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F. L. CLAYTON, JR.
Senior Vice President

Alabama Power
the southern electric system

December 18, 1979

Docket Nos. 50-348 and 50-364
NRC IE Bulletin 79-15

Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Director, Division of Reactor
Construction Inspection

Dear Sir:

In response to IE Bulletin 79-15, Deep Draft Pump Deficiencies, Alabama Power Company submitted a letter dated July 18, 1979. Our response stated that we did not have any of the pumps in use at Farley in the listed systems. Subsequent to that response, further review has determined that Farley Plant has deep draft pumps similar to those identified by the bulletin in safety related application. Attached is our supplemental response to IE Bulletin 79-15 addressing the items requested for these pumps.

Yours very truly,

F. L. Clayton, Jr.

FLCJr/JGS:bhj

Attachment

cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. M. D. Hunt, Region II (w/Attachment)
Office of Inspection and Enforcement
Reactor Operations Inspection (w/Attachment)

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IE BULLETIN 79-15

1. The number of deep draft pumps similar to those shown in Figures 1 and 2 utilized in safety related applications in each facility.

   Response: 10 Unit 1
   10 Unit 2 (Under Construction)

2. Manufacturer, model, capacity and plant application.

   Response:

	Unit 1	Unit 2
Manufacturer:	Byron Jackson	Johnson
Model:	30 KXE, Single Stage	30½ X 18 Type A, 2 Stage 27cc
Capacity:	9750 GPM @ 175 TDH	9750 GPM @ 175 TDH
Plant Application:	River Water Makeup To the Cooling Pond	River Water Makeup To The Cooling Pond
Manufacturer:	Byron Jackson	Johnson
Model:	32 RXL-28 KXL, Two stage	30½ X 18 Type A, 2 Stage 27cc
Capacity:	9000 GPM @ 210 TDH	9000 GPM @ 210 TDH
Plant Application:	Plant Service Water	Plant Service Water

3. Overall dimensions of PUmps.

   Response:

	Byron Jackson		Johnson	
	River	Service	River	Service
Total Height:	51'-4 7/8"	45'-2 1/8"	51'-2"	45'-6 1/2"
Pump Height:	45'-9 5/8"	40'-2"	---	---
Min. Submergence:	4'-6"	5'-0"	4'-6"	5'-0"
Pump length below floor:	41'-7 5/8"	36'-0"	41'-4½"	35'-9"
Dia. of Suction Bell:	2'-10"	2'-10"	2'-6"	2'-6"
Dia. of Pump Column:	20" O.D.	20" O.D.	20" O.D.	20" O.D.

4. Summary of startup, testing, and routine maintenance history.

   Response:

Model 30 KXE - BJ River Water Pumps

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A. River Water Functional and Flush (Startup Preop)

1. Flush R.W. lines
2. Test Minimum Flow System
3. Test Operation of R.W. System
4. Test R.W. Pumps

a. Pump Control Verification
b. Pump lube and cooling system operation
c. Pump normal operation

(1) Running current for each phase
(2) Bus voltage
(3) Discharge pressure
(4) Discharge flow
(5) Dead head pressure
(6) Pump vibration
(7) Bearing temperatures
(8) Motor Winding RTD readings

5. Calibration and loop checks

B. FNP-1-STP-25.1 & 2 (Monthly) Inservice
FNP-1-STP-25.3 & 4 (Annual) Inservice

1. Monthly

a. Differential pressure measurement
b. Upper and lower motor oil reservoir levels
c. Mounting flange vibrations

2. Annual

a. Differential pressure
b. Upper and lower motor oil reservoir levels
c. Mounting flange vibrations
d. Bearing temperatures

3. Test reviews (monthly)

- #4 RWP vib. high 12/11/77, 1/11/78, 6/13/78, 9/13/78, 11/18/78, 6/19/79
- #5 RWP vib. high 6/13/78
- #2 RWP vib. high 12/15/78
- #8 RWP vib. high 12/11/77, 12/27/77, 1/13/78, 4/11/78, 4/15/78, 10/2/78, 12/15/78
- #9 RWP vib. high 6/13/78, 7/20/79, 7/22/79
- #10 RWP vib. high 9/13/78, 10/17/78

4. Test Reviews (Annual)

- #8 RWP vib. high 4/15/78

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C. FNP-1-GMP-5.0 Vibration measurements
FNP-1-GMP-9.0 General pump inspection
FNP-1-GMP 21.0 Coupling Alignment

