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

October 9, 1990

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

Dear Sir:

The enclosed Licensee Event Report number 90-010-00, Docket No. 50-304/DPR-48 from Zion Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(iv), which requires a 30 day written report when any event or condition occurs that results in manual or automatic actuation of any Engineered Safety Feature.

Very truly yours,

W. R Kunsch
for T. P. Joyce
Station Manager
Zion Generating Station

TPJ/blg

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 2	0 5 0 0 0 3 0 4	1 of 0 3

Title (4)

Unit 2 Trip Due to Condenser Boot Failure

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 9	0 7	9 0	9 0	---	0 1 0	--- 0 0	1 0	0 9	9 0	N/A	

OPERATING MODE (9): 1

POWER LEVEL (10): 9 8

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

___ 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)
___ 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
John Clevenger, Engineer ext. 2328	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
X	S G	E X J	D 0 6 7	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

___ Yes (If yes, complete EXPECTED SUBMISSION DATE)

X NO

Expected Submission Date (15): Month | Day | Year

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

On 9/7/90 Zion Unit 2 tripped on a sudden loss of condenser vacuum. Inspections found a failed condenser expansion boot in the A-bay of the condenser, a failed low pressure turbine rupture disc, and that both of the feed water pumps' rupture discs had been deformed. Internal inspection of the condenser determined that the initiating event had been a failure of the boot. The root cause analysis determined that the condenser expansion boot had a life expectancy of 5 to 7 years but had been in service for 9 years. Aggravating the aged condition was improper torquing and exposure to excessive temperature. All safety systems responded as designed. Corrective action included replacement of the damaged components, adding the boots to the Preventive Maintenance program to ensure that they are replaced at 5 year intervals, and to follow vendor installation recommendations.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)					Page (3)		
		Year	///	Sequential Number	///	Revision Number			
Zion Unit 2	0 5 0 0 0 3 0 4	9 0	-	0 1 0	-	0 0	0 2	OF	0 3

TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

A. CONDITION PRIOR TO EVENT

MODE 1 - Power RX Power 98 RCS [AB] Temperature/ Pressure 559 °F/ 2235 psig

B. DESCRIPTION OF EVENT

On 9/7/90 at 1947 hours Unit 2 tripped on loss of condenser vacuum [SG]. Inspection of the condenser found a failed condenser expansion boot in A-bay, one failed low pressure turbine rupture disc on the "A" low pressure turbine, and 2 deformed feed water pump rupture discs which also exhaust into the A-bay of the condenser. Inspection of the condenser internals found no damage except that the expansion boot cover plate was bent inward at approximately 45 degrees at the point of the boot failure, indicating a large in-rush of air into the condenser. The normal steam flow into the condenser failed to condense in the presence of this large amount of non-condensible gas, and pressurized the condenser. The over-pressurization caused the failure of the low pressure turbine rupture disc and the deformation of the feed water pumps' rupture discs. The loss of vacuum and subsequent over-pressurization was too rapid to permit operator action to prevent the Unit trip.

C. APPARENT CAUSE OF EVENT

The reactor trip on 9/7/90 was the result of the failure of A-bay condenser expansion boot. Review of various plant data on extraction steam pressures and temperatures, off-gas flows, condenser vacuum, and other systems supports failure of the expansion boot as the cause of this reactor trip. The expansion boot was in service for 9 years which is in excess of the 5 to 7 year life expectancy recommended by the manufacturer. Aggravating the old age of the boot were mechanical and thermal stresses. During the boot replacement, the vendor supplied guidance on temperature ranges and torque values to prevent premature deterioration of the boot. The torque values on the clamps that hold the boot in place were found to be in excess of this recommendation and the temperatures that the boot was exposed to in service may have exceeded that which the boot material could withstand.

D. SAFETY ANALYSIS OF EVENT

The reactor trip followed the turbine trip on low condenser vacuum. The Reactor Protection System actuated normally. All safety systems responded as designed.

E. CORRECTIVE ACTIONS

Researching the history of the boots showed that the boot in C-bay was the same age, 9 years, as the boot in A-bay. The boot in B-bay was 2 years old. The B-bay boot was inspected and some deterioration, possibly due to over-torquing, was found. The condenser expansion boots in all three condenser bays were replaced.

To prevent condenser expansion boots from being left in service past their service life, they have been added to the Preventive Maintenance program to be changed out every three outages (approximately every 5 years). The comment section of the Mechanical Maintenance shop job sheet for the main condenser has been updated to include instructions to follow the vendor reccomendations for torque values. The job sheet is referenced by the Work Analyst prior to analyzing any work request on the Main Condenser.

Researching the history of the condenser expansion boots on Unit 1, it was determined that the boots in A-bay and C-bay were replaced in 1988. There is no history of when the boot in B-bay was last changed out. The boots in the Unit 1 condenser have also been added to the Preventive Maintenance program. The boot in B-bay will be changed out during the next refueling outage.

Additionally, appropriate procedure changes will be made to prevent introducing steam to the condenser when no vacuum is present. The annunciator response manual (ARM) will be changed to include notifying Tech Staff when the Exhaust Hood Temperature High-High annunciator alarms. The ARM will also be changed to include introducing steam to the condenser with no vacuum present as a probable cause for this alarm.

These open items will be tracked by commitment #304-180-90-10601 (series).

F. PREVIOUS EVENTS

Several condenser boot events at other plants were reviewed for similar plant conditions. No cases were found where the condenser vacuum failed so quickly that the operators had no warning and no time to react.

G. COMPONENT FAILURE DATA

Dearborn Rubber Co.
406 E. Plaza Drive
Westmont, Il. 60559

Condenser Expansion Boot
dogbone shape
10" wide X 5/8" thick X 122' long
Neoprene cover with polyester web

AND
CAUSE CODES

Rev. 0

DVR # 22-2-90-106

- [X] Lost generation
- [X] Reactor trip
- [ ] NRC violation, level _____
- [ ] Cost > $25,000
- [X] ESF actuation
- [ ] GSEP event, class _____
- [ ] Hazard or Spill
- [X] NRC reportable
- [ ] Tech Spec LCO
- [ ] Personnel injury
- [X] LER [ ] PSE
- [ ] Potential or future loss
  SALP functional area OP

	COMPONENT TYPE	FAILURE MODE	DEPARTMENT
X	IS	MM1	MM
X			
X			

	LICENSED?	LEVEL	DEPT	TYPE DETAIL CODE
A				
A				
A				

	TYPE	DETAIL CODE	DEPARTMENT
B			
B			
B			

	TYPE	DETAIL CODE
C		

TYPE OF DETAIL PROC.

	DEFICIENCY CODE TYPE
D	
D	
D	

	TYPE	DETAIL CODE	DEPT
E			
E			
E			

Form 15-52-2.3