UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

July 13, 2007

Kevin Walsh
Vice President Operations
Waterford 3
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000382/2007007

Dear Mr. Walsh:

On May 31, 2007, the US Nuclear Regulatory Commission (NRC) completed a component design bases inspection at your Waterford Steam Electric Station. The enclosed report documents our inspection findings. The preliminary findings were discussed on May 10, 2007, with Mr. J. Laque and other members of your staff. After additional in-office inspection, a final telephonic exit meeting was conducted on May 31, 2006, with you and other members of the your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The team reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

This report documents five findings of very low safety significance (Green). Four of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these violations as noncited violations (NCVs), consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any of the NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Waterford Steam Electric Station, Unit 3, facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response, if any, will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA John Hanna for/

Jeff A. Clark, P. E.
Chief, Project Branch E
Division of Reactor Projects

Docket: 50-382
License: NPF-38

Enclosure: NRC Inspection Report 050000382/2007007
w/Attachment: Supplemental Information

cc w/Enclosure:
Mr. Jeff Forbes
Senior Vice President and
Chief Operating Officer
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Vice President, Operations Support
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Ms. Kimberly S. Cook, Director
Nuclear Safety Assurance
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-0751

Mr. Joe Kowalewski
General Manager, Plant Operations
Waterford 3 SES
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-0751

Manager, Licensing
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093

Chairman
Louisiana Public Service Commission
P.O. Box 91154
Baton Rouge, LA 70825-1697

Richard Penrod, Senior Environmental
Scientist, State Liaison Officer
Office of Environmental Services
Northwestern State University
Russsell Hall, Room 201
Natchitoches, LA 71497

Parish President Council
St. Charles Parish
P.O. Box 302
Hahnville, LA 70057

Mr. John McCann
Director, Nuclear Safety & Licensing
Entergy, Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Louisiana Department of Environmental
Quality Radiological Emergency Planning
and Response Division
P.O. Box 4312
Baton Rouge, LA 70821-4312

Louisiana Department of Environmental
Quality
Office of Environmental Compliance
P.O. Box 4312
Baton Rouge, LA 70821-4312

Lisa R. Hammond, Chief
Technological Hazards Branch
National Preparedness Division
FEMA Region VI
800 N. Loop 288
Denton, TX 76209

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Senior Project Engineer, DRP/E **(GDR)**
Team Leader, DRP/TSS **(CJP)**
RITS Coordinator **(MSH3)**

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	50-382
License:	NPF-38
Report Nos.:	05000382/2007007
Licensee:	Entergy Operations, Inc.
Facility:	Waterford Steam Electric Station, Unit 3
Location:	Hwy. 18 Killona, Louisiana
Dates:	April 9 through May 31, 2007
Team Leader:	G. Larkin, Senior Resident, Waterford Steam Electric Station, Unit 3
Assist. Team Leader:	J. Nadel, Reactor Inspector, Engineering Branch 1
Inspectors:	G. Replogle, Senior Project Engineer, Projects Branch E S. Garchow, Operations Examiner, Operations Branch R. Azua, Reactor Inspector, Engineering Branch 1
Accompanying Personnel:	H. Anderson, Mechanical Engineer, Beckman and Associates S. Kobylarz, Electrical Engineer, Beckman and Associates
Others:	M. Runyan, Senior Reactor Analyst
Approved By:	J. Clark, PE, Chief Project Branch E

SUMMARY OF FINDINGS

IR05000382/2007007; April 16 through May 31, 2007; Waterford Steam Electric Station, Unit 3: baseline inspection, NRC Inspection Procedure 71111.21, Component Design Basis Inspection.

The report covers an announced inspection by a team of four regional inspectors, two contractors and one senior resident inspector. Five findings were identified. All of the findings were of very low safety significance. The final significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, Significance Determination Process. Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 3, dated July 2000.

A. NRC-Identified Findings

Cornerstone: Mitigating Systems

- Green. The team identified a noncited violation of 10 CFR 50.65(a)(2) for the failure to adequately demonstrate the performance or condition of the dry cooling tower motor-driven sump pumps. Specifically, the licensee failed to periodically verify that the pump flow rates were consistent with their design basis requirements and pump performance problems were likely to go unnoticed. Therefore, the licensee had no technical justification for continued Maintenance Rule (a)(2) status.

  The finding was greater than minor because it could be a more significant safety concern if left uncorrected. In addition, the finding was similar to non-minor finding Example 7.b in NRC Inspection Manual Chapter 0612 Appendix E, "Examples of Minor Issues," in that there were performance concerns associated with the dry cooling tower sump pumps. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be a qualification deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment (Section 1R21.b.1).

- Green. The team identified a finding for the failure to properly implement the site foreign material exclusion procedure for the dry cooling tower sumps. Specifically, the procedure required the establishment of a foreign material exclusion area if foreign materials could adversely impact equipment function. The area surrounding the dry cooling tower sumps met this criteria but the licensee failed to establish a foreign material exclusion area to protect the sump pump system from damage. The sump pumps had previously suffered damage due to foreign material intrusion.

  The finding was more than minor because it affected the mitigating systems cornerstone objective (external factors attribute) to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be a qualification deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, “Operability Determination Process for Operability and Functional Assessment.” The finding had a crosscutting aspect in the area of human performance (work practices component) in that the licensee failed to effectively communicate expectations regarding procedure adherence and personnel failed to follow the site procedure (H.4(b)). The finding was indicative of current plant performance because the open sump and the foreign material vulnerability were known to plant personnel on an ongoing basis (Section 1R21.b.2).

- Green. The team identified a noncited violation of Technical Specification 6.8.1.a, “Procedures,” for inadequate procedural guidance for operators to respond to a postulated loss of offsite power event coincident with a design basis rain event. The design basis calculation specified that, during certain rain precipitation events, operators must transfer the pump power to a safety related power source within 30 minutes of a loss of offsite power to protect safety related motor control centers from flooding. The motor control centers are needed to ensure ultimate heat sink operability. Due to the sequencing of steps in the procedure, operators took approximately 50 minutes to transfer essential power to the pumps. In addition, if offsite power was restored before safety related power was provided to the pumps, there was no instruction to restore the normal power supply (which would have tripped).

