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September 6, 1979

Re: Docket Nos.: 50-277
50-278

IE Bulletin 79-15

Mr. Harold D. Thornburg, Director
Division of Reactor Construction Inspection
Office of Inspection & Enforcement
United States Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Dear Mr. Thornburg:

This letter is in response to IE Bulletin 79-15, which you forwarded to us on July 11, 1979, concerning manufacturing deficiencies which have been identified in deep draft pumps utilized in safety related applications in several facilities. The "Action to be Taken by Licensees" and our responses are treated sequentially.

Action To Be Taken By Licensee

- 1) Provide information relative to the number of deep draft pumps similar to those shown in Figures 1 and 2 utilized in safety related applications in each facility.
- 2) Provide information relative to manufacturer, model, capacity and plant application of applicable pumps.

Response

There are 13 deep draft pumps in safety related applications at PBAPS. Four pumps serve Unit 2, four serve Unit 3, and the remaining five are common to both Units. All of the above described pumps are similar to Figure 1.

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The High Pressure Service Water Pumps (HPSW) function to provide cooling water (river water) to the Residual Heat Removal (RHR) Heat Exchangers for all modes of the RHR requiring cooling water.

The Emergency Service Water Pumps (ESW) normally provide cooling water (river water) to the Emergency Diesels and upon loss of normal Service Water to various ECCS pumps, motor and room coolers and to the Reactor Building Closed Cooling Water Heat Exchangers. The Emergency Cooling Water (ECW) Pump serves as a back-up pump to the two ESW pumps.

The Diesel and Motor Driven Fire Pumps are the water source for all water type fire protection systems.

| Equipt No. | Plant Application | Model No. | Capacity Flow-gpm Head-Feet | Manufacturer |
|---------------|--------------------------------|-----------|-----------------------------------|---------------------|
| <u>UNIT 2</u> | | | | |
| 2AP42 | High Pressure Service Water | D-24821 | 4500 700 | Layne & Bowler |
| 2BP42 | High Pressure Service Water | D-24821 | 4500 700 | Layne & Bowler |
| 2CP42 | High Pressure Service Water | D-24821 | 4500 700 | Layne & Bowler |
| 2DP42 | High Pressure Service Water | D-24821 | 4500 700 | Layne & Bowler |
| <u>UNIT 3</u> | | | | |
| 3AP42 | High Pressure Service Water | D-27517 | 4500 700 | Layne & Bowler |
| 3BP42 | High Pressure Service Water | D-27517 | 4500 700 | Layne & Bowler |
| 3CP42 | High Pressure Service Water | D-27517 | 4500 700 | Layne & Bowler |
| 3DP42 | High Pressure Service Water | D-27517 | 4500 700 | Layne & Bowler |
| <u>COMMON</u> | | | | |
| 0AP57 | Emergency Service Water | D-26074 | 8000 96 | Layne & Bowler |
| 0BP57 | Emergency Service Water | D-26074 | 8000 96 | Layne & Bowler |
| 00P186 | Emergency Cooling Water | D-28460 | 8000 96 | Layne & Bowler |
| 00P63 | Diesel Driven Fire Pump | 6927F | 2500 289 | Fairbanks- Morse |
| 00P64 | Motor Driven Fire Pump | 6927F | 2500 289 | Fairbanks- Morse |

Action To Be Taken By Licensee

- 3) Provide overall dimensions of applicable pumps.

Response

The requested information is provided as follows:

| <u>Pump</u> | <u>Length(1)</u> | <u>Diameter(2)</u> |
|---------------------------------------|------------------|--------------------|
| High Pressure Service Water | 372.75" | 18.75" |
| Emergency Service Water | 359" | 30.75" |
| Emergency Cooling Water | 520.25" | 30.75" |
| Motor and Diesel Driven Fire Pumps | 316" | 15.45" |

(1) Length is overall length of pump, exclusive of driver.

(2) Diameter is pump column diameter (maximum bowl diameter).

Action To Be Taken By Licensee

- 4) Provide summary of startup, testing and routine maintenance history.

Response

Startup testing for all pumps consisted of flow, discharge pressure, pump shutoff head pressures, motor current (except Diesel Fire Pump), vibration and temperature data collection. Routine testing of subject pumps is performed in accordance with the Peach Bottom Atomic Power Station Technical Specifications and In Service Inspection pump testing requirements which address ASME B&PV Code Section XI, and, in general, consists of the above mentioned parameters. Routine maintenance history is included below in conjunction with response to question 5.

Action To Be Taken By Licensee

- 5) Provide information relative to operational problems and major repair efforts.

