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September 26, 1979

United States Nuclear Regulatory Commission
Attention: Boyce H. Grier, Director
Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

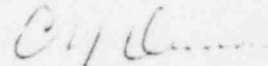
Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334
License No. DPR-66
Response To IE Bulletin 79-15

Gentlemen:

We have reviewed Bulletin No. 79-15. A total of eleven (11) deep draft pumps are presently being utilized in safety-related applications at Beaver Valley Unit No. 1. We are providing the attached information for each pump as required by the Bulletin.

If you have any questions regarding this response, please contact my office.

Very truly yours,


C. N. Dunn
Vice President, Operations

Attachment

cc: United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
Washington, DC 20555

United States Nuclear Regulatory Commission
Division of Operating Reactors
Attn: A. Schwencer, Chief
Operating Reactors Branch No. 1
Washington, DC 20555

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DUQUESNE LIGHT COMPANY
Beaver Valley Power Station
Unit No. 1

RESPONSE TO NRC IE BULLETIN 79-15

A. Low Head Safety Injection Pumps [SI-P-1A, 1B]

Total number of pumps: 2
Manufacturer: Ingersoll-Rand
Model: 25APK; 2-stage
Capacity: 3000 GPM at 255 ft.
Plant Application: Provide emergency core cool
Overall dimensions: 53.25 ft. (discharge center bottom of
suction bell)

Summary Of Startup Testing

The flow capability of the low head safety injection pumps was demonstrated by operating each pump with suction from the Refueling Water Storage Tank (RWST) under miniflow and under maximum flow hot and cold leg injection conditions. Pump response time was recorded along with pump flow and head data. The capability of the high head safety injection pumps to take suction from the low head safety injection pumps was also demonstrated.

Operational Testing

The low head safety injection pumps are verified operational once a month during plant operation by operating each pump for approximately 15 minutes on miniflow.

Special Testing

A special test was performed to verify that the 1A Low Head Safety Injection Pump [SI-P-1A] was capable of delivering full flow at the end of a thirty day operating period. The results of the test were previously forwarded to the NRC in a letter from C. N. Dunn to A. Schwencer dated July 26, 1978.

Routine Maintenance History - [SI-P-1A]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
2/19/77	Inspection
12/18/77	Installed temporary vibration equipment
12/29/77	Installed support spring can under pump discharge nozzle to prevent pump misalignment due to weight of nozzle
3/10/78	Removed pump, installed four accelerometers, reinstalled and realigned pump
3/22/78	Supported test crew on mounting pickups for 30-day run test
4/17/78	Obtained tong ammeter readings
4/21/78	Installed steel coupling rings in place of brass coupling rings

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A. Low Head Safety Injection Pumps [SI-P-1A, 1B] (continued)

Routine Maintenance History - [SI-P-1A] (continued)

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
5/13/78	Replaced damaged nipple on eductor piping
5/27/78	Decontaminated eductor piping
6/3/78	Weld-repaired pump discharge
6/11/78	Heated piping to bring within tolerance
6/26/78	Mounted accelerometers
7/6/78	Disassembled, inspected and overhauled pump and plumbed pump can
8/6/78	Aligned motor-pump coupling

Routine Maintenance History - [SI-P-1B]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
2/19/77	Inspection
1/7/78	Installed spring can under pump discharge and aligned pump to satisfy NRC request due to high vibration on Surry's pumps
1/11/78	Installed temporary vibration equipment
6/15/78	Removed and inspected motor
6/24/78	Tightened swagelocks to eliminate pump shaft seal accumulator leak
6/28/78	Replaced coupling to resolve excessive vibration problem
7/6/78	Disassembled, inspected and overhauled pump and replumbed pump can

Operational Problems

Coupling-related misalignment problems and severe bearing wear.

Major Repair Efforts

Both low head safety injection pumps were inspected and overhauled at the completion of a 30-day run test. The original couplings were replaced with a spigot fit type coupling with close tolerances. Chrome-plated shaft sleeves were installed on the pump shafts to provide a harder bearing surface and all pump bearings were replaced with modified tri-lobe bearings. Both pump cans were restored to the vertical condition and the pump mounting flanges at the top of the can were machined horizontally level to achieve perpendicularity with the can centerline. The alignment of the assembled pump columns were checked using optical alignment equipment and the column section flanges were machined to achieve acceptable alignment of all pump bearings.

A. Low Head Safety Injection Pumps [SI-P-1A, 1B] (continued)

Major Repair Efforts (continued)

A cross tie has been installed to provide long-term backup capability for the low head safety injection pumps by supplying core cooling water from the sump using the outside recirculation spray pumps.

