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Donna Jacobs
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Waterford 3

10 CFR 50.73

W3F1-2012-0060

July 31, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Licensee Event Report 2012-005-00
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Entergy is hereby submitting Licensee Event Report (LER) 2012-005-00 for Waterford Steam Electric Station Unit 3. This report provides details associated with inoperability of one train of a safety related system due to calibration drift of an I/P transducer.

Based on plant evaluation, it was determined that this condition is reportable under 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(D). In addition, this is an interim report for 10 CFR 21.21(a)(2).

This report contains no new commitments. Please contact Michael Mason, Licensing Manager (acting), at (504) 739-6673 if you have questions regarding this information.

Sincerely,

DJ/WH

Attachment: Licensee Event Report 2012-005-00

cc: Mr. Elmo E. Collins, Jr. RidsRgn4MailCenter@nrc.gov
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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NRC Senior Resident Inspector Marlone.Davis@nrc.gov
Waterford Steam Electric Station Unit 3 Dean.Overland@nrc.gov
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Washington, DC 20555-0001

INPO Records Center lerevents@inpo.org

Attachment to

W3F1-2012-0060

Licensee Event Report 2012-005-00

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 10/31/2013

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Waterford 3 Steam Electric Station	05000 382	1 OF 6

4. TITLE

Calibration Drift of I/P Transducer Causes Inoperability of Safety Related System

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
										05000
06	01	2012	2012	- 005 -	00	07	31	2012	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100

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

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☒ OTHER Specify in Abstract below or in NRC Form 366A
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (*Include Area Code*)
Waterford 3 Steam Electric Station Michael Mason	(504) 739-6673

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
B	CC	TCV	M120	N					

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
09	29	2012

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

On 6/1/2012 at 04:26 CDT, Operations declared Auxiliary Component Cooling Water (ACCW) Train A inoperable due to excessive seat leakage through air operated temperature control valve ACC-126A. The Component Cooling Water Technical Specification 72 hour shutdown action was entered. The valve was unable to meet its low leakage safety function when closed by flow demand. Following maintenance, ACCW Train A was declared operable on 6/2/2012 at 14:30 CDT.

Similar conditions have occurred since October of 2011. Engineering evaluation has determined the cause to be calibration drift of successive I/P transducers for the valve operator for ACC-126A. Since the condition is only recognized when placing the system in standby, the recurring condition created several occasions where past operability of ACCW Train A was not assured. Train B has not exhibited this problem. Analysis has determined that the impact on safety significance of ACC-126A failing to fully close is minimal.

This condition is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(D). In addition, this is an interim report for 10 CFR 21.21(a)(2).

REPORTABLE OCCURRENCE

On 6/1/2012 at 04:26 CDT, Operations declared Auxiliary Component Cooling Water (ACCW) [BS] Train A inoperable due to excessive seat leakage through air operated temperature control valve ACC-126A [TCV]. The Component Cooling Water (CCW) [BS] Technical Specification 72 hour shutdown action was entered. The valve was unable to meet its low leakage safety function when closed by flow demand. Following maintenance, ACCW Train A was declared operable on 6/2/2012 at 14:30 CDT.

Similar conditions have occurred since October of 2011. Engineering evaluation has determined the cause to be calibration drift of successive I/P transducers [TD] for the valve operator for ACC-126A. Since the condition is only recognized when placing the system in standby, the recurring condition created several occasions where past operability of ACCW Train A was not assured. Train B has not exhibited this problem. Analysis has determined that the impact on safety significance of ACC-126A failing to fully close is minimal.

This condition is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B) (Operation Prohibited by Technical Specification), 10 CFR 50.73(a)(2)(ii)(B) (Unanalyzed Condition), and 10 CFR 50.73(a)(2)(v)(D) (Condition That Could Have Prevented Fulfillment of a Safety Function). In addition, this is an interim report for 10 CFR 21.21(a)(2).

INITIAL CONDITIONS

During this time period, Waterford Steam Electric Station Unit 3 (Waterford 3) was operating in Mode 1, stable at or near 100% power. Both trains of ACCW were aligned for normal operations with no plant protection system actuation signals present.

EVENT DESCRIPTION

On 6/1/2012, Operations was transferring the cooling of CCW from the Wet Cooling Tower (WCT) [BS] to the Dry Cooling Tower (DCT) [BS] in preparation of securing ACCW Train A for planned maintenance. As required by procedure, Operators attempted to close air operated valve (AOV) ACC-126A using the manual mode of operation of the valve controller. With the controller output at zero, Operators noted that system flow indicated over 1000 gpm, indicating the valve did not fully close. ACCW Train A was declared inoperable and troubleshooting commenced.

