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POWER & LIGHT

WATERFORD 3 SES • P.O. BOX B • KILLONA, LA 70066-0751

Ref: 10CFR50.73(a)(2)(i)

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A4.05
QA

July 13, 1989

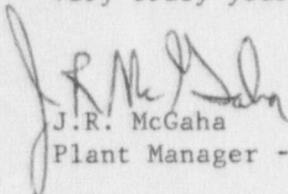
U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Reporting of Licensee Event Report

Gentlemen:

Attached is Licensee Event Report Number LER-88-030-02 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(i).

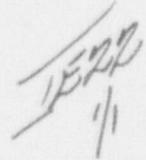
Very truly yours,


J.R. McGaha
Plant Manager - Nuclear

JRM/DME:rk

(w/Attachment)

cc: Messrs. R.D. Martin
J.T. Wheelock - INPO Records Center
E.L. Blake
W.M. Stevenson
D.L. Wigginton
NRC Resident Inspectors Office



LICENSEE EVENT REPORT (LER)

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TITLE (4)
Fire Barrier Discrepancies Dating from Initial Plant Construction

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)							
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)					
1	2	18	8	4	8	8	8	0	3	0	0	0	5	0	0	0
									N/A		0	5	0	0	0	
									N/A		0	5	0	0	0	

OPERATING MODE (9) 6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more of the following) (11)									
POWER LEVEL (10) 0 0 0	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)								

LICENSEE CONTACT FOR THIS LER (12)

NAME A.L. Holder - Supervisor - Nuclear, Fire Protection & Safety	TELEPHONE NUMBER 5 1 0 4 4 6 4 7 3 4 8 2
	AREA CODE

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUF. TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUF. TURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14) <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> 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) (16)

Since November 10, 1988, a number of discrepancies have been identified in fire-rated assemblies at Waterford Steam Electric Station Unit 3. The discrepancies were identified during inspection of fire walls, floors, and ceilings per Licensee Event Report (LER) 88-025 and fire seals per LER 88-030-00. The discrepancies involve fire seals, fire barriers and fire dampers. They also involve fire rated assemblies which had not been previously included in the inspection procedures. Fire seal discrepancies include voiding, missing seals, missing damming, and seals with less than the required depth. Several gaps or holes were found in fire barriers. It was found that the annular space around some ventilation duct penetrations may not be adequately sized to permit fire damper operation during fires. These events were previously reportable as conditions prohibited by Technical Specification (TS) 3.7.11 for fire rated assemblies. However TS 3.7.11 was deleted from the TSS on March 31, 1989.

The root cause of these events is attributed to an inadequate fire assembly design, installation and inspection program during initial plant construction. Most of these discrepancies either have been corrected or will be corrected by November 1989. For those discrepancies requiring more than routine repair such as design changes, a long term corrective action plan is being developed. Compensatory actions for impaired fire rated assemblies will continue until the discrepancies are corrected.

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

On November 10, 1988, Waterford Steam Electric Station Unit 3 was in cold shutdown when Maintenance personnel identified unsealed penetrations in the floor and wall of the Reactor Auxiliary Building (RAB) (EIIS Identifier NF) Computer Room. These discoveries were made during an inspection of fire walls, floors, and ceilings committed to in Licensee Event Report (LER) 88-025. The LER committed to inspecting all fire barriers in accordance with procedure ME-003-009, "Fire Walls, Floors, and Ceilings," by April 30, 1989.

As this inspection continued, more fire rated assembly discrepancies were discovered. These included missing fire-rated penetration seals (fire seals) and fire seals missing damming material. Due to the number of identified discrepancies, plant management decided to perform a 100% inspection of accessible fire seals in accordance with procedure ME-003-006, "Fire Barrier Penetration Seals." These were visual inspections of the exterior portions of the fire seals and were completed by January 15, 1989.

Fire seal and fire barrier deficiencies were reportable as conditions prohibited by Technical Specification (TS) 3.7.11. TS 3.7.11 stated that fire rated assemblies shall be operable in all modes or comply with action 'a' within one hour for the affected assembly. Action 'a' consisted of verifying the operability of fire detection equipment on at least one side of the inoperable fire assembly and establishing an hourly fire watch. In the absence of operable detection equipment it was required that a continuous fire watch be established.

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TS 3.7.11 was deleted from the Technical Specifications on March 31, 1989. These requirements are now administratively controlled under procedure UNT-005-013, "Fire Protection Program." Thus, these discrepancies are considered to be no longer reportable as conditions prohibited by the Technical Specifications. This revision is submitted as a followup to the original LER in order to describe the full scope of the identified discrepancies and the corrective actions.

As a result of the inspections, discrepancies were identified in fire seals, fire dampers, and fire barriers. Out of a total of more than 2000 fire seals in the plant, 230 fire seals were declared inoperable and considered to meet the former reporting criteria. 75 fire dampers were declared inoperable as a result of a review of duct penetrations. 6 gaps or holes in fire barriers rendering these barriers inoperable were identified. Additionally, 3 types of fire rated assemblies were identified that were not included in the fire rated assembly inspection procedures and had not been inspected since initial plant startup. The remainder of this report discusses the above discrepancies.

