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10 CFR § 50.73  
L-2008-228

OCT 23 2008

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

Re: Turkey Point Unit 3  
Docket No. 50-250  
Reportable Event: 2008-004-00  
Date of Event: August 27, 2008  
Emergency Containment Filter Inoperable Due to Control Circuit Length

The attached Licensee Event Report 05000250/2008-004-00 is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B) to provide notification of the subject event.

If there are any questions, please call Mr. Robert Tomonto at 305-246-7327.

Very truly yours,



William Jefferson, Jr.  
Vice President  
Turkey Point Nuclear Plant

Attachment

cc: Regional Administrator, USNRC, Region II  
Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant

JEFF  
NPR

**1. FACILITY NAME** Turkey Point Unit 3 **2. DOCKET NUMBER** 05000250 **3. PAGE** 1 of 5

**4. TITLE** Emergency Containment Filter Inoperable Due to Control Circuit Length

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
8	27	2008	2008	004	00	10	23	2008	FACILITY NAME	DOCKET NUMBER

**9. OPERATING MODE** 1

**10. POWER LEVEL** 100

**11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)**

<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
<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)(C)	<input type="checkbox"/> OTHER
<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)(v)(D)	

Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

NAME: Paul F. Czaya TELEPHONE NUMBER (Include Area Code): 305-246-7150

**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)**

On August 27, 2008, during the design of a control switch modification, Engineering personnel identified a voltage drop concern with the Unit 3 3B Emergency Containment Filter (ECF) control circuit. The ECF fans are required to automatically start upon a loss of coolant accident (LOCA) signal. Two of three ECF fans are required to accomplish the safety function. Calculations show that the voltage is not adequate to pickup the 3B ECF starter coil for a LOCA start signal at the minimum allowable post trip switchyard voltage. The 3B ECF was declared inoperable on August 27, 2008. The apparent cause for the 3B ECF being declared inoperable is a latent design error. An interposing relay was installed within the control circuit and the 3B ECF was declared operable on August 30, 2008. The control circuit length for starting the 3B ECF from the control switch is within the allowable length, therefore, the 3B ECF would have been able to be started manually in a low voltage situation. The ECF system does not play a role in the prevention of a core damage accident and the conditional containment failure probability given a LOCA or steam line break is very low, reducing significantly the risk importance of the ECF system function of removing radioactive gases and particulates from the containment.

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**NARRATIVE**

**DESCRIPTION OF THE EVENT**

On August 27, 2008, during the design of an Emergency Containment Cooler [BK] and Emergency Containment Filter (ECF) control switch [BH, HS] modification, Engineering personnel identified a voltage drop concern with the Unit 3 swing 3B ECF control circuit. This AC circuit has four paths that provide an automatic loss of coolant accident (LOCA) start signal (Safety Injection [BQ] and Sequencer) to the motor control center (MCC) starter [MCC, MSTR] (size 4). The longest circuit length in these four paths is 2,590 feet. When compared to the Unit 4 swing 4A ECF it was noted that an interposing relay [BH, RLY, 42X] was used to compensate for the voltage drop.

The ECF fans [BH, FAN] are required to automatically start upon a LOCA signal. No calculation or evaluation was found to justify the amount of cable [BH, CBL] length used in the 3B ECF LOCA signal portion of the control circuit. Therefore, calculations were performed to identify what the maximum lengths and minimum MCC voltages should be for this circuit to function properly. These calculations show that the voltage is not adequate to pickup the 3B ECF starter coil [BH, MCC, MSTR, CL] for a LOCA start signal at the minimum allowable post trip switchyard voltage.

The 3B ECF was declared inoperable and Condition Report 2008-27014 was initiated to address this condition. The Technical Specification (TS) ACTION for one inoperable ECF is "...restore the inoperable filter to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours."

