# Indian Point 2 4Q/2007 Plant Inspection Findings

# **Initiating Events**

Significance: Mar 31, 2007 Identified By: NRC Item Type: NCV NonCited Violation FAILURE TO INCORPORATE DESIGN BASIS INFORMATION INTO PROCEDURES TO ASSURE ADEQUATE COOLING WATER FLOW TO THE RCP THERMAL BARRIERS The inspectors identified a Green, non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that, Entergy did not appropriately incorporate design requirements into an operating procedure used to establish adequate component cooling water (CCW) flow to the reactor coolant pump (RCP) thermal barriers. Specifically, the flow specification in the CCW operating procedure did not incorporate the calculated design flow requirements to bound allowable CCW temperature limits. Entergy entered this issue into their corrective action program and will be evaluating the flow requirements specified in procedure 2-SOP-4.1.2, "Component Cooling Water System Operation," to ensure that they bound the allowed plant operating limits.

The inspectors determined that this finding was more than minor because it was associated with the Equipment Performance attribute of the Initiating Events cornerstone; and, it affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, Entergy did not incorporate design flow requirements necessary to assure adequate cooling water flow to the RCP thermal barriers into the plant operating procedures which establish the required flow. On a loss of seal injection, the procedure did not ensure that the heat removal capability was adequate to prevent a rise in seal temperature which would require the RCP to be stopped with a subsequent reactor trip. The inspectors evaluated the significance of this finding using Phase 1 of IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." This finding was determined to be of very low safety significance because it would not result in exceeding the Technical Specification limit for identified reactor coolant system leakage and would not have likely affected other mitigating systems resulting in a loss of their safety function. The inspectors found that the procedurally established nominal flow band would have assured adequate cooling of the RCP thermal barriers for the highest CCW supply temperature recorded over the previous year.

The inspectors determined that this finding had a cross-cutting aspect in the area of human performance because the operating procedure used to set the flow rate of cooling water to the RCP thermal barriers was not adequate to make certain that sufficient cooling water was available to assure the components could perform their design function. (Section 1R15)

Inspection Report# : 2007002 (pdf)



Item Type: NCV NonCited Violation

FAILURE TO ESTABLISH TESTING TO ASSURE ADEQUATE COOLING WATER FLOW TO THE RCP THERMAL BARRIERS

The inspectors identified a Green, NCV of 10 CFR 50 Appendix B, Criterion XI, "Test Control," in that, Entergy did not establish appropriate testing to assure adequate component cooling water (CCW) flow to the reactor coolant pump thermal barriers. Specifically no preventive maintenance activities or functional checks were conducted for the individual flow meters. It was determined that the rotameters on 21 and 23 RCP were not indicating correctly and that actual CCW flow to the thermal barrier heat exchangers was less that the design requirements for CCW temperature. Entergy entered this issue into their corrective action program (CR-IP2-2007-00783 and 00955), adjusted individual cooling water flow within the nominal band using ultrasonic flow meters, wrote work orders to replace the faulty flow meters, and is conducting an evaluation to determine the appropriate test requirements for the flow indicators.

This inspectors determined that this finding was more than minor because it was associated with the Equipment Performance attribute of the Initiating Events cornerstone; and, it affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, Entergy's test program did not assure that all testing required to demonstrate that the RCP thermal barriers will perform satisfactorily in service because no testing was performed to ensure the accuracy of the individual flow meters used to establish the required cooling water flow. Consequently, it was identified that two individual flow indicators did not read correctly and the CCW flow to two RCP's was not sufficient to assure adequate cooling in the event that seal water was lost based on the flow requirements established in design calculations. On a loss of seal injection, the cooling water flow would not ensure that the heat removal capability was adequate to prevent a rise in seal temperature which would require the RCP to be stopped with a subsequent reactor trip. The inspectors evaluated the significance of this finding using Phase 1 of IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." This finding was determined to be of very low safety significance because it would not result in exceeding the Technical Specification limit for identified reactor coolant system leakage and would not have likely affected other mitigating systems resulting in a loss of their safety function. (Section 1R15)

Inspection Report# : 2007002 (pdf)

# **Mitigating Systems**



Identified By: NRC Item Type: NCV NonCited Violation

**Degraded 12 Fire Main Booster Pump Cell Fire Door** 

The inspectors identified a non-cited violation (NCV) of License Condition 2.K., fire protection program, because Entergy failed to identify a degraded three-hour rated fire door on the east entrance of the 12 fire main booster pump room. The door was determined to be inoperable due to a misalignment, which prevented the door from fully closing. Entergy entered this issue into their corrective action program, took immediate compensatory action, realigned the door, and ensured that it would fully close.

