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W3F1-2000-0008  
A4.05  
PR

February 4, 2000

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  
Reporting of Licensee Event Report

Gentlemen:

Attached is Licensee Event Report (LER) 00-001-00 for Waterford Steam Electric Station Unit 3. This report provides details of a condition wherein a sprinkler system pressure and flow demand exceeds water supply capability (fire pumps). This coupled with cables from multiple trains being routed in the fire area (RAB 6) and fire loading in the fire area exceeding the protection provided by the one hour fire wrap on the (Appendix R) protected train, resulted in a reportable condition. The condition is being reported pursuant to 10CFR50.73(a)(2)(ii)(B) as outside the design basis of the plant.

This letter contains one commitment (See Attachment 2). If you have any questions, please contact O.P. Pipkins at (504) 739-6707.

Very truly yours,

A handwritten signature in cursive script that reads "E.P. Perkins". The signature is written in black ink and has a long, sweeping underline.

E.P. Perkins  
Acting - Director,  
Nuclear Safety Assurance

EPP/OPP/ssf  
Attachments

IE22

Licensee Event Report (LER-00-001-00)

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cc: (w/Attachments)  
E.W. Merschoff (NRC Region IV)  
N. Kalyanam (NRC-NRR)  
A.L. Garibaldi  
P. Lewis - INPO Records Center  
J. Smith  
N.S. Reynolds  
NRC Resident Inspectors Office  
Louisiana DEQ/Surveillance Division

**LICENSEE EVENT REPORT (LER)**

<b>FACILITY NAME (1)</b> <b>Waterford Steam Electric Station, Unit 3</b>	<b>DOCKET NUMBER (2)</b> <b>05000-382</b>	<b>PAGE (3)</b> <b>1 of 5</b>
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**TITLE (4)**  
**An Appendix R Non-Compliance Outside Design Basis Condition Involving An Inoperable Sprinkler System**

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 NAME	DOCKET NUMBER
01	05	00	00	001	00	02	04	00	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>OPERATING MODE (9)</b> 1	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)</b>							
	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
<b>POWER LEVEL (10)</b> 100	20.2203(a)(2)(i)		20.2203(a)(3)(i)		X 50.73(a)(2)(ii)		50.73(a)(2)(x)	
	20.405(a)(1)(ii)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
		20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		
		20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

**LICENSEE CONTACT FOR THIS LER (12)**

<b>NAME</b> <b>Name / Title</b> <b>O.P. Pipkins, Senior Licensing Engineer</b>	<b>TELEPHONE NUMBER (Include Area Code)</b> <b>(504) 739-6707</b>
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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>				<b>EXPECTED SUBMISSION DATE (15)</b>	MONTH	DAY	YEAR
<b>YES</b> (If yes, complete EXPECTED SUBMISSION DATE).	<b>X</b>	<b>NO</b>					

**ABSTRACT (Limit to 1400 spaces, i. e., approximately 15 single-spaced typewritten lines) (16)**

On January 5, 2000, with the plant operating in Mode 1 at 100% reactor power, it was determined, during reviews of sprinkler system hydraulic calculations, that a fire protection sprinkler system (FPM-18) was inoperable due to system demand exceeding fire pump capability in Fire Area RAB 6. Compensatory measures (continuous fire watches) were established in the Fire Area. Electrical cables for both trains of reactor safe shutdown equipment are routed through the fire area. It was determined that the sprinkler system did not meet original design requirements. Initially, it was believed that actual fire loading in the affected fire area was less than the one hour protection provided by the cable raceway fire enclosures installed on essential Train 'B' raceways in that area. However, during subsequent reviews, it was determined on January 6, 2000 that fire loading in that area actually exceeded one hour. At that point, it was recognized that the condition was outside the design bases and a one-hour notification was made to the NRC. No actual fire event occurred. The condition was determined to be due to an inadequate original design configuration. Corrective measures are being addressed under the plant corrective action program. The condition did not compromise the health and safety of the general public. This event is not considered a Safety System Functional Failure (SSFF).

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

**REPORTABLE OCCURRENCE**

On January 6, 2000, during continuing reviews of a sprinkler system deficiency it was determined that the actual fire loading in the fire area (RAB 6) exceeded the one hour protection provided by the fire rated enclosure installed on essential Train 'B' raceways in the area. The potential existed for a single fire to damage alternate trains of safe shutdown equipment in the area. The condition was reported to the NRC Operations Center via ENS within one hour of the determination of reportability, in accordance with the requirements of 10CFR50.72(b)(1)(ii)(B). The condition is hereby being reported within 30 days of discovery under the requirements of 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant.

**INITIAL CONDITIONS**

At the time of initial discovery of the condition on January 5, 2000, the plant was operating in Mode 1 at approximately 100% reactor power. No major systems, structures or components were out of service specific to this condition.

**EVENT DESCRIPTION**

On January 5, 2000, an Appendix R fire suppression system noncompliance condition was discovered during evaluations associated with a design bases reconstitution effort for plant sprinkler systems and revision of sprinkler system calculations. During reviews of sprinkler system hydraulic calculations, it was determined that fire protection sprinkler system FPM-18 [KP] has a pressure demand that is beyond the capability of the plant fire water supply system (fire pumps). The system demand pressure exceeded the available supply pressure by approximately 200 psi. Thus, the system design is inadequate when compared to the original design and performance requirements of the system. At 0928 on January 5, 2000, Operations declared FPM-18, RAB +35 West Penetration Area, inoperable due to the condition. The plant entered Technical Requirements Manual (TRM) 3.7.10.2 Action 'a.' and issued a fire impairment (#00-005). A continuous fire watch was established

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

in the area as a compensatory measure. It was determined that the combustible loading in the fire area exceeds 70 minutes, which is beyond the fire resistance rating of the one hour fire barriers installed on Train 'B' essential equipment cables in the area.