I. FIRE SEALS

Fire seal discrepancies have been classified into three major categories: (1) seals which were found to contain voids, (2) seals which were not installed according to their typical design detail, and (3) missing seals.

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

Voids were found in 99 fire seals considered to be reportable. In most cases, these voids were discovered when the damming material was removed to check the sealing material for voiding. A void is an air gap in the sealing material which results in a seal depth less than required by the typical design detail. Voids would have resulted from either an insufficient amount of sealing material being injected into the penetration or a failure of the sealing material to properly expand, fill, and solidify in the penetration.

During initial construction, the fire seal vendor installed permanent damming material prior to injecting silicone foam through a hole in the damming material. At the time of installation, seals installed with permanent damming were checked for void formation by inserting plastic cable ties between the damming and the edge of the penetration to feel for resistance from the foam. Void formation in the sealing material was not readily detectable using this inspection method. Thus, the root cause for allowing these voids to go undetected during initial construction was an inadequate vendor fire seal installation/inspection procedure.

The vendor has changed its fire seal installation procedure since initial construction. The seals are now injected through temporary damming material. After the seal cures, the temporary damming material is removed and the seal is inspected. If the seal is satisfactory, permanent damming is then installed. This installation method is also now reflected in Waterford 3 procedure NOCP-301, "Installation and Rework of Penetration Seals, Conduit Seals, Fire Breaks, and Water Barriers." These actions should ensure that subsequent improperly formed seals will be identified and corrected.

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123 fire seals considered to be reportable were found to deviate from the vendor's typical design detail. The types of deviations can be categorized into three groups: (1) silicone foam seals missing damming material, (2) seals that were not installed with the required depth of sealing material in the fire barrier, and (3) other assorted deficiencies. It should also be noted that some of the seals shared two or more of the above deficiencies. Some seals also included voids.

The root cause for missing damming on silicone fire seals is believed to be twofold. In some cases, the damming may have fallen out or may have been pushed out by expanding sealing material. In other cases, it is believed that the permanent damming on silicone foam seals was removed by mistake. This would have occurred when temporary damming used to install nearby high density silicone or leaded elastomer (HDSE/HDLE) seals was removed per the HDSE/HDLE seal installation procedure. HDSE/HDLE seals are not required to be provided with permanent damming.

There are several reasons that seals were installed with less than the required depth of sealing material in the fire barrier:

1. The Nuclear Penetration List (NPL) incorrectly specified a depth less than the required seal depth for certain type seals. This has been attributed to personnel error.
2. Premature removal of temporary damming in HDSE/HDLE seals allowed the seal to spread. These discrepancies have been attributed to not allowing the seal to properly cure in accordance with vendor installation procedures.
3. Some seals were installed in piping sleeves outside the plane of the fire barrier. These discrepancies have been attributed to inadequate quality verification of the seal installation during initial construction.

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4. The seal was not installed with a sufficient quantity of seal material to meet the required depth. This was also due to inadequate quality verification of seal installation during initial construction.

17 seals considered to be reportable were found to deviate from the vendor's typical design detail due to other assorted deficiencies. These deficiencies include the use of incorrect sealing or damming material, inadequate cell structure in the sealing material, imbedded conduits in the seal, and the installation of a one-way fire rated seal backwards. Some of these seals also exhibited some of the other deficiencies described herein. These discrepancies are all considered to be due to inadequate quality verification during initial construction.

There were 19 penetrations and five conduits considered to be reportable that were found to be missing seals. 11 of these penetrations and the five conduits were not listed on the NPL, so they were never identified as requiring seals. In one case, the NPL stated the seal was deleted when in fact it had not been deleted. The remaining penetrations were inaccurately signed off as having been satisfactorily sealed during the initial 100% seal inspection by the Architect Engineer in 1984.

Most of the fire seal discrepancies have been repaired or will be repaired by the end of the third refuel outage, currently scheduled to conclude by the end of November 1989. These corrective actions require routine repair of all or a portion of the seal in accordance with procedure NOCP-301. In some cases, however, the corrective action for fire seals will involve the design change process. These actions are being included in a long term corrective action plan for fire rated assembly discrepancies which cannot be corrected by routine repair. Compensatory actions (fire watches) for impaired fire rated assemblies will continue until the discrepancies are corrected.

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Additionally, there are several hundred fire seals that have been identified as inaccessible. These seals are located in high radiation areas or are obstructed by seismic supports, piping, or angle iron. Some of these seals will be inspected during the third refuel outage. Evaluations are underway to determine the feasibility of obtaining access to the other seals for inspection. The majority of these seals are HDSE/HDLE seals which have demonstrated a low failure rate. These seals will be considered operable unless proven otherwise.

