to the exhaust fan failure, including an evaluation of several parameters associated with the operational condition of the fan going back over 10 years. The

evaluation also included a detailed review of past maintenance and engineering activities associated with the fan. This led to the determination that a combination of maintenance and engineering modification activities performed in March 1999 was the cause of the failure of the fan on April 25, 2013, in which the fan hub became disengaged from the hub sleeve of the motor shaft. Specifically, a maintenance activity was performed which involved reworking the threads of the principal threaded fastener that connects the fan with the motor shaft, thereby reducing the amount of stress supportable by the threaded connection. At the same time, an engineering design change was implemented that modified the configuration of the fan hub to hub sleeve connection, which increased the amount of stress on the threads. The combination of these activities resulted in a weaker connection that was susceptible to a failure due to separation. Accordingly, the licensee's evaluation identified the following three contributing causes:

- Reworking the threads reduced the allowable stress of the fan hub to sleeve connection
- Using 6 set screws instead of the original 2 set screws increased the loading on the hub sleeve threads and thus further reduced the allowable stress of the fan hub to sleeve connection
- Low cycle fatigue loading on the already weakened hub to sleeve connection eventually exceeded the allowable stress level of the connection

These conclusions were also supported by the results of an independent failure evaluation that was performed on the failed component by an engineering firm contracted by the licensee to determine the exact nature and cause of the failure of the fan hub to hub sleeve connection. With the exception of the scope of the extent of cause evaluation as discussed in Section 02.02.d below, the inspector concluded the licensee's root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

c. Determine whether the root cause evaluation included consideration of prior occurrences of the problem and knowledge of prior operating experience.

The licensee's evaluation included a review of internal and external operating experience. The licensee conducted an Entergy corrective action program search, as well as an external operating experience database search, for previously documented conditions that involved causal factors related to deficiencies in equipment monitoring, and did not identify any prior occurrences related to testing and monitoring of supporting systems. The inspector noted that the licensee's evaluation did not include a search for prior operating experience involving problems related to rework of threaded connections or modifications to fastener configurations on safety-related components.

The licensee conducted a fleet-wide search of the Entergy corrective action program for any previously documented conditions involving ventilation fan failures similar to the failure experienced at Waterford in April 2013. This review identified that a failure of the same component (train B EDG ventilation exhaust fan) has occurred at Waterford

in 1999. This failure occurred following a maintenance that involved the replacement of the fan motor. The failure was attributed to the motor electrical leads having been inadvertently reversed, resulting in a separation of the fan hub from the hub sleeve due to a reverse starting torque that was applied when the motor was started in the reverse direction. This was the event that led to the maintenance and engineering design modification activities discussed in Section 02.02.b above.

The licensee also conducted an industry-wide search for operating experience involving ventilation fan failures. This review concluded that no prior operating experience involving a failure of the threaded connection associated with this type of ventilation fan. The licensee's review also consisted of direct contact with engineers at other operating plants within the industry that have similar ventilation system components. This review also concluded that fan failures that had been experienced at other facilities were not of the same nature or connection configuration as that of the failure experienced at Waterford.

The inspector concluded that the licensee's evaluation included a consideration of prior occurrences of the problems of previous similar equipment failures and failures associated with inadequate monitoring. The inspector also concluded that the licensee's evaluation included a consideration of prior operating experience, with the exception of prior operating experience related to the contributing causes of rework of threaded connections and modifications to connection configurations. This aspect is further discussed in Section 02.02.d below related to the licensee's extent of cause evaluation.

d. Determine whether the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The licensee's evaluation included an extent of cause evaluation for the identified root cause of failing to monitor the EDG ventilation exhaust fan, a component affecting the operability of a safety system, during testing. Specifically, EDG operating and testing procedures did not require the EDG exhaust fan differential pressure to be monitored commensurate with its safety significance. The inspectors noted that the scope of the licensee's review was limited to considering monitoring of safety-related room coolers. The licensee's extent of cause evaluation did not include a review of operating and testing procedures for other safety systems to determine whether vulnerabilities exist similar to the deficiency found with the EDG procedures. Specifically, the evaluation did not include a review to determine whether adequate monitoring of available indications during testing to detect if a degraded condition exists for a component that impacts the operability of a safety system is prescribed by other existing operating and testing procedures.