Inspection Report# : 2007004 (pdf)



Significance: Oct 03, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

PROCEDURE INADEQUATE TO ENSURE OPERABILITY OF SI PUMPS DURING VENTING

The inspectors identified a non-cited violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because Entergy did not ensure that procedures associated with operation of the safety injection (SI) system during venting were appropriate to the circumstances. Specifically, procedure 2-PT-M108, "RHR/SI [residual heat removal/safety injection] System Venting," did not have appropriate controls to ensure the safety injection piping and pumps remained operable during accident conditions. Entergy entered the issue into their corrective action program and revised the venting procedure to ensure operator actions are appropriately evaluated and credited to maintain operability of the system.

The inspectors determined that this finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone; and it impacted the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding was evaluated using Phase 1 of IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations." The inspectors determined this finding resulted in a loss of function of a single train of SI for approximately five minutes. Because the total inoperability time was less than the allowed outage time of 72 hours, and the finding is not potentially risk significant due to a seismic, flooding, or severe weather initiating event, this finding screens as very low safety significance (Green).

The inspectors determined that this finding had a cross-cutting aspect in the area of human performance because Entergy did not ensure that complete, accurate and up-to-date procedures were available. (H.2(c))

Inspection Report# : 2007004 (pdf)



Identified By: NRC Item Type: NCV NonCited Violation INADEQUATE DESIGN CONTROL ASSOCIATED WITH VORTEXING AND NET POSITIVE SUCTION **HEAD CALCULATIONS** 

The team identified a finding of very low significance involving a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that, Entergy did not ensure adequate suction submergence for the three safety injection (SI) pumps by not properly translating vortex and net positive suction head (NPSH) design parameters into calculations relative to reactor water storage tank (RWST) level. Specifically, Entergy used a non-conservative method to calculate the level required to prevent pump vortexing, and used a non-conservative RWST level value for determining available NPSH for the SI pumps. Entergy entered the issue into their corrective action program and revised the affected calculations.

The finding is more than minor because the calculation deficiencies represented reasonable doubt on the operability of the SI pumps, even though the pumps were ultimately shown to be operable. The finding is associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 of the significance determination process (SDP), documented in NRC Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," because it was a design deficiency that did not result in a loss of SI system operability, based upon the team's verification of Entergy's revised calculations. Inspection Report# : 2007007 (pdf)



Significance: Feb 16, 2007 Identified By: NRC Item Type: NCV NonCited Violation **INADEQUATE DIFFERENTIAL PRESSURE VALUE USED FOR MOV 746 AND MOV 747 TONENSURE** VALVE CAPABILITY

The team identified a finding of very low significance involving a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that, Entergy did not accurately incorporate design parameters into valve thrust calculations for motor operated valve (MOV) 746 and MOV 747. Specifically, Entergy used an incorrect and nonconservative differential pressure in the calculations for MOV 746 and MOV 747, which were developed to verify that the valves could develop sufficient thrust to open under postulated design basis conditions. Additionally, an incorrect equation was used in determining the reduction in motor torque due to degraded voltage conditions. Entergy entered the issue into their corrective action program and revised the affected calculations using the correct information.

The finding is more than minor because the calculation deficiencies represented reasonable doubt on the operability of MOV 746 and MOV 747. The finding is associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 of the SDP, because it was a design deficiency that did not to result in a loss of MOV 746 and MOV 747 operability, based upon the team's verification of Entergy's revised calculations. Inspection Report# : 2007007 (pdf)



Feb 16, 2007 Significance: Identified By: NRC Item Type: NCV NonCited Violation INADEQUATE DESIGN CONTROL FOR ENVIRONMENTAL EFFECTS TO ENSURE THE AVAILABILITY OF THE TURBINE DRIVEN AUXILIARY FEEDWATER PUMP OPERATION The team identified a finding of very low safety significance involving a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that, Entergy did not establish adequate design control measures to ensure the availability of the turbine driven auxiliary feedwater pump (TDAFWP) during a postulated loss-of-offsite power (LOOP) event. Under certain LOOP situations, the team determined that the TDAFWP steam supply could be inadvertently isolated because of inadequate calculations and procedures for limiting the AFWP room temperature rise. Specifically, a calculation to determine the auxiliary feedwater pump (AFWP) room temperature rise during a LOOP did not include heat input from the TDAFWP. Further, actions that could limit the rise in AFWP room temperature and prevent the inadvertent isolation of the TDAFW pump (opening an AFWP room roll-up door or promptly restoring forced ventilation) were not included in procedures. Entergy entered this issue into their corrective action program, implemented immediate compensatory actions, and revised AFWP room temperature rise calculations.

