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QA

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
NRC Inspection Report 89-11

Gentlemen:

In accordance with 10 CFR Part 2.201, Louisiana Power & Light hereby submits in Attachment 1 the response to the Violation identified in Appendix A of the subject Inspection Report.

If you have any questions concerning this response, please contact T.J. Gaudet at (504) 464-3325.

Very truly yours,

R.F. Burski
Manager
Nuclear Safety & Regulatory Affairs

RFB:TJG:ssf

Attachment

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ATTACHMENT 1

LP&L Response to the Violation Identified in Appendix A
of Inspection Report 89-11

VIOLATION NO. 8911-01

Inadequate Design Control

Criterion III of Appendix B to 10 CFR Part 50 states, in part, "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in 10 CFR 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions.... The 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...." This is implemented by the licensee's approved Quality Assurance Plan.

Contrary to the above, the following examples of the failure to control the facility design adequately were identified:

1. Containment sump recirculation valves' backup air supply accumulators were not designed or tested to ensure proper system operation for all conditions postulated by the design basis.
2. Static uninterruptible power supply 3A-S was modified by the addition of a nonsafety-related load to the distribution panel without accounting for the effects of load faults on the inverter operation.

These examples are a Severity Level IV violation.

RESPONSE

(1) Reason For The Violation

Example 1

The root cause of the deficiency cited in example 1 was an inadequate review of design requirements for the noted air accumulators.

Safety injection sump recirculation isolation valves SI-602 A&B are air actuated, safety-related valves that are required to be closed during the safety injection phase and to open on a recirculation actuation signal (RAS) during a design basis event. The Instrument Air System (IA) normally positions the valves. In the event of a loss of IA, air accumulators are provided to supply air to operate these valves. The installation specifications for the SI-602 A&B

accumulators were based on a large break loss of coolant accident (LOCA) with IA not available and a RAS generated within one hour. Accordingly, the accumulators were designed to maintain sufficient pressure to perform their function for one hour. The accumulators were not reevaluated during construction to ensure that they were adequately designed for the small break LOCA. During a small break LOCA scenario, the valves may be required to operate longer than one hour after the IA supply is compromised. (Small break LOCA's are the limiting accident for determining the length of time after a LOCA that the valves must be able to function.)

The possibility that these valves may need to operate beyond the existing one hour limit was identified during LP&L's evaluation of Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety Related Equipment." Thus, in January, 1989, Problem Evaluation/Information Request (PEIR) 10673 was generated to further evaluate this concern.

On March 30, 1989 a Nonconformance Condition Identification (NCI 262265) was issued to expedite the engineering evaluation. Then on March 31, 1989, the situation was determined to be reportable as an unanalyzed condition that has existed since initial startup. (Note: This information has been submitted to the NRC in LER-89-007 via LP&L Letter No. W3A89-0129 dated 5/1/89.)

Example 2

The root cause of the deficiency cited in example 2 was a design inadequacy that occurred during the design phase of the Waterford 3 static uninterruptible power supplies (SUPSs). A brief discussion on the design is provided below. At this point, it is important to note that the inadequate design relates to the design philosophy of the SUPS that was originally established by the Waterford 3 Architect Engineer and not to a deficiency in meeting the regulatory requirements.

Typically, SUPS design incorporates an automatic static transfer switch for instantaneous transfer to a bypass source in the event of a fault on the SUPS output or on feeder circuits. This bypass source provides high current for rapid clearance of the faulted circuit. During the design phase of the Waterford 3 SUPS, a conscientious decision had to be made on whether or not to install this automatic static transfer switch feature. At that time, the NRC and the industry identified several concerns with the operation of uninterruptible power supplies (UPSs) (Reference: NRC (AEOD) Case Study Report - Operational Experience Involving Losses of Electrical Inverters, December 1986). In particular, several failures of static transfer switches had occurred due to problems with solid state devices used in these switches. These failures led to degradation of the inverter and/or the entire UPS system, and the reliability of the static transfer switch was in question. Based on these concerns, there appeared to be no advantage in providing the automatic static

transfer switch for fast fault clearances. Accordingly, Waterford 3 (and some other PWRs) chose not to incorporate this feature into the SUPS design.