The inspector also identified that the licensee's extent of cause evaluation did not include a review of the contributing causes that were identified in the root cause evaluation, as required by licensee Procedure EN-LI-118, "Root Cause Evaluation Process," Revision 18. The contributing causes were associated with an engineering modification to a fastener configuration in a safety-related application, as well as maintenance practices involving reworking of threaded connections on safety-related

components. The inspector noted that the licensee's root cause evaluation did not address the extent of these causes.

The licensee's evaluation included a review of the extent of condition associated with the failure of the train B EDG ventilation exhaust fan to determine whether other similar plant components may be susceptible to the same failure mechanism. The licensee's evaluation determined that the failure of the fan hub/sleeve connection was applicable to a specific configuration that is unique to this type of fan (a hydramotor-controlled variable blade pitch fan). The only two applications of this type of fan in the plant are the train A and train B EDG ventilation exhaust fans. Thus, the only other component in the plant that may be susceptible to a similar failure mechanism would be the train A EDG exhaust fan.

As discussed above in Section 02.02.b, the licensee's evaluation determined that the train B fan hub sleeve had a weakened threaded connection due to a 1999 maintenance activity in which the threads were reworked, as well as a design change to increase the number of set screws used to secure the hub-to-sleeve spanner nut, which increased the stress on the threaded connection. These actions were performed following a previous failure of the train B fan hub connection in 1999 that was the result of bumping the fan in the reverse rotating direction due to the motor leads having been inadvertently reversed during motor replacement, thereby damaging the hub sleeve threads.

The above factors all contributed to the likelihood of a future failure at this connection. The licensee's evaluation included a review of the maintenance history for the train A fan, which determined that the fan motor was replaced in 2003. The review further determined that: 1) the motor had not been reverse-wired, and thus the fan hub had not experienced a reverse rotation starting torque; 2) the threaded hub sleeve connection was not removed or reworked; and 3) the attachment of the spanner nut to the hub sleeve was unchanged from the original configuration of 2 set screws. An additional factor considered in the licensee's evaluation was the fact that, due to differences in the ventilation system arrangements between the two trains, the train A fan motor is of a different size than the train B fan motor and produces approximately 40 percent less starting torque. Based on the above, the licensee's evaluation determined that a weakened or failed condition does not exist on the train A fan.

The licensee conducted a search under a corrective action for Condition Report CR-WF3-2013-02530 for prior engineering changes involving set screws to determine if any similar conditions may exist in other plant components. No other similar conditions were identified. However, the inspector noted that the licensee's evaluation did not include a review of the extent to which the current condition of other safety-related components may have been affected by maintenance activities involving reworking threads.

The inspector concluded that the licensee's evaluation did not adequately address the extent of condition and extent of cause of the problem, as described above. The licensee entered these and other inspector observations into the corrective action program as Condition Report CR-WF3-2014-5234.

- e. Determine whether the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The licensee's evaluation included a review of whether a weakness in any safety culture component contributed to any causes of the issue. The licensee's evaluation identified weaknesses in three safety culture components that were related to the identified causes of the performance deficiency. Weaknesses in the component of resources within the area of human performance were identified due to procedures not being in place to ensure proper operation of the EDG exhaust fans during operation and testing of the EDGs. Also, work documents that documented the reworking of the spanner nut and hub sleeve threads in 1999 did not contain specific instructions to ensure the quality of the re-worked threads.

Weaknesses were also identified in the component of work control within the area of human performance, as well as the component of the corrective action program within the area of problem identification and resolution. The impact of changes to the work scope associated with the maintenance and engineering change that accompanied the 1999 fan motor replacement activity was not appropriately addressed. The problem documented when the fan hub separated due to reverse rotation torque was not thoroughly evaluated. An engineering change that introduced additional set screws into the fan hub assembly design did not appropriately consider the additional stress on the hub sleeve threads that would be associated with the change. Also, the cumulative effect of the reworked threads and the additional set screws with respect to the loading on the hub-to-sleeve connection was not appropriately considered.

The inspector concluded that the licensee's evaluation included an appropriate consideration of safety culture components.

- f. Findings

No findings were identified.