Response

Included in this section, in addition to information from 5) above, is the partial response to 4), relative to routine maintenance history. Operational problems, as such, are exhibited by the need for corrective action and therefore are an integral part of the below provided information:

High Pressure Service Water PumpsUNIT 2

| <u>2AP42</u> | <u>Work Performed</u> |
|--------------|---|
| 5/29/73 | Repacked pump |
| 10/22/73 | Shaft sleeve bound on shaft Replaced with 3AP42 pump |
| 1/20/76 | Reset impeller clearances |
| 6/19/76 | Reset impeller clearances |
| 3/22/77 | Replaced Column Flange Bolts for seismic upgrade |
| 6/20/77 | Repacked pump and installed new shaft sleeve. |
| 8/30/77 | Replaced coupling bolts and nuts found not to be within specifications |
| 5/30/79 | Repacked pump |

| <u>2BP42</u> | <u>Work Performed</u> |
|--------------|---|
| 10/5/73 | Reset impeller clearances |
| 2/13/74 | 2BP42 Removed for vendor inspection, replaced with 3BP42 |
| 5/20/75 | Repacked pump |
| 5/26/75 | Repacked pump |
| 3/15/76 | Rebuilt pump (low capacity) |
| 6/19/76 | Rebuilt pump (Broken Shaft Coupling) |

| | |
|---------|---|
| 10/6/76 | Rebuilt pump (Broken Shaft Coupling) Evaluation made and coupling hardness reduced. |
| 8/17/77 | Replaced Column Flange Bolts for Seismic Upgrade |
| 9/11/77 | Replaced coupling bolts and nuts found not to be within specifications |
| 7/12/78 | Reset impeller clearances |
| 9/25/78 | Rebuilt pump (low capacity) |

2CP42Work Performed

| | |
|---------|---|
| 10/5/73 | Reset impeller clearances |
| 10/8/73 | Adjust packing |
| 6/19/76 | Reset impeller clearances |
| 4/14/77 | Replaced Column Flange Bolts for seismic upgrade |
| 7/21/77 | Repacked pump and replaced lantern ring |
| 8/31/77 | Replaced coupling bolts and nuts found not to be within specifications |
| 9/28/78 | Rebuilt pump (low capacity) |

2DP42Work Performed

| | |
|---------|--|
| 10/5/73 | Reset impeller clearances |
| 1/19/75 | Adjusted packing |
| 5/22/75 | Repacked pump |
| 3/1/77 | Repacked pump |
| 7/28/77 | Removed obstruction from first stage impeller and reset impeller clearances |

| | |
|---------|---|
| 9/11/77 | Replaced column flange bolts for seismic upgrade and replaced coupling nuts and bolts found not to be within specifications |
| 7/7/78 | Reset pump clearances |
| 5/22/79 | Adjusted packing |

UNIT 33AP42Work Performed

| | |
|---------|--|
| 8/20/74 | Reset impeller clearances |
| 3/14/76 | Adjusted packing |
| 2/22/77 | Adjusted packing |
| 3/18/77 | Replaced column flange bolts for seismic upgrade |
| 4/10/77 | Adjusted packing |
| 9/13/77 | Replaced coupling bolts and nuts found not to be within specifications |
| 2/2/79 | Pump removed for rebuild (low capacity) |

3BP42Work Performed

| | |
|---------|--|
| 8/20/74 | Impeller clearance checked |
| 8/23/74 | Repacked pump |
| 9/13/77 | Replaced coupling bolts and nuts found not to be within specifications |
| 9/26/77 | Replaced column flange bolts for seismic upgrade |
| 12/8/77 | Added packing to pump |
| 7/18/78 | Reset impeller clearances |
| 8/30/78 | Reset impeller clearances |
| 9/21/78 | Repacked pump |

3CP42Work Performed

| | |
|---------|---|
| 8/20/74 | Checked impeller clearance |
| 1/6/76 | Pump repacked |
| 4/4/77 | Replaced column flange bolts for seismic upgrade |
| 9/27/77 | Replaced coupling bolts and nuts found not to be within specifications |
| 7/13/78 | Reset impeller clearance |

3DP42Work Performed

| | |
|----------|--|
| 8/20/74 | Reset impeller clearances |
| 11/20/76 | Repacked pump |
| 5/3/77 | Replaced column flange bolts for seismic upgrade |
| 9/7/77 | Pump rebuilt (motor had been improperly reconnected and subsequently run in reverse rotation) |
| 12/7/77 | Repacked pump |
| 9/22/78 | Adjusted packing |

COMMONOAP57 -
Emergency Service Water 'A'Work Performed

| | |
|---------|--|
| 3/22/77 | Replace motor hold down bolts for seismic upgrade |
|---------|--|

OBP57 -
Emergency Service Water 'B'Work Performed

| | |
|---------|---|
| 4/20/77 | Replace motor holddown bolts for seismic upgrade |
|---------|---|

