Indian Point 3
Nuclear Power Plant
P.O. Box 215
Buchanan, New York 10511
914 739.8200

NewYorkPower Authority

June 19, 1991
IP3-91-035

Docket No. 50-286
License No. DPR-64

Document Control Desk
Mail Station PI-137
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

The attached Licensee Event Report LER 88-007-01 is hereby submitted in accordance with the requirements of 10CFR50.73. This supplement addresses commitments to the NRC that were contained in LER-88-007-00. The root cause of this event has been identified. This event is of the type defined in the requirements per 10CFR50.73(a)(2)(i).

Very truly yours,

For

Joseph Russell
Resident Manager
Indian Point Three Nuclear Power Plant

VC/rj
Attachment

cc: Mr. Thomas T. Martin
Regional Administrator
Region 1
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

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PDR ADOCK 05000286
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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Indian Point Unit 3	0 5 0 0 0 2 8 6	1 OF 0 5

TITLE (4) Manual Reactor Shutdown Due to 2 Gallon Per Minute Steam Generator Primary to Secondary Leak in Number 31 Steam Generator Caused by Degraded Tube

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)
1 0	1 9	8 8	8 8	— 0 0 7	— 0 1	0 6	1 9	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 1 0 0

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

	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)		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	
	AREA CODE	
Vincent R. Coulehan, Plant Engineer	9 1 4	7 3 6 8 0 4 7

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	S B	S G	W 1 2 0	YES					

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)

On October 19, 1988 with the reactor at 100 percent power, a primary to secondary leak of approximately two gallons per minute developed in the No. 31 Steam Generator. An orderly plant shutdown commenced at 2325 hours on October 19, 1988 and the plant achieved cold shutdown at 1100 hours on October 20, 1988. All plant systems functioned properly during the event. It was subsequently determined by inspection that a 250 degree circumferential thruwall crack occurred in a peripheral tube in the 31 steam generator (SG) at the sixth support plate. Inspections were conducted on the damaged tube in the No.31 steam generator by visual and Eddy Current methods with the assistance of Westinghouse Electric Corporation. The root cause for this event has been identified as high cyclic fatigue. The damaged tube was plugged and stabilized by the insertion of a cable stabilizer and an array of tubes surrounding the damaged tube were plugged with controlled leakage sentinel plugs.

DESCRIPTION OF THE EVENT:

On Wednesday, October 19, 1988, at 2026 hours with the plant at 100 percent power, control room operators received a Process Radiation Monitor Alarm (IL) for the R-15 Steam Jet Air Ejector (SJAE) (SH). Air ejector effluent automatically diverted to containment. Operations personnel on duty conducted the applicable sections of Temporary Operating Procedure TOP-50, "Steam Generator Primary to Secondary Leakage Surveillance" and Off Normal Operating Procedure ONOP-SG-1, "Steam Generator Tube Leak". The on-duty watch chemist was notified to sample the air ejector effluent to verify the validity of this alarm condition. Initial Chemistry results at 2100 hours showed only slight activity in the diverted sample. Plant supervisors then directed the Chemistry Department to calculate an estimated release in preparation for realigning the SJAE exhaust back to its normal discharge point. At 2219, Operations realigned the air ejectors back to atmosphere per Chemistry's calculations and the Watch Chemist proceeded to sample the air ejector effluent at the turbine building sample station. A primary to secondary leak rate of 2 gallons per minute (gpm) was calculated and the Shift Supervisor was informed at 2320 hours. Health Physics surveys taken of the main steam piping determined that activity was present in the No. 31 main steam line (SB). This information indicated a primary to secondary leak in the No. 31 steam generator (SB) (W120) (Model 44D).

A 2 gpm leak exceeds the Technical Specification 3.1.F.8 which limits primary to secondary leakage to less than 0.3 gpm per steam generator and less than 1.0 gpm for all steam generators. At 2325 hours an Unusual Event was declared and all notifications were conducted in accordance with the Emergency Plan. The Shift Supervisor directed that the plant be in hot shutdown condition within 4 hours and a cold shutdown condition within an additional 24 hours (Technical Specification 3.1.F.8). The plant was placed in hot shutdown in two hours and seven minutes and cold shutdown in an additional nine hours and thirty one minutes. The reactor shutdown and eventual plant cooldown proceeded in an orderly and controlled manner.

