NRC Form 366
(9-83)

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

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Susquehanna Steam Electric Station - Unit 1	0 5 0 0 0 3 8 7	1 OF 0 3

TITLE (4)

Emergency Service Water Spray Networks Frozen.

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 3	1 0	8 4	8 4	— 0 1 7	— 0 1	0 6	0 6	8 4	Susquehanna - Unit 2	0 5 0 0 0 3 8 8
										0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
4	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 0 0	20.405(a)(1)(i)	50.36(c)(1)	X 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)	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
L.A. Kuczynski - Nuclear Plant Specialist III	AREA CODE 7 1 7 5 4 2 - 1 3 7 5 9

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	
C	B I	P S X	S 3 2 5	N							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 9	0 3	8 4

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

The A-1 (89 risers) and B-2 (43 risers) spray pond riser networks were found to be frozen during the performance of a weekly preventive maintenance activity to pump down the risers. After four days of milder weather, all four networks were thawed out and successfully pumped down. Unit 1 was shut down throughout the event; Unit 2 was in a pre-fuel load status. All spray headers and risers were inspected and no damage was found. The networks were pumped down every two days and monitored for leakage every day until March 31, 1984, when it was considered that the probability of the risers freezing again would be very low. Long term fixes are being investigated that will ensure that freezing of the spray networks does not occur again.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Susquehanna Steam Electric Station Unit 1	0 5 0 0 0 3 8 7	8 4	— 0 1 7	— 0 1	0 2 OF 0 3

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

During the investigation performed in response to spray pond riser arm damage caused by ice formation on the spray nozzles (LERs 84-002 and 84-002, Rev. 1), concerns were raised that leakage past the seats of the spray pond riser network inlet valves (2-30 in. butterfly) could lead to ice formation in the risers themselves. A preventive maintenance activity was instituted to pump down the riser networks on a weekly basis to minimize the possibility of freezing in the risers. Routine maintenance of the riser network inlet valves is impractical since complete isolation of ESW is required and results in a one hour L.C.O.

The A-1, A-2, B-1 and B-2 spray pond networks were pumped down for the first time under the new procedure in February 27, 1984 at 2240 hours. On March 7, 1984 at 1505 hours the B-1 and B-2 networks were successfully pumped down. The A-1 and A-2 network pumpdown was not attemped because of a prerequisite in the pumpdown procedure which required RHRSW and ESW systems to be shut down. When ESW and RHRSW are running, it is very difficult to pump down the networks associated with this loop. The spray piping drain pump discharges into the RHRSW Bypass line upstream of a restricting orifice. When RHRSW and ESW pumps are running (discharging through the bypass line), sufficient back pressure is created by the restricting orifice to drive the capacity of the drain pump far back on its pump curve (small flow). A combination of this small flow and the leakage past the isolation valves, makes the time to drain down a network excessively long. The A loop of RHRSW was required to be running to support other plant evolutions and was not able to be shut down. On March 10, 1984, the A-1 and A-2 spray networks were attemped to be pumped down. The A-2 network was successfully drained but the A-1 network had indications of being frozen (no flow observed thru the A-1 spray network). After determining the A-1 network was frozen, the B-1 and B-2 networks were examined for similar conditions. The B-1 network was not frozen and the B-2 network was suspected to be frozen. Outside air temperature was approximately 6°F when the frozen networks were identified.

Even though a Limiting Condition for Operation was not incurred because of the risers being frozen, Unit 1 was in cold shutdown and Unit 2 was pre-fuel load, all risers were to be returned to service prior to re-start of Unit 1. Ambient temperatures moderated over the next few days and all riser networks were able to be pumped down when the procedure was run on March 14, 1984. All spray headers and risers were inspected and no damage was found.

From March 14, 1984 through March 31, 1984, the riser networks were pumped down every two days and monitored for leakage every day. Present directions regarding riser network pumpdown specify that, between September 1 and March 31, the pumpdown will be done once per week, except when either of the following occur:

- when the outside air temperature drops to 35°F, riser pumpdown will commence within 12 hrs., and will occur once every two days while temperature is below 35°F, or

-when the outside air temperature drops to 33°F, riser pumpdown will commence within one hour and will occur once every two days while temperature is below 33°F.

Guidelines have also been developed for spray pond operation to avoid freezing fo the risers and spray nozzles at low ambient temperature (32°F or below) when Residual Heat Removal Service Water (RHRSW) and Emergency Service Water (ESW) system heat loads make it desirable to direct flow through the spray networks. If pond temperature is above 75°F, the sprays may be run with the riser network bypass valves closed. This configuration insures that the pond can provide adequate cooling under even the worst case heat loads under the most severe hot weather meteorological condition anticipated. If pond temperature is between 60°F and 70°F, the sprays should be run with the riser network bypass valves open. This configuration provides moderate cooling and regulation of the rate of change of pond temperature. If the pond temperature is 60°F or less, the sprays should remain isolated with the riser network bypass valves open. If the pond temperature is less than 60°F and the use of sprays is unavoidable, flow through the sprays should be maintained so that the height of the sprays is 4-12 inches above the nozzles (accomplished by opening the bypass valve). If the sprays are operated in this range, a stagnant condition is avoided and the potential for freezing is reduced because droplet sizes are maximized and the amount of time the droplets are exposed to the air is minimized.

This occurrence is reported under 10CFR50.73(a)(2)(v), because one large and one small spray network would have been unable to perform their safety function of heat removal from cooling water used in the Emergency Service Water system and the Residual Heat Removal Service Water system. Since positive assurance could not be provided that the frozen risers would be thawed prior to the need to utilize the spray network, it must be assumed that the single failure criteria for the spray network could no longer be met. The Station's FSAR (Section 9.2.7.3.1) contains analysis of spray pond capabilities under a LOCA/Forced Shutdown scenario with only one spray network available, and concludes that the spray pond would still meet the performance requirements of an ultimate heat sink. Thus, while the single failure criteria could not be met, the units could have been safely maintained under a LOCA/Forced Shutdown situation (A-2 and B-1 spray arrays were available throughout this event). Also, engineering evaluation has shown that for single unit operation, a LOCA can be safely dissapated by only one large array. (At the date of occurrence, only one unit was licensed for operation and one large and one small array were available for operation.) The bypass lines which allow returning water to be injected directly to the spray pond without passing through a spray network were available for operation throughout the event.

1 Long term fixes will be developed and submitted to NRC Region I by September 1, 1984, to ensure the freezing of the spray header does not reoccur.

PP&L Pennsylvania Power & Light Company
Two North Ninth Street • Allentown, PA 18101 • 215/770-5151

June 6, 1984

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 84-017-01
ER 100450 FILE 841-23 Docket No. 50-387
PLA-2228 License No. NPF-14

Attached is Licensee Event Report 84-017-01. This event was determined to be reportable per 10CFR50.73(a)(2)(v) in that, during a preventive maintenance activity to pump down the spray pond network risers, portions of the spray pond network risers were discovered to be frozen. A long-term fix will be developed and submitted to NRC Region I by September 1, 1984.

1

+ J Palmer for

H.W. Keiser
Superintendent of Plant-Susquehanna

LAK/pjg

cc: Dr. Thomas E. Murley
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Mr. R.H. Jacobs
Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 52
Shickshinny, PA 18655

IE22
1/1