  This finding was more than minor because it affected the mitigating systems cornerstone objective (external factors component) to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. In addition, the finding was similar to non-minor finding Example 3.k in NRC Inspection Manual Chapter 0612 Appendix E, “Examples of Minor Issues,” in that there was reasonable doubt of the operability of the system under certain heavy rain conditions. Using the Manual Chapter 0609, “Significance Determination Process,” Phase 1 Worksheet, the team determined that a Phase 2 significance determination was required because the finding potentially represented a loss of system safety function. The team performed a Phase 2 significance determination and found the finding was potentially greater than Green in significance. A Region IV senior reactor analyst performed a Phase 3 significance determination and found the issue was of very low safety significance (Section 1R21.b.3).

- Green. The Team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the failure to ensure that the 125 Vdc safety-related batteries would remain operable if all the intercell and terminal connections were at the resistance value of 150 micro-ohms as allowed by Technical Specification Surveillance Requirement 4.8.2.1.b.2 and 4.8.2.1.c.3.

  The finding was greater than minor because it affected the mitigating systems cornerstone objective (design control attribute) to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, “Significance Determination Process,” Phase 1 Worksheet, the finding was determined to be a design deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, “Operability Determination Process for Operability and Functional Assessment,” (Section 1R21.b.4).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the failure to promptly correct a condition adverse to quality (dirt and debris in the dry cooling tower heat exchanger fins). The condition adversely impacted the heat exchangers' heat removal rates. The dry cooling towers had very little design margin under some scenarios. In addition, the licensee failed to respond to trend data that showed degraded heat exchanger performance, had no basis for the specified 5 year cleaning interval specified in their heat exchanger program, and hadn't actually cleaned the towers for approximately 11 years.

  This finding was more than minor because it was similar to non-minor Example 3.k in NRC Inspection Manual Chapter 0612 Appendix E, "Examples of Minor Issues," in that there was a reasonable doubt of the operability of the dry cooling towers. Using Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be of very low safety significance (Green) because the finding was a qualification deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment." The finding had a crosscutting aspect in the area of problem identification and resolution (corrective action program attribute) in that the issue was identified but corrective actions were not taken in a prompt manner (P.1(d)). The issue was indicative of current performance because the system engineer was aware of the degraded cooling tower condition for several years (Section 1R21.b.5).

B. Licensee-Identified Violations.

None.

REPORT DETAILS

1 REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and important design features may be altered or disabled during modifications. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee’s probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than two or a Birnbaum value greater than 1E-6.

a. Inspection Scope

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria. The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator a scenario, as well as during simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions because of modifications, and margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded, conditions; NRC resident inspector input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in-depth margins.

The inspection procedure requires a review of 15-20 risk-significant and low design margin components, 3 to 5 relatively high-risk operator actions, and 4 to 6 operating experience issues. The sample selection for this inspection was 20 components, 5 operator actions, and 5 operating experience items.

The components selected for review were:

- 125 Vdc Battery Train A
- Emergency Diesel Generator Train B
- 230 kV Switchyard Breaker 7182
- 4.16 kV Bus 2B Breaker 2B-4
- 4.16 kV Bus 3B Undervoltage Relays
- Turbine Driven Emergency Feedwater Pump
- Shutdown Cooling Valve, SI-401B
- High Pressure Safety Injection Pump Train A
- Dry Cooling Tower Train A
- Wet Cooling Tower Train B
- Condensate Storage Pool
- Train A Containment Spray Header
- Train B Component Cooling Water Heat Exchanger
- Reactor Water Storage Pool
- Shutdown Cooling Valve SI-407B
- Emergency Diesel Generator Fuel Oil Tank Train B
- Emergency Diesel Generator Room Exhaust Fan Train B
- Turbine Driven Auxiliary Feedwater Pump
- Turbine Driven Emergency Feedwater Pump Steam Trip and Throttle Valves
- Auxiliary Component Cooling Water Valve ACC-126B

The selected operator actions were:

- Response to steam generator tube rupture with a loss of off-site power.
- Align potable water to instrument air compressors.
- Isolate the faulted steam generator and cooldown the reactor coolant system.
- Energize dry cooling tower sump pumps.
- Replenish emergency diesel generator air receivers.

The operating experience issues were:

- NRC Information Notice 2005-021, “Plant Trip and Loss of Preferred AC Power From Inadequate Switchyard Maintenance”

- NRC Information Notice 2006-22, “New Ultra-Low-Sulfur Diesel Fuel Oil Could Adversely Impact Diesel Engine Performance”

- NRC Information Notice 1998-41, “Spurious Shutdown of Emergency Diesel Generators from Design Oversight”

- NRC Information Notice 2006-21, "Operating Experience Regarding Entrainment of Air Into Emergency Core Cooling and Containment Spray Systems"

- NRC Bulletin 88-04, "Potential Safety-Related Pump Loss"

b. Findings

.1 Failure to Meet Maintenance Rule Requirements for Dry Cooling Tower Sump Pumps

Introduction. The team identified a Green noncited violation of 10 CFR 50.65(a)(2) for the failure to adequately demonstrate the performance or condition of the dry cooling tower motor-driven sump pumps. Specifically, the licensee failed to periodically verify that the pump flow rates were consistent with their design basis requirements and pump performance problems were likely to go unnoticed. Therefore, the licensee had no technical justification for continued Maintenance Rule (a)(2) status.

Description. Section (a)(1) of the Maintenance Rule requires periodic monitoring of systems within the scope of the rule against licensee established goals in a manner sufficient to provide reasonable assurance that the equipment remains capable of fulfilling its intended functions. Section (a)(2) of the rule specifies that monitoring against "goals" is not required where it has been demonstrated that the performance of the equipment is being effectively controlled through maintenance. The licensee had placed the dry cooling tower sump pumps in (a)(2) status. Normally, when placing equipment in (a)(2) status, licensees will establish performance monitoring criteria to demonstrate continued effective maintenance and compliance with the Maintenance Rule.

The dry cooling tower sump pumps are critical to the continued operation of the Waterford-3 ultimate heat sink during heavy rain events. While not safety-related, the pumps are required to meet 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena." If the motor-control centers flood, the fans to the ultimate heat sinks could fail.

The licensee's ultimate heat sink included two redundant trains, each consisting of one dry and one wet cooling tower. The dry cooling tower area was open to the environment and extended below grade level. Each dry cooling tower basin had a sump with two non-safety motor-driven sump pumps and one portable diesel driven pump. During design basis rainfall events, if water collected in the dry cooling tower basin to a level of approximately 1.5 feet, the motor-driven sump pump motors would be submerged and could fail. The sump pumps protect the Train A and B safety related motor control centers, which were located near the bottom of the basins. The motor control centers provided safety related power to all the fans in both the dry and wet cooling towers. The design bases calculation MD(Q)-9-38 assumed the motor-driven pumps discharged water at 270 gallons per minute (gpm) and the diesel driven pump discharged at 300 gpm.

