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ACCESSION NBR: 9007110118 DOC.DATE: 90/07/06 NOTARIZED: NO DOCKET #
 FACIL: 50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylv 05000388
 AUTH.NAME AUTHOR AFFILIATION
 LLOYD, H. Pennsylvania Power & Light Co.
 STANLEY, H.G. Florida Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-006-00: on 900529, RHR pump motor oil cooler failure w/
generic implications.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: LPDR 1 cy Transcripts. 05000388

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Pennsylvania Power & Light Company

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July 6, 1990

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 90-006-00
FILE R41-2
PLAS - 432

Docket No. 50-388
License No. NPF-22.

Attached is Licensee Event Report 90-006-00. This report is being provided on a voluntary basis. The event described in the report was initially determined to be reportable per 10CFR50.72(b) (2) (iii) as a condition that alone could have prevented a safety system from performing its function due to a failed Residual Heat Removal pump motor oil cooler and the required ENS notification was completed. Initial analysis indicated the possibility of a generic issue. However, further analysis eliminated this concern and thus it was determined as not being a reportable event per 10CFR50.73.

H.G. Stanley
Superintendent of Plant - Susquehanna

HL/mjm

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

Mr. G. S. Barber
Sr. Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 35
Berwick, PA 18603-0035

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Susquehanna Steam Electric Station - Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 8 8	PAGE (3) 1 OF 0 4
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TITLE (4)
RHR Pump Motor Oil Cooler Failure With Possible Generic Implications

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)																																		
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<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">OPERATING MODE (9) 4</td> <td colspan="10">THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)</td> </tr> <tr> <td rowspan="6">POWER LEVEL (10) 0 0 0</td> <td><input type="checkbox"/> 20.402(b)</td> <td><input type="checkbox"/> 20.405(c)</td> <td><input type="checkbox"/> 50.73(a)(2)(iv)</td> <td><input type="checkbox"/> 73.71(b)</td> </tr> <tr> <td><input type="checkbox"/> 20.405(a)(1)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)</td> <td><input type="checkbox"/> 73.71(c)</td> </tr> <tr> <td><input type="checkbox"/> 20.405(a)(1)(ii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(vi)</td> <td><input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)</td> </tr> <tr> <td><input type="checkbox"/> 20.405(a)(1)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> <td rowspan="3">Voluntary</td> </tr> <tr> <td><input type="checkbox"/> 20.405(a)(1)(iv)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.405(a)(1)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)</td> </tr> </table>											OPERATING MODE (9) 4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)										POWER LEVEL (10) 0 0 0	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vi)	<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(vii)	Voluntary	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)
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LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
H. Lloyd, Jr. - Power Production Engineer	7 1 7 5 4 2 - 3 9 1 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
X	B	0 H X	G	0 8 2	Y				

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On May 29, 1990, with Unit 2 in Cold Shutdown (Condition 4) and Unit 1 at 100% power, it was discovered during routine operator rounds that the Unit 2 "C" RHR pump motor oil cooler had developed a tube leak. The leak caused the reservoir to overflow and the oil/water mixture flowed into the motor internals. Initial analysis indicated that the cause might have been Microbiologically Influenced Corrosion (MIC) and rapid penetration of the tube wall was possible. Based on potential for common mode failure, it was decided to shut down Unit 1 and not restart Unit 2 until all RHR motor oil coolers had been replaced. Additional analysis of the tubing and corrosion deposits by corrosion experts concluded that the root cause of the failure was due to under-deposit corrosion accelerated by the presence of manganese, and not microbiologically influenced corrosion as originally suspected. This event was initially determined to be reportable per 10CFR50.72(b) (2) (iii) as a condition that alone could have prevented a safety system from fulfilling its function. After additional examination and analysis, it is now believed that neither unit was at any significant risk based on the condition of the other RHR pump motor oil coolers. The decision to shutdown Unit 1 and not re-start Unit 2 until the motor oil coolers were replaced was prudent based on the data available at the time. The motor oil cooler in all eight (8) RHR pumps were replaced and both Units were returned to service. The issue of raw water cooling systems and associated heat exchanger preventive maintenance program is being addressed through a task plan.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Unit 2 Susquehanna Steam Electric Station	DOCKET NUMBER (2) 0 5 0 0 0 3 8 8	LER NUMBER (8)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 0	- 0 0 6	- 0 0	0 2	OF 0 4

