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U. S. Nuclear Regulatory Commission
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Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Reportable Occurrence 92-020-01

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," Revision 1 to Licensee Event Report 92-020 is being submitted. This revision corrects minor typographical errors and descriptive information contained in our original submittal dated December 1, 1992.

Sincerely,

C. A. Schrock
Manager-Nuclear Engineering

VJC\jms

Attach.

cc - INPO Records Center
Mr. Patrick Castleman, US NRC
US NRC, Region III

IE22

NRC Form 366
(9 83)

U S NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

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TITLE (4) Manual Reactor Trip Initiated Due to Low Forebay Level, Loss of Traveling Water Screens, Decreasing Condenser Vacuum, and Electrical Generator Output Dips

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)
										N/A	0 5 0 0 0
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OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10) 1 0 0	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Victoria J. Cuneo - Licensing	AREA CODE 4 1 4 — 4 3 3 – 1 6 8 5

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	
X	E I A	I 5 2	M 1 7 5	Y							
X	S J	F C V	C 6 3 5	Y							

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

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

This report describes the events that led to the initiation of a manual reactor trip from 100 percent power, and the post-trip plant response. The manual reactor trip was initiated at 2340 hours on November 1, 1992 in response to low forebay level, the failure of all four traveling water screens, decreasing condenser vacuum, and dips in electrical generator output. Following the manual trip, plant systems responded as designed with the following two exceptions:

1. A non-safety related circuit breaker, 1-407, which connects an alternate supply of power to electrical bus 4 from the reserve auxiliary transformer did not automatically close on a loss of power to the main auxiliary transformer.

2. Feedwater control valve, FW-7A, failed to close completely.

The event was initiated by a buildup of debris on the traveling water screens which resulted in a low forebay level and subsequent failure of the screens. Sustained strong easterly winds had resulted in increased amounts of debris being deposited on the screens.

Prior to returning the plant to service, a post-trip review was performed to determine and correct the causes of the equipment malfunctions. Breaker 1-407 and FW-7A were tested and shown to operate correctly. Additional testing of each component is scheduled for the 1993 refueling outage. The plant was connected to the grid at 1121 on November 3, 1992.

DESCRIPTION

This report describes the events that led to the initiation of a manual reactor [RCT] trip from 100 percent power and the subsequent post-trip plant response. The manual reactor trip was initiated at 2340 hours on November 1, 1992 in response to deteriorating operating conditions. Sustained strong easterly winds had existed throughout the day which resulted in increased amounts of debris being deposited on the traveling water screens [SCN], and intermittent differential pressure alarms. Operating staff had taken mitigating actions by placing the screens in continuous backwash operation and were frequently checking the screens. Other than the continuous backwash of the screens, plant operations were normal with two circulating water pumps [P] in operation.

Approximately five minutes preceeding the initiation of the trip, the Control Room received a forebay level alarm, indicating that insufficient water was passing through the screens to meet the demands of normal power operation with all pumps running. In accordance with emergency procedures, one of the two circulating water pumps was manually tripped and forebay level recovered.

Over the next few minutes, forebay low-low level alarms were received three times; each time, the operating circulating water pump (CWP) automatically tripped as designed, and forebay level recovered sufficiently to allow operating staff to restart CWPs in an attempt to maintain plant operation until the screens could be cleared.

During this same time period, three megawatt electric (MWe) load fluctuations occurred. The first 63 MWe fluctuation coincided with the first trip of all CWPs and was recovered when a CWP was restarted. Within the two minutes immediately preceeding the trip, forebay low-low level alarms and CWP automatic trips occurred twice; all four screens were reported out of service; a condenser [COND] vacuum low alarm was received; and two large (442 and 426 MWe) load fluctuations occurred. Each large load swing was accompanied by lifting of the moisture separator reheater steam relief valves.

Based on deteriorating plant conditions, the Shift Supervisor directed the initiation of a manual trip at 2340 hours.

Following initiation of the manual trip, all plant systems responded as designed with the following two exceptions:

1. Non-safety related circuit breaker 1-407, "Reserve Auxiliary Transformer 4160V Supply," did not automatically close to transfer Bus 4 loads from the Main Auxiliary Transformer to the Reserve Auxiliary Transformer as designed. The breaker also failed to close in response to a manual close signal initiated from the Control Room.