An AOV diagnostic test was performed on ACC-126A, however the valve operator I/P transducer output signal locked up at 13.8 psig output signal (15.00 psig +/- 0.12 psig required to close valve). A second test revealed that the I/P transducer calibration had drifted as compared to the last calibration performed on 10/11/2011 under Work Order (WO) 00292841. The modulation function of the transducer was not affected. Based on this information, Engineering and Maintenance determined that the I/P transducer required replacement. A replacement I/P transducer was not immediately available, therefore the decision was made to install the old I/P transducer from ACC-126A which was removed on 10/11/2011. After successfully calibrating the replacement I/P transducer, ACC-126A was returned to service for post-maintenance testing and subsequently declared operable.

The modulating closed function of ACC-126A is a safety function since it assures adequate WCT water inventory will exist for seven days post Loss of Coolant Accident (LOCA). Engineering Change EC-38218 (performed 6/15/2012 under CR-WF3-2012-2870) documents that 110 gpm of leakage past ACC-126A when the demand flow is 0 gpm would not result in exhausting the design basis WCT water inventory in the event of a worst case design basis accident under worst case meteorological conditions. The calculation established by correlation that the Ultimate Heat Sink (UHS) [BS] remains capable of performing its design basis safety function for the prescribed mission time as long as ACC-126A leakage is limited such that the system jockey pump maintains at least 16.4 psig system high point pressure. Plant operation outside of these conditions represents an unanalyzed condition.

A review of ACCW Train A system operation for the past three years has found several instances of inability to

maintain system high point pressure with the jockey pump, all since October 2011. These resulted in replacement of the I/P transducer. These instances are listed in the following table.

Train A I/P Transducer Replacements

10/10/2011	ACC-126A I/P Transducer was replaced under (WO-292841) due to issues with calibration (CR-WF3-2011-6951). Removed I/P Transducer: S/N# A776947-6, was provided by Argo Turboserve Corporation under PO-10117835 purchased from Callaway. Date of Manufacture April 2006. Installed I/P Transducer: S/N# 60050-6, was provided by Argo Turboserve Corporation under PO-10329852 purchased from Callaway. Date of Manufacture September 2010. Removed I/P Transducer successfully past bench calibration, and was determined to be acceptable for re-installation.
6/1/2012	ACC-126A I/P Transducer was replaced under WO-312796 as ACC System flow was observed to be 1400-2000 gpm while securing ACCW Train 'A' (CR-WF3-2012-2692). Removed I/P Transducer: S/N# 60050-6, was provided by Argo Turboserve Corporation under PO-10329852 purchased from Callaway. Date of Manufacture September 2010. Installed I/P Transducer: S/N# A776947-6, was provided by Argo Turboserve Corporation under PO-10117835 purchased from Callaway. Date of Manufacture April 2006. This I/P Transducer was originally removed from ACC-126A under WO-292841 during a complete accessory replacement due to issues during calibration. This I/P Transducer was calibrated afterwards and deemed to be functioning acceptable.
7/5/2012	ACC-126A I/P Transducer was replaced under WO-320439 due to ACCW Train 'A' system high point pressure dropping to 0 psig when ACCW pump A was secured (CR-WF3-2012-3217). Spray flow was verified locally at wet cooling tower A. The jockey pump was running. Removed I/P Transducer: S/N# A776947-6, was provided by Argo Turboserve Corporation under PO-10117835 purchased from Callaway. Date of Manufacture April 2006. Installed I/P Transducer: S/N# 8768-8, was provided by Argo Turboserve Corporation under PO-10351691 purchased from Callaway. Date of Manufacture March 2012.
7/9/2012	ACC-126A I/P Transducer was replaced under WO-319967 due to ACCW Train 'A' high point pressure appeared to be oscillating between 0 PSIG and 5 PSIG for several minutes and slowly rose over the next several minutes with the average of the oscillations around 7 PSIG. Removed I/P Transducer: S/N# 8768-8, was provided by Argo Turboserve Corporation under PO-10351691 purchased from Callaway. Date of Manufacture March 2012. Installed I/P Transducer: S/N# 8768-9, was provided by Argo Turboserve Corporation under PO-10351691 purchased from Callaway. Date of Manufacture March 2012.

A review of ACCW Train B system operation for the past three years has found no instances of inability to maintain system high point pressure with the jockey pump. I/P transducers were replaced as planned maintenance, as listed in the following table.

Train B I/P Transducer Replacements

2/17/2012	ACC-126B I/P Transducer was replaced under WO-51673380 during a required PM (CR-WF3-2012-00789). Removed I/P Transducer: S/N# A903874-2, was provided by Enertech under purchase order WPY00584. Date of Manufacture July 2000. Installed I/P Transducer: S/N# 60050-5, was provided by Argo Turboserve Corporation under PO-10329852 purchased from Callaway. Date of Manufacture September 2010.