The 1E SUPS at Waterford 3 (3A-S and 3B-S which are manufactured by Elgar Corporation) are 10 KVA safety-related power supplies that feed power distribution panels (PDP) 390-SA and 391-SB, respectively. The SUPS are required for normal operation of the plant and safe shutdown during a design basis accident condition. The existing design feature is such that a fault on any load feeder circuit with an instantaneous demand of 165% full load amps will drive the 3A-S/3B-S SUPS into shutdown condition for 0.5 seconds before driving it into the current limiting mode. The protective devices on the feeder may not trip fast enough to isolate the faulted circuit.

During a design basis accident, non-1E loads are postulated to fail in an adverse manner. PDP 390-SA has a non-1E load (Telephone Cabinet PEC 2) on Circuit No. 65. (Note: At that time, the Architect Engineer considered communications to be a vital part of the plant and therefore elected to make such a connection.) Thus, a failure of the non-safety telephone cabinet during a design basis accident has the potential to momentarily shutdown the 1E SUPS and degrade the Class 1E system.

The original understanding of the design was that upon the inception of a fault, the SUPS would supply up to 150% full load amps and then go into current limiting mode. In the event that the current limiting mode failed, the 165% shutoff limit would protect the inverter from severe damage. This arrangement was considered a backup protective feature. The fact that the SUPS could overshoot to the 165% shutoff limit before getting into the 150% current limiting mode condition was not obvious and only realized after the vendor was persistently questioned.

There are four more Class 1E SUPS at Waterford 3, which are of similar design but different manufacture. These SUPS do not have the backup shutoff feature. Consequently, as far as LP&L was concerned, the connecting loads associated with the SUPS had no bearing on the design.

(2) Corrective Steps That Have Been Taken And The Results Achieved

Example 1

A detailed engineering evaluation was performed to address this concern as documented in NCI 262265. The results of the evaluation (as amended on 4/20/89) indicated that adequate operating pressure in the accumulators could be maintained for the limiting small break LOCA (0.01 ft²) in which a RAS is predicted to occur within 16 hours. A

graph of required IA header pressure versus maximum allowable accumulator pressure decay rate was developed. Operations issued Standing Instruction 89-04 to establish IA operation based on the IA header pressure graph. Until a permanent solution is implemented, the IA system pressure will be monitored and controlled by Operations Standing Instruction 89-04.

Example 2

A Nonconformance Condition Identification (NCI 262261) was generated on 3/30/89 to formally address and document corrective actions for the potential loss of power condition for SUPS 3A-S during design basis accident conditions.

On 3/31/89, Circuit No. 65 of PDP 390 was disconnected from SUPS 3A-S at the local terminals in the cabinet. Temporary power from a non-safety supply (PDP 3014 Circuit No. 5) was then provided to telephone cabinet PEC 2 under a temporary alteration (TA 89-009).

All loads on PDP 390-SA and PDP 391-SB were reviewed to ensure that no other non-1E loads existed.

(3) Corrective Steps Which Will Be Taken To Avoid Further Violations

Example 1

Station Modification Request (SMR) SI-007 has been issued to propose several solutions to ensure long term operation of valves SI-602 A&B after a LOCA with a simultaneous loss of IA.

PEIR 71128 has been initiated to review the design basis of the air and nitrogen accumulators with respect to small break LOCAs.

Example 2

A design change will be implemented to make TA 89-009 a permanent installation. (Note: Station Modification Request No. SMR ID-003 has been generated to accomplish this task). Also, the drawings for PDP 390-SA and PDP 391-SB will be marked to ensure that non-1E loads are not added to them in the future.

(4) Date When Full Compliance Will Be Achieved

Example 1

The design basis review of the accumulators is expected to be complete by December 31, 1989. Permanent installation of one of the proposed solutions of SMR SI-007 is expected by Refuel No. 4, at which time LP&L will be in full compliance.

Example 2

The design change (DC 3180) and drawing revision are scheduled for completion by 12/31/89, at which time LP&L will be in full compliance.