   The 480V electrical buses normally supplied from Bus 4 (1-42, 1-43, and 1-45) automatically transferred (through a crosstie design feature) to their respective 480V

buses supplied from 4160V Bus 3. The 480V Bus 1-46 automatically loaded on the Technical Support Center Diesel Generator as designed.

2. FW-7A, "Main Feedwater Flow Control Valve [FCV] to Steam Generator A," control room valve status lights indicated the valve was in an intermediate position and had not fully closed as designed. Control room flow indication confirmed there was no flow in the associated feedwater line.

In addition to the two equipment malfunctions noted above, operating staff failed to complete the shift channel checks for Volume Control Tank level (Table TS 4.1-1 item 17) and Regenerative Heat Exchanger Flow (Table TS 4.1-1 item 13) within the required surveillance period.

CAUSE OF THE EVENT

Reactor Trip

The reactor trip was manually initiated due to the deteriorating plant conditions noted above.

Low Forebay Level

The cause of the low forebay level is attributed to the blockage and subsequent failure of the Traveling Water Screens.

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

Traveling Screen Failure

The failure of the Traveling Water Screens is attributed to the excessive amount of organic debris (logs and seaweed) entering the intake structure as a result of sustained strong easterly winds. The debris bound the traveling water screens and caused all 4 protective shear pins and one drive chain to break.

Low Vacuum

The degradation of normal condenser vacuum is a result of the loss of circulating water pumps due to low-low forebay levels. With the screens unable to turn, debris clogged the screens and prevented an adequate amount of water from entering the forebay for normal circulating water pump operation.

Megawatt Output Load Fluctuations

A definitive cause of the initial 63 MWe load dip could not be determined. Although an extensive post-trip review was performed, the current data point recording capability (coupled with the momentary duration of the load dip) did not provide sufficient evidence for a definitive determination. Several potential causes for the load variation were hypothesized and reviewed. These included: grid fluctuation; main steam control valve movement; low pressure turbine intercept valve closure; moisture separator reheater drain line opening and dumping steam into the Condenser; and Condenser pressure increase. Evaluations are continuing.

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

Kewaunee has limited computer data collection capability fo. parameter trending of short duration events. Additional information needed to diagnose the load swings was either not trended by the plant process computer or the time between recorded data points was too long to aid in the evaluation. The plant process computer has over 500 analog input data signals which are recorded every hour. Of these data points, 200 points can be recorded every 2 minutes and 96 of the points can be recorded every 15 seconds. Each fluctuation in electrical generator output lasted approximately 1 minute. For each hypothesis, the available recorded data would not support a final determination of cause.

The 442 and 426 MWe load swings were caused by the closure of the four low pressure turbine intercept valves. The intercept valves are designed to close when a load rejection condition is anticipated. These valves are designed to close when a 30 percent or greater mismatch exists between megawatt electric output and the low pressure turbine inlet pressure (sensed downstream of the intercept valves). However, due to an accumulation of instrument deviations, the intercept valves closed at a mismatch of approximately 15.7 percent. It is believed the 15.7% mismatch resulted from increased LPT inlet pressures caused by increasing condenser pressure.

Breal 'r 1-407 Failure

A definitive cause for the failure of breaker 1-407, "Reserve Auxiliary Transformer 4160V Supply" to close on either an automatic or manual actuation signal has not yet been determined. The breaker was removed and bench tested. The breaker actuated as designed. A replacement breaker was installed. Troubleshooting of the Westinghouse W-2 control room

switch for breaker 1-407 was performed and the switch functioned properly. Additional testing of the failed breaker will be performed. Additional testing of the control room switch is scheduled for the 1993 refueling outage.

FW-7A Failure to Close

The root cause for the failure of FW-7A to close completely could not be determined. FW-7A was cycled numerous times and monitored each time to ensure valve closure. For the initial two closures, the valve remained approximately 1/16 of an inch open; however, for the remainder of actuations the valve closed completely as designed. Further diagnostic testing is scheduled for FW-7A and FW-7B for the 1993 refueling outage. A rebuild of FW-7A's operator and internal valve inspection is also scheduled for the 1993 refueling outage.