02.03 Corrective Actions

- a. Determine whether appropriate corrective actions are specified for each root and contributing cause or that the licensee has an adequate evaluation for why no corrective actions are necessary.

The licensee's evaluation identified several corrective actions. The principal corrective actions to address the root cause were to revise the system operating Procedure OP-009-002, "Emergency Diesel Generator," and surveillance testing Procedure OP-903-068, "Emergency Diesel Generator and Subgroup Relay Operability Verification," to include requirements to monitor the ventilation exhaust fan differential pressure when the EDG system is operating. Additional corrective actions included the replacement of the train B EDG exhaust fan hub assembly with new parts in the original configuration (which was completed within four days of the discovery of the failed condition of the fan in order to restore the EDG to an operable condition), as well as the evaluation of maintenance practices on the EDG exhaust fan components and

discussion with the vendor to determine whether all appropriate maintenance activities were being performed. The inspector concluded that the identified corrective actions were appropriate and addressed the root and contributing causes.

The inspector noted that an expanded extent of cause evaluation may result in the identification of additional corrective actions that are appropriate to address additional issues associated with the root and contributing causes. These actions will be evaluated in a future NRC supplemental inspection.

- b. Determine whether corrective actions have been prioritized with consideration of risk significance and regulatory compliance.

The licensee's immediate corrective actions restored the EDG to an operable condition in order to restore compliance with plant technical specifications promptly upon discovery of the failure. The inspector determined that the licensee adequately prioritized the remaining corrective actions with consideration of the risk significance of the EDG system and regulatory compliance. This included appropriate actions to address a notice of violation issued by the NRC and restore compliance (see Section 02.03.e below).

- c. Determine whether a schedule has been established for implementing and completing the corrective actions.

The inspector determined that the licensee adequately established a schedule for implementing and completing the corrective actions. The inspector noted that, as of the date of the on-site inspection, all corrective actions for this issue had been completed with the exception of one long-term enhancement action involving a revision to the plant monitoring computer system to provide additional indications for the EDG exhaust fan flow. The inspector concluded that a schedule has been established for implementing this action.

- d. Determine whether quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The inspector determined that the licensee had developed an effectiveness review plan to determine the method, attributes, acceptance criteria, and schedule for effectiveness reviews of the corrective actions to prevent recurrence (CAPRs). The inspector reviewed this plan as captured in the corrective action program as LO-WLO-2013-00149. The corrective actions that had been identified as CAPRs were the revisions to the system operating Procedure OP-009-002, "Emergency Diesel Generator," and surveillance testing Procedure OP-903-068, "Emergency Diesel Generator and Subgroup Relay Operability Verification," as well as the replacement of the train B EDG exhaust fan hub assembly with new parts in the original configuration. The measures for determining effectiveness included the verification that the EDG system operating procedure log sheets have been completed with appropriate flow data and acceptance criteria, that the appropriate indications are being monitored, and that a failure of the fan due to separation of the fan hub from the hub sleeve has not recurred.

The inspector noted that, although similar requirements to monitor exhaust fan flow indications had been added to both the system operating procedure logs (which are implemented every time the EDG is in operation) as well as the EDG surveillance testing procedure, only the implementation of the system operating procedure logs action was included in the effectiveness review. The licensee entered this observation into the corrective action program as Condition Report CR-WF3-2014-5234 and initiated actions to add effectiveness measures for the surveillance testing procedure similar to those for the operating procedure logs to the effectiveness review plan. Overall, the inspector concluded that adequate measures of success had been developed for determining the effectiveness of the corrective actions to prevent recurrence.

- e. Determine whether the corrective actions planned or taken adequately address the Notice of Violation that was the basis for the supplemental inspection.

The NRC issued a Notice of Violation to the licensee on March 28, 2014, for the failure to identify and perform adequate testing on the train B EDG exhaust fan to demonstrate that the exhaust fan would perform satisfactorily in service (NRC Inspection Report 05000382/2014009, ADAMS ML14086A768). During this inspection, the inspector determined that the licensee restored compliance by revising the system operating Procedure OP-009-002, "Emergency Diesel Generator," and surveillance testing Procedure OP-903-068, "Emergency Diesel Generator and Subgroup Relay Operability Verification," to include requirements to monitor the ventilation exhaust fan differential pressure during testing. The inspector concluded that the corrective actions taken or planned were adequate to address the Notice of Violation that was the basis for the supplemental inspection.