	S/N# 60050-5, failed during post maintenance testing.
2/18/2012	ACC-126B I/P Transducer was replaced due to the new I/P failing. Installed I/P Transducer: S/N# A903874-2, was provided by Enertech under purchase order WPY00584. Date of Manufacture July 2000.

This condition first occurred on ACC-126A in October, 2011. It has since occurred three times, the most recent on July 9, 2012. Waterford 3 has not been able to obtain replacement I/P transducers which do not exhibit calibration drift at the high end. The modulate function is unaffected.

On 7/10/2012, compensatory measures were implemented under CR-WF3-2012-3280 to maintain operability of ACCW Train A by establishing a proceduralized manual action to locally close ACC-126A post accident based on proceduralized criteria. This action, along with previously established system monitoring, provides continued assurance of operability.

This reported condition is entered into the site corrective action program as CR-WF3-2012-2962.

SYSTEM DESIGN

The ACCW System is a dual train (Trains A and B) system which supplements the heat removal of the Dry Cooling Towers (DCTs) in cooling the CCW System by providing cooling water to the shell side of the CCW Heat Exchangers. The ACCW system removes heat load from the CCW systems (at the CCW heat exchangers) after CCW leaves the DCTs and rejects the heat load to the atmosphere via the Wet Cooling Towers (WCTs). The ACCW system is designed to operate during normal operation and following a design basis event or accident, including Loss of Coolant Accidents (LOCA) or Main Steam Line Break (MSLB) inside the Containment. Upon receipt of a Safety Injection Actuation Signal (SIAS), the ACCW removes sufficient heat from the CCW to ensure that the CCW supply temperature does not exceed its design basis maximum temperature of 115°F by providing sufficient flow through the CCW heat exchanger while minimizing the water consumption of the WCTs. ACCW flow control is facilitated by the throttling of valve ACC-126A(B) via temperature control loop CC ITAC7075A(B). With the system in standby, operability is maintained by the operation of a jockey pump to preclude void formation.

ACC-126A is a 12 inch, Class 2 butterfly valve. The valve is equipped with a Fisher model 486U-15-40 double acting piston actuator. ACC-126A is a fail-as-is AOV and is provided with a backup nitrogen accumulator, if needed, to perform is safety related functions. The actuator accessories include two Fisher 67CFR filter regulators, a Masoneilan 8005N I/P transducer and a Fisher 3570 positioner. The air supply for ACC-126A is supplied either by the Instrument Air System [LD] or Nitrogen Accumulator [LK].

ACC-126A is controlled by temperature controller CC-ITIC7070A [TC] on Control Room panel CP-33. Two meters and six pushbuttons are mounted on the controller face. The left side meter indicates setpoint temperature over a range of 50 to 130°F. The right side meter shows controller output over a range of 0 to 100 percent. Valve movement is proportional to the output signal. The AUTO/MAN pushbuttons backlight when in automatic/manual control. The SETPT RAISE/LOWER pushbuttons change the setpoint temperature as indicated by the setpoint meter and backlight when setpoint achieves 130/50 °F, respectively. The OUTPUT RAISE/LOWER pushbuttons change controller output in manual only and backlight when output achieves 100/0 percent, respectively.

During normal operation, ACC-126A is in the AUTOMATIC mode of operation. The WCTs are utilized during the summer months while the DCTs are relied upon during the winter months. Typically the temperature setpoint on CP-33 is between 84˚F - 87˚F during the summer to ensure the DCT Fans do not start. ACC-126A is required to regulate flow through the shell side of the CCW Heat Exchanger such that constant outlet temperature is maintained. ACC-126A is controlled by temperature controller CC ITIC7070A on CP-33. The tube side outlet temperature (CC ITE7075A) [TC] of the CCW heat exchanger controls the valve. If the temperature exceeds the setpoint for CC ITAC7075A1 during normal operation the valve begins to control flow. Under accident conditions,

ACC-126A is required to modulate this flow to the WCT until post accident heat can be removed by the DCTs alone. (NOTE: The modulation position of ACC-126A may be at the closed or near closed position reducing evaporative losses to maintain WCT water inventory for the entire accident.) ACC-126A is provided with a nitrogen accumulator to perform this function during a loss of instrument air.

On SIAS, the setpoint is automatically raised to 115°F provided WCT Basin temperature is above 74°F. This change can be observed on the controller setpoint meter. Raising the setpoint preserves WCT Basin inventory during an accident to meet the 30 day post-LOCA requirements.

CAUSAL FACTORS

An apparent cause evaluation with failure mode analysis was conducted. The Masoneilan 8005N I/P Transducer, based on industry operating experience, is susceptible to foreign material (exceeding 5 microns in size) causing drifting and output pressure lock-ups. In addition, the I/P calibration did not exhibit a complete shift in span, indicating that this drifting was due to a physical obstruction within the I/P transducer.

