

**Gordon L. Johnston**  
Plant Manager  
Peach Bottom Atomic Power Station

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August 31, 2000

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Washington, DC 20555

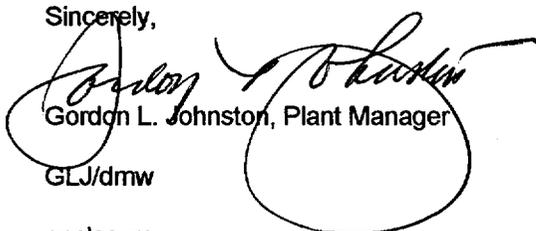
Docket No. 50-277 and 50-278  
SUBJECT: Licensee Event Report, Peach Bottom Atomic Power Station Units 2 and 3

This LER reports the plant being in a degraded condition outside of the plant design basis. The degraded condition affects the Emergency Diesel Generators capability to mitigate a design basis LOOP/LOCA. Specifically, the degraded condition involves a cross flow condition between the air coolant and the jacket coolant heat exchangers on the Emergency Diesel Generators that changes the assumptions made for the heat transfer analysis for the Emergency Diesel Generators. The LER is being submitted pursuant to the requirements of 10 CFR 50.73 (a)(2)(i)(B), 10 CFR 50.73 (a)(2)(ii), and 10CFR 50.73(a)(2)(v).

Reference: Docket Nos. 50-277 and 50-278  
Report Number: 2-00-002  
Revision Number: 00  
Event Date: 08/01/00  
Report Date: 08/31/00

Facility: Peach Bottom Atomic Power Station Unit 2 & 3  
1848 Lay Road, Delta, PA 17314

Sincerely,

  
Gordon L. Johnston, Plant Manager

GLJ/dmw

enclosure

cc: N. J. Sproul, Manager, Financial Controls and Co-owner Affairs  
R. R. Janati, Commonwealth of Pennsylvania  
INPO Records Center  
H. J. Miller, US NRC, Administrator, Region I  
R. I. McLean, State of Maryland  
A. C. McMurtray, US NRC, Senior Resident Inspector  
A. F. Kirby III, DelMarVa Power

CCN 00-14070

*IE22*

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001  
Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to the industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor and a person is not required to respond to, the information collection.

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

<b>FACILITY NAME (1)</b> Peach Bottom Atomic Power Station Units 2 and 3	<b>DOCKET NUMBER (2)</b> 0500 277	<b>PAGE (3)</b> 1 of 5
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**TITLE (4)**  
This LER reports the Emergency Diesel Generators being in a degraded condition outside of the design basis for operation, in a condition prohibited by the Technical Specifications, and in a condition which could have prevented the fulfillment of the safety functions of the diesel generators.

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 Name	Docket Number
08	01	00	00	002	00	08	31	00	Peach Bottom	0500 278
									Facility Name	Docket Number

<b>OPERATING MODE (9)</b>	1	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)</b>								
		20.2201(B)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)		
<b>POWER LEVEL (10)</b>	93	20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)		
		20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71		
		20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)				<b>OTHER</b>
		20.2203(a)(2)(iii)		50.36(c)(1)	X	50.73(a)(2)(v)				Specify in Abstract below
		20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)				or in NRC Form 336A

**LICENSEE CONTACT FOR THIS LER (12)**

<b>NAME</b> Donna Wielgopolski	<b>TELEPHONE NUMBER (include area code)</b> 717.456.4634
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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

Cause	System	Component	Manufacturer	Reportable to EPIX	Cause	System	Component	Manufacturer	Reportable to EPIX
B	LB	CLR	C470						

**SUPPLEMENTAL REPORT EXPECTED (14)**

YES (if yes, complete EXPECTED SUBMISSION DATE)	X	NO	<b>EXPECTED Submission Date (15)</b>	Month	Day	Year
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**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On August 1, 2000, field data from Generic Letter 89-13 testing positively identified cross flow conditions being present between the Emergency Diesel Generator's (EDG's) air coolant and jacket coolant heat exchangers. Based on this data, each EDG's loading and heat transfer requirements were re-evaluated. Results of this analysis identified that the heat sink temperature required to support the EDG's capability to mitigate a design basis Loss of Coolant Accident/Loss of Offsite Power (LOCA/LOOP) event is lower than 90°F. Review of the plant's operational history identified that in 1999, the Peach Bottom heat sink temperature exceeded the maximum temperature necessary to support all of the EDG's capability to mitigate a LOCA/LOOP.