OOP186 -
Emergency Cooling Water

Work Performed

NONE

NONE PERFORMED

OOP63 -
Diesel Driven Fire Pump

Work Performed

4/12/73

Pump removed for inspection during construction. Long run times at minimal flow caused silt buildup in pump and subsequent starting problems

OOP64 -
Motor Driven Fire Pump

Work Performed

9/20/78

Repacked pump

Action To Be Taken By Licensee

- 6) Provide information relative to the longest interval that each pump has been available for operation without corrective maintenance. Identify the number of cycles of operation during this interval, the duration of each cycle and the operating mode(s) (recirculation, rated flow, etc.). Identify the longest continuous operation at or near rated flow conditions for each pump and the status of the pump operability at the end of the run.

Response

The requested information is provided as follows:

AVAILABILITY FOR OPERATION
WITHOUT MAJOR* CORRECTIVE
MAINTENANCE

High Pressure Service WaterUNIT 2

| <u>Pump</u> | <u>Period</u> | <u>Duration</u> |
|-------------|--------------------|-------------------|
| A | 10/22/73 - 1/20/76 | 2 years, 98 days |
| B | 2/13/74 - 3/15/76 | 2 years, 32 days |
| C | 10/5/73 - 6/19/76 | 2 years, 284 days |
| D | 10/5/73 - 7/28/77 | 3 years, 323 days |

UNIT 3

| <u>Pump</u> | <u>Period</u> | <u>Duration</u> |
|-------------|-------------------|-------------------|
| A | 8/20/74 - 2/2/79 | 4 years, 192 days |
| B | 8/20/74 - 8/30/78 | 4 years, 355 days |
| C | 8/20/74 - 7/13/78 | 3 years, 328 days |
| D | 8/20/74 - 7/17/78 | 3 years, 332 days |

* Major Corrective Maintenance is specified to indicate that some maintenance which would not affect pump performance or operability, i.e., packing leakage, was performed during these periods.

Emergency Service Water A & B

No major corrective maintenance has been required on these pumps.

Emergency Cooling Water

No major corrective maintenance has been required on this pump.

Diesel and Motor Driven Fire Pumps

With the exception of the silt problem on the Diesel Fire Pumps during plant construction as described in response 5), no major corrective maintenance has been required on these pumps.

CYCLES AND CYCLE DURATION SUMMARY FOR LONGEST
INTERVAL WITHOUT MAJOR CORRECTIVE MAINTENANCE

UNIT 2
HIGH PRESSURE SERVICE
WATER PUMPS

| Cycle Duration | A Pump (Cycles) | B Pump (Cycles) | C Pump (Cycles) | D Pump (Cycles) |
|-------------------|--------------------|--------------------|--------------------|--------------------|
| 5 min. | 5 | 4 | 6 | 13 |
| -30 min. | 9 | 5 | 12 | 43 |
| 30-60 min. | 4 | 15 | 7 | 66 |
| 1-10 hr. | 30 | 42 | 46 | 65 |
| 10-50 hr. | 5 | 10 | 21 | 16 |
| 50-100 hr. | | | 2 | 4 |
| 100-120 hr. | | | 1 | |
| 120-140 hr. | | | | 1 |
| 140-160 hr. | | | | 1 |
| 160-180 hr. | | | | |
| 180-200 hr. | | | | |
| 200-220 hr. | | | | |
| 220-240 hr. | | 1 | | |

UNIT 3
HIGH PRESSURE SERVICE
WATER PUMPS

| Cycle Duration | A Pump (Cycles) | B Pump (Cycles) | C Pump (Cycles) | D Pump (Cycles) |
|-------------------|--------------------|--------------------|--------------------|--------------------|
| 5 min. | 33 | 31 | 24 | 25 |
| 5-30 min. | 60 | 35 | 19 | 23 |
| 30-60 min. | 27 | 2 | 5 | 5 |
| 1-10 hr. | 68 | 24 | 20 | 31 |
| 10-50 hr. | 15 | 11 | 10 | 8 |
| 50-100 hr. | 3 | 3 | 4 | 6 |
| 100-120 hr. | | 4 | | 2 |
| 120-140 hr. | 1 | 1 | | 3 |
| 140-160 hr. | | 1 | | |
| 160-180 hr. | 2 | 2 | | |
| 180-200 hr. | 1 | | | |
| 200-220 hr. | | 1 | | |
| 220-240 hr. | | | | |

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A AND B EMERGENCY SERVICE WATER PUMPS
AND EMERGENCY COOLING WATER PUMP

| <u>Cycle Duration</u> | <u>A Pump (Cycles)</u> | <u>B Pump (Cycles)</u> | <u>ECW Pump (Cycles)</u> |
|---------------------------|----------------------------|----------------------------|------------------------------|
| 1 min. | 810 | 810 | 1660 |
| 15 min. | 25 | 25 | 5 |
| 30 min. | 230 | 230 | - |
| 1 hour | 580 | 580 | - |
| Various (1) | 120 | 120 | - |

(1) Cycle durations vary in this category from approximately 15 minutes to 16 hours. Included in this category are estimated ESW pump starts during emergency diesel runs for various infrequent surveillances, trouble shooting, governor testing, and startup feed outages.