Failure to Perform Shift Channel Checks

The two readings for SP 18-125 were not recorded within the "once per shift" Technical Specification requirement because the Nuclear Auxiliary Operators were performing higher priority activities to stabilize the plant and restore plant systems.

ANALYSIS OF THE EVENT

The low forebay level had minimal safety significance. Adequate forebay level and service water supply was maintained for normal and emergency functions. Both the service water and fire systems remained operable throughout the event.

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

The failure of the traveling screens had minimal safety significance. Adequate water supply was available to the service water and fire pumps.

The safety significance of the electrical output variations was minimal. Although this event involved large dips in electrical output, they had no effect on the primary system. Primary plant parameters remained constant during the electrical swings. Westinghouse was consulted concerning the effects of the large megawatt electric swings on the turbine generator. Westinghouse concluded that the generator was capable of withstanding that magnitude of load dips without any damage to the equipment.

The failure of Breaker 1-407 to actuate as designed was of minimal safety significance. Electrical Bus 4 does not power safety related equipment. When the automatic transfer of Bus 4 to the Reserve Auxiliary Transformer did not occur, the 480V electrical buses powered from Bus 4 (1-42, 1-43, and 1-45) were automatically repowered (through a crosstie feature) from 480V buses supplied by Bus 3. The 480V bus 1-46 automatically loaded on the Technical Support Center Diesel Generator as designed. A spare breaker was installed for breaker 1-407 and returned to service within 2 hours of the manual trip.

The failure of FW-7A to completely close was of minimal safety significance. FW-7A is the main feedwater control valve, and receives a closure signal to isolate feedwater if any of the following conditions are met: steam generator hi-hi level, safety injection, or reactor trip concurrent with low average reactor coolant temperature. Although the valve did not completely

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close as designed, there was no indication of feedwater flow in the control room. In addition, the downstream valve, FW-12A, was capable of closure to ensure feedwater isolation was completed.

Failure to complete the two channel check surveillances had minimal safety significance: the channel checks were satisfactorily completed within two hours of their required surveillance interval.

The reactor trip is reportable in accordance with 10CFR50.73(a)(2)(iv) as an event that resulted in actuation of the reactor protection system. This event was also reported in accordance with 10CFR50.72(b)(2)(ii) at 0040 hours on November 2. 1992.

The missed surveillance is being reported in accordance with 10CFR50.73(a)(2)(i)(B) as a violation of Technical Specification Table 4.1-1 items 13 and 17.

CORRECTIVE ACTIONS

The following corrective actions were completed prior to returning the plant to operation:

1. A post trip review was conducted to verify that the plant responded as designed. Equipment malfunctions were investigated and troubleshooting was performed.

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2. The Nuclear Auxiliary Operators replaced shear pins in two of the four Traveling Water Screens and returned them to service within approximately ten minutes of the trip. All four screens were repaired prior to the plant resuming normal operation.

3. The missed shift channel checks were completed at 0209 on November 2, 1992. Control room indication was re-checked to verify the readings were within allowed channel deviations. Each channel check was acceptable.

4. The low pressure turbine inlet pressure transmitter was recalibrated. Additional instruments in the loop were also checked and calibrated as necessary. The setpoint will now actuate at the desired 30 percent mismatch between megawatt electric output and LPT inlet pressure.

5. Circuit Breaker 1-407 was replaced. The automatic transfer and manual closure circuitry were tested satisfactorily for the replacement breaker prior to restarting the plant.

6. FW-7A was successfully tested.

Following the performance of a post trip review and corrective actions, the plant was reconnected to the grid at 1121 on November 3, 1992.

ADDITIONAL INFORMATION:

EQUIPMENT FAILURES:

1. McGraw Edison Company (American Switch Gear Corp) 5000 Volt/2000 Amp circuit breaker model PSD.

2. Copes-Vulcan, Inc. 16" 900 psi Globe valve model D-100.

SIMILAR EVENTS:

Although Kewaunee has not had any similar reportable events, the forebay level has decreased numerous times during Kewaunee's 18 years of operation requiring manual tripping of CWPs or resulting in automatic CWP trips. These events were caused by a build up of ice on the Traveling Water Screens of the intake structure.