



LIC-16-0075
August 22, 2016

10 CFR 50.73

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

Fort Calhoun Station, Unit No. 1
Renewed Facility Operating License No. DPR-40
NRC Docket No. 50-285

Subject: Licensee Event Report 2016-003, Unplanned Turbine Trip during DCS Modification

Please find attached Licensee Event Report 2016-003, Revision 0. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A). There are no new commitments being made in this letter.

If you should have any questions, please contact Brad Blome, Manager, Site Regulatory Assurance, at (402) 533-7270.

Respectfully,

For

Shane M. Marik
Site Vice President and CNO

SMM/ktm

Attachment

c: K. M. Kennedy, NRC Regional Administrator, Region IV
C. F. Lyon, NRC Senior Project Manager
S.M. Schneider, NRC Senior Resident Inspector



LICENSEE EVENT REPORT (LER)

(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/>)

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 FOIA, Privacy and Information Collections Branch (T-5 F53), 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.

1. FACILITY NAME

Fort Calhoun Station

2. DOCKET NUMBER

05000285

3. PAGE

1 OF 4

4. TITLE

Unplanned Turbine Trip during DCS Modification due to Failure to Identify and Disable the Transmitter Deviation Based Trip

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
06	22	2016	2016	- 003	- 00	08	22	2016	FACILITY NAME	05000
									FACILITY NAME	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 checked="" 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 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 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 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

Corey Cameron

TELEPHONE NUMBER (Include Area Code)

402-533-7337

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

YES (If yes, complete 15. EXPECTED SUBMISSION DATE) NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

An automatic turbine trip occurred resulting in an automatic Reactor Protective System (RPS) actuation from mode 1 at 100% power due to loss of turbine load at 0841 Central Daylight Time on June 22, 2016. System actuation and responses were as designed. There were no Safety Systems inoperable that contributed to this event. The trip occurred during Post Modification Testing activities on the turbine Emergency Trip System (ETS) pressure loop trip. Engineering failed to identify and disable the transmitter deviation based trip. The differences between the substituted input values selected for testing and the output of the signal selector block were sufficient to trigger the two transmitters-in-deviation trip for the ETS loop.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(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/>)

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 FOIA, Privacy and Information Collections Branch (T-5 F53), 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Fort Calhoun Station	05000-285	2016	- 003	- 00

NARRATIVE

BACKGROUND

Fort Calhoun Station (FCS) is a two-loop reactor coolant system (RCS) of Combustion Engineering design. Fort Calhoun Station replaced the original General Electric (GE) Mark I turbine control system with a Foxboro digital Turbine Control System (TCS) per engineering change (EC) 32387 in April 2011. The system was placed into service in December 2013. The turbine trip logic loops use 2 out of 3 (2oo3) trip logic. The trip logic reduces to 1 out of 2 (1oo2) logic when a loop transmitter fails or is bypassed. This creates a single point vulnerability (SPV) should a transmitter failure be undetected by the digital control system (DCS) while providing a false trip signal. This design was specifically included in the replacement of the TCS.

DESCRIPTION

A FCS trend of Rosemount transmitter failures recently caused engineering to reduce potential single point plant trip vulnerabilities by implementing a new modification for the TCS logic. The purpose of the modification was to eliminate the potential SPVs identified in multiple loops by changing the configuration of the signal selector block to provide 2 out of 2 (2oo2) trip logic when a transmitter is failed or bypassed and 2oo3 trip logic when all 3 inputs are available.

A work order (WO) implementing the EC was prepared and approved covering the configuration change and Post Modification Testing (PMT). The PMT was integrated into the work instructions, therefore no secondary PMT task was added to the electronic tracking, review and approval software. A Duty Manager Challenge, per WC-AA-2000 "Emergent Issue Response", was requested and performed by the Station Duty Manager for the activity. Engineering was performing a modification to the DCS to multiple turbine trip loops when the event occurred. Two loops involving lube oil pressure trip logic were successfully modified and tested under the WO just prior to the event.

An automatic turbine trip occurred resulting in an automatic Reactor Protective System (RPS) actuation due to loss of turbine load at 0841 Central Daylight Time (CDT) on June 22, 2016. The Headquarter Operations Officer (HOO) was informed of the event per 10 CFR 50.72(b)(2)(iv)(B) (RPS Actuation) and 50.72(b)(3)(iv)(A) (Specified System Actuation (RPS)). This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A), Specified System Actuation (RPS). The event was entered into the Corrective Action Program as CR 2016-05505. The trip occurred during Post Modification Testing activities on the turbine ETS pressure loop trip logic (third loop to be modified under the WO). There are two trip logic paths typically associated with the turbine trips: the first is the process level (e.g. low ETS pressure) with the second trip based on a deviation of 2 transmitters (2 in Deviation) from the median signal of the triplicated inputs processed by the signal selector block. Engineering failed to identify and disable the transmitter deviation based trip.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(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/>)

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 FOIA, Privacy and Information Collections Branch (T-5 F53), 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Fort Calhoun Station	05000-285	2016	- 003	- 00

NARRATIVE

The differences between the substituted input values selected for testing and the output of the signal selector block were sufficient to trigger the two transmitter deviation trip for the ETS loop.

CONCLUSIONS

Direct Cause(s):

1. Failure to identify the need to place block P3325_X2, Emergency Trip System Pressure 2-in-deviation input, in manual prior to PMT.
2. The values selected for the transmitter manual input during PMT placed the loop logic in a 2 in deviation condition which satisfied turbine trip logic through block P3325_X2.

The PMT for this modification was created by System Engineering following the completion of the Design Change Package (DCP). The DCP had installation instructions that identified placing the process trip block in manual but failed to recognize a second trip path existed. This information was not validated by the System Engineer while creating the work package and PMT.

Root Cause:

1. The Shift Management failed to set and to enforce standards related to the emergent work process.

The root cause was determined based on the organizational weakness that has been identified with the maintenance, implementation, and challenge of the emergent work process at FCS. It was identified that the overall standards associated with challenges to risk significant work within the station were below expectations.

Corrective Actions:

The basis for the corrective actions is to align the station on how to successfully implement the emergent work process at FCS. This includes the standards and expectations associated with the B-lists and risk determinations for items determined to be emergent. Direct and contributing causes were resolved through the use of setting expectations in the System Engineering department on technical products, station personnel training, and benchmarking fleet best practices.

FCS reviewed other work packages written or ghost written by System Engineering for same or similar errors, eliminated additional work on DCS components, and challenged the emergent work list to ensure bases and conditions were vetted with the correct amount of rigor to ensure similar events would not take place.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(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/>)

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 FOIA, Privacy and Information Collections Branch (T-5 F53), 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Fort Calhoun Station	05000-285	2016	- 003	- 00

NARRATIVE

SAFETY CONSEQUENCES

PMT on DCS caused a turbine trip protecting the main generator as designed. Plant safety systems shutdown the reactor plant and support systems operated as designed. The plant trip is considered uncomplicated.

SAFETY SYSTEM FUNCTIONAL FAILURE

This does not represent a safety system functional failure in accordance with NEI 99-02, revision 7.

PREVIOUS EVENTS

LER 2014-003 – FCS did not display an adequate amount of rigor in the risk management process to prevent the plant trip.