- f. Findings

No findings were identified.

02.04 Evaluation of IMC 0305 Criteria For Treatment Of Old Design Issues

The licensee did not request credit for self-identification of an old design issue; therefore, the risk-significant issue was not evaluated against the IMC 0305 criteria for treatment of an old design issue.

40A6 Meetings, Including Exit

Exit Meeting Summary

On October 10, 2014, the inspector presented the inspection results to Mr. M. Chisum, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee if any of the material examined during the inspection should be considered proprietary. The licensee did not identify any proprietary information.

On November 20, 2014, the inspector conducted a re-exit meeting with Mr. C. Rich, Director of Regulatory and Performance Improvement, and other members of the licensee staff to discuss the NRC's conclusion that one of the inspection objectives (associated with extent of cause) was not met and that additional supplemental inspection would be required in order to close the White finding. The licensee acknowledged the issues presented.

40A7 Licensee-Identified Violations

The following violation of very low safety significance (Severity Level IV) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as a non-cited violation.

Title 10 CFR 50.73, "Licensee event report system," requires, in part, that a licensee shall submit a licensee event report (LER) within 60 days after the discovery of a reportable event. Contrary to the above, on July 21, 2013, the licensee failed to submit an LER within 60 days after the discovery of a reportable event. Specifically, the licensee failed to submit an LER within 60 days of the discovery of the inoperable train B EDG due to the exhaust fan failure, which was a reportable event that was discovered on May 22, 2013. On August 21, 2013, the licensee identified the failure to submit the LER within 60 days after the discovery of the event and entered the issue into the corrective action program as Condition Report CR-WF3-2013-4025. The LER was submitted by the licensee on September 11, 2013. The inspector determined that traditional enforcement is applicable to this violation since it is a violation that impacted the regulatory process. The inspector determined that this is a Severity Level IV violation in accordance with the NRC Enforcement Policy, Section 6.9.d.9.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Chisum, Site Vice President
M. Richey, General Manager, Plant Operations
R. Gilmore, Manager, Systems and Components
J. Jarrell, Manager, Regulatory Assurance
B. Lanka, Director, Engineering
L. Milster, Licensing Specialist, Licensing
R. Osborne, Manager, Performance Improvement
C. Rich, Jr., Director, Regulatory & Performance Improvement
P. Rodrigue, Operations Shift Manager
J. Wilbur, Senior Lead Engineer
J. Williams, Senior Licensing Specialist

NRC Personnel

F. Ramirez, Senior Resident Inspector
C. Speer, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

05000382/2013008-01	VIO	Failure To Establish an Adequate Test Program to Demonstrate that the train B Emergency Diesel Generator Exhaust Fan Would Perform Satisfactorily In Service (Section 40A4)
---------------------	-----	---

LIST OF DOCUMENTS REVIEWED

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-LI-102	Corrective Action Process	20
EN-LI-102	Corrective Action Process	21
EN-LI-118	Root Cause Evaluation Process	18
EN-LI-118	Cause Evaluation Process	19
EN-LI-118	Cause Evaluation Process	20
OP-009-001	Emergency Diesel Generator	320
OP-009-001	Emergency Diesel Generator	321
OP-903-068	Emergency Diesel Generator and Subgroup Relay Operability Verification	307
OP-903-068	Emergency Diesel Generator and Subgroup Relay Operability Verification	308
UNT-006-010	Event Notification and Reporting	305

Condition Reports (CRs)

CR-WF3-2013-02497	CR-WF3-2013-02530	CR-WF3-2013-02549	CR-WF3-2013-04025
CR-WF3-2014-01478	CR-WF3-2013-04587	CR-WF3-2014-05136	CR-WF3-2014-05210
CR-WF3-2014-05234			

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision Date</u>
WF3 LER 2013-005	Emergency Diesel Generator Inoperable Due To Room Exhaust Fan Failure	00 and 01
LO-WLO-2013-00149	Effectiveness Review	February 19, 2014
SD-EDG	Emergency Diesel Generator	20
SD-HVR	Reactor Auxiliary Building HVAC	11