The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 of the SDP, because it did not represent the loss of safety function of the TDAFWP (single train) for greater than its 72 hour technical specification allowed outage time, based on the team's review and assessment of site ambient temperature data over the last year.

Inspection Report# : 2007007 (pdf)



**G** Feb 16, 2007 Significance: Identified By: NRC Item Type: NCV NonCited Violation FAILURE TO ADEQUATELY MONITOR GAS TURBINE SYSTEM PERFORMANCE AS REQUIRED BY THE MAINTENANCE RULE

The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50.65 (a)(1), the Maintenance Rule, in that, Entergy failed to monitor the gas turbine (GT) system in a manner that provided reasonable assurance that the system could perform its intended safety function. Specifically, Entergy did not establish appropriate GT reliability goals, and therefore did not take corrective actions, when GT-1 had exceeded these goals for maintenance preventable functions failures (MPFF). In addition, Entergy did not properly classify repeat MPFFs, which resulted in a similar failure to take corrective actions as required. This resulted in additional GT-1 out of service time that would not have happened if appropriate actions had been taken. Entergy entered this issue into their corrective action program and lowered the allowable goal for MPFFs, and revised the GT-1 (a)(1) action plan to improve reliability.

The finding is more than minor because appropriate GT reliability goals were not established commensurate with safety and appropriate corrective actions were not taken when goals were not met. This finding is associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 and Phase 2 of the SDP, which considered that the additional GT-1 out of service time due to this issue could be as much as three days. The finding has a cross-cutting aspect in the area of human performance because Entergy did not adequately ensure procedures were complete, accurate, and up-to-date. Specifically, procedure ENN-DC-171, "Maintenance Rule Monitoring," did not provide steps to discriminate between the classification of an initial design deficiency and further failures due to the same condition, resulting in mis-classifying several GT functional failures. Inspection Report# : 2007007 (pdf)



Identified By: NRC

Item Type: FIN Finding

#### FAILURE TO CORRECT DEGRADED GAS TURBINE 1 RELIABILITY

The team identified a finding of very low safety significance involving Entergy procedure, EN-LI-102, "Corrective Action Process," in that, Entergy failed to take corrective actions to address degraded GT-1 reliability. This resulted in a two and one half day time period in January 2007 when GT-1 and GT-3 were simultaneously inoperable because, after GT-3 was made inoperable for planned maintenance activities, GT-1 was subsequently found to be inoperable. Specifically, the reliability of GT-1 declined from an average of 75% for 2005 and the first 10 months of 2006, to

50% for the three months from November 2006 to January 2007; however, Entergy did not take actions to correct this degraded reliability. Entergy entered this issue into their corrective action program and developed an action plan to address GT reliability issues.

The issue is more than minor because it is associated with the equipment reliability attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 and Phase 2 of the SDP, assuming that both GT-1 and GT-3 were unavailable for the two and one half days, due to this issue. The finding has a cross-cutting aspect in the area of problem identification and resolution because Entergy did not correct degraded reliability of GT-1, resulting in having GT-1 and GT-3 simultaneously inoperable.

Inspection Report# : 2007007 (pdf)



Significance: Feb 16, 2007 Identified By: NRC

Item Type: NCV NonCited Violation

INADEQUATE STATION BATTERY CAPACITY TESTING FOR DEGRADATION MONITORING

The team identified a finding of very low safety significance (Green) involving a non-cited violation of Technical Specification 3.8.6.6, in that, Entergy did not perform station battery capacity testing in accordance with IEEE Standard 450-1995 (related to battery maintenance and testing). Specifically, Entergy procedurally terminated battery capacity testing at the rated discharge time (four hours), before reaching the minimum voltage, as specified by IEEE Standard 450-1995. This prevented accurate quantitative measurement of capacity degradation and identification of the need to conduct potential accelerated battery testing, as specified by both IEEE Standard 450-1995 and the technical specifications, if battery capacity drops by more than 10% relative to the previous test. Entergy entered the issue into their corrective action program and performed calculations using past test data, which demonstrated that the capacities of station batteries had not degraded more than 10%.