**CAUSE OF THE EVENT**

The apparent cause for the 3B ECF being declared inoperable is a latent design error. The original calculation that installed the 3B ECF was not located, and the calculation that was performed for its relocation to a different power supply was inadequate.

**ANALYSIS OF THE EVENT**

**Background**

The ECF System reduces the iodine concentration in the containment [NH] atmosphere following a maximum hypothetical accident to levels ensuring that the off-site dose will not exceed the guidelines of 10 CFR 100 at the site boundary. The ECF System in each containment consists of three filter units each containing a moisture separator [BH, SEP], a high efficiency particulate air filter bank [BH, FLT], and an impregnated charcoal filter bank [BH, ABS], motor [BH, MO], fan, instrumentation and controls .

The filter units are strategically located around the inside of each containment above the refueling floor. The location of the three filter units provides individual isolation and prevents recirculation between units.

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Following a LOCA, a safety injection signal will automatically energize motor control circuits to start the three filter unit fans. If outside power [EB] or full emergency power [EK] is available, all three filter units are started. However, only two are required. If electric power is limited due to the failure of an emergency diesel generator [EK, DG], two of the three units are started.

The ECFs have a 75 HP fan that utilizes a size 4 NEMA contactor [BH, MSTR, CNTR] within a 120 VAC control circuit. The control circuit has automatic start contacts from the sequencer and manual start contacts from the control switch, either of which will energize or drop out the contactor to start and stop the fan motor. These NEMA 4 contactors require a minimum of 91.2 Volt (76% of rated), and 8.87 amp (at 76% rated voltage) to pick up.

It is common to install an interposing relay in place of the size 4 contactor to limit the amount of current drawn through the length of the control circuit. The interposing relay typically will require a minimum of 90 Volt, and 0.8 amp to pick up. The lower current translates to a smaller voltage drop, thus ensuring that enough voltage reaches the relay coil for proper operation. The NEMA 4 contactor is typically placed in the control circuit directly at the voltage source with a controlling contact from the interposing relay, thus making the distance and voltage drop to the contactor negligible.

**Analysis**

The maximum allowable circuit length for a size 4 NEMA contactor/starter supplied from the 3D MCC is 1,472 feet. The 3B ECF contains four automatic signal paths from the sequencer, all of which are greater than the computed maximum length, the longest of these paths being 2,590 feet.

The NEMA 4 contactor for the 3B ECF requires a minimum of 91.2 Volt (76% of rated) to start the fan. During a low voltage accident scenario, the available voltage at the contactor was calculated to be 81.84 Volt (68.2% of rated). With this low amount of voltage available, the contactor would not be expected to start the ECF when called upon to do so from an automatic signal.

The NEMA 4 contactor has an inrush current demand of approximately 9 amps. The voltage drop from the source to the contactor is directly proportional to the current and the amount of resistance in the circuit. The resistance in the circuit is increased due to the amount of length in the circuit. The 3B ECF automatic start paths that lead to the contactor were found greater than 1600 ft with 2590 ft being the longest. At these lengths, and the demanded current of the contactor, the voltage drop along the circuit is too great and sufficient voltage at the contactor is not met during a low voltage automatic signal condition.

A search was performed to determine how the control circuit length of the 3B ECF was justified. In 1990, the power supply for the 3B ECF was moved to the 3D MCC. The calculation used (EC-130), however, failed to qualify the entire control circuit length. The calculation only qualified the additional length added to the control circuit by moving the ECF to the 3D MCC and did not verify the total circuit length. The only additional guidance was found within calculation EC-144. This calculation is a general calculation which discusses the allowable cable lengths for AC control circuits. This calculation suggests that all

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NEMA 4 size contactors should have an interposing relay. This relay demands less current and therefore is not subject to the large voltage drop seen by the contactor.

Calculation EC-130 was performed over 18 years ago by a vendor and it is not possible to determine why the calculation was not performed thoroughly, or why the guidance of EC-144 was not followed. The original design and calculation of the 3B ECF could not be located.