For the dry cooling tower sump pumps, the team reviewed the licensee's Maintenance Rule performance criteria to verify compliance with the rule. The team identified several concerns, as follows:

1. The licensee had established inadequate performance criteria for monitoring pump performance. The licensee had defined a Maintenance Rule Functional Failure as any failure which causes the flow rate from one dry cooling tower area (defined as one diesel pump and two motor-driven pumps) to be less than 325 gpm. The team identified that the minimum design basis flow rate was actually 570 gpm (300 gpm from the diesel-driven pump and 270 gpm from one motor-driven pump).

2. The licensee did not adequately monitor pump flows to verify that the performance criteria were met. The licensee's Maintenance Rule reliability criteria was:

    > The pumps experience no functional failures in 18 months and no repeat maintenance rule functional failures in 36 months.

    To qualify as a functional failure, the licensee specified that two of the three pumps would have to fail at the same time. However, if the emergency diesel pump failed, the two motor driven pumps may not have sufficient flow to meet the 570 gpm design need. The licensee only monitored diesel driven pump flow every five years and performed no meaningful monitoring of the motor driven pumps. While the system engineer stated that he periodically checked pump flow rates after it rained (when a pump was operating) and that according to an informal calculation (not written down) the pump flow rate was about 270 gpm, the team identified the following problems with this method:

    - The uncertainty with the computer point timing method (that the engineer used) was +/- 59 seconds at the start and stop points. Since the engineer only monitored flow for one minute, the data was not meaningful.

    - In most cases, only one pump was operating at the time when the check was performed. The second pump would not start unless sump level reached a second higher setpoint.

    - The method, had it been adequate, did not demonstrate that both motor-driven pumps could pump 270 gpm when pumping at the same time. The pumps discharged to a common header. If one pump can discharge at 270 gpm into the header, it's a well known fact that two pumps pumping into the same discharge header pump discharge flows are reduced. The discharge head (back-pressure) increases with two pumps operating and reduces the discharge flow.

3. Foreign materials in the dry cooling tower sump could result in unidentified degraded system performance. The licensee's monitoring efforts were inadequate to consistently detect this condition. Foreign material lodged in the pumps and/or piping could partially block flow. During this NRC inspection, the team noted wood and insulation in the vicinity of the dry cooling tower sumps. In addition, the Train A dry cooling tower sump cover plate did not cover the entire sump, making it easy for the materials to accidently end up in the sump. The team also noted the following past foreign material related problems:

   - On August 28, 2005, during Katrina, the control room received dry cooling tower and fuel handling building high sump alarms. An operator reported that the dry cooling tower sump drains were clogged with debris.

   - In August 2000, a dry cooling tower sump pump seized and had to be completely replaced. The licensee determined that the pump failed due to foreign material in the pump strainer and pieces of cloth were found wrapped around the pump's impeller.

   While catastrophic failures of one of the motor driven pumps might be identified through normal operation, the more likely scenarios involving partial flow blockage could easily go unnoticed.

Due to the lack of periodic flow test data, problems demonstrating pump performance from maintenance rule functional failure and reliability criteria, and historical problems with intrusion of foreign material into the dry cooling tower sumps, the team concluded that the licensee's Maintenance Rule performance demonstration for these pumps was neither technically justifiable nor reasonable. Therefore, the licensee did not demonstrate acceptable performance in accordance with the Maintenance Rule Section (a)(2) and was required to place the pumps in (a)(1) status.

In response to the team's concerns, the licensee performed flow testing of the pumps and verified that the pumps could produce their design basis flow rates.

Analysis. The failure to develop and implement technically justifiable performance criteria for the motor-driven sump pumps, for compliance with provisions of the Maintenance Rule, was a performance deficiency. The finding was greater than minor because it could be a more significant safety concern if left uncorrected. In addition, the finding was similar to non-minor finding Example 7.b in NRC Inspection Manual Chapter 0612 Appendix E, "Examples of Minor Issues," in that there were performance concerns associated with the dry cooling tower sump pumps. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be a qualification deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment."

Enforcement. 10 CFR 50.65, Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, (a)(1) states "Each holder of a license to operate a nuclear power plant... shall monitor the performance or condition of structures, systems, or components, against licensee established goals, in a manner sufficient to provide reasonable assurance that such structures, systems, and components... are capable of fulfilling their intended functions." The Maintenance Rule, (a)(2) states, "Monitoring as specified in paragraph (a)(1) of this section is not required where it has been demonstrated that the performance or condition of a structure, system, or component is being effectively controlled through the performance of appropriate preventive maintenance, such that the structure, system, or component remains capable of performing its intended function." Contrary to the above, the licensee has failed to establish goals sufficient to provide reasonable assurance that the dry cooling tower sump pumps could perform their intended function and failed to demonstrate, through the performance of appropriate preventative maintenance, that the dry cooling tower sump pumps remained capable of performing their intended function. Because the violation is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report CR-WF3-2007-02004, this violation is being treated as a noncited violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000382/2007007-01) "Failure to Meet Maintenance Rule Requirements for Dry Cooling Tower Sump Pumps."

.2 Failure to Implement Foreign Material Exclusion Procedure for Dry Cooling Tower Sumps

Introduction. The team identified a Green finding for the failure to properly implement the site foreign material exclusion procedure for the dry cooling tower sumps. Specifically, the procedure required the establishment of a foreign material exclusion area if foreign materials could adversely impact equipment function. The area surrounding the dry cooling tower sumps met this criteria but the licensee failed to establish a foreign material exclusion area to protect the sump pump system from damage. The sump pumps had previously suffered damage due to foreign material intrusion.

Description. During a plant walkdown, the team noted foreign material near the opening to the Train A dry cooling tower sump, including wooden doorstop wedges, pieces of plastic and trash. As noted in Section 1R21.b.1 of this report, the sump pumps are critical to maintaining ultimate heat sink operability during heavy rain events.

Procedure EN-MA-118, "Foreign Material Exclusion," Revision 2 states, in part:

> This procedure applies to all Station activities having the potential to introduce foreign material into systems or components which could impact plant safety, power generation, or system reliability. The requirements of this procedure should be applied when maintenance, modifications, repairs, inspection, and operating activities are being conducted on open piping, vessels, tubing, instrumentation, mechanical, and electrical equipment.