This issue is more than minor because it is associated with the procedure quality attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 of the SDP, because it did not represent the loss of station battery safety function, based upon the team's verification of Entergy's calculations. Inspection Report# : 2007007 (pdf)

Significance: Feb 16, 2007 Identified By: NRC Item Type: NCV NonCited Violation **INEFFECTIVE CORRECTIVE ACTION FOR HIGH INTER-TIER BATTERY RESISTANCES** 

The team identified a finding of very low safety significance involving a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that, Entergy did not take effective corrective actions for a condition adverse to quality concerning out-of-tolerance inter-tier resistances on the No. 21 station battery. Specifically, after repeated failures of the No. 21 station battery inter-tier resistance testing, vendor and IEEE Standard 450-1995 recommended corrective actions were not taken to correct the adverse out-of-tolerance resistance trend. Entergy entered the issue into their corrective action program and performed calculations, which demonstrated that the voltage drop due to the as-found resistance of the inter-tier connections was small and did not impact No. 21 battery operability.

This issue is more than minor because if it was left uncorrected, it would have become a more significant safety concern. Specifically, high resistance connections in a battery that is loaded during accident conditions can cause localized heating and can cause permanent damage to the battery. The finding has very low safety significance, based on Phase 1 of the SDP, because it did not represent the loss of No. 21 station battery safety function, based upon the team's verification of Entergy's revised calculations. The finding has a cross-cutting aspect in the area of problem identification and resolution because Entergy did not take effective corrective actions to address the adverse trend of out-of-tolerance inter-tier resistances.

Inspection Report# : 2007007 (pdf)



Identified By: NRC Item Type: NCV NonCited Violation

#### UNTIMELY CORRECTIVE ACTIONS FOR DECREASE IN BATTERY MARGIN

The team identified a finding of very low safety significance involving a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that, Entergy did not promptly identify and correct a condition adverse to quality, with respect to known errors in the No. 23 station battery design calculations. Specifically, Entergy did not recognize at the appropriate time the need to write a condition report, perform an operability determination, or place controls on the use of the No. 23 battery design calculations when errors were discovered in the No. 23 battery design calculations that significantly lowered the battery capacity margin. Entergy entered the issue into their corrective action program and performed calculations, which demonstrated No. 23 station battery operability through the next refueling outage, based on the calculated margin and conservatisms available.

This issue is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding has very low safety significance, based on Phase 1 of the SDP, because it did not represent the loss of No. 23 station battery safety function, based upon the team's verification of Entergy's revised calculations.

The finding has a cross-cutting aspect in the area of problem identification and resolution because Entergy failed to promptly identify the decrease in margin found in the No. 23 battery design calculations of record. Inspection Report# : 2007007 (pdf)

## **Barrier Integrity**

Significance: Oct 03, 2007 Identified By: NRC Item Type: NCV NonCited Violation UNTIMELY CORRECTIVE ACTIONS TO REPAIR A DEGRADED SERVICE WATER FLOW INSTRUMENT

The inspectors identified a non-cited violation of 10 CFR 50 Appendix B, Criterion XVI, "Corrective Actions," in that, Entergy did not implement timely corrective actions for a degraded condition associated with the 25 Containment Fan Cooler Unit (FCU) flow indicator. Specifically, the failure to take timely corrective actions for the degraded service water flow indicator for the 25 FCU, initially identified in October 2006, resulted in the inability to ensure that sufficient service water flow was available for the component to perform its intended function. Subsequently, it was identified that a reduced service water flow condition did exist. Entergy entered the issue into their corrective action program and implemented corrective actions to restore adequate indication of service water flow to the 25 FCU. Entergy is evaluating maintenance practices to determine the appropriateness of a periodic blow-down of the transmitter impulse lines to prevent sediment buildup.

The inspectors determined that this finding was more than minor because it was associated with the structure, system, and component and barrier performance attribute of the Barrier Integrity cornerstone; and it impacted the cornerstone objective of providing reasonable assurance that the physical design barrier (containment) protects the public from radionuclide releases caused by accidents or events. This finding was evaluated using IMC 0609, Appendix H, "Containment Integrity Significance Determination Process." This was determined to be a Type B finding because it potentially impacted containment integrity but did not result in the increased likelihood of an initiating event. This finding was determined to be of very low safety significance because, while it could impact late containment failure, it did not impact a function that was important to large early release frequency.

