UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

July 11, 2008

Mike Blevins, Executive Vice President
and Chief Nuclear Officer
Luminant Generation Company LLC
ATTN: Regulatory Affairs
Comanche Peak Steam Electric Station
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION - NRC SUPPLEMENTAL INSPECTION REPORT 05000445/2008009 AND 05000446/2008009

Dear Mr. Blevins:

On June 6, 2008, the U.S. Nuclear Regulatory Commission completed an inspection at your Comanche Peak Steam Electric Station, Units 1 and 2, facility. The enclosed supplemental inspection report documents the inspection findings which were discussed at the exit meeting on June 5, 2008, with Mr. R. Flores and other members of your staff.

The NRC performed this supplemental inspection to assess your evaluation associated with a White finding in the first quarter of 2008 (failure of Unit 1 Train B Emergency Diesel Generator 1-02). Detailed observations, assessments, and conclusions of the inspection are presented in the enclosed inspection report.

The inspection concluded that the root causes of the finding were adequately defined and understood, and the corrective actions resulting from the evaluations appropriately addressed the identified causes.

Based on the results of this inspection, no findings of significance were identified.

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

Sincerely,

/RA/

Claude E. Johnson, Chief
Project Branch A
Division of Reactor Projects

Dockets: 50-445; 50-446
Licenses: NPF-87; NPF-89

Enclosure:
NRC Inspection Report 05000445/2008009 and 05000446/2008009

cc w/enclosure:
Mr. Fred W. Madden, Director
Regulatory Affairs
Luminant Generation Company LLC
P.O. Box 1002
Glen Rose, TX 76043

Timothy P. Matthews, Esq.
Morgan Lewis
1111 Pennsylvania Avenue, NW
Washington, DC 20004

County Judge
P.O. Box 851
Glen Rose, TX 76043

Mr. Richard A. Ratliff, Chief
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

Environmental and Natural
Resources Policy Director
Office of the Governor
P.O. Box 12428
Austin, TX 78711-3189

Mr. Brian Almon
Public Utility Commission
William B. Travis Building
P.O. Box 13326
1701 North Congress Avenue
Austin, TX 78701-3326

Ms. Susan M. Jablonski
Office of Permitting, Remediation
and Registration
Texas Commission on
Environmental Quality
MC-122
P.O. Box 13087
Austin, TX 78711-3087

Anthony Jones
Chief Boiler Inspector
Texas Department of Licensing
And Regulation
Boiler Division
E.O. Thompson State Office Building
P.O. Box 12157
Austin, TX 78711

Electronic distribution by RIV:
Regional Administrator (Elmo.Collins@nrc.gov)
DRP Director (Dwight.Chamberlain@nrc.gov)
DRP Deputy Director (Anton.Vegel@nrc.gov)
DRS Director (Roy.Caniano@nrc.gov)
DRS Deputy Director (Troy.Pruett@nrc.gov)
Senior Resident Inspector (John. Kramer@nrc.gov)
Branch Chief, DRP/A (Claude.Johnson@nrc.gov
Senior Project Engineer, DRP/A (Thomas.Farnholtz@nrc.gov)
Team Leader, DRP/TSS (Chuck.Paulk@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)

Only inspection reports to the following:
DRS STA (Dale.Powers@nrc.gov)
J. Adams, OEDO RIV Coordinator (John.Adams@nrc.gov)
P. Lougheed, OEDO RIV Coordinator (Patricia.Lougheed@nrc.gov)
ROPreports
CP Site Secretary (Sue.Sanner@nrc.gov)

SUNSI Review Completed: CEJ ADAMS: ☒ Yes ☐ No Initials: CEJ
☒ Publicly Available ☐ Non-Publicly Available Sensitive ☐ Non-Sensitive
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U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	50-445, 50-446
Licenses:	NPF-87, NPF-89
Report :	05000445/2008009 and 05000446/2008009
Licensee:	Luminant Generation Company LLC
Facility:	Comanche Peak Steam Electric Station, Units 1 and 2
Location:	FM-56, Glen Rose, Texas
Dates:	June 2-6, 2008
Inspector:	R. Cohen, Resident Inspector
Approved by:	C. Johnson, Chief, Project Branch A Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000445/2008009, 05000446/2008009; 06/02/2008 - 06/06/2008; Comanche Peak Steam Electric Station, Units 1 and 2, Procedure 95001 Supplemental Inspection.

