



April 17, 2020

ULNRC-06574

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

10 CFR 50.73

Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
RENEWED FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2020-001-00
EMERGENCY EXHAUST INOPERABLE DUE TO FAN BELT DEGRADATION AND FAILURE**

The enclosed Licensee Event Report is submitted in accordance with 50.73(a)(2)(i)(B), 50.73(a)(2)(v)(C), and 50.73(a)(2)(v)(D), to report the inoperability of the B train Emergency Exhaust System due to fan belt degradation and failure, resulting in an operation or condition prohibited by Technical Specifications and a condition that could have prevented fulfillment of a safety function.

If you have any questions concerning this LER, please contact Tom Elwood, Supervising Engineer, Regulatory Affairs and Licensing at (314) 225-1905.

Sincerely,

Frederick J. Bianco
Senior Director, Nuclear Operations

Enclosure: LER 2020-001-00

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cc: Mr. Scott Morris
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. L. John Klos
Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O9E3
Washington, DC 20555-0001


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NRC FORM 366 (04-2017)		U.S. NUCLEAR REGULATORY COMMISSION				APPROVED BY OMB: NO. 3150-0104			EXPIRES: 03/31/2020					
		LICENSEE EVENT REPORT (LER)				Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.								
		(See Page 2 for required number of digits/characters for each block)												
(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)														
1. FACILITY NAME Callaway Plant Unit 1						2. DOCKET NUMBER 05000483			3. PAGE 1 of 4					
4. TITLE Emergency Exhaust Train Inoperable Due to Fan Belt Degradation and Failure														
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME		DOCKET NUMBER			
02	18	2020	2020	- 001	- 000						05000			
									FACILITY NAME		DOCKET NUMBER			
											05000			
9. OPERATING MODE		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)												
1		<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)			
		<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)			
		<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)(A)			
		<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)			<input type="checkbox"/> 50.73(a)(2)(x)			
100%		<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(A)			<input type="checkbox"/> 73.71(a)(4)			
		<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(B)			<input type="checkbox"/> 73.71(a)(5)			
		<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)			<input type="checkbox"/> 73.77(a)(1)			
		<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)			<input type="checkbox"/> 73.77(a)(2)(i)			
		<input type="checkbox"/> 20.2203(a)(2)(vi)			<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(vii)			<input type="checkbox"/> 73.77(a)(2)(ii)			
									<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A		
12. LICENSEE CONTACT FOR THIS LER														
LICENSEE CONTACT T.B. Elwood, Supervising Engineer, Regulatory Affairs and Licensing									TELEPHONE NUMBER (Include Area Code) 314-225-1905					
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT														
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX					
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE			MONTH	DAY	YEAR			
<input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)						<input type="checkbox"/> NO			09	01	2020			
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)														
<p>On February 18, 2020, one of the two fan belts on the fan unit for the B train of the Emergency Exhaust System (EES) was discovered to be broken. Following replacement of the fan belts on February 22, 2020, it was identified on February 24, 2020 that the fan belts had not been properly tensioned. Based on assessment of these identified conditions, it was determined that the EES B train was inoperable from June 25, 2019 to February 26, 2020 due to degraded/nonconforming fan belts. During this time, the B train of the Emergency Exhaust System would not have been capable of performing its safety function for its required 30-day mission time in the event of an accident. The plant was operating in Mode 1, and fuel handling operations involving irradiated fuel assemblies were performed during the period that the B train of emergency exhaust was inoperable.</p> <p>Investigation into the root cause and development of corrective actions for the event reported in this LER were impeded by implementation of COVID-19 pandemic countermeasures. A supplement to this LER will be submitted when this information is available.</p>														

NRC FORM 366A (04-2017)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104	EXPIRES: 3/31/2020
 LICENSEE EVENT REPORT (LER) CONTINUATION SHEET		Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.	
(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)			

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Callaway Plant Unit 1	05000-483	YEAR 2020	SEQUENTIAL NUMBER - 001	REV NO. - 000

NARRATIVE

1. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

The event reported in this LER involves the Emergency Exhaust System (EES). The EES (EIS: VF) serves both the auxiliary building and the fuel building. Following a safety injection signal (SIS), safety related dampers isolate the auxiliary building, and the EES filters and exhausts potentially contaminated air due to leakage from ECCS systems. The EES is also designed to filter airborne radioactive particulates from the area of the spent fuel pool following a fuel handling accident.

The EES consists of two independent and redundant trains. Each train consists of a heater, a prefilter, a high efficiency particulate air (HEPA) filter bank, an activated charcoal adsorber section for removal of gaseous activity (principally radioiodines), and a fan. Ductwork, dampers, and instrumentation also form part of the system. A second bank of HEPA filters follows the adsorber section to collect carbon fines.

The EES is on standby for an automatic start following receipt of a fuel building ventilation isolation signal (FBVIS) or a safety injection signal (SIS). Initiation of the SIS mode of operation takes precedence over any other mode of operation. In the SIS mode, the system is aligned to exhaust the auxiliary building.

