NRC-01-089

NMC
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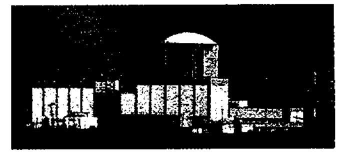
Kewaunee Nuclear Power Plant
N490, State Highway 42
Kewaunee, WI 54216-9511
920-388-2560

Operated by
Nuclear Management Company, LLC



August 14, 2001

10CFR 50.73

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

Ladies/Gentlemen:

DOCKET 50-305
OPERATING LICENSE DPR-43
KEWAUNEE NUCLEAR POWER PLANT
REPORTABLE OCCURRENCE 2001-004-00

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," the attached Licensee Event Report (LER) for reportable occurrence 2001-004-00 is being submitted. This report contains no new commitments.

Sincerely,

Kyle A. Hoops
Manager-Kewaunee Plant

ADB

Attach.

cc - INPO Records Center
US NRC Senior Resident Inspector
US NRC, Region III

IE22

NRC FORM 366 (1-2001)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)		Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4)

Air Volume Booster Diaphragm Failure Results in RPS Actuation and Reactor Trip

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	20	2001	2001	-- 004 --	00	08	20	2001	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	096

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Anthony David Bolyen – Plant Licensing	(920) 388-8864

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SJ	FCV	M430	Y					

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

On 6/20/01 at 0011 CDT, while the plant was operating at ninety-six percent power, a Reactor Protection System (RPS) actuation occurred when the feedwater (FW) regulating valve (FW-7B) to the "B" steam generator failed to the closed position. All other safety-related equipment operated as expected. Feedwater is regulated by 12-inch air-operated valves (AOV) (FW-7A and FW-7B). An Air Volume Booster is in line with each valve actuator to assist in air bleed off during a feedwater isolation signal. During the post-trip recovery, plant personnel inspected the Air Volume Booster for FW-7B and identified a tear in the diaphragm. The root cause of this event is the "running to failure" maintenance schedule for FW Regulating Valve Volume Booster Relays. This event was reported in accordance with 10CFR50.72(b)(1)(iv)(B) as a valid RPS actuation.

This event was analyzed from a Probabilistic Risk Assessment (PRA) perspective. The incremental core damage probability (ICDP) and incremental large early release probability (ILERP) were 4.66E-09 and 5.26E-12, respectively. Thus, this event was of negligible safety significance.

The Air Volume Boosters for both FW-7A and FW-7B were replaced. Following repairs, the reactor became critical on June 21 at 0225 CDT, and the plant output breaker was closed at 1205 CDT. Full power was reached on June 22, 2001 at 1050 CDT.

DESCRIPTION

On June 20, 2001 at 0011 CDT, while the plant was operating at ninety-six percent power, a Reactor Protection System (RPS) [JC] actuation occurred. The RPS trip actuated by a steam flow and feedwater flow mismatch in coincidence with water level in the "B" steam generator [SG] below the low level trip setpoint. The feedwater regulating valve (FW-7B) [FCV] to the "B" steam generator failed to the closed position. Plant Operators (utility, licensed) attempted to control the valve manually; however, manual control was also affected by the failure.

Following the trip, the rod bottom light for control rod D4 was off; however, the Individual Rod Position Indicator (IRPI) for control rod D-4 indicated zero. Emergency boration was used to inject the required amount of boric acid for one stuck rod. Subsequent to the reactor trip, a letdown isolation signal was received. Letdown isolation was an expected response to the transient. When letdown isolation valve LD-2 went closed, it indicated mid-position instead of closed, which disabled normal letdown. Excess letdown was established at 0028 CDT. All other safety-related equipment operated as expected.

CAUSE OF THE EVENT

Feedwater flow is regulated by 12-inch air-operated valves (AOV) (FW-7A and FW-7B). Each AOV consists of a diaphragm actuator attached to the valve stem. An Air Volume Booster is in line with each valve actuator to assist in air bleed off during a feedwater isolation signal. The Air Volume Booster provides a one-to-one change in pressure with increased volumetric flow and consists of two chambers with a rubber diaphragm sealed between.

During the post-trip recovery, plant personnel inspected the Air Volume Booster for FW-7B and identified a tear in the diaphragm. Laboratory analysis has determined the actual failure mechanism to be diaphragm-to-booster body bonding, which led to tearing of the neoprene diaphragm. KNPP does not have a regular replacement schedule for volume boosters. Therefore, the root cause of this event is the "running to failure" maintenance schedule for Feedwater Regulating Valve Volume Booster Relays. The Air Volume Booster for FW-7B was last replaced in 1989.

The rod bottom light for control rod D4 was found to be burned out. Rod D4 fully inserted into the core. Letdown Isolation Valve LD-2 had fully closed but indicated mid-position because the shaft had rotated such that the closed position limit switch was not engaging.

ANALYSIS OF THE EVENT

This event was reported in accordance with 10CFR50.72(b)(1)(iv)(B) for a valid Reactor Protection System actuation. Because all safety-related equipment performed their safety-related functions, this failure does NOT constitute a Safety System Functional Failure as described by 10CFR50.73(a)(2)(v).

This event was analyzed from a Probabilistic Risk Assessment (PRA) perspective. The base case core damage frequency (CDF) and large early release frequency (LERF) with the configuration that existed at the time of the event were 4.467E-05/year and 6.485E-06/year respectively. As a result of this event, the CDF and LERF were calculated to be 4.733E-05/year and 6.488E-06/year respectively. The configuration

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TEXT CONTINUATION

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

lasted from 0011 to 1532 on June 20. This duration is 15.35 hours. The incremental core damage probability (ICDP) and incremental large early release probability (ILERP) were then:

ICDP = [4.733E-05/year – 4.467E-05/year] x 15.35hours x 1year/8760 hours = 4.66E-09.

ILERF = [6.488E-06/year – 6.485E-06/year] x 15.35hours x 1year/8760 hours = 5.26E-12.

Therefore, this event was of negligible safety significance.

CORRECTIVE ACTIONS

The Air Volume Boosters for both FW-7A and FW-7B were replaced. Both diaphragms were sent to an off-site laboratory for analysis. As part of our corrective action program, KNPP is establishing a regular replacement schedule for select components in the feedwater regulating valve air control circuits.

Following repairs, the reactor became critical on June 21 at 0225 CDT and the plant output breaker was closed at 1205 CDT. Full power (526.7 MWe, 96 percent) was reached on June 22, 2001 at 1050 CDT.

SIMILAR EVENTS

During the last three years, KNPP has experienced no RPS actuations as a result of a failed air booster.

ADDITIONAL INFORMATION

Air Booster FW-7B is manufactured by Moore Products Co., model number 61H, B/M 10342S16CD.