Commonwealth Edison
Zion Generating Station
Shiloh Blvd. & Lake Michigan
Zion, Illinois 60099
Telephone 708 / 746-2084

February 15, 1990

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

Dear Sir:

The enclosed Licensee Event Report number 90-002-00, Docket No. 50-295/DPR-39 from Zion Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(vii)(B), which requires a 30 day written report when any event occurs where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to remove residual heat.

Very truly yours,

for T. P. Joyce
Station Manager
Zion Generating Station

TPJ/PG/or

Enclosure: Licensee Event Report

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
CECo Distribution List

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Zion Unit 1	0 5 0 0 0 2 9 5	1 of 0 5

Title (4)

1A Auxiliary Feedwater Pump Cavitation

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)
0 1	1 6	9 0	9 0	---	0 0 2	--- 0 0	0 2	1 5	9 0	N/A	

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)											
7	0 0 1	___	20.402(b)	___	20.405(c)	___	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)	X	50.73(a)(2)(vii)	___	Other (Specify in Abstract below and in Text)				
		___	20.405(a)(1)(iii)	___	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
	AREA CODE
Dennis Sheehan, HPES Coordinator ext. 2361	7 0 8 7 4 6 - 2 0 8 4

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
A	B A	P	P 0 2 5	Y						

SUPPLEMENTAL REPORT EXPECTED (14)		Expected Submission Date (15)	Month	Day	Year
___ Yes (If yes, complete EXPECTED SUBMISSION DATE)	___ X NO				

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

Unit 1 was in Mode 7, Low Power Physics Testing, approximately 1 percent reactor power, and at normal operating pressure and temperature. Due to a combination of management error and procedural deficiency, the 1A turbine driven Auxiliary Feedwater (AFW) Pump was run deadheaded (all discharge valves and the recirculation valve shut). This operation damaged the pump. When the 1A pump was manually tripped, steam vented back into the suction line, and caused the 1C AFW pump to also trip, on a low suction pressure signal. The 1B AFW pump was started. The 1A AFW pump was disassembled, and the pump impeller replaced. Training will be conducted to emphasize the proper course of action when procedural deficiencies are identified. The safety significance was minimal because the 1B AFW pump was always available; reactor power was low, so there was no danger of loss of heat sink; and the low suction pressure condition was momentary, so the 1C pump was also available immediately after the trip signal cleared.

A. CONDITION PRIOR TO EVENT

MODE 7 - Physics Testing RX Power 1% RCS [AB] Temperature/ Pressure 547 °F/2235 psig

There was no equipment out of service prior to this event that affected the severity of the event.

B. DESCRIPTION OF EVENT

The Unit was in Mode 7 - Low Power Physics Testing, approximately 1 percent reactor power, and at normal operating pressure and temperature. Reactor power and temperature were being maintained constant due to moderator temperature coefficient concerns. The 1B and 1C Auxiliary Feedwater (AFW) Pumps were in operation supplying feedwater to the Steam Generators. The discharge flowpaths for the AFW System were in a split configuration, due to the 1A AFW Pump being considered administratively inoperable. The 1A turbine driven AFW Pump was administratively inoperable pending the completion of modification testing. There were no additional maintenance activities in progress that were directly related to the event.

In preparation for the operability test on the 1A AFW pump, (PT-7), the 1B AFW Pump was gradually unloaded by slowly throttling closed the Steam Generator (S/G) Isolation Valves FW0050, 0052, 0054 and 0056. This was done in an effort to maintain reactor coolant temperature and control rod positions as constant as possible due to moderator temperature coefficient (MTC) concerns. Reactor coolant temperature and control rod positions were being maintained within very narrow limits to maintain a negative MTC as fission poisons burned in. After unloading the 1B AFW Pump it was shutdown in preparation for testing the 1A AFW Pump. After completing the shutdown of the 1B AFW Pump, the Unit Nuclear Station Operator (NSO) in reviewing the test procedure noted that the procedure would result in the isolation of the recirculation flow for the 1A AFW Pump during the time required to gather pump performance data. In the present plant configuration (FW0050, 0052, 0054, and 0056 closed) this would result in the 1A AFW Pump being in a deadheaded condition. The Shift Supervisor did not understand the full extent of the Unit NSO's concern about the configuration. The 1A AFW Pump was started and was operated on recirculation flow for approximately 15 minutes. During this period the Unit NSO once again questioned Shift Supervisors about closing the recirculation flow path that would be performed in upcoming steps. The Shift Supervisor consulted with the Shift Engineer, and determined that the procedure should be followed as written. This determination was based on knowledge of the procedure and review of the Station P&ID drawings, instead of actual conditions. During this time frame, the Unit NSO was taking data on feed flow being supplied to the Steam Generators. In the current configuration this flow was being supplied by the 1C AFW Pump instead of the 1A AFW Pump that was being tested. At this time the Unit NSO asked the Shift Supervisor why the AFW System flows were being recorded, because the flow was only being supplied by the 1C AFW Pump. The actual procedure was then reviewed by the Shift Engineer.

B. DESCRIPTION OF EVENT (Continued)

At approximately 19:17 the 1A AFW Pump recirc valve was closed. At approximately 19:24, the operators stationed locally at the 1A AFW Pump noted an abnormal temperature rise on the pump's thrust bearing, water hammer sounds, and the oil cooling water relief valve had lifted. The 1A AFW Pump was manually shutdown from the Control Room at approximately 19:25. The 1A AFW Pump impeller was damaged, and required replacement. After shutdown of the 1A AFW Pump, the 1C AFW Pump auto tripped on low suction pressure. Investigation has shown this to be the result of a pressure transient induced due to steam venting back into the suction header from the 1A AFW Pump after shutdown. The 1B AFW Pump was locally verified to be vented and then was started. The S/G Isolation Valves FW0050, 0052, 0054, and 0056 were reopened, and feed flow was re-established to the Steam Generators.