This report covers a one week period of inspection by a Comanche Peak Steam Electric Station based resident inspector. No violations were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, “Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management’s review. 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.

Cornerstone: Mitigating Systems

> The U.S. Nuclear Regulatory Commission performed this supplemental inspection to assess the licensee’s evaluation associated with a White finding (failure of Unit 1 Train B Emergency Diesel Generator 1-02) in the first quarter of 2008. The primary reason for this finding being characterized as White was based on the results of a Phase 3 analysis performed by a region-based senior reactor analyst. The failure of Emergency Diesel Generator 1-02 was attributed to paint being deposited in a location that caused the EDG to fail to start on demand. During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector determined that the licensee identified the most probable cause of the diesel failure to start, adequately determined the apparent root cause and significant contributing causes, and established appropriate corrective actions to prevent recurrence. The licensee’s evaluation identified that the most probable cause was a drop of paint that adhered to the fuel pump control rack so as to keep it from operating as designed. The paint came from a maintenance activity where the Train B emergency diesel generators in both units were being painted to improve material condition. The root cause analysis determined that, although there was no documented evidence that a drop of paint was on the fuel rack at the time of the test, there was evidence that a drop of paint was there at one time.

REPORT DETAILS

01 INSPECTION SCOPE

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with a White finding (Train B Emergency Diesel Generator [EDG]) in the first quarter 2008.

Unit 1 Train B EDG 1-02 failed to start on demand. The primary reason for this finding being characterized as White was based on the results of a Phase 3 analysis performed by a region-based senior reactor analyst. The failure of EDG 1-02 was attributed to a drop of paint being deposited in a location that caused the EDG to fail to start on demand during a monthly surveillance test on November 21, 2007. Following 11 hours of troubleshooting, EDG 1-02 was restored to operable status.

The supplemental inspection was focused on the event occurring since the last successful surveillance test on EDG 1-02 on October 24, 2007, and when the diesel was returned to operable status, November 22, 2007, whether root causes and contributing causes were understood, whether extent of conditions and extent of causes were identified, and whether sufficient corrective actions were taken to prevent recurrence.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determination of who (i.e., licensee, self-revealing, or NRC) identified the issue and under what conditions

Paint that was deposited and adhered to a fuel rack in a location that prevented Unit 1 Train B EDG 1-02 to start on demand during a monthly surveillance test was self-revealing. EDG 1-02 was declared inoperable on November 21, 2007.

b. Determination of how long the issue existed and prior opportunities for identification

The issue existed some time between the last successful test on October 24, 2007, and the monthly surveillance test failure that occurred on November 21, 2007. EDG 1-02 successfully started and loaded during a surveillance performed on October 24, 2007. The diesel failed to start during a monthly surveillance test on November 21, 2007, because the fuel rack on at least one fuel injection pump was bound to the extent that the entire fuel rack assembly was unable to leave the "no fuel" position. This was caused by painting activities on and around the diesel. Painting activities to improve the appearance of EDG 1-02 started on October 15, 2007, and ended on November 21, 2007. The licensee determined that no root cause was identified; however, it is believed that the most probable cause of EDG 1-02 failure to start was a paint drop that was not cleaned off of the 6L fuel pump control rack. This paint drop prevented the operation of the control rack from moving into the fuel pump and at the same time restricted operation of all other 15 fuel racks on the EDG 1-02. The failure of this component to respond to the diesel start prevented the engine from receiving sufficient fuel to run.

The licensee had prior opportunities to identify this condition. The licensee determined that although there were daily inspections of the engine performed by painters, paint supervisors and an operations field support supervisor or operations nuclear equipment operators, paint could still be found on sensitive components. Not only did these inspections fail to cause this paint to be removed from the sensitive components, but they also failed to identify the existence of the paint drop on the 6L fuel pump control rack. This is supported by photographs taken immediately after the event that showed that some components had paint on them but should have been free of paint according to a pre-job briefing notebook that was used by painters. This notebook identified sensitive components that were not to be painted or have paint on them.