The procedure required that a foreign material exclusion zone be established to prevent foreign materials from adversely impacting system reliability. It applied to safety and non-safety related systems.

Contrary to the above, the Train A dry cooling tower sump was open (lost lid) for over 7 years and the area was not controlled as a foreign material exclusion zone. Consequently, on several occasions foreign materials entered the sump and adversely impacted sump pump performance. For example, in August 2000 foreign material became bound around one of the pump impellers, destroying the pump. It was noted that the pump suction side was full of debris (CR-WF3-2000-0879).

Analysis. The failure to properly implement the site foreign material exclusion procedure was a performance deficiency. The finding was more than minor because it affected the mitigating systems cornerstone objective (external factors attribute) to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be a qualification deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment." The finding had a crosscutting aspect in the area of human performance (work practices component) in that the licensee failed to effectively communicate expectations regarding procedure adherence and personnel failed to follow the site procedure (H.4(b)). The finding was indicative of current plant performance because the open sump and the foreign material vulnerability were known to plant personnel on an ongoing basis.

Enforcement. Since the finding involved non-safety related equipment, no violation of NRC requirements occurred. The licensee entered this finding into their corrective action program as Condition Report WF3-2007-01859 (FIN 05000382/2007007-02), "Failure to Implement Foreign Material Exclusion Procedure for Dry Cooling Tower Sumps."

.3 Inadequate Procedure for Restoring Power to Dry Cooling Tower Sump Pumps

Introduction. The team identified a Green NCV of Technical Specification 6.8.1.a, "Procedures," for inadequate procedural guidance for operators to respond to a postulated loss of offsite power event coincident with a design basis rain event. The design basis calculation specified that, during certain rain precipitation events, operators must transfer the pump power to a safety related power source within 30 minutes of a loss of offsite power to protect safety related motor control centers from flooding. The motor control centers are needed to ensure ultimate heat sink operability. Due to the sequencing of steps in the procedure, operators took approximately 50 minutes to transfer essential power to the pumps. In addition, if offsite power was restored before safety related power was provided to the pumps, there were no instructions to restore the normal power supply (which would have tripped).

Description: The Train A and B ultimate heat sinks each consist of a dry cooling tower and a wet cooling tower. The cooling towers are located below grade, in the cooling tower basins. A safety related motor-control center (one for each set of cooling towers) is also located below grade, close to the bottom of the basins. Two motor-operated and one diesel driven non-safety related sump pumps are located in each cooling tower basin to, in part, protect the motor-control centers and the operability of the ultimate heat sinks.

During a loss of offsite power, coincident with a design basis rain event, Calculation MD(Q)-9-38, "Capacity of Wet Cooling Tower Basins," Revision 4 assumed operators align safety grade power to the dry cooling tower sump pumps within 30 minutes of event initiation. Emergency Operating Procedure OP-902-004, "Excess Steam Demand Recovery," Revision 10, was one of several emergency operating procedures that were used to direct the required 30 minute action. It stated, in part:

> IF offsite power has been lost, AND can NOT be restored within 30 Minutes, THEN REFER TO Appendix 20, "Energize DCT [dry cooling tower] Sump Pumps" and energize at least one DCT sump pump in each sump.

In addition to the above, Waterford 3 made a commitment (W3P82-0652) to the NRC as part of the licensing basis that the emergency operating procedures would include provisions for switching the dry cooling tower sump pump power supplies to the emergency bus within 30 minutes of a loss of off-site power.

During a steam generator tube rupture exercise in the simulator (that included a loss of offsite power) followed by an in-plant observation, the team observed that the crew took approximately 50 minutes to complete the required step. The team evaluated the impact of the additional actions associated with responding to a steam generator tube rupture, as these would not normally be performed for a loss of offsite power with design basis rain. However, the additional steps did not make a meaningful difference in the timing. Under optimistic conditions, the team estimated that a best-case time would be 37 minutes. The significant contributor to the delay was the step's late placement within the implementing procedure. The team noted that, once ordered, operators could perform the step in 12 minutes.

The team considered whether operators might recognize the importance of the step and perform it earlier than the procedure would dictate. The licensee's process allowed this step to be performed out of sequence. The team reviewed training materials and noted that the action was discussed but was not one of the learning objectives. Further, the team interviewed licensed operators and found that operators, in general, were not familiar with the requirement, or the basis for the requirement. Accordingly, the team determined that the operators were not likely to recognize the importance of performing the step earlier, out of sequence. They were more likely to perform this step in the specified order.

A second, related, concern involved a scenario where offsite power was initially lost but was recovered shortly thereafter. In this case, the feeder breaker to the sump pumps would automatically trip off when offsite power was lost. When offsite power was restored, the pumps would not have power and there was no procedural step that required that power be provided to the pumps within 30 minutes. The previously noted procedure step would only be completed if operators believed that offsite power would be lost for more than 30 minutes.

In response to the team's concerns, the licensee provided prompt training to all operating crews regarding the importance of ensuring that the pumps are powered within 30 minutes in response to any loss of offsite power, regardless of duration, and to perform the necessary steps out of sequence, if necessary. In addition, the licensee initiated action to make appropriate procedure changes.

Analysis. The failure to provide adequate emergency operating procedures was a performance deficiency. This finding was more than minor because it affected the mitigating systems cornerstone objective (external factors component) to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. In addition, the finding was similar to non-minor finding Example 3.k in NRC Inspection Manual Chapter 0612 Appendix E, "Examples of Minor Issues," in that there was reasonable doubt of the operability of the system under certain heavy rain conditions. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the team determined that a Phase 2 "Significance Determination Process," was required because the finding potentially represented a loss of system safety function. The team performed a Phase 2 "Significance Determination Process," and found the finding was potentially greater than Green in significance. A Region IV senior reactor analyst performed a Phase 3 "Significance Determination Process," and found the issue was of very low safety significance (Green). The primary assumptions included:

- The frequency for the design basis rainfall rate was 1.9E-7/yr.

- The time to restore power following a loss of offsite power event is conservatively assumed as one hour.

- The diesel powered sump pump would be started at 3 hours into the event.

- Offsite power is lost at the beginning of the precipitation event.

- The delay of 30 minutes in restoring power would add approximately 0.1 feet to the maximum depth in the basin.