DIESEL AND MOTOR DRIVEN FIRE PUMPS*

| <u>Cycle Duration</u> | <u>Diesel Driven Fire Pump</u> | <u>Motor Driven Fire Pump</u> |
|---------------------------|------------------------------------|-----------------------------------|
| 15 min. | 21 | 18 |
| 30 min. | - | 72 |
| 1 hour | 6 | 6 |
| 3 hours | - | 12 |

* Cycle and Cycle durations are estimated.

LONGEST CONTINUOUS
OPERATION AND PUMP
STATUS AFTER RUN

| <u>High Pressure Service Water</u> | <u>Hours</u> | <u>Subsequent Pump Status</u> |
|--|--------------|--|
| <u>UNIT 2</u> | | |
| 2A Pump | 47 | Satisfactory flow, discharge head and physical condition. |
| 2B Pump | 231 | Satisfactory flow, discharge head and physical condition. |
| 2C Pump | 101 | This run occurred during an outage. Subsequent to this run, the pump was run an additional 330 hours, at which time the discharge pressure of the pump was low and was increased by resetting impeller clearances. |
| 2D Pump | 155 | This run was terminated due to a sudden decrease in discharge pressure. Pump was removed, foreign obstruction (rope) found in first stage impeller, pump reinstalled and performance satisfactory. (Subsequent inspection performed by diver in all bays for foreign material) |
| <u>UNIT 3</u> | | |
| 3A Pump | 197 | Satisfactory flow, discharge head and physical condition. |
| 3B Pump | 168 | Satisfactory flow, discharge head and physical condition. |
| 3C Pump | 100 | Satisfactory flow, discharge head and physical condition. |
| 3D Pump | 132 | Satisfactory flow, discharge head and physical condition. |

Emergency Service Water and Emergency Cooling Water Pumps

The ESW pumps are run primarily to provide cooling water to the emergency diesels. As a result, there have been no significantly long continuous operations of these pumps. The longest run for these pumps is estimated to have been approximately 16 hours. No corrective maintenance has been required on these pumps. Similarly, there have been no significantly long continuous operations of the ECW pump, which had also required no corrective maintenance.

Diesel and Motor Driven Fire Pumps

There have been no significantly long continuous operations of these pumps, and with the exception of the silt problem on the Diesel Fire Pump during plant construction, as described in response 5), no major corrective maintenance has been required on these pumps.

In addition to the information provided above, the following information is available at the plant site and our central maintenance shops, where pump rebuild work is performed, for inspection:

- 1) Drawings, sectional assemblies and parts list.
- 2) Detailed history of pump maintenance (alignment, parts replacement, etc.) including bearing wear data, replacement frequency and a comparison with the manufacturers rated life for wearing surfaces.
- 3) Quality assurance and reliability testing requirements.
- 4) Design specifications.
- 5) Results of tests performed during operation or prior to licensing.
- 6) Details of the procedures used to align the pump column.

Maintenance and Operating History EvaluationHigh Pressure Service Water Pumps

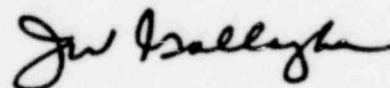
The major problems associated with the HPSW pumps have been identified and resolved. In summary, column flange bolts were seismically upgraded, coupling bolts and nuts were installed to specification, shaft coupling material hardness was decreased. Additionally, an ongoing program of mud/silt accumulation measurement and removal exists to eliminate suspected shaft coupling damage from the same, and to eliminate some degree of pump wear leading to low capacity. The HPSW pumps do not presently meet design specifications relative to discharge pressure at rated flow, however, the technical specification discharge pressure at rated flow is significantly below design; present pump discharge pressures, at rated flow, are approximately 45 psig above the technical specification values. Based on the above, the operability status of the HPSW pumps is deemed to be adequate and no further actions are anticipated.

Emergency Service Water, Emergency Cooling Water, and Fire Pumps

The maintenance and operating history of these pumps indicate reliable performance and conformance to design requirements. Based on this history, no action is anticipated with respect to these pumps.

Should you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,



cc: Boyce H. Grier
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