Operations personnel diverted the SJAE exhaust back to containment at 2335 hours, terminating the release to the atmosphere. The total time the SJAE exhaust was lined up to the atmosphere was 76 minutes, resulting in a release of 4.98 E-2 curies which is 0.093% of the Offsite Dose Calculation Manual (ODCM) limit. The main steam isolation valve (MSIV) for number

31 steam generator was shut at 0147 hours on October 20, 1988. At 0205 hours on October 20, control room operators completed isolation of the No. 31 steam generator. At 0220 hours on October 20, 1988 the SJAE exhaust was directed back to the atmosphere. At 0256 hours it was decided to divert the SJAE exhaust back into containment due to cross contamination from mixing of the secondary plant steam. During the 36 minutes the air ejector exhaust was lined up to the atmosphere, Chemistry calculated a release of 6.71 E-3 curies, which corresponds to 0.019% of the Technical Specification limit. The Unusual Event was terminated at 0710 hours on October 20, 1988 with the primary system at 320 degrees F and 440 psig. During the shutdown all equipment functioned normally. The plant was placed in a Cold Shutdown Condition on October 20, 1988 at 1100 hours.

INVESTIGATION OF THE EVENT:

With the plant stabilized and cool down in progress, plans for examining and identifying the leak were formulated by plant staff.The plant was drained to mid-loop to facilitate Steam Generator inspection. Subsequent inspection identified the leaking tube to have a 250 degree circumferential thruwall crack.

CAUSE OF THE EVENT:

The shutdown of the unit was initiated due to the primary to secondary leakage rate exceeding the Technical Specification Limit (3.1.F.8) of 0.3 gallons per minute per steam generator and 1.0 gallons per minute for all steam generators. The cause of the number 31 steam generator tube leak was a 250 degree circumferential thruwall defect. This particular tube had experienced some minor denting that was seen in previous inspections but the tube failure was not consistent with the tube failures or degradation phenomena previously observed at the plant. A detailed investigation conducted by the Power Authority and Westinghouse Electric personnel concluded that the root cause for this event has been identified as high cyclic fatigue. The analysis of the tube failure is contained in the Westinghouse report INT 91-529.

CORRECTIVE ACTIONS:

The following is a summary of corrective actions undertaken as a result of this event.

1) A 100 percent Eddy Current Test program on the No. 31 and 32 Steam Generators.

2) Visual analysis of the cracked tube's inner diameter was conducted utilizing fiber optics with assistance of Westinghouse Electric Corporation.

3) The cracked tube was plugged and stabilized by the insertion of a cable stabilizer designed to maintain bundle structural integrity.

4) Sentinel plugs were installed in adjacent tubes surrounding the failed tube to provide indication in the event that the failed tube were to break loose and damage tubes in close proximity. The sentinel plugs permit minimal flow through a tube to permit indication of a primary to secondary leak, yet will provide significant flow restriction in the event of catastrophic tube failure.

5) An enhanced radiation monitoring program will be used on the secondary plant's Steam Jet Air Ejectors. This program will include the use of an additional adjacent line radiation monitor. New administrative guidelines for primary to secondary leakage and increased frequency of Chemistry samples on the Steam Jet Air Ejector effluent will be implemented.

6) A plant modification to the valve and piping of the steam jet air ejectors will allow the R-15 monitor to be in service while the effluent is being diverted to containment.

ANALYSIS OF THE EVENT:

This event is reportable under 10CFR50.73(a)(2)(i). An evaluation has determined that this event has been considered under the guidelines of the plant FSAR and Technical Specifications. An analysis of this event as it relates to Indian Point Three is as follows:

1. The No. 31 Steam Generator 2 gpm leak is within the Accident Analysis boundaries presented in Chapter 14 of the FSAR.

2. The Noble Gas releases to atmosphere of 0.093 percent and 0.019 percent of the Technical Specification Limit were each within the Noble Gas Releases limits as analyzed in Chapter 11 of the FSAR for a primary to secondary leakage.

SECURING FROM THE EVENT:

With the unit in cold shutdown, plant personnel are completing all necessary corrective actions in order to return the unit to service. Primary to secondary leakage events have occurred previously at Indian Point Unit 3: March 20, 1979 (LER 286-79000), September 28, 1981 (LER 286-81007), and March 24, 1982 (LER 286-82001). This event is unique in that the failure was a circumferential thruwall crack, a failure mechanism not previously identified at Indian Point 3.