

James A. FitzPatrick  
Nuclear Power Plant  
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Harry P. Salmon, Jr.  
Resident Manager

December 7, 1992  
JA-FP-92-0830

United States Nuclear Regulatory Commission  
Document Control Desk  
Mail Station P1-137  
Washington, D.C. 20555

SUBJECT: DOCKET NO. 50-333  
LICENSEE EVENT REPORT: 92-048-00 - Inadequate Seismic  
Installation of Safety Related  
for Valves

Dear Sir:

This updated report is submitted in accordance with  
10CFR50.73(a)(2)(ii)(B), 50.73(a)(2)(v), and 50.73(a)(2)(vii).

Questions concerning this report may be addressed to  
Mr. David Holliday at (315) 349-6359.

Very truly yours,

HARRY P. SALMON, JR.

DAH  
HPS:DAH:tld  
Enclosure

cc: USNRC, Region 1  
USNRC Resident Manager  
INPO Records Center

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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Inadequate Seismic Installation of Safety Related for Valves

LICENSEE CONTACT FOR THIS LER (12)

TELEPHONE NUMBER \_\_\_\_\_

AREA CODE	3 4 9 - 6 3 5 9
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)

☒ NO

EXPECTED  
SUBMISSION  
DATE (15)

MONTH	DAY	YEAR
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ABSTRACT (limit to 1400 spaces, i.e. approximately fifteen single space typewritten lines) 116

EISS Codes are in [ ].

The plant was in cold shutdown for maintenance, refuel, and modification activities. Refueling and vessel reassembly had been completed. On 11/06/92, the seismic installation of two redundant 4160V/600V safety-related transformers [EB] were determined to be inadequate: the coil assembly legs were installed over 1/2" studs, but no washers or nuts were installed. In addition, the enclosure base channels were not anchored to the floor. Each Load Center supplies power to a Control Rod Drive [AA] pump motor and four electrical switchgear enclosures [ED] which supply most safety-related loads in the Reactor Building [NG] such as motor operated valves and distribution panels. Anchorage details were not specifically shown for the transformer support legs on plant construction drawings (Cause Code D). After analyzing the existing conditions against present industry standards, engineering determined that a degraded condition existed and was reportable under 10CFR50.72. Emergency Core Cooling Systems (ECCS) were declared inoperable and the NRC was notified via the Emergency Notification System on 11/06/92. NYPA performed calculations and designed proper anchorages. The transformers and enclosures were anchored by 11/10/92.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

EIIIS Codes are in [ ].

Description of Event

The plant was shutdown for maintenance, refuel, and modification activities. Refueling and reactor vessel reassembly had been completed. On November 6, 1992, the seismic installations of two redundant safety-related electrical transformers were determined to be inadequate. The events leading up to that discovery are as follows:

On August 8, 1992, a 1000KVA safety-related transformer [EB] (identified as 71T-13) shorted out and required replacement. Another transformer (750KVA) was installed temporarily by plant maintenance personnel so that outage related maintenance and modification activities could continue. (See LER-92-035.)

During a walkdown being performed in early October for a proposed modification to retain the 750KVA transformer as a permanent installation for 71T-13, engineering found the temporary transformer not anchored to the floor. Upon further investigation of the unanchored condition it was determined that the original transformer had not been bolted down. Although the coil legs were installed over 1/2" studs welded to the transformer enclosure base channel, no washers or nuts were installed. In addition, the transformer and adjacent breaker enclosure base channels were not anchored to the sills embedded in the floor. The engineers then inspected the redundant safety-related transformer (71T-14) in another area of the same building and found it to have the same unanchored condition.

The transformers, located in the Reactor Building (Secondary Containment) [NG], consist of three 4160V to 600V coils (one per phase) mounted on a common frame with four legs. The four legs sit on a base channel which also supports the frame for the front and rear doors. The transformer section is located between the incoming power disconnect and the supply circuit breakers. The overall unit is commonly referred to as a Load Center [FD].

Each Load Center supplies medium voltage power (600VAC) to a Control Rod Drive [AA] pump motor and four electrical switchgear enclosures, commonly referred to as Motor Control Centers. The Motor Control Centers contain circuit breakers which supply power to safety-related loads such as motor operated valves, pump motors (below 50HP), and electrical distribution and lighting [FG] panels.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

It was not known at the time of the wal down whether the unanchored condition was by design or was an installation error. Engineering personnel looked at transformers in two other similar safety-related load centers in another building which were provided during plant construction by the same supplier. However, these load centers had newer transformers which had replaced the original transformers in early 1987 and they were bolted down. It is not known if the original transformers in these other load centers were bolted down during original plant construction.