C. APPARENT CAUSE OF EVENT

A formal Human Performance Evaluation System investigation was conducted, and found the cause of this event was personnel error compounded by procedural deficiency.

The following inappropriate actions took place:

1. The Shift Engineer (SE) assumed pump discharge valves were throttled.
2. The Shift Control Room Engineer (SCRE) assumed procedure intended to deadhead pump.
3. The SCRE allowed the PT to continue.
4. The NSO directed the Equipment Operator (EO) to close the recirculation valve 1FW-0041.

The following factors led to each inappropriate action:

Inappropriate Action #1.

1. The SE failed to recognize the NSO's concerns.
2. The SE did not accurately understand the information that the NSO was attempting to relay to him.
3. This particular procedure, PT-7, had been successfully completed numerous times in the past.
4. SE assumed the AFW pumps discharge valves were throttled open.
5. Because of items 3 and 4 the SE was not aware of the reason to be apprehensive about the situation.
6. SE felt a perceived pressure to complete PT-7 on the AFW pumps.
7. Unusual plant conditions (near zero MTC) and split discharge header configuration contributed to the inappropriate actions of the SE.

Inappropriate Action #2.

1. The SCRE failed to investigate a situation which contradicted normal practice.
2. The SCRE failed to make an appropriate judgement due to the wrong assumption being made about the intent of the procedure.
3. Unusual plant conditions (near zero MTC) and split discharge header configuration contributed to the inappropriate actions of the SCRE.
4. SCRE felt a perceived pressure to complete the PT-7 on the AFW pumps.

B. DESCRIPTION OF EVENT (Continued)

At approximately 19:17 the 1A AFW Pump recirc valve was closed. At approximately 19:24, the operators stationed locally at the 1A AFW Pump noted an abnormal temperature rise on the pump's thrust bearing, water hammer sounds, and the oil cooling water relief valve had lifted. The 1A AFW Pump was manually shutdown from the Control Room at approximately 19:25. The 1A AFW Pump impeller was damaged, and required replacement. After shutdown of the 1A AFW Pump, the 1C AFW Pump auto tripped on low suction pressure. Investigation has shown this to be the result of a pressure transient induced due to steam venting back into the suction header from the 1A AFW Pump after shutdown. The 1B AFW Pump was locally verified to be vented and then was started. The S/G Isolation Valves FW0050, 0052, 0054, and 0056 were reopened, and feed flow was re-established to the Steam Generators.

C. APPARENT CAUSE OF EVENT

A formal Human Performance Evaluation System investigation was conducted, and found the cause of this event was personnel error compounded by procedural deficiency.

The following inappropriate actions took place:

1. The Shift Engineer (SE) assumed pump discharge valves were throttled.
2. The Shift Control Room Engineer (SCRE) assumed procedure intended to deadhead pump.
3. The SCRE allowed the PT to continue.
4. The NSO directed the Equipment Operator (EO) to close the recirculation valve 1FW-0041.

The following factors led to each inappropriate action:

Inappropriate Action #1.

1. The SE failed to recognize the NSO's concerns.
2. The SE did not accurately understand the information that the NSO was attempting to relay to him.
3. This particular procedure, PT-7, had been successfully completed numerous times in the past.
4. SE assumed the AFW pumps discharge valves were throttled open.
5. Because of items 3 and 4 the SE was not aware of the reason to be apprehensive about the situation.
6. SE felt a perceived pressure to complete PT-7 on the AFW pumps.
7. Unusual plant conditions (near zero MTC) and split discharge header configuration contributed to the inappropriate actions of the SE.

Inappropriate Action #2.

1. The SCRE failed to investigate a situation which contradicted normal practice.
2. The SCRE failed to make an appropriate judgement due to the wrong assumption being made about the intent of the procedure.
3. Unusual plant conditions (near zero MTC) and split discharge header configuration contributed to the inappropriate actions of the SCRE.
4. SCRE felt a perceived pressure to complete the PT-7 on the AFW pumps.

E. CORRECTIVE ACTIONS

1. The 1A AFW Pump was disassembled, and the impeller replaced.
2. The discharge piping and supports were walked down and inspected for damage. No damage was found.
3. It will be stressed to all personnel that if serious doubts or concerns exist about the consequences of an evolution, the evolution shall not continue until all doubts and concerns are addressed to the fullest extent possible.
4. A review of pump operating characteristics shall be included in licensed operator retraining.
5. PT-7 will be revised to include a caution that a flow path for the pump must be provided at all times during performance of the PT.
6. All procedures related to pumps will be reviewed to ensure this caution concerning maintenance of a flow path is included where appropriate.
7. The test procedure was intended to be performed in Modes 1 or 2 (with valves throttled) for the 1A (turbine driven) AFW Pump. Test precautions did not explicitly preclude performance in other modes even though the mode of performance could be implied from the precautions. Therefore, the management decision making process should address plant conditions in relationship to the evolutions being performed prior to directing the performance of an activity.

Corrective actions #3, 4, 5 and 6 will be tracked by commitment #295-200-90-00601.

F. PREVIOUS EVENTS

A computer keyword search using the words 'auxiliary feedwater', 'failure', 'deadhead', 'discharge valve', and 'closed' was conducted and yielded no previous events of a similar nature.

An NPRDS search was conducted using cause code for operating error. No failures were found of similar nature at Zion Station.

A manual search of previous Licensee Event Reports and Deviation Reports was conducted. No events where damage to an AFW pump was incurred due to discharge valve misalignment could be found.

G. COMPONENT FAILURE DATA

MANUFACTURER	DESCRIPTION
Pacific Pumps	AFW Pump impeller