The following modifications are expected to be installed during the upcoming refueling outage:

1. Replacement of the column sections with shorter sections of greater stiffness. This modification will double the number of drive shaft guide bearings.
2. Addition of a lower pump bearing.
3. Replacement of the existing threaded drive shaft couplings with snap-on type couplings.
4. Installation of a stiffening wedge mechanism to provide intermediate bracing between the pump columns and the pump can.
5. Installation of a flow straightening vortex eliminator at the inlet piping connection of the pump can.

Longest Interval Of Pump Operability Without Corrective Maintenance

The 1A Low Head Safety Injection Pump [SI-P-1A] was available for service for 404 days from 8/6/78 to 9/14/79. During this time, the pump was run on recirculation for approximately fifteen minutes twelve times.

The 1B Low Head Safety Injection Pump [SI-P-1B] was available for service for 447 days from 6/24/78 to 9/14/79. During this time, the pump was run on recirculation for approximately fifteen minutes thirteen times.

Longest Continuous Operation

The 1A Low Head Safety Injection Pump [SI-P-1A] was run on recirculation flow equivalent to approximately 5% of full flow for 720 hours. At the conclusion of the test run, a short test at full flow (pumping into the depressurized Reactor Coolant System) was performed to demonstrate that the pump was still capable of delivering full flow at the end of the thirty-day operating period.

The 1B Low Head Safety Injection Pump [SI-P-1B] has not been operated at full flow except during start-up testing.

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B. Outside Containment Recirculation Spray Pumps [RS-P-2A, 2B]

Total number of pumps: 2
Manufacturer: Bingham-Willamette Co.
Model: 10X18B-J-VCR; 2-stage
Capacity: 3500 GPM at 251 ft.
Plant Application: Containment depressurization and back-up for emergency core cooling
Overall dimensions: 53.0 ft. (discharge centerline to bottom of suction bell)

Summary Of Startup Testing

Startup testing was performed to verify proper pump operation and the absence of vortexing at the pump inlets at the containment sump. With the pumps operating at 2000 GPM, pump performance data was obtained. With the pumps operating at shutoff, pump performance and vibration data and motor running current data was obtained.

Operational Testing

The outside recirculation spray pumps are started dry once per month during plant operation to verify starting ability. Once per 18 months, the pump casings are filled and the pump run for 5 to 10 minutes.

Maintenance History - [RS-P-2A]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
1/10/76	Tested, inspected and lubricated motor
6/2/76	Wiped up oil leaking from pump motor
9/9/76	Replaced plastic caps with pipe plugs to fix upper bearing oil leak
1/9/77	Tested, inspected and lubricated motor
1/13/78	Tested, inspected and lubricated motor
4/25/78	Load-tested shaft handling tool
7/6/78	Disassembled, inspected and overhauled pump and replumbed pump can
2/14/79	Tested, inspected and lubricated motor

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B. Outside Containment Recirculation Spray Pumps [RS-P-2A, 2B] (continued)

Maintenance History - [RS-P-2B]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
2/22/76	Tested, inspected and lubricated motor
3/11/76	Reassembled incorrectly assembled mechanical seal
2/6/77	Tested, inspected and lubricated motor
10/21/77	Installed fitting to accept tygon hose
3/28/78	Tested, inspected and lubricated motor
5/2/78	Load-tested eyebolts to lift pump
7/6/78	Disassembled, inspected and overhauled pump and replumbed pump can

Operational Problems

Bearing wear and shaft scoring.

Major Repair Efforts

Both outside recirculation spray pumps were disassembled and inspected during an outage in the spring of 1978. Moderate bearing wear and minor shaft scoring were observed. Optical alignment checks of the assembled pump columns and the pump can were performed. The pump column flanges were machined to obtain acceptable alignment of all pump column bearing with the optical centerline. The pump can was restored to vertical and the pump mounting flanges were machined. The pump shafts were chrome-plated to provide a harder bearing surface. No further modifications are considered necessary.

Longest Interval Of Pump Availability Without Corrective Maintenance

The 2A Outside Recirculation Spray Pump [RS-P-2A] was available for service for 687 days from 6/2/76 to 4/20/78. During this time, the pump was started dry thirty times and operated once with the casing filled for 5 to 10 minutes.

The 2B Outside Recirculation Spray Pump [RS-P-2B] was available for service for 589 days from 3/11/76 to 10/21/77. During this time, the pump was started dry twenty-one times and operated with the casing filled once for 5 to 10 minutes.

Longest Period Of Continuous Operation

Except for the original startup testing and the 5 to 10 minute runs to fulfill surveillance requirements, the pumps have not been operated continuously.