In 1992, a 10 CFR Part 21 report was issued by Coltec to address the potential for cross flow conditions which was not accounted for in the original design of the equipment. In 1992, the station performed thermography to determine if cross flow conditions existed, however, results of the thermography were determined to be inconclusive at a later date. Additional testing for cross flow was incorporated as part of the Generic Letter 89-13 testing which was conducted in July and August, 2000. The results of the July/August testing verified that cross flow existed between the air coolant and the jacket coolant heat exchangers but did not provide complete qualitative data to determine the entire impact of cross flow on the EDG operation. The main cause of this event is attributed to a design deficiency.

The LER is being submitted pursuant to the requirements of 10 CFR 50.73 (a)(2)(i)(B), 10 CFR 50.73 (a)(2)(ii), and 10 CFR 50.73 (a)(2)(v) for the plant being outside of design basis, operation prohibited by Technical Specifications, and a condition which could have prevented the fulfillment of the safety functions of the diesel generators to mitigate a design basis LOCA/LOOP event.

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**Requirements of the Report**

The LER is being submitted pursuant to the requirements of 10 CFR 50.73 (a)(2)(i)(B) due to the plant not meeting the shutdown requirements of Technical Specification LCO 3.8.1 Condition F, when 3 of the 4 diesels were inoperable based on their inability to mitigate a LOCA/LOOP design basis accident for a maximum of approximately 25 continuous hours during the summer of 1999 when heat sink temperatures exceeded the heat sink temperature values of the data analysis.

This LER is also being submitted pursuant to the requirements of 10 CFR 50.73 (a)(2)(ii) and 10 CFR 50.73 (a)(2)(v) for the EDGs (EIS:LB) not being capable of performing their mitigating function during an accident condition when heat sink (EIS: BI, BS) temperatures exceeded limits identified in the EDG re-analysis for operability thereby placing the plant outside of the original design basis.

**Unit Conditions at Time of Event**

Unit 2 was in Mode 1 (RUN) at approximately 93 percent power (EIS: EA) during unit coastdown prior to a scheduled refueling outage. Unit 3 was in Mode 1 (RUN) at approximately 100 percent power (EIS:EA). No other systems, structures, or components were inoperable during test performance which contributed to this event. It should be noted that during the period of analysis (Summer 2000) the heat sink temperature remained well below the analyzed temperature required to support operability of all EDGs.

**Description of the Event**

Peach Bottom Atomic Power Station Units 2 and 3 have four emergency buses for each unit and four EDGs. Each EDG supplies power to an emergency bus on each unit; therefore, an event affecting any one or more EDGs will have an impact on both operating units.

In 1989, the NRC issued Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The GL addressed the potential degradation of heat transfer capabilities in safety related equipment due to fouling of equipment heat exchangers which utilize service water as the cooling medium. The air coolant and jacket coolant heat exchangers for the EDGs were included within the scope of GL 89-13.

Subsequent to this letter, the manufacturer of the EDGs, Coltec, issued a Part 21 notification to the industry in 1992. The notification indicated the potential for cross flow conditions to exist between the air coolant and the jacket coolant heat exchangers on certain EDGs. The Part 21 notification stated this condition may adversely affect the ability of the heat exchangers to perform as designed.

Upon receipt of the Part 21 from Coltec, the issue was evaluated for impact to the station. Coltec had provided the utilities with several options to resolve the issue. These options included (1) do nothing,

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(2) close a manual valve permanently to stop the cross flow, (3) close a manual valve during periods of warm river temperatures, or (4) install a check valve. A plan was created to evaluate the evidence of potential cross flow between the air coolant and the jacket coolant heat exchangers utilizing the equipment which was to be installed for GL 89-13 testing. If cross flow was present, further actions would be evaluated at that time. In the interim, thermography was performed on the coolers to determine if the presence of cross flow existed. This testing proved to be inconclusive in definitively ruling out any adverse impact due to cross flow.