Enforcement: Technical Specification 6.8.1.a, "Procedures," requires, in part, that written procedures be established, implemented, and maintained for the activities specified in Regulatory Guide 1.33, Revision 2, Appendix A. Item 6© of Appendix A required procedures for combating emergencies and significant events, including the loss of electrical power. The noted emergency operating procedure directed operator actions for combating a loss of offsite power, including the restoration of electrical power to the dry cooling tower sump pumps within 30 minutes. Contrary to the above, the procedure was inadequate, in that the procedure steps were sequenced in a manner that made it highly unlikely that operators would provide alternate power to the dry cooling tower sump pumps within the 30 minute requirement. In addition, if off-site power was restored before the power transfer occurred, the procedure contained no step to ensure that the normal power (which tripped off) was restored. Because the violation is of very low safety significance and has been entered into the licensee's corrective action program as Waterford Condition Report CR-WF3-2007-01679, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000382/2007007-03), "Inadequate Procedure for Restoring Power to Dry Cooling Tower Sump Pumps."

.4 Inadequate Acceptance Criteria for Battery Cell-to-Cell and Terminal Connection Resistance Value

Introduction. The Team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, Design Control," for the failure to ensure that the 125 Vdc safety-related batteries would remain operable if all the intercell and terminal connections were at the resistance value of 150 micro-ohms as allowed by Technical Specification Surveillance Requirement 4.8.2.1.b.2 and 4.8.2.1.c.3.

Description. The team questioned the basis for the acceptance criteria of less than 150 micro-ohms for cell-to-cell and terminal connections that were found in the Station Battery Bank and Charger Quarterly and 18-month maintenance Surveillance Procedures ME-003-210, "Station Battery Bank and Charger (Quarterly)," Revision 10, and ME-003-220, "Station Battery Bank and Charger (18 Month)," Revision 15, respectively, and that were used to satisfy Technical Specification Surveillance Requirements 4.8.2.1.b.2 and 4.8.2.1.c.3. The licensee's engineers could not provide a documented technical basis for the 150 micro-ohm resistance acceptance criteria. The licensee initiated condition report CR-WF3-2007-01490 to address this concern. A previous NRC Design Inspection team also questioned the basis for the 150 micro-ohm criterion in a report on July 27, 1998, and the licensee had initiated condition report CR-WF3-1998-0758 to address the affect of inter-cell resistance on equipment voltage.

The apparent cause analysis performed under CR-WF3-1998-0758 considered the 150 micro-ohm basis for the cell-to-cell connection resistance to be "unrealistic." Further, the licensee determined that the battery would not remain operable with all of the intercell resistances at the allowed design limit. The team noted that this condition was inconsistent with 10 CFR 50.36, which contains requirements for technical specifications. The CFR specifies that the limits are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Nonetheless, the 150 micro-ohm resistance value was neither validated nor changed. The team found that the 150 micro-ohms criterion is over 16 times the average installed resistance for terminal connections at Waterford 3 (when new), and on average approximately 5 times greater than the installed inter-cell connection resistance, based on more recent surveillance data for Battery A.

To ensure battery operability, the licensee administratively controlled the total station battery inter-cell and terminal connection resistance when performing the 18-month surveillance procedure ME-003-220. The surveillance procedure required an engineering evaluation if a connection measurement was found to be greater than 20 percent over an installed resistance value. The team considered this approach reasonable for the 18 month surveillance.

In contrast to the 18 month surveillance, the quarterly surveillance procedure contained no additional administrative controls. The team found that the 150 micro-ohms acceptance criteria for the subject terminal connections could allow for inter-cell and terminal resistance conditions that could exceed the calculated available margin. Calculation EC-E98-001, "Calculation of Maximum Allowable Battery Inter-Cell Connection Resistance," Revision 0, determined that the Train A battery had 829 micro-ohms of margin available. Just 6 cells, of the 60 cell battery, at the allowed 150 micro-ohm limit could exceed the available margin. The surveillance permitted all the battery cells intercell resistances to be up to the 150 micro-ohm limit.

<u>Analysis</u>. The failure to adequately verify or check a design value in accordance with NRC design control requirements was a performance deficiency. The finding was greater than minor because it affected the mitigating systems cornerstone objective (design control attribute) to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be a design deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment."

<u>Enforcement</u>. 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, the licensee failed to properly check the adequacy of the 125 Vdc battery design, in that the 150 micro-ohm acceptance criteria used in surveillance procedures was not adequate to ensure battery operability. Because this finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-WF3-2007-01490 and CR-WF3-2007-01722, this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000382/2007007-04), "Inadequate Acceptance Criteria for Battery Cell-to-Cell and Terminal Connection Resistance Value."

.5 <u>Failure to Take Prompt Corrective Measures to Address Degraded Dry Cooling Towers</u>

<u>Introduction.</u> The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the failure to promptly correct a condition adverse to quality (dirt and debris in the dry cooling tower heat exchanger fins). The condition adversely impacted the heat exchangers' heat removal rates. The dry cooling towers had very little design margin under some scenarios. In addition, the licensee failed to

respond to trend data that showed degraded heat exchanger performance, had no basis for the specified 5 year cleaning interval specified in their heat exchanger program, and hadn't actually cleaned the towers for approximately 11 years.

Description. During a plant walkdown on April 17, 2007, the team noted debris between the dry cooling tower fins. The dry cooling tower heat exchangers are water to air heat exchangers. Each train has 15 large electric fans that force cooling air across the heat exchanger fins. There is a small gap between each of the fins, where air must be able to pass to ensure proper heat exchanger performance. The gaps were clogged in several areas of the heat exchangers. The licensee had determined that, when new, the dry cooling tower heat exchangers had only about 3 percent margin for the post-tornado response and about 15 percent margin for the large break loss of coolant accident response.

The team noted that industry guidance documents clearly cautioned against dirt and debris between heat exchanger fins. For example, Electric Power Research Institute's "Alternative to Thermal Performance Testing and/or Tube-Side Inspections of Air-to-Water Heat Exchangers," specified, in part, that the licensee should demonstrate by inspection that the air-side flow paths are unobstructed. The document further explained that one must be able to provide assurance that the air-side finned surface is not blocked by foreign material such as lint and that the entire surface area of the heat exchanger is available to transfer heat. The team noted that the licensee appeared to be actively using this document but had failed to follow this important guidance.