II. FIRE DAMPERS

75 fire dampers have been declared inoperable as a result of a review of drawing details of ventilation duct penetrations. The concern is that the fire dampers may have been installed with less than adequate annular space around the outside of the ductwork for thermal expansion. This could impact fire damper operability during fire conditions. Evaluations are being conducted to determine what the proper ventilation duct penetration configurations should be. A walkdown of these dampers is in progress to determine if mitigating circumstances exist that are not evident in the drawings which would render the dampers operable and to determine appropriate corrective actions for the remaining dampers. Any corrective actions are expected to involve the design change process and will be included in a long term corrective action plan.

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III. FIRE WALLS, FLOORS, & CEILINGS

Six deficiencies meeting former reporting criteria were found in fire rated barriers by the inspection of fire walls, floors, and ceilings. Five of these are classified as initial plant construction deficiencies and include three small openings in fire barriers, and two walls with approximately one and one-half inch gaps where the wall did not meet the ceiling. The gaps were obscured by angle iron. The remaining discrepancy involved the removal of a lifting eyebolt from an equipment hatch. The resultant hole penetrated the equipment hatch, which is a fire rated barrier. The eyebolt was reinstalled and welded to prevent its removal. The other discrepancies have been corrected with one exception (a gap over a ventilation duct) which is presently under evaluation.

IV. PREVIOUSLY UNINSPECTED FIRE RATED ASSEMBLIES

During fire rated assembly inspections, it was discovered that three types of fire rated assemblies were not included in the inspection procedures and had not been inspected since initial plant startup. One hour fire walls were not included in ME-003-009, and isolation joint seals were not included in ME-003-006 or ME-003-009. Thermolag fire barriers had been identified on October 10, 1988, as not having been included in ME-003-009 since initial plant startup (see LER 88-025). Isolation joint seals are installed where floors, walls, and ceilings of the RAB meet the Reactor Containment Building (RCB) (EIIIS Identifier NH). When fire rated assembly inspection procedures were developed during initial construction, these three assemblies were overlooked due to personnel error.

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One hour thermolag fire barriers were included in ME-003-009 on December 27, 1988, and were inspected by April 30, 1989. One hour walls will be included in ME-003-009 and inspected by August 30, 1989. Isolation joint seals will be inspected using special work instructions by September 30, 1989, and will be included in the appropriate procedure by March 31, 1990.

V. CONCLUSION

The primary objective of the Waterford 3 fire protection program is to insure that the systems necessary to achieve and maintain safe shutdown will remain available in the event of a fire. The fire protection program consists of design features, personnel, equipment and procedures to provide defense-in-depth protection of the public health and safety. The program utilizes passive and active fire protection features to minimize the probability and consequences of postulated fires.

Defense-in-depth is provided by detection and suppression systems, manual fire suppression capability, fire rated barriers and administrative control of combustible material. These features are applied to achieve the following objectives:

1. Prevention of fires through the control and separation of ignition sources,
2. Prompt detection and suppression of fires,
3. Confinement of fires to their areas of initiation, and
4. Protection of redundant trains of safe shutdown equipment.

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While fire barriers are a major component of the fire protection program, they are never-the-less only one component of the integrated fire protection program. At no time is the protection of safe shutdown capability dependent upon only one fire protection feature. Had a fire occurred in an area with an impaired barrier prior to its identification as such, other features of the fire protection program would have been available to perform their respective functions and control and extinguish the fire in its area of initiation. While not minimizing the significance of the fire rated assembly discrepancies which have been identified, it is important to acknowledge that this defense-in-depth has to some extent mitigated the potential impact of these discrepancies. Furthermore, in most cases the identified impairment represents a small percentage of the surface area of the fire barrier and as such the barrier would still afford a significant degree of protection.

The extensive inspections performed and the timely corrective actions taken in this area have demonstrated the importance Louisiana Power & Light attaches to the fire protection program. Although the problems found in several types of fire rated assemblies (eg. certain fire seals, isolation joint seals, and fire dampers) may involve a longer term to achieve resolution, they will continue to receive the same degree of attention and resources that have recently been applied in this area. A long term corrective action plan is being developed to properly address these items.

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After initial startup, requirements were placed in the design change procedures to perform a Fire Protection review for any modifications involving fire rated assemblies. In 1988 the installation and rework procedure for fire seals was significantly upgraded based on more recently obtained improved installation practices. The inspection procedure for fire seals was also changed to provide more correct inspection criteria. The extensive inspections and evaluations performed coupled with the procedural changes that have been made along with those planned for the near future provide a high degree of confidence that these types of problems and causes will have been adequately identified and corrected and will not recur. This event did not threaten the health or safety of the public or plant personnel.

SIMILAR EVENTS

LERs 87-021 and 88-011 reported penetration fire seal discrepancies. LERs 85-026 and 88-025 reported firewall discrepancies.

PLANT CONTACT

A.L. Holder, Supervisor-Nuclear, Fire Protection and Safety, 504/464-3482.