**CAUSAL FACTORS**

The root cause of the condition was determined to be design configuration and analysis: original design inadequate. Specifically, input errors in the original hand prepared hydraulic calculations caused the deficiency. The calculations did not adequately account for the number of fittings and lengths of piping in the system. The calculations also applied an incorrect minimum required pressure for cable tray spray nozzles. The combination of these input errors, when corrected, results in a higher sprinkler system pressure demand.

A contributing cause included design configuration and analysis: inadequate review of design. It is believed that the reviews performed may have consisted of checking the calculation math (by hand) and possibly not scrutinizing the calculation methodology.

**CORRECTIVE ACTIONS**

Immediate actions involved establishing a continuous fire watch in the fire area (RAB 6) as required by TRM 3.7.10.2. Physical piping changes will be made to the sprinkler system to reduce the pressure drop in the system. The hydraulic calculations for all sprinkler systems calculated by the applicable vendor (Viking Sprinkler Company) are being reviewed and all identified discrepancies are being addressed via the Waterford 3 Corrective Action Program.

**SAFETY SIGNIFICANCE**

The condition involved a sprinkler system (FPM 18) pressure demand exceeding the capability of the plant fire water supply system. The sprinkler system protects fire area RAB 6 located in the

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Reactor Auxiliary building, + 35 elevation, which has an approximate 3,600 square ft floor area. The area is an electrical penetration area with a high concentration of cables routing through it in cable trays. Among the cables routed through the area are essential Train 'A' and 'B' and 'AB' cables. The area is provided with sprinkler protection at the ceiling and within trays. The area is also protected with an automatic, early warning smoke detection system, hose stations, fire extinguishers and a one-hour fire rated enclosure for all essential Train 'B' raceways. The calculated combustible loading in the area is 71 minutes. The combustible loading in the area exceeded the capability of the one-hour rated raceway fire barriers. This presented the potential for damage to redundant trains of equipment required for reactor safe shutdown in the event of a fire in the area. The condition is not risk significant because the cables in the area are IEEE-383 rated, and are typically characterized as having a slow fire growth rate and limited fire spread potential. The automatic fire detection system would provide early warning of a fire, allowing rapid response and manual fire extinguishing activities using the plant fire brigade. The one-hour fire rated barrier on essential Train 'B' cables mitigates any potential delay in manual response actions. Although deficient, the sprinkler system would have delivered water to a fire in the area.

In addition, the fire IPEEE model was used to quantitatively assess the risk impact of this condition. The fire IPEEE model conservatively assumed that all cables in the fire area, except for the EFW control and isolation valve cables, would fail in a fire. Fire modeling was used for the EFW control and isolation valves to determine which cables would actually fail. The sprinkler system deficiency was represented by assuming that automatic suppression was completely failed. Manual suppression was modeled, and a probability of manual suppression failure was estimated. It was assumed that successful manual suppression would protect the fire-wrapped B train cables in the fire area. In calculating the risk impact, the plant systems associated with cables that could be failed in a fire in RAB 6 were set to failed and the fire IPEEE fault tree was solved to estimate the probability of random, non-fire-related failure of available mitigative systems. The resulting conditional core damage probability (CCDP) was multiplied by the fire frequency to give the core damage frequency

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(CDF). The CDF increase associated with this degraded condition was estimated as 1.8E-7 per year, which would be considered a very small risk by the guidance of NUREG-0800, Section 19.0, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking: General Guidance." This is considered to be a conservative estimate because any non-EFW control and isolation valve cables that were routed through the fire area were assumed to be failed, regardless of whether an actual fire could fail them all. Fire modeling of various postulated fire sources against the cables as actually routed would be expected to show less (more localized) damage, and result in lower CDFs, than assumed in this evaluation.

This event is not considered a Safety System Functional Failure (SSFF).

**SIMILAR EVENTS**

Similar events were documented in LER 99-009-00 and 99-016-00. This condition was another case where design configuration and analysis deficiencies resulted in not being able to provide adequate sprinkler coverage for the entire fire area. The conditions are being identified as a result of an ongoing design reconstitution reviews of plant sprinkler systems.

**ADDITIONAL INFORMATION**

Energy Industry Identification System (EIIIS) codes are identified in the text within brackets [ ].

**COMMITMENT IDENTIFICATION/VOLUNTARY ENHANCEMENT FORM**

Attachment 2 to W3F1-2000-0008  
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COMMITMENT(S)	ONE-TIME ACTION*	CONTINUING COMPLIANCE*	SCHEDULED COMPLETION DATE (IF REQUIRED)	ASSOCIATED CR OR ER
Physical piping changes will be made to the sprinkler system to reduce the pressure drop in the system.	X			CR-WF3-2000-0002

\*Check one only

VOLUNTARY ENHANCEMENT(S)	ASSOCIATED CR OR ER