Performance Trending: The team identified that the licensee had not taken any action in response to adverse performance trend data and was not meeting a Final Safety Analysis Report commitment for performance monitoring. The team asked the licensee for trend or performance information for the heat exchangers. The licensee provided a trend of fan motor-power (this was the only trending the licensee was performing). The theory suggested that, as flow through the heat exchanger is impeded, the fans would use less power (they drive less air). The team noted that fan power usage had decreased over time. For example, in 1999, over three years after the last cleaning (and the first data point) the average fan motor power usage for Train A was 42.6 horse power. By 2001, the average fan power usage was only 39 horse power (only two data points were taken). For Train B, the available data was more limited with respect to the time between data gatherings. In 2000, the average fan power usage was 38 horse power and one year later it was still 38 horse power. Since the Trains A and B heat exchangers were identical, and motor power usage for clean heat exchangers should be the same, it appeared that Train B was degraded as well. Engineers stated that they were taking the data but weren't using the information. This was inconsistent the Final Safety Analysis Report. Section 3.1.4.2 states, in part:

> Normally, both dry towers are continuously operated. Therefore, the structural and leaktight integrity of the components and the operability of their active components are demonstrated in this way. <u>Data is taken periodically during normal plant operation to confirm heat transfer characteristics</u>.

Contrary to the above, the licensee had taken dry cooling tower data but failed to evaluate the data and confirm the heat transfer characteristics.

Prior Opportunities: The team also identified that the licensee had previously noted dirt and debris in the heat exchanger fins (a condition adverse to quality) but had failed to promptly correct the condition. For example, Work Request 00004284, dated June 17, 2003, stated, in part:

> The finned tubes [dry cooling Tower A] have a buildup of dust and debris and need to be cleaned at the next opportunity.
>
> Dry cooling Tower B finned tubes have a buildup of dust and debris and need to be cleaned at the next opportunity.

Contrary to the instructions of the work request, the dry cooling towers had not been cleaned, almost 4 years later. The team considered the failure to promptly correct the condition adverse to quality a violation of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Actions.

Cleaning Interval: The team identified that the licensee had no basis for the 5 year cleaning interval specified in their heat exchanger monitoring program and the licensee had not actually cleaned the heat exchangers for about 11 years. Cooling Tower A exterior was last cleaned in April 1996, while cooling Tower B was cleaned in May 1996.

The licensee had included the dry cooling towers in their program for monitoring and cleaning heat exchangers in accordance with Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." Section III.B of the generic letter recommends: 1) periodic thermal performance testing of heat exchangers; or 2) trend test results for both the air and water flow rates in the heat exchangers <u>and</u> perform visual inspections of both the air and water sides. The nominal recommended test/inspection interval was 18 months but licensee's could extend the interval based on sound technical justification.

The team asked the licensee for the inspection interval justification. The justification only considered the condition of the water side of the heat exchanger and made no reference to the buildup of dirt and debris on the air side. Further, the licensee failed to perform meaningful trending of the air flow rates and did not act on results from the visual inspections. The team considered the licensee's justification for the 5 year inspection and cleaning interval for the air-side inadequate.

Licensee Response: In response to the team's concerns, the licensee performed thermography of the heat exchanger surfaces and determined that the data was inconsistent with clean heat exchangers. The licensee took actions to promptly clean the heat exchangers within the next few months. This was reasonable because the heat exchangers are extremely large and cleaning must be performed by a qualified contractor. In addition, the cleaning would be completed before the hottest summer months.

The licensee performed an operability evaluation and determined that the heat exchangers were degraded but capable of performing their safety functions. While there was little design margin, the licensee was able to take advantage of margin elsewhere in the plant. For example, the wet cooling towers (which are also part of the ultimate heat sink) had more design margin. In addition, the licensee had not experienced the worst case design basis outside temperature and humidity conditions in the past year.

Analysis. The failure to promptly correct a condition adverse to quality (degraded dry cooling tower heat exchangers) was a performance deficiency. This finding was more than minor because it was similar to non-minor Example 3.k in NRC Inspection Manual Chapter 0612 Appendix E, "Examples of Minor Issues," in that there was a reasonable doubt of the operability of the dry cooling towers. Using Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to be of very low safety significance (Green) because the finding was a qualification deficiency confirmed not to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment." The finding had a crosscutting aspect in the area of problem identification and resolution (corrective action program attribute) in that the issue was identified but corrective actions were not taken in a prompt manner (P.1(d)). The issue was indicative of current performance because the system engineer was aware of the degraded cooling tower condition for several years.

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," states, in part, "Measures shall be established to assure that conditions adverse to quality, such as... deficiencies and nonconformances are promptly identified and corrected." On June 17, 2003, the licensee identified a deficiency, in that the dry cooling towers were degraded because they had dirt and debris on the heat transfer surfaces. This was a condition adverse to quality. Contrary to the above, the licensee failed to take prompt corrective measures to address the condition adverse to quality. Because the violation is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report CR-WF3-2007-01433, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000382/2007007-05), "Failure to Take Prompt Corrective Measures to Address Degraded Dry Cooling Towers."

4 OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

The team reviewed Waterford 3 condition reports associated with the selected components, operator actions and operating experience notifications. In addition, this report contains the following issue that has problem identification cross-cutting aspects.

Section 1R21.b.5 documents an issue where the licensee failed to take prompt corrective measures to address dirt and debris in the dry cooling towers.

4OA6 Meetings, Including Exit

On May 10, 2007, the team leader presented the preliminary inspection results to Mr. J. Loque, Acting General Manager for Plant Operation, and other members of the licensee’s staff. On May 31, 2007, the Component Design Bases Inspection Team Leader conducted a telephonic final exit meeting with Mr. K. Walsh, Vice President and other members of the licensee's staff. The licensee acknowledged the findings during each meeting. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

ATTACHMENTS: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

K. Walsh, Vice President, Operations
H. Brodt, Engineer, Probabilistic Safety Assessment
K. Cook, Director, Nuclear Safety Assurance
R. Dodds, General Manager, Plant Operations (Acting)
C. Fugate, Manager, Operations (Acting)
J. Holman, Manager, Safety and Engineering Analysis
J. Meibaum, Electrical Maintenance Supervisor
M. Mills, Training Manager
R. Murillo, Manager, Licensing
R. Putnam, Manager, Programs and Components
J. Rachal, Design Engineering Supervisor
R. Stewart, Component Engineering Supervisor