Technical Specification (TS) 3.7.13, "Emergency Exhaust System (EES)," provides the Limiting Condition for Operation (LCO), Required Actions and Surveillance Requirements for the EES.

2. INITIAL PLANT CONDITIONS:

At the time of the event, Callaway was operating in Mode 1.

3. EVENT DESCRIPTION:

On February 18, 2020, the Primary Operations Technician, a nonlicensed operator, reported that one of the two belts on the CGG02B Emergency Exhaust fan (EIS FAN) was broken. The second belt was visually verified to still be intact and installed on the sheaves. The Shift Manager was notified, and CGG02B was declared inoperable, Condition A of Technical Specification 3.7.13 was entered for the inoperable EES B train.

During the performance of the as-found inspection, the inner belt was discovered lying on the bottom of the belt guard and appeared to have undergone a tensile break. No evidence of long term wear of the belt was observed, and no foreign material was identified in the belt guard or around the v-belt drive. A work history search confirmed the belts had been replaced on June 25, 2019, and that the belts had approximately 10 hours of run-time prior to the failure. Since the mission time for the EES is 30 days, failure of the belt after 10 hours of run time is contrary to the capability of the EES B to meet its 30-day mission time requirement. This vulnerability existed throughout the time period from when the belts were replaced on June 25, 2019 to when they were again replaced on February 22, 2020. Following replacement of the belts on Saturday February 22, 2020 the unit was returned to service at 13:05 that same day.

After discovery of the belt failure and subsequent replacement of the belts, as described above, an additional condition was identified on February 24, 2020 from discussion with the maintenance supervisor who oversaw the belt replacement. The new/additional condition was based on the supervisor's observation that following replacement of the outer belt, the belt tension appeared to have relaxed as the fan continued to operate, a new task was added to the belt replacement job to check belt tension. The as-found tension values of both belts were measured and found to be outside of the acceptance criteria established in the job. A corrective action document was written to document the inadequate belt tensions, and the EES B train was again declared inoperable on February 24, 2020 at 19:23. Adjustments to the v-belt tension and drive alignment were made under the new tasks added to the belt replacement job. The motor sheave was replaced with a

spare sheave, and the belts were replaced. Following an 8-hour run, belt tensions were measured and verified to be within acceptance criteria. After a minor adjustment to fan speed and another belt tension verification, EES B train was declared operable at 14:42 on February 26, 2020.

It has been determined that the B train of the Emergency Exhaust System was inoperable from June 25, 2019 to February 26, 2020. This overall time period includes the time from when the belts for CGG02B were replaced on June 25, 2019 to when they were again replaced on February 22, 2020. It also includes the time from when the second belt replacement to when the belts were properly tensioned and minor adjustments were completed on February 26, 2020, after recognizing (and correcting) the need for proper belt tensioning. During this entire time, the plant was in Mode 1.

4. ASSESSMENT OF SAFETY CONSEQUENCES:

The degraded/nonconforming condition of the EES B train fan belt reported in this LER did not significantly degrade plant safety. The Emergency Exhaust system is credited with mitigating radiological consequences of two licensing basis post-accident release pathways.

- Post LOCA leakage of containment sump recirculation fluids (FSAR Section 15.6.5.4.1.2)
- Fuel Building Fuel Handling Accident (FSAR Section 15.7.4.5)

With regards to the postulated post-LOCA leakage of containment sump fluids, subsequent to the injection phase of the accident sequence, the water in the containment recirculation sumps is recirculated by the residual heat removal, ECCS centrifugal charging and safety injection pumps, and the containment spray pumps. Due to the operation of the ECCS and the containment spray system, most of the radioiodine released from the core may be assumed to be contained in the containment sump fluids. The licensing basis analysis assumes that a portion of the recirculated fluids leaks into the auxiliary building during the recirculation phase of operation. Ten percent of the leaked fluids is assumed to flash to steam and become airborne. The radioiodines contained in this flashed fraction of ECCS leakage provide the radioactive inventory that drives radiological consequences associated with this pathway.

One EES train is credited with performing a 90% efficient removal of the iodines associated with the described pathway. Calculated consequences for the pathway are directly proportional to the leak rate of ECCS fluids into the auxiliary building. Technical Specification 5.5.2.b requires that Callaway monitor and minimize the leak rates of sources of recirculated sump fluids. Results of the Technical Specification 5.5.2.b leak rate monitoring indicate that for the extended period of time that the EES B train was inoperable, leak rates were significantly lower than operational limits and much lower than the values assumed in the licensing basis analysis of record. Measured leak rates for all trains combined were less than 1 drop per minute. The analysis of record is based on a combined leak rate of 2 gallons per minute. The reduced leak rates corresponding to actual plant conditions for the identified time period would have resulted in calculated releases from the post-accident ECCS pathway being significantly lower than the calculated values reported in the FSAR even without credit taken for the Emergency Exhaust charcoal filter adsorber beds.