The only safety related size 4 starters are those associated with the ECFs in both Units 3 and 4. The 3B ECF was the only ECF whose automatic control circuit length was beyond its maximum permissible length. All circuits associated with non-safety related size 4 starters were found to be within their maximum length.

**Reportability**

Technical Specification (TS) Limiting Condition for Operation 3.6.3, Emergency Containment Filtering System, requires three ECFs to be operable when a unit is in Mode 1, 2, 3 or 4. The required action for an inoperable ECF is as follows:

“With one emergency containment filtering unit inoperable, restore the inoperable filter to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.”

The design deficiency regarding the control circuit length of the 3B ECF has been in existence for at least 18 years. Unit 3 has been in Modes 1-4 for longer than the allowed 7 days on numerous occasions in the past. Therefore, with the 3B ECF considered inoperable with the design deficiency, the required action of TS 3.6.3 was not complied with. This is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B):

- “Any operation or condition which was prohibited by the plant's Technical Specifications except when:
- (1) The Technical Specification is administrative in nature;
  - (2) The event consisted solely of a case of a late surveillance test where the oversight was corrected, the test was performed, and the equipment was found to be capable of performing its specified safety functions; or
  - (3) The Technical Specification was revised prior to discovery of the event such that the operation or condition was no longer prohibited at the time of discovery of the event.”

The inoperability of the 3B ECF and noncompliance with the required action of TS 3.6.3 does not meet any of the three exceptions for reporting in 10 CFR 50.73(a)(2)(i)(B). Therefore, the condition is reportable.

**ANALYSIS OF SAFETY SIGNIFICANCE**

The 3B ECF is required to be capable of automatically starting from a sequencer or safety injection signal. During safety injection conditions when the plant has tripped and the 3B ECF is required to automatically start, Operations personnel would be directed to the Emergency Operating Procedure (EOP) network. In

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the EOP procedures, Operations personnel are directed to verify that the ECFs are running. If an ECF is found not running, then they are directed to be manually started. The control circuit length for the starting of the 3B ECF from the control switch is only 594 feet. Therefore, the 3B ECF would start manually in a low voltage situation.

The ECFs are not modeled in the Probabilistic Safety Analysis (PSA). The Level 2 analysis does not credit the ECF System. This system is designed to remove radioactive gases and particulates from the containment atmosphere as a result of a LOCA or steam line break. The system does not play a role in the prevention of a core damage accident, so there is no increase in core damage frequency and therefore, the Incremental Conditional Core Damage Probability is zero. The ECFs play a role in reducing the radioactive release as a result of a core damage accident; however, in the Level 2 portion (containment/radioactive release model) of the PSA, the conditional containment failure probability given a LOCA or steam line break is very low, reducing significantly the risk importance of the ECF System function of removing radioactive gases and particulates from the containment. The Large Early Release Fraction (LERF) at Turkey Point is dominated by containment bypass sequences (Steam Generator Tube Rupture and Inter-System LOCA), so a slight reduction in the reliability of the ECF System will have negligible effect on LERF, and therefore, a very low Incremental Conditional Large Early Release Probability.

**CORRECTIVE ACTIONS**

An interposing relay was installed within the control circuit. The 3B ECF was declared operable on August 30, 2008 within the allowed outage time of 7 days from the date of discovery on August 27, 2008.

As a result of an extent of condition review, it was determined that the only safety related size 4 starters are those associated with the ECFs in both Units 3 and 4. The 3B ECF was the only ECF whose automatic control circuit length was beyond its maximum permissible length. All circuits associated with non-safety related size 4 starters were found to be within their maximum length.

**ADDITIONAL INFORMATION**

EIIS Codes are shown in the format [EIIS SYSTEM: IEEE system identifier, component function identifier, second component function identifier (if appropriate)].

FAILED COMPONENTS IDENTIFIED:           None

PREVIOUS SIMILAR EVENTS:           None