The inspectors determined that this finding had a cross-cutting aspect in the area of problem identification and resolution because Entergy did not thoroughly evaluate the condition when initially identified. (P.1(c))

Significance: Mar 31, 2007

Identified By: NRC

Item Type: NCV NonCited Violation **FAILURE TO MOVE CONTAINMENT HYDROGEN ANALYZERS TO 10 CFR 50.65 (A)(1) STATUS** The inspectors identified a Green, NCV of 10 CFR 50.65(a)(2) because Entergy did not demonstrate that the performance or condition of the containment hydrogen monitoring system was being effectively controlled through the performance of appropriate preventive maintenance such that the system remained capable of performing its intended function. The inspectors identified that both channels of the containment hydrogen/oxygen (H2/O2) analyzers had been out of service since September 7, 2006, due to compressor seal leakage. The inspectors determined that the H2/O2 analyzers are within the scope of Entergy's Maintenance Rule program since they are used in the emergency operating procedures. The inspectors noted that, based on the significant unavailability time of both trains, the system should have been in 10 CFR 50.65(a)(1) status with an action plan to improve system performance back to an (a)(2) status. Entergy entered this issue into their corrective action program and changed the priority of the work orders to perform repairs on the H2/O2 analyzers.

This inspectors determined that this finding affected the Barrier Integrity cornerstone and was more than minor since it was similar to Example 7.b in IMC 0612, Appendix E, "Examples of Minor Issues." Specifically, Entergy failed to demonstrate effective control of the performance of the H2/O2 analyzers and did not place the system in (a)(1) status. The inspectors evaluated the significance of this finding using Phase 1 of IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." The finding required further evaluation through IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," because it resulted in an actual reduction in the defense-in-depth for the hydrogen control function of the reactor containment. The inspectors determined that this finding was of very low safety significance because it did not affect core damage frequency and the H2/O2 analyzers are not important to large early release frequency.

The inspectors determined this finding had a cross-cutting aspect in the area of human performance because Entergy did not ensure that equipment and resources were available to assure reliable operation of the H2/O2 analyzers. Specifically, Entergy did not minimize long-standing equipment issues and maintenance deferrals associated with the containment hydrogen monitoring system. (Section 4OA2)

Inspection Report# : 2007002 (pdf)

### **Emergency Preparedness**

Significance: Mar 31, 2007 Identified By: NRC Item Type: FIN Finding INADEQUATE CORRECTIVE ACTIONS FOR FAILURE TO APPROPRIATELY MONITOR SERVICE WATER INTAKE BAY LEVEL

The inspectors identified a Green finding because Entergy failed to take adequate corrective actions for an issue associated with monitoring of service water intake bay level. This deficiency could have prevented identification of entry conditions for an emergency action level. Entergy entered this issue into the corrective action program as CR IP3-2007-00453, and initiated several corrective actions, including plans for enhanced monitoring of service water bay levels, backwashing of trash racks, procedural upgrades, correction of service water bay level instrumentation modification installation, development of modifications for enhanced service water level monitoring equipment, and enhanced inspection and cleaning of intake structure trash racks.

The inspectors determined that this finding was more than minor because it was associated with the Emergency Preparedness cornerstone attribute of facilities and equipment; and, it affected the cornerstone objective of ensuring that a licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, inadequate monitoring of service water intake bay level could have resulted in failure to declare a notification of unusual event (UE). The inspectors reviewed the EAL entry criteria and determined that this performance deficiency did not affect Entergy's ability to declare any event higher than a UE. The inspectors evaluated this finding using IMC 0609, Appendix B, "Emergency Preparedness Significance Determination Process," Sheet 1, "Failure to Comply," and determined that it was of very low safety significance because the declaration of a UE based on low service water bay level could have been missed or delayed, consistent with the example provided in the appendix.

The inspectors determined that this finding had a cross-cutting aspect in the area of problem identification and resolution because Entergy did not implement effective corrective actions for a previously identified issue associated with inadequate monitoring of service water intake bay level. (Section 1R17)

Inspection Report# : 2007002 (pdf)

## **Occupational Radiation Safety**

#### **Public Radiation Safety**

#### **Physical Protection**

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the <u>cover letters</u> to security inspection reports may be viewed.

### Miscellaneous

Last modified : February 04, 2008