The inspector reviewed the records describing the as-found condition of the diesel, reviewed the tests and analysis performed on EDG 1-02, and discussed the issue with the dispositioning manager and the diesel system engineer. As a result of these activities, the inspector agreed that EDG 1-02 failed to start due to paint being deposited on the diesel fuel rack linkage during painting activities on and around EDG 1-02 between October 24 and November 21, 2007.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issue

The licensee determined that EDG 1-02 was inoperable for a period of time since the last successful surveillance on October 24, 2007, and November 21, 2008 when EDG 1-02 was successfully started. On November 7, 2007, the redundant train EDG 1-01 was being barred over in preparation for its monthly surveillance test. During this 65 minute period, two trains of emergency power may not have been operable. To account for the increased risk of the EDG 1-01 being taken out of service for 65 minutes, EDG 1-02 was assumed to be unavailable (due to the failure on November 21, 2007). Although the EDG 1-01 was removed from service for a surveillance test, the EDG 1-01 was considered to be recoverable during a water roll and available during the run portion of the surveillance. The 'configuration risk' for the period of unsure operability was found to be risk significant (total of 9.47E-06). It was noted that even if an exposure time 14 days (T/2) is used, since the actual time that the EDG 1-02 became unavailable is not known, the 'configuration risk' value would still be risk significant (4.90E-06). A Phase 3 analysis performed by a Region IV senior reactor analyst determined that the total change in core damage frequency was 8.93E-6 which is considered comparable to the licensee's results. The analyst used the SPAR model for CPSES (Comanche Peak Steam Electric Station) to estimate the change in risk associated with internal initiators that was caused by the finding.

02.02 <u>Root Cause and Extent of Condition Evaluation</u>

a. Evaluation of methods(s) used to identify root cause(s) and contributing cause(s)

To evaluate this issue, the licensee used a combination of structured root cause analysis techniques including barrier analysis, confirm refute matrix, and event and casual factor chart. The inspector determined that the licensee followed its procedural guidance for performing root cause analysis. The procedural guidance is contained in Procedure CPSES Cause Analysis Handbook, Revision 10.

b. Level of detail of the root cause evaluation

The licensee's root cause evaluation was thorough and identified the most probable cause of the Unit 1 Train B EDG 1-02 failure to start on demand during a monthly surveillance test. This cause was due to a paint drop being deposited on the diesel fuel rack linkage during painting activities on and around EDG 1-02. This paint drop was not cleaned off of the 6L fuel injector control rack after painting activities. This paint drop prevented the operation of the control rack from moving into the 6L fuel pump and at the same time restricted operation of the other 15 fuel racks on EDG 1-02. The failure of this component to respond to the diesel start prevented the engine from receiving sufficient fuel to run. Painting Procedure MSM-G0-0220, "General Plant Painting," Revision 2, allowed a visual inspection for paint or a manual manipulation of the fuel rack.

In addition, significant contributing causes were identified which included: (1) work practices of painters and other groups who performed daily paint clean up inspections failed to identify paint spatter and drops that needed to be cleaned off sensitive engine components, (2) painters tools and techniques were not completely effective in preventing paint spatter and drips, (3) the directions in Control Room Alarm Procedure ALM-1302A, Revision 5, were not specific and due to differences in interpretation, the time to discover the problem was extended for approximately 8.5 hours, (4) the fuel control shaft break away force was last performed in 1999 and, due to aging, the licensee believes that this force may have increased because of wear. This increased force may have contributed to the force it would have taken to overcome the adhesion of the paint drop.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

The licensee's evaluation included a review to determine if similar problems had previously been reported with painting activities resulting in inoperability of an EDG. The review included both internal (Comanche Peak) and external operating experience. An internal operating experience review determined that no prior experiences were found associated with mechanical binding of EDG control linkage as a result of painting activities causing a "failure to start" of any EDGs. The external operating experience search returned records where paint was determined to cause the "failure to start" of EDGs as a result of gross painting errors (e.g., painting activities causing binding of control linkages). In several cases, paint was found on fuel metering rods. The licensee reported that these events differed from the CPSES event because paint was purposefully applied directly to the control linkages, where at CPSES, the paint was accidentally splattered or dripped onto the fuel rack. The inspector did not possess any information to the contrary.