A review of design documents was performed by engineering to determine the anchorage requirements for the two transformers. The anchorage details were not specifically shown for the legs on plant construction drawings. The vendor instructions for generic transformer installation specifies the removal of the nuts and washers at each of the four base channel studs. The original equipment supplier, General Electric, and the architect/engineer, Stone and Webster Engineering, were contacted to search for the original anchorage requirements. This search failed to determine original anchorage requirements.

After reviewing existing design information and analyzing the existing conditions against present standards, engineering determined that a degraded condition existed and was reportable under 10CFR50.72. The NRC was notified via the Event Notification System (ENS) on November 6, 1992.

NYPA performed calculations and designed new anchorages for the two transformers, with concurrence from General Electric, using the temporary modification process. By November 10, 1992, the transformer enclosure base channels had been welded to the sills embedded in the floor and the transformer legs were anchored to the transformer enclosure base channels by installing washers and nuts.

Cause

The condition was caused by inadequate installation instructions during original plant construction (NRC Cause Code D). Although approved general equipment foundation drawings issued by General Electric clearly show the 1/2" bolts attaching the transformer enclosure base channel to the sills embedded in the floor, they do not specify anchoring requirements for the transformer legs.



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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Analysis

The condition was not safety significant at the time of discovery. The plant had been shutdown since November 28, 1991. Plant systems had been previously aligned for shutdown cooling and refueling had been completed.

The condition could have been safety significant during a major earthquake more severe than the Operating Basis Earthquake (OBE). Severe seismic movements could potentially cause either (or both) transformers to tip slightly, causing a short circuit or causing the electrical bus bars to bend or fail.

A failure of either transformer during power operation of the plant would result in the inoperability of multiple systems which would require a forced manual plant shutdown to meet Technical Specification requirements. The systems involved include most Emergency Core Cooling Systems (ECCS), including Residual Heat Removal (RHR) (Torus and Shutdown Cooling) [BO], Core Spray [BM], Emergency Service Water (ESW) [BI], Standby Gas Treatment (SBGT) [BH], Standby Liquid Control (SLC) [BR], Control Rod Drive (CRD), Reactor Water Cleanup [CE], Neutron Monitoring System [IG], Drywell Sump [WK], Drywell Cooling [VB], and some ventilation systems [VA].

NYPA Engineering reviewed the unanchored condition and found that the transformer legs would remain in place during an Operating Basis Earthquake (OBE), but may lift during the more severe Design Basis Earthquake (DBE). The analyses were conservative and did not take into account any support or dampening by electrical bus bars or cables.

The Safety Analysis discussed in the Final Safety Analysis Report (FSAR) includes an evaluation of the postulated failure of one complete safety-related 4KV bus as an active component failure in addition to an initiating event. Failure of one safety related Load Center Transformer would be a less severe event. Even if both Load Centers became de-energized, the Automatic Depressurization System (ADS), High Pressure Coolant Injection (HPCI) System [BJ], Reactor Core Isolation Cooling (RCIC) System [BN], and Low Pressure Coolant Injection (LPCI) Subsystems [BO] would have been available to lower reactor pressure and provide cooling water to the core.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

The transformer coils were originally seismically qualified and certified in 1974 to the FSAR design basis by General Electric. NYPA Engineering reviewed and evaluated the structural adequacy of the new modified anchorage for seismic loading. The seismic accelerations used in the design of the modified anchorage are the same as the original design basis specified in the original purchase specification which meets the Final Safety Evaluation Report requirement for Seismic Class I Structures. The evaluation by NYPA shows that the seismically qualified coils with the modified anchorages are adequate to resist the original design basis accelerations for the OBE and the DBE.

The as-found condition requires a report under 10CFR50.73 (a)(2)(ii)(B). It was a condition that resulted in the plant being in a condition that was outside the design basis of the plant.

The as-found condition also requires a report under 10CFR50.73 (a)(2)(v). It was a condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to shutdown the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

The as-found condition also requires a report under 10CFR50.73 (a)(2)(vii). It was a single condition causing two independent trains or channels to become inoperable in systems designed to shutdown the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

Corrective Actions

1. The affected systems were declared inoperable.
2. Other safety-related load centers of similar design were verified to be adequately secured.
3. Seismically qualified anchorages were designed and the legs for both sets of transformers were anchored to the base channels. Completion Date: November 10, 1992.
4. The Load Center enclosure base channel anchorages were evaluated and were welded to the sills embedded in the floor. Completion Date: November 10, 1992.

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Additional Information

Failed Components:

None

(Affected Components: 71T-13, 71T-14)

Similar Events:

None

Related Industry Experience:

NRC Information Notice 80-21, Anchorage  
and Support of Safety-Related Electrical  
Equipment