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

DESCRIPTION OF EVENT

On May 29, 1990, with Unit 2 operating in Condition 4 at 0% power and Unit 1 operating in Condition 1 at 100% power, it was discovered that the Unit 2 "C" RHR (RHR; EIIS Code: BO) pump motor oil cooler had developed a tube leak. The leak allowed Emergency Service Water (ESW; EIIS Code: BI) to leak into the motor upper bearing oil reservoir which caused the reservoir to overflow and the oil/water mixture flowed into the motor internals. The pump was not in service at the time. The wetting of the motor internals resulted in the pump being inoperable and necessitated motor removal and shipment to the vendor for cleaning and refurbishment. A new motor oil cooler was installed during the refurbishment. Also, the failed motor oil cooler was returned to PP&L for performance of a root cause analysis of the failure. Based on the possibility of common mode failure, it was recommended by the Plant Operations Review Committee to shutdown Unit 1 and not restart Unit 2 until all RHR motor oil coolers had been replaced. Plant Management concluded that it was appropriate to implement this recommendation. The NRC was notified via the ENS notification system.

CAUSE OF EVENT

Initial analysis indicated that the cause might have been Microbiologically Influenced Corrosion (MIC) and further indicated the possibility of rapid penetration of the tube wall. Additional analysis of the tubing and corrosion deposits by corrosion experts concluded that the failure was due to under-deposit corrosion accelerated by the presence of manganese, and not microbiologically influenced corrosion as originally suspected. The specific failure of the subject cooler seems to have been caused by a history of long stagnant periods; the stagnant periods provided an ideal environment for the under-deposit corrosion. The root cause diagnosis of under-deposit local (pitting) corrosion is based upon the presence, in all cases examined, of copper, calcium, iron, and manganese at the corrosion sites. The corrosion rates observed are both predictable and within the range of rates one would anticipate for under-deposit corrosion. One exception to this predictability was the '2C' motor oil cooler. The remaining seven coolers had degraded to varying degrees but '2C' was not typical. MIC was eliminated as a potential significant contributor due to three factors: 1) the low levels of (sulphur and chlorides in the deposits, 2) morphology inconsistent with pitting dominated by MIC, and 3) lack of uniform penetration across all of the coolers which were examined.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Unit 2 Susquehanna Steam Electric Station	DOCKET NUMBER (2) 0 5 0 0 0 3 8 8	LER NUMBER (6)			PAGE (3)	
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		9 0	- 0 0 6	- 0 0	0 3	OF 0 4

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

REPORTABILITY/ANALYSIS

This event was initially determined to be reportable per 10CFR50.72(b) (2) (iii) as a condition that alone could have prevented a safety system from fulfilling its function appeared to exist. After additional examination and analysis of the failed cooler and visual inspection of the other RHR pump motor oil coolers, it was determined that a significant generic problem did not exist and that neither unit was at any significant risk based on the condition of the other RHR pump motor oil coolers nor would they have been under other operating conditions. The decision to shutdown Unit 1 and not re-start Unit 2 until the motor oil coolers were replaced was prudent based on the data available at the time. As a result, PP&L is filing this report as a voluntary exchange of information and have determined the event does not constitute a 10CFR50.73(a) (2) (v) (B) report.

CORRECTIVE ACTIONS

The motor oil coolers in all eight (8) RHR pumps were replaced. Unit 2 was returned to service on June 14, 1990 and Unit 1 on June 17, 1990. In order to assure the reliability of the other safety-related components, a sampling of heat exchangers were inspected and their conditions evaluated. These inspections provided data to assure that the condition of these components were within the range of those predicted by the heat exchanger program. In addition, since the known condition of these components was documented during previous inspections, a comparison was made to determine if accelerated growth had occurred since the last inspection. Results indicate a gradual degradation of the heat exchangers within a predicted range and well within the bounds of our heat exchanger program.

Our raw water cooling systems and associated heat exchanger preventive maintenance program is being addressed through a task plan presented below. PP&L's position is that this is necessary to provide confidence that each component is and will remain capable of reliable service for a predictable period of time. Items to be addressed by this plan are as follows: assessing our compliance with, and the adequacy of our Heat Exchanger Preventive Maintenance Program, necessity of near term heat exchanger inspections, evaluation of our response to NRC Generic Letter 89-13 (Service Water System Problems Affecting Safety-Related Equipment), determine industry experience on leaks in similar heat exchangers, additional analysis to confirm accuracy of our root cause determination. The technical aspects of this evaluation will include design and operational data such as materials, flows, water chemistry, temperatures and periodic maintenance. After completion of the Task Plan, appropriate recommendations will be presented to Management based on our study. Should any information resulting from this study warrant an update, such information will be provided.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

ADDITIONAL INFORMATION

Failed Component Identification: Heat Exchanger: Cooling Coil Assembly
Model: DD213A8533AC
Manufacturer: General Electric

Previous Similar Events: No previous failures of this type.