d. Consideration of potential common cause(s) and extent of condition of the problem

The licensee's evaluation considered the potential for common causes and extent of condition associated with painting activities resulting in inoperability of EDG1-02. The licensee reported that the extent of condition applied to three other EDGs, but in particular, the EDG 2-02 which was being painted in a parallel activity at the same time. The licensee's extent of cause evaluation stated that paint can block vent holes, air pathways, and bind mechanical equipment when it dries. No other vulnerabilities were

identified. The inspector considered the extent of condition and the extent of cause evaluations to be adequate to address this concern.

02.03 Corrective Actions

a. Appropriateness of corrective action(s)

After it was identified that EDG 1-02 failed to start on November 21, 2007, the licensee declared EDG 1-02 inoperable and entered the applicable Technical Specification (TS) action statement. Troubleshooting and investigating activities were initiated. It was determined that a paint drop was deposited and remained on at least one fuel rack in a location that prevented motion required to support the operation of EDG 1-02. The licensee satisfied the Technical Specification required actions by restoring the EDG to an operable status on November 22, 2007.

The licensee established corrective actions to prevent recurrence including: (1) develop and implement procedures to ensure that a maintenance pull test of the fuel rack mechanisms ensures they are free to operate after painting activities, (2) develop an "as you go" inspection and clean up when painting around sensitive components, (3) use this issue as operational experience in prejob briefing for painters to heighten their sensitivity to the problems paint drops and spatter can cause for mechanical linkages, (4) develop a checklist to be used by the painters to perform an inspection of equipment in applicable areas of the plant, (5) procure paint brushes which can better hold paint without drips, (6) investigate alternate techniques of painting which would minimize paint drips and spatter on sensitive engine components, (7) revised diesel failure to start alarm response procedure that components are free to move by including an action to manually manipulate the fuel racks, (8) perform a break away force test on a periodic basis to ensure that the fuel rack operating resistance has not increased to the extent that could degrade engine response and control, and (9) assess the effectiveness of the corrective actions to prevent recurrence. The inspector determined that the proposed corrective actions were appropriate.

b. Prioritization of corrective actions

The licensee's immediate corrective actions restored the EDG 1-02 to operable status within the Technical Specification allowed outage time. After the EDG was returned to operable status, the licensee inspected other potentially affected EDGs to assess the extent of condition. The inspector verified that these inspections did not reveal similar condition on other diesel generators due to painting activities. The inspector considered the prioritization of corrective actions to be appropriate.

c. Establishment of schedule for implementing and completing the corrective actions

The licensee established adequate schedules for completion of the specified corrective actions. The troubleshooting, investigation, and the return of the EDG 1-02 to operable status was completed at the earliest opportunity and within the Technical Specification allowable outage time. The procedure improvements had been completed at the time of the inspection and incorporated into Procedures MSM-G0-0220, "General Plant Painting Procedure," Revision 2, and ALM-1302A, "Alarm Procedure Diesel Generator 1-02 Panel, Revision 5.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

Smart Form SMF-2008-0000418-00 specified an action to perform an effectiveness review to determine if corrective actions have corrected the cause of the identified condition or has created barriers to reduce the frequency and consequences of the cause of the identified condition to acceptable levels. This action involves performing a self-assessment to measure the effectiveness of the process changes to ensure future painting activities around safety-related EDGs do not effect the safety function of the EDGs. Success criteria are specified in the corrective action plan. This action has a due date of November 11, 2008. The inspector considered this to be adequate to determine the effectiveness of the corrective actions to prevent recurrence.