CORRECTIVE ACTIONS

- The I/P transducer for ACC-126 was replaced with a calibrated I/P transducer.
- Initiated a compensatory measure for operability establishing criteria for system parameter monitoring which ensures recognition of degradation when placing system in standby.
- Initiated a compensatory measure for operability establishing a proceduralized manual action to locally close ACC-126A post accident based on proceduralized criteria.
- Sent one of the Masoneilan 8005N I/P transducers to the vendor, Argo Turboserve Corporation, for evaluation.

SAFETY SIGNIFICANCE

An analysis was performed using the meteorological conditions (Wet and Dry Bulb) during the time frame bounded by the apparent cause, the assumptions described in the Final Safety Analysis Report Table 9.2-10, calculation MNQ9-9, ECM03-002, W3-DBD-4, and the recently identified impacts of the WCT and DCT recirculation effects as described in CR-WF3-2012-02332 to determine the safety significance of ACC-126A failing to fully close. The analysis concluded that there were no impacts to nuclear, radiological, and industrial safety due to this event.

ACC-126A is required to regulate flow through the shell side of the CCW Heat Exchanger such that constant outlet temperature is maintained. Under accident conditions ACC-126A is required to modulate this flow to the WCT until post accident heat can be removed by the DCT alone.

Calculation MNQ9-9 (Wet Cooling Tower Losses During a Loss of Coolant Accident (LOCA)) determines the water losses from the WCTs during a Large Break LOCA. W3-DBD-4 (Component Cooling Water and Auxiliary Component Cooling Water Design Basis Document) shows that the Small Break LOCA event is bounding for WCT inventory margin. This event is analyzed by combining the UHS water consumption determined in MNQ9-9 for the bounding LOCA with the Emergency Feedwater (EFW) from the WCTs determined in calculation ECM03-002 (Water Inventory Needed for Cooling the Reactor Coolant System via the EFW System). The analysis credits stopping ACCW flow to the CCW Heat Exchanger, i.e., closing ACC-126A(B), at approximately 4.5 days post accident. The WCTs and the associated basin inventory are required up to 9 days post accident to support essential chiller cooling.

Calculation MNQ9-9 shows that CCW Heat Exchanger heat transfer is relatively high for several hours into the event. Throttling ACC-126A occurs throughout the event to maintain CCW Heat Exchanger shell side flow to control CCW temperature at 115°F to protect the WCT basin water inventory for the 9 day WCT mission time. This analysis was based on the worst case maximum three day average dry bulb temperature of 89°F with an

associated wet bulb temperature of 76°F.

Reviewing parameter trends prior to the event, the I/P transducers calibration began to drift on 4/09/2012 at 14:59 and continued until ACCW Pump A was secured on 6/01/2012 at 04:29. During this time period, the maximum three day average dry bulb temperature was identified to be 81.38˚F (from 5/26/2012 09:00 to 05/29/2012 08:00) with a corresponding maximum three day average wet bulb temperature of 73.29˚F. Using these meteorological conditions, an analysis was performed to determine if adequate water inventory would have been available assuming ACC-126A was leaking 2000 gpm (this bounds all flow leakage documented) when it was required to stop ACCW flow to the CCW Heat Exchanger to support the WCT inventory assumptions. Based on this analysis, sufficient water inventory would have been available post accident with the worst case meteorological conditions seen since the time of discovery. This is due to the DCTs being capable of removing more heat because the meteorological conditions were less than assumed in the design basis during the time of discovery.

INTERIM 10 CFR 21 REPORT

This report includes interim reporting as specified in 10 CFR 21.21(a)(2). Because of the repeated calibration drift of the I/P transducers as documented in the Event Description section of this report, Waterford 3 sent one of the Masoneilan 8005N I/P transducers to the vendor, Argo Turboserve Corporation, for evaluation. The vendor report was received by Waterford 3 Procurement on 6/15/2012. The vendor report documents an as-found condition of a missing interior part, the nozzle ball, and states the item will not function without the ball in place. The date of receipt of the vendor report by Waterford 3, 6/15/2012, serves as the discovery date referred to in the regulation. This interim report is required, as allowed by the regulation, because the evaluation of whether the condition could create a substantial safety hazard is not complete. The additional analysis will evaluate the effect of the condition occurring on both trains of ACCW as the affected part could have been used on both trains. This evaluation should be completed within 60 days of this Licensee Event Report.

SIMILAR EVENTS

Corrective action program data for the past three years was searched for similar failures. The applicable similar events are documented in the Event Description section where they were evaluated for past operability.

ADDITIONAL INFORMATION

Energy industry identification system (EIIS) codes are identified in the text within brackets [ ].