NRC Personnel

D. Overland, Senior Resident Inspector (Acting)

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000382/2007007-01	NCV	Failure to Meet Maintenance Rule Requirements for Dry Cooling Tower Sump Pumps
05000382/2007007-02	FIN	Failure to Implement Foreign Material Exclusion Procedure for Dry Cooling Tower Sumps
05000382/2007007-03	NCV	Inadequate Procedure for Restoring Power to Dry Cooling Tower Sump Pumps
05000382/2007007-04	NCV	Inadequate Acceptance Criteria for Battery Cell-to-Cell and Terminal Connection Resistance Value
05000382/2007007-05	NCV	Failure to Take Prompt Corrective Measures to Address Degraded Dry Cooling Towers

LIST OF DOCUMENTS REVIEWED

Condition Reports

2007-01753	2007-01428	2006-02184	2004-00479	2000-01435
2007-01701	2007-01428	2006-01991	2003-03703	2000-00879
2007-01683	2007-01421	2006-00858	2003-01400	1999-00789
2007-01679	2007-01420	2006-00756	2003-01345	1998-00988
2007-01648	2007-01405	2006-00575	2003-00933	1998-00473
2007-01634	2007-01398	2005-04895	2003-00565	1995-00713
2007-01633	2007-01343	2005-03826	2003-00448	1994-01085
2007-01573	2007-00981	2005-03533	2003-00448	1994-00927
2007-01456	2007-00486	2005-02393	2002-02085	2001-0819
2007-01446	2007-00116	2005-01405	2002-01634	1998-0473
2007-01445	2006-04640	2005-01346	2002-01602	1996-0875
2007-01444	2006-04540	2005-01344	2002-01546	2007-01445
2007-01440	2006-04336	2005-00587	2002-01539	2007-01722
2007-01438	2006-03610	2005-00420	2002-01530	2007-01828
2007-01437	2006-03466	2004-02703	2002-01269	2006-03072
2007-01436	2006-03352	2007-01490	2001-00819	2004-03345
2007-01433	2006-03273	2004-02504	2001-00717	1998-0758
2007-01433	2006-02786	2004-02438	2001-00274	2005-00103
2007-01432	2006-02388	2004-02370		

Calculations

EC-E90-006, Emergency Diesel Generator Loading and Fuel Oil Consumption, Revision 7

EC-E91-050, Degraded Voltage Relay Setpoint & Plant Load Study, Revision 4

EC-E91-055, AC Short-Circuit Calculations, Revision 4

EC-E91-056, Relay Settings and Coordination Curves for 6.9 kV and 4.16 kV and 480 V Buses, Revision 1

EC-E91-058, Battery 3A-S “A” Train Calculation for Station Blackout, Revision 4

EC-E91-061, Battery 3A-S Cell Sizing, Revision 4

EC-E98-001, Calculation of Maximum Allowable Battery Inter-cell Connection Resistance, Revision 0

EC-M94-029, Motor Operated Valves - Minimum Required Thrust for Periodic Verification of Gate Valves, Revision 1

EC-M92-030, MOV Design Basis Review SI-005, Revision 4

EC-M92-036, MOV Design Basis Review SI-001, Revision 6

EC-S01-005, Post-Loss of Coolant Accident Heat Load on Ultimate Heat Sink, Revision A

EC-I01-006, Determination of Secondary Systems Measurement Channels Functional Safety Significance, Revision 0 DRN. No. 05-0034

EC-I01-007, Determination of Emergency Core Cooling Systems Measurement Channels Functional Safety Significance, Revision 0 DRN. No. 05-3

EC-I01-010, Determination of Cooling Water Systems Measurement Channels Functional Safety Significance, Revision 0

ECI03-001, Refueling Water Storage Pool Temperature Instrument Uncertainty, Revision 0 DRN No. 05-643

ECI04-002, Condensate Storage Pool Temperature Uncertainty Calculation, Revision 0 DRN No. 04-0129

ECI91-003, Emergency Feedwater Condensate Storage Pool Level Loop Uncertainty, Revision 2 DRN No. 04-2115

ECI91-005, Wet Cooling Tower Basin Water Level Instrumentation Loop Uncertainty Calculation, Revision 1 DRN No. 05-36

ECI99-001, ESF Response Time Acceptance Criteria Basis, Revision 2

ECM-84-001, Tank Volume / Level Tables, Revision 6 DRN No. 04-1399

ECM95-008, Ultimate Heat Sink Design Basis, Revision 2 DRN No. 05-1603

ECM95-009, Ultimate Heat Sink Fan Requirements Under Various Ambient Conditions, Revision 1 DRN No. 05-1604

EC-M95-012, Minimum Pipe Submergence to Prevent Vortexing, Revision 4

EC-M97-025, Required Submergence to Prevent Vortexing in the Condensate Storage Pool, Revision 0 DRN No. 03-640

ECM99-010, Ponding in the Dry Cooling Tower Basins, Revision 0 Change 2

ECM02-001, Minimum Required EFW Pumps Discharge Pressure during Recirculation, Revision 0

EC-S05-013, Ultimate Heat Sink Containment Heat Loads, Revision 0 DRN No. 05-1451

EC-S98-015, 3716 MWt Containment Pressure and Temperature Response Analysis, Revision 0

MN(Q) 9-3, Heat Removal Capacities of Dry Cooling Tower and Wet Cooling Tower after LOCA, Revision 3 DRN No. 05-1605

MN(Q)9-9, Wet Cooling Tower Losses during LOCA, Revision 5 DRN No. 05-1606

MN(Q)-9-17, Revised Emergency Feedwater Requirements - Design Basis Tornado Event, Revision 2 Change 3

MN(Q)-9-38, Capacity of Wet Cooling Tower Basins, Revision 4

MNQ9-65, CCW Temperature Evaluation, Revision 2 DRN No. 05-1643

MNQ10-1, Emergency Feedwater System Head Curves, Revision 2 DRN No. 03-637

MN(Q)-10-12, NPSH Available for Emergency Feedwater Pumps, Revision 1

MN-62, Auxiliary Feedwater System, Revision 1

9C2-SY, Maximum Heat Rejected by the Essential Chiller to its Condenser Cooling Water During Different Modes of Plant Operation, Revision 0 Change 1

3-H, Diesel Generator Room Ventilation, Revision 0

B13.16, Diesel Oil Feed Tank Level Instrumentation Loop Uncertainty, Revision 1

EC-E90-006, Emergency Diesel Generator Loading and Fuel Consumption, Revision 7

EC-M91-001, EDG Fuel Oil Transfer Pump Recirculation and Discharge Flow, Revision 2