03 MANAGEMENT MEETINGS

Exit Meeting Summary

On June 5, 2008, the inspector presented the inspection results to Mr. R. Flores, Site Vice President, and members of his staff who acknowledged the findings. The inspector confirmed that proprietary information was provided or examined during the inspection and the inspector destroyed this information at the conclusion of the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

LIST OF DOCUMENTS REVIEWED

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Blevins, Executive Vice President and Chief Nuclear Officer
M. Bozeman, Supervisor, Emergency Planning
G. Casperson, Interim Manager, Training
H. Davenport, System Engineer
R. Flores, Site Vice President
D. Goodwin, Director, Operations
A. Heap, System Engineer
T. Hope, Manager, Regulatory Performance
R. Kidwell, Licensing Analyst
D. Kross, Plant Manager
F. Madden, Director, Regulatory Affairs
M. McCutchen, System Engineer
E. Meaders, Manager, Outage
J. Mercer, Maintenance Rule Coordinator
G. Merka, Licensing Analyst
J. Meyer, Manager, Nuclear Technical Support
W. Morrison, Interim Director, Nuclear Maintenance
W. Reppa, Manager, System Engineering
J. Skelton, System Engineer
K. Strickland, Supervisor, Nuclear Maintenance
P. Torres, Supervisor, Nuclear Maintenance
C. Tran, Engineering Programs Manager
D. Wilder, Manager, Security, Emergency Planning, and Environmental
H. Winn, System Engineer

NRC

C. Johnson, Chief, Project Branch A, DRP
D. Allen, Senior Resident Inspector, CPSES
B. Tindell, Resident Inspector, CPSES

LIST OF ITEMS, OPENED, CLOSED, AND DISCUSSED

Opened and Closed

None

LIST OF DOCUMENTS REVIEWED

Smartforms/Evaluations

Eval-2007-003253-00	SMF-2006-003157-00	SMF-2008-001905-00
SMF-2004-001177-00	SMF-2007-002401-00	SMF-2008-001906-00
SMF-2004-001884-00	SMF-2007-003035-00	SMF-2008-001908-00

SMF-2004-002972-00	SMF-2007-003302-00	SMF-2008-001910-00
SMF-2005-000395-00	SMF-2007-003426-00	SMF-2008-001980-00
SMF-2006-001656-00	SMF-2008-001898-00	

Licensee Event Reports

LER 2007-01-00, "EDG Failed Surveillance Test Due to Paint on Fuel Injector Control Linkage," Comanche Peak Unit 1

Procedures

NUMBER	TITLE	REVISION
MSM-GO-0220	General Plant Painting	2
ALM-1302A	Diesel Generator 1-02 Panel	5
MSM-P0-3374	EDG Monthly Run Related Inspections	3
MSM-GO-0216	Protective Coatings	23
OPT-214A	Emergency Diesel Operability Test	19
OWI-104-28	Plant Equipment Operator Diesel Generator 1-02 Operating Log;	11
MSM-GO-0220	Diesel Generator Painting Pre-Job Work Aid	0
STA-202	Nuclear Generation Procedure Change Process	32
OPT 214A	EDG Operability Test	19
	ES Cause Analysis Handbook	10

Work Orders

3439601	4-07-176545
3439604	4-07-276544
4-07-176543	5-07-502391

Drawings

Fuel Control Shaft Break Away Force Study dated October 8, 1999

Other

CPSES Operations Logs, dated November 21-22, 2007

Root Cause Analysis, Eval-2007-003253-02-02

TU Electric Office Memorandum; CPSES-9800371; Expectations For Procedure Compliance; dated February 2, 1998

OE 26026, Unit 1 B-Train EDG Failed to Start at Comanche Peak

Information Notices

IN 93-76, “Inadequate Control of Paint and Cleaners for Safety-Related Equipment”
IN 91-46, “Degradation of EDG Fuel Oil Delivery Systems”

NRC Inspection Documents

Manual Chapter 0612 Appendix C; Guidance For Supplemental Inspections; June 20, 2003

NRC Inspection Plan – Comanche Peak 95001; INSPECTION FOR ONE OR TWO WHITE INPUTS IN A STRATEGIC PERFORMANCE AREA; dated May 29, 2008

Inspection Report Numbers 05000445/2008009 and 05000446/2008009

Inspection Procedure 95001, “Inspection For One Or Two White Inputs In A Strategic Performance Area,” dated October 16, 2006

NRC Inspection Report

CPSES IR 05000445/2007008 (ML080600164)