• Inside Containment Recirculation Spray Pumps [RS-P-1A, 1B]

Total number of pumps: 2
Manufacturer: Bingham-Willamette Co.
Model: 10X18B - VCR; 2-stage
Capacity: 3500 GPM at 245 ft.
Plant Application: Containment depressurization
Overall dimensions: 15' 6 5/8" (discharge centerline to bottom of suction bell)

Summary Of Startup Testing

Proper pump operation was checked by operating the pumps at shutoff. Pump performance and vibration data and motor running current data were obtained. The pumps were also run in the recirculation mode but no flow data was obtained.

Operational Testing

The inside recirculation pumps are started dry once per month during plant operation to verify starting ability.

Maintenance History - [RS-P-1A]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
12/22/75	Tested, inspected and lubricated motor
5/18/78	Tested, inspected and lubricated motor
5/21/78	Removed deck plate
6/7/78	Removed screens for picture taking and reinstalled
8/9/79	Removed motor and sent out for modification of lower thrust bearing recommended by vendor because of possible generic defect

Maintenance History - [RS-P-1B]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
1/5/76	Tested, inspected and lubricated motor
2/7/77	Tested, inspected and lubricated motor
5/18/78	Tested, inspected and lubricated motor
5/21/78	Removed deck plate
6/7/78	Removed screens for picture taking and reinstalled
7/29/79	Removed motor and sent out for modification of lower thrust bearing recommended by vendor because of possible generic defect

C. Inside Containment Recirculation Spray Pumps [RS-P-1A, 1B] (continued)

Operational Problems

None

Major Repair Efforts

In June of 1979, the motors from both pumps were repaired and rebuilt by the General Electric Company to meet bearing changes incorporated in the motors used in the Surry and North Anna plants of VEPCO. The changes included a change in the lower bearing, a new design lower slinger and clearance changes between the shaft and the lower shield.

Longest Interval Of Pump Availability Without Corrective Maintenance

The 1A Inside Recirculation Spray Pump [RS-P-1A] was available for service for 1,134 days from 3/22/76 to 5/1/79. During this time, the pump was started dry thirty-six times.

The 1B Inside Recirculation Spray Pump [RS-P-1B] was available for service for 1,148 days. During this time, the pump was started dry thirty-eight times.

D. Reactor Plant River Water Pumps [WR-P-1A, 1B, 1C]

Total number of pumps: 3
Manufacturer: Byron Jackson Pump Division of the Borg-Warner Corp.
Model: 28 KXH; single stage
Capacity: 9000 GPM at 155 ft.
Plant Application: Supplies cooling water to reactor plant related equipment
Overall dimensions: 66' 11" (discharge centerline to bottom of suction bell)

Summary Of Startup Testing

Startup testing was performed to verify that the pumps are capable of supplying the required flow of river water. Pump performance data was obtained at various flow rates including full flow.

Operational Testing

Operability is verified by operating the pumps for approximately one-half hour at normal flow at least once a month when the plant is operating.

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D. Reactor Plant River Water Pumps [WR-P-1A, 1B, 1C] (continued)

Maintenance History - [WR-P-1A]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
4/11/76	Inspected motor and supply cable
9/8/76	Reinstalled incorrectly installed fittings
10/5/76	Replaced rubber expansion joint with one of higher rating
10/5/76	Lanced seal water lines
10/18/76	Replaced broken coupling
4/26/77	Inspected motor and supply cable
8/3/77	Cleaned lines
12/19/77	Cleaned seal water line and two valves
11/11/78	Inspected motor and supply cable

Maintenance History - [WR-P-1B]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
4/10/76	Inspected motor and supply cable
4/21/76	Replaced mechanical seal; seal faces were worn and pitted, causing leakage
8/13/76	Flushed clogged motor cooling line
9/7/76	Repaired oil leak
10/5/76	Replaced rubber expansion joint with one of higher rating
10/5/76	Replaced broken shaft coupling between second and third shafts
10/10/76	Replaced broken shaft coupling - last coupling
11/18/76	Overhauled pump; couplings were broken
8/3/77	Cleaned lines

Maintenance History - [WR-P-1C]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
4/11/76	Inspected motor and supply cable
8/13/76	Replaced expansion joint with one of higher rating
8/14/76	Cleared clogged seal water line
4/20/77	Inspected motor and supply cable
7/25/77	Overhauled shaft couplings, inner column bearings except for bottom and outer column bolts; polished and dressed shaft sections and threads; functionally tested.

D. Reactor Plant River Water Pumps [WR-P-1A, 1B, 1C] (continued)

Operational Problems

Coupling failures and plugged seal water lines.