With regards to the fuel building fuel handling accident, fuel handling operations of irradiated assemblies were performed during December 2019. One EES train is credited with performing a 90% efficient removal of radioiodines that would emerge from the surface of the spent fuel pool following a postulated fuel handling accident. The licensing basis fuel handling accident described in the Callaway FSAR is based on a limiting fuel assembly that is dropped after 72 hours of subcritical decay time. Callaway's FSAR Chapter 15 radiological consequence analysis of accidents considers 5 iodine isotopes. The longest-lived of these isotopes, I-131, has a radiological half-life of approximately 8 days. The irradiated fuel handled during December 2019 had at least 8 months of subcritical decay time. Gap inventories in the handled assemblies were sufficiently low such that the calculated release of iodines to the environment following a postulated fuel building fuel handling accident during the period of EES train B inoperability would have been significantly lower than those reported in the FSAR even without credit taken for the Emergency Exhaust charcoal filter adsorber beds.

The above evaluation of safety consequences is based on complete unavailability of the EES function (i.e., both trains inoperable). Throughout the time that the EES B train was determined to be inoperable, the EES A train was OPERABLE except only for a brief period of time on February 12, 2020.

Based on the above considerations, it has been concluded that the degraded/nonconforming condition of the B train Emergency Exhaust fan best did not significantly degrade plant safety.

5. REPORTING REQUIREMENTS:

This LER is submitted pursuant to 50.73(a)(2)(i)(B) as an operation or condition prohibited by Technical Specifications. Additionally, this LER is submitted pursuant to 50.73(a)(2)(v)(C) and 50.73(a)(2)(v)(D) as a condition that would have prevented fulfillment of a safety function.

Technical Specification (TS) LCO 3.7.13 requires two trains of the Emergency Exhaust System (EES) to be OPERABLE for the Safety Injection Signal (SIS) mode of operation during Modes 1, 2, 3, and 4, and during the movement of irradiated fuel assemblies in the fuel building.

The EES B train was inoperable for a duration of approximately 246 days. During this period of inoperability, the plant was operating in Mode 1. With one EES train inoperable, Required Action A.1 of TS 3.7.13 requires restoring the EES train to OPERABLE status within 7 days. With the Completion Time of Required Action A.1 not met, Required Actions C.1 and C.2 of TS 3.7.13 require the plant be in Mode 3 within 6 hours and in Mode 5 within 36 hours. The condition reported in this LER represents an operation or condition not in compliance with the restoration and shutdown Completion Times of Technical Specification 3.7.13.

Additionally, during December of 2019, a fuel handling campaign was performed in the fuel building. Movement of irradiated fuel assemblies in the fuel building is a specified condition of applicability for TS 3.7.13. With the Required Action and Completion Time of Condition A not met during movement of irradiated fuel assemblies in the fuel building, Required Actions D.1 and D.2 require either the OPERABLE EES train to be placed in FBVIS mode or the movement of irradiated fuel assemblies in the fuel building to be immediately suspended. Due to the unknown inoperability of the EES B train at the time of the fuel handling campaign, the requirements of Conditions D.1 and D.2 of TS 3.7.13 were not met during the movement of irradiated fuel assemblies in the fuel building.

The EES performs a function that reduces the post-accident release of radioactive material and mitigates the consequences of an accident. The EES B train was inoperable from June 25, 2019 to February 26, 2020. A review of work history for the EES A train identified that it was concurrently out of service for three hours and six minutes for in-place filter testing on February 12, 2020. Therefore, on February 12, 2020, both trains of emergency exhaust were unavailable. This represents a condition that would have prevented the fulfillment of a safety function.

Based on the above, this event is being reported as an operation or condition prohibited by Technical Specifications in accordance with 50.73(a)(2)(i)(B) and as a condition that would have prevented fulfillment of a safety function in accordance with 50.73(a)(2)(v)(C) and 50.73(a)(2)(v)(D).

6. CAUSE OF THE EVENT:

The root cause investigation for this event has been delayed by the COVID-19 pandemic countermeasures. A supplemental Licensee Event Report will be submitted upon completion of the investigation. The supplement LER will also include the EPIX information in Section 13 of the LER form.

7. CORRECTIVE ACTIONS:

The root cause investigation and determination of corrective actions for this event have been delayed by the COVID-19 pandemic countermeasures. A supplemental Licensee Event Report will be submitted upon completion of the investigation and determination of the corrective actions.

The B train Emergency Exhaust fan belts have been replaced, and enhancements were implemented for the post-maintenance testing performed following the belt replacement. Both trains of emergency exhaust are OPERABLE, and Callaway is in compliance with Technical Specifications.

8. PREVIOUS SIMILAR EVENTS:

A review of LERs from the past three years for Callaway found no other events involving broken fan belts on fans required by Technical Specifications.