EC-M97-025, Required Submergence to Prevent Vortexing in the CSP, Revision 0

ECI91-053, Diesel Oil Storage Tank Level Instrumentation Loop Uncertainty Calculation, Revision 1

ECM-84-001, Tank Volume/Level Tables, Revision 6

ECM-M95-012, Minimum Pipe Submergence to Prevent Vortexing, Revision 4

MNQ9-46, Component Cooling Water Pumps NPSH Available, Revision 0

Design Basis Documents

W3-DBD-003, Emergency Feedwater System, Revision 2-7 - Grouping (2)

W3-DBD-020, Feedwater System, Revision 1 - Grouping (18)

W3-DBD-013, Containment Spray System, Revision 1

W3-DBD-001, Safety Injection System, Revision 3

W3-DBD-002, Emergency Diesel Generator and Automatic Load Sequencer Design Basis Document, Revision 3

Drawings

5817-9399, Emergency Diesel Generator "A" Starting Sequence CWD Sht. 1, Revision 5

5817-9520, Emergency Diesel Generator "A" Starting Sequence CWD Sht. 2, Revision 5

5817-9401, Emergency Diesel Generator "A" Starting Sequence Description Sheet, Revision 1

5817-9402, Emergency Diesel Generator "A" Starting Sequence Description Sheet, Revision 1

5817-9407, Emergency Diesel Generator "A" Shutdown and Alarm System CWD and Conn, Revision 7

L0065S05, Waterford 230 kV SW. Station, Station One Line, Sh 1 of 3, Revision 1

L0065D15, Waterford 230 kV SW. Station, Breaker S7182 Control Panel Trip 1, 2 & Close, Revision 4

L0065V75W, Waterford 230 kV Switchyard, Bay 3 GCB S7182

Vendor Drawing DC Control Schematic Diagram, Revision 0

L0065V76W, Waterford 230 kV Switchyard Bay 3 GCB S7182 Vendor Drawing DC Control Schematic Diagram, Revision 0

L0065VP3, Waterford 230 kV SW. Station, Bay 3 Breaker S7182 Nameplates Vendor Protection Drawing , Revision 0

LOU 1564 B-289, Sh 14A,Power Distribution & Motor Data 4.16 kV Switchgear 3B2 Protective Relay Settings, Revision 6

G163, Flow Diagram - Containment Spray and Refueling Water Storage Pool, dated 01/18/83

P-4975, Parts List - Top Mechanism Trip Throttle Valve with Hard Packing, dated 01/06/77

B424 Sheet 1419, Control Wiring Diagram - Auxiliary Feedwater Pump, Revision 10

B424 Sheet 1420, Control Wiring Diagram - Auxiliary Feedwater Pump, Revision 4

G153 Sheet 3, Flow Diagram Feedwater, Condensate & Air Evacuation Systems, Revision 40

G-499 S02 Sheet 2, Common Foundation Structure Masonry, Revision 15

1564 G-907, Document Revision Notice DRN C9702673 - Reactor Auxiliary Building Pool Liner Details, Revision 9 to reflect "Adding vortex breakers to the Refueling Water Storage Pool (RWSP) drains PF4 and PF5."

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4305-5685R11, Essential Cooling Water - Auxiliary CCW Pump A Suction from Wet Cooling Towers, Revision 11

5817-9376, EDG Cooling Water Schematic: Train A, Revision 2

B288, Cable and Conduit List, Installation Notes, Revision 14

G375, Cooling Tower Area Lighting, December 19, Revision 1975

G853, HVAC Airflow Diagram, RAB El. +21.00', Revision 0

KSV-47-16, EDG Cooling Water Schematic, Revision June 25, 1975

Modifications

ER-W3-2001-1125-000, CCW Monitoring Plan, Revision 0

ER-W3-2001-1125-001, CCW Monitoring Plan Clarifications, Revision 00

MAI 406238, Route DCT Sumps Discharge, Revision 0

Maintenance Work Authorizations/Work Requests

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00034401-01	51035606	54219-01	1047839	1060844
00034403-01	23578-01	23578-01	1177120	1122470
00064907	67963-01	80456-01	72627-01	54008-01
00064908	36469-01	84743-01	22946-01	1146703
00080756	40765-01	89317-01	63383-01	1146883

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ME-003-210, Station Battery Bank and Charger (Quarterly), Revision 10

ME-003-220, Station Battery Bank and Charger (18 Month), Revision 15

ME-004-213, Battery Intercell Connections, Revision 11

ME-004-235, Station Battery Chargers A & B Setpoint Verification, Revision 12

ME-004-231, Station Battery Charging, Revision 13

ME-003-321, ABB Undervoltage Relay Model 411T5375-L, Revision 3

ME-003-327, 4.16 kV G.E. Magne Blast Breaker, Revision 12

SD1202, High Voltage SF6 Circuit Breaker Maintenance Standard, Revision 2

Emergency Operating Procedure OP-002-000, Standard Post Trip Actions, Revision 10

Emergency Operating Procedure OP-002-002, Loss of Coolant Accident Recovery, Revision 11

Emergency Operating Procedure OP-002-003, Loss of Off-Site Power/Loss of Forced Circulation Recovery Procedure, Revision 5

Emergency Operating Procedure OP-002-004, Excess Steam Demand Recovery, Revision 10

Emergency Operating Procedure OP-002-007, Steam Generator Tube Rupture Recovery, Revision 11

Emergency Operating Procedure OP-002-009, Standard Appendices, Revision 3

OP-009-001, Containment Spray, Revision 11

OP-903-001, Technical Specification Surveillance Logs, Revision 30

OP-903-033, Cold Shutdown IST Valve Tests, Revision 21

OP-903-034, Containment Spray Valve Lineup Verification, Revision 5

OP-903-035, Containment Spray Pump Operability Check, Revision 12

OP-903-036, Containment Spray Actuation Signal Teat, Revision 9

EN-DC-136, Temporary Modifications, Revision 1

EN-DC-311, MOV Periodic Verification, Revision 0

EN-DC-319, Inspection and Evaluation of Boric Acid Leaks, Revision 0

EN-LI-102, Corrective Action Process, Revision 9

MM-006-053, Check Valve Inspection (Swing), Revision 3

NWS-T-8, NWS Safety Valve Test Procedure for ENTERGY - Waterford 3 Dresser / Consolidated Pressurizer Safety Valves, Revision 2

EN-MA-118, Foreign Material Exclusion, Revision 2

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