Based on initial review and presumptions made during the Part 21 review, cross flow conditions were not expected at Peach Bottom. As such the prioritization and execution of the developed testing program for GL 89-13 had changed over the course of time from 1993 to present, focused more on the fouling effects described by GL 89-13 than on the potential impacts of cross flow from the Part 21 issue. PECO Nuclear initially installed the GL 89-13 equipment at Limerick Generating Station (LGS) due to LGS EDG heat exchanger design margin being lower in conservatism with the closed loop Emergency Service Water system affects. Peach Bottom planned to capture lessons learned from LGS installation and subsequent testing, prior to proceeding with installation at the site. Due to the necessity of taking data during seasonal changes and various heat exchanger cleanliness conditions, it takes approximately 6 years to collect the necessary GL 89-13 testing data.

Peach Bottom had started testing to determine the location of the GL 89-13 testing equipment in April, 1999. Some indications of cross flow were identified in September, 1999, but installed equipment was not accurate, and only gave gross indications. More sensitive measuring equipment was installed in January of 2000. Further testing to determine if cross flow conditions existed began in March of 2000. Results of this testing indicated that cross flow did exist between the air coolant and the jacket coolant heat exchangers of the EDGs, however, the results were not complete since data at various heat sink temperatures and EDG alignments were required.

Additional testing had been scheduled over the next several months of 2000. The testing during July 2000, further indicated the extent of cross flow present. The data obtained from this test was utilized in a preliminary calculation to determine the impact of the cross flow on EDG operability. The initial results of this analysis indicated that in order to maintain operability of all the EDGs during a LOCA/LOOP event, the heat sink temperatures would need to be below 90°F. Further testing was scheduled to obtain data to complete the analysis, because the July 2000 data was not conclusive.

Further testing and investigation confirmed the cross flow condition and identified that in the summer of 1999, heat sink temperatures were above the initial values in the re-analysis for several periods of time which impacted the EDGs capability to mitigate a design basis LOCA/LOOP and subsequently placed the

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plant into a operating condition prohibited by Technical Specifications 3.8.1.

It should be noted that EDG surveillances conducted during these periods were completed satisfactory and did not indicate any overheating issues.

As a compensatory measure, a manual valve has been closed to isolate a portion of the cross flow between the air coolant and the jacket coolant heat exchangers on each EDG. Additionally, an administrative limit of 88°F has been established for the heat sink while further EDG cross flow data is collected and analyzed. Currently, the heat sink temperature is below the 88°F administrative limit and all EDGs are operable.

The investigation into this issue is still being performed. Additional analysis of EDG data will be performed to determine an appropriate permanent solution to the degraded condition.

**Cause of the Event**

The cause of this issue is a design deficiency on the EDGs which allows cross flow between the air coolant and jacket coolant heat exchangers. This deficiency results in the EDGs not being capable of fully mitigating a design basis LOCA/LOOP for heat sink temperatures lower than 90F.

**Analysis of the Event**

During the summer of 1999, for approximately 42 days, the heat sink temperatures periodically exceeded the calculated temperatures necessary to support the capability of the EDGs to mitigate a design basis LOCA/LOOP event. During this period, the worst condition resulted in the heat sink temperature exceeding the calculated temperatures for three of the four EDGs for approximately 25 continuous hours. Based on engineering judgement, if a LOCA/LOOP event did occur during the period of high heat sink temperatures, the EDGs would have continued to supply the required load, but the engine would have heated up. In this condition, compensatory actions such as load balancing or increasing cooling water flow, could have been employed to limit the impact on the affected EDGs. No events occurred requiring the EDGs during the period when the high heat sink temperature condition existed, therefore, there was no actual impact to the plant.

Furthermore, a PSA analysis concluded that there was minimal effect on core damage frequency as a result of this condition. The PSA analysis evaluated all events based on the following: 1. the limited impact on the capability of the affected EDGs, and 2. the conclusion that the affected EDGs would continue to operate at reduced loading when heat sink temperatures were greater than the calculated temperatures.

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**Corrective Actions**

As a compensatory measure, a manual valve has been closed to isolate the cross flow between the air coolant and the jacket coolant heat exchangers on each EDG. This will allow the EDGs to perform their intended function up to a heat sink temperature of 88°F. Currently, heat sink temperatures are below the 88°F administrative limit and all EDGs are operable.

Further evaluation will be conducted as to the permanent resolution of the degraded condition.

**Previous Events**

No previous events could be identified where the EDGs were rendered inoperable due to heat sink temperatures being greater than allowed.