Major Repair Efforts

All three reactor plant river water pumps have been overhauled and the couplings replaced. Recently, the seal water lines were successfully cleaned with a chemical solution. Modifications are planned to replace the seal water lines with stainless steel piping to eliminate metal buildup on the inside of the presently installed carbon steel piping. The 1A Pump impeller was recently replaced because of damage caused by a foreign object entering the pump suction. Repair work is presently being performed on the 1B Pump to repair the impeller, lower shafts and bearings, a cracked spider assembly and to modify the impeller wearing surface and lower bearing housing.

Longest Interval Pump Availability Without Corrective Maintenance

The 1A Reactor Plant River Water Pump [WR-P-1A] was available for service for 289 days from 10/18/76 to 8/3/77. During this time, the pump was operated at near rated flow conditions thirty-one times for a total of 3,129.5 hours. The following is a chronological list of the duration of each operating period: 283, 24, 88, 200, 44, 28.5, 5.5, 72, 144, 18, 60, 11, 92, 18.5, 297, 90, 16, 1.0, 2, 93, 341, 0.5, 1.0, 8, 251.5, 390, 11, 342, 24, 24 and 149 hours.

The 1B Reactor Plant River Water Pump [WR-P-1B] was available for service for 773 days from 8/3/77 to 9/14/79. During this time, the pump was operated at near rated flow conditions sixty-three times for a total of 9,404 hours. The following is a chronological list of the duration of each operating period: 80, 506, 192, 40, 157, 259, 40, 12, 16, 120, 89, 1.5, 69, 161, 62.5, 430, 156.5, 1.5, 148.5, 92, 59, 5, 0.5, 1.0, 57.5, 88, 184.5, 180.5, 13.5, 75.5, 11.5, 263, 1.0, 477, 27.5, 23.5, 656, 5, 76.5, 472, 111, 34, 8.5, 599.5, 250.5, 256, 201, 181, 261, 1.0, 103, 189, 63, 514, 11.5, 642, 88, 11.5, 161, 236.5, 151, 12 and 6.5 hours.

The 1C Reactor Plant River Water Pump [WR-P-1C] was available for service for 416 days from 7/25/77 to 9/14/79. During this time, the pump was operated at near rated flow conditions forty-four times for a total of 5,051 hours. The following is a chronological list of the duration of each operating period: 38, 74, 0.5, 95.5, 0.5, 88, 40, 28, 120, 89, 334, 1.5, 124, 49.5, 45, 51, 5, 77, 160, 238, 19, 6, 159.5, 52, 7, 70, 259, 94, 62.5, 1.0, 13.5, 0.5, 0.5, 26.5, 0.5, 23.5, 512, 327, 886, 185.5, 2, 2, 74 and 609 hours.

Longest Continuous Operation

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The 1A, 1B and 1C pumps were operated continuously at near rated flow conditions for 390, 656 and 886 hours, respectively. All three pumps were operable at the end of the runs.

E. Auxiliary River Water Pumps [WR-P-9A, 9B]

Total number of pumps: 2
Manufacturer: Johnston Pump Company
Model: 27CC - 18LS; 2-stage
Capacity: 9000 GPM at 180 ft.
Plant Application: Back-up supply of cooling water to reactor plant related equipment
Overall dimensions: 61' 11" (centerline of discharge to bottom of suction bell)

Summary Of Startup Testing

Pump performance data was obtained with the pumps operating at seven different flow conditions including full flow and shutoff.

Operational Testing

The pumps are operated monthly during plant operation at near rated flow for approximately 1/2 hour to verify operability. Once per eighteen months, the pumps are operated for approximately 2 1/2 hours.

Maintenance History - [WR-P-9A]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
2/3/77	Cleaned pump seal water sight glass
2/4/77	Disassembled pump, cleaned parts, thawed ice on inner column and reassembled pump

Maintenance History - [WR-P-9B]

<u>Completion Date</u>	<u>Description Of Maintenance Action</u>
2/16/77	Replaced packing

Operational Problems

None

Major Repair Efforts

None

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E. Auxiliary River Water Pumps [WR-P-9A, 9B] (continued)

Longest Interval Of Pump Availability Without Corrective Maintenance

The 9A Auxiliary River Water Pump [WR-P-9A] has been available for service for 954 days from 2/4/77 to 9/14/79 and is still operable. During this period, the pump was operated at near rated flow conditions for approximately 1/2 hour thirty times and for approximately 2 1/2 hours once.

The 9B Auxiliary River Water Pump [WR-P-9B] has been available for service for 942 days from 2/16/77 to 9/14/79 and is still operable. During this period, the pump was operated at near rated flow conditions for approximately 1/2 hour twenty-eight times and for approximately 2 1/2 hours once.

Longest Continuous Operation

Both pumps were operated at near rated flow conditions for approximately 2 1/2 hours to fulfill the 18-month surveillance requirement. Both pumps were operable at the end of the runs.

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