D. Maintenance History

#4 RWP - packing adjustments & vibration problems
#5 RWP - packing adjustments
#8 RWP - packing adjustments & vibration problems

#9 RWP - packing adjustments
#10 RWP - packing adjustments & vibration problems

Model 32 RXL - 28 KXL - BJ Service Water Pumps

A. Service Water Preop

1. Verify pump minimum flow bypass
2. Verify design flows for Cold Shutdown conditions
3. Verify design flows for normal operation
4. Verify individual SW pump design and operation

   a. Running current for each phase
   b. Bus voltage
   c. Discharge pressure
   d. Pump vibration
   e. Pump rpm
   f. Bearing temperature
   g. Dead head pressure

5. Pump lube and cooling system operation

B. FNP-1-STP-24.1 & 2 (Monthly) Inservice
FNP-1-STP-24.3 & 4 (Annual) Inservice

1. Monthly

   a. Total Dynamic Head
   b. Upper and lower oil reservoir levels
   c. Flow rate
   d. Mounting flange vibration

2. Annual

   a. Total Dynamic Head
   b. Upper & lower oil reservoir levels
   c. Flow rate
   d. Mounting flange vibration
   e. Bearing temperature
   f. Discharge pressure

3. Test reviews (monthly)

   - #1D SWP vib. high 11/18/78
   - #E SWP vib. high 11/18/78, 11/28/78

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4. Test reviews (annual)

   - No discrepancies

C. FNP-1-GMP-5.0 Vibration Measurements
FNP-1-GMP-9.0 General Pump Inspection
FNP-1-GMP-21.0 Coupling Alignment

D. Maintenance History

#1A SWP - packing adjustments, 1/18/79: Major inspection, lift setting
#1B SWP - packing adjustments, lift setting
#1C SWP - packing adjustments, lube/cooling flow, lift setting
#1D SWP - packing adjustments, minor vibration problem, lift setting
#1E SWP - packing adjustments, minor vibration problem, lift setting

Model 30½ X 1B Type A, 2 stage - Johnson River Water and Service Water Pumps

These pumps have been operated some but the preoperation test has not yet been performed.

5. Operational problems and major repair efforts.

Response:

Unit 1

#10 RWP: 11/78 - Put on spare bowl and sent original bowl assembly to BJ for repair.
#9 RWP: 12/78 - Repaired on site.
#4 RWP: 2/79 - Put repaired bowl from #10 RWP on and sent suction bell to BJ.
#5 RWP: 9/79 - BJ has original bowl assembly, will return in ~ 2 weeks.

November, 1978 - #10 pump had high vibration. The pump was removed and disassembled. The suction bearing was seized to the shaft and had rotated in its housing. The line bearings were worn out of tolerance. The vanes on the impellor were cracked on the leading edge at the hub.

The bowl was replaced, all bearings were replaced and several shafts were replaced.

December, 1978 - #9 RW pump was disassembled due to high vibration and experience with #10.

Same general condition was observed. The wear ring clearances were satisfactory. Hence the bowl was not replaced. The impellor was replaced.

February, 1979 - #4 RW pump was disassembled due to experience with #9 and #10. Same general condition was observed. Bowl assembly was replaced.

August, 1979 - #5 RW pump was disassembled. Same general condition was observed. The impellor had experienced severe cavitation at some time. The cracking in the vane area was again present. The impellor had been repaired at some time before - it showed signs of brazing, etc. The bowl assembly was replaced.

April, 1979 - 1A pump was disassembled based on experience with R.W. Bearings were out of tolerance at the bottom. The lubrication line to lower bearing was clogged 99%. Bearings were replaced.

Unit 2

Unit still under construction.

6. 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 model(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:

Unit 1

River Water Pumps

QSP25P004-B

Longest interval of availability: 12/6/77 to 2/21/79

Cycle	Duration	Mode
1	1 day, 4 hours	Rated Flow
2	2 days, 16 hours	"
3	4 days, 16 hours	"
4	0 days, 8 hours	"
5	22 days, 8 hours	"
6	0 days, 20 hours	"
7	0 days, 4 hours	"
8	0 days, 8 hours	"
9	0 days, 8 hours	"
10	2 days, 12 hours	"
11	0 days, 8 hours	"
12	8 days, 4 hours	"
13	0 days, 8 hours	"
14	0 days, 4 hours	"
15	0 days, 12 hours	"
16	3 days, 4 hours	"
17	1 day, 12 hours	"
18	4 days, 20 hours	"
19	11 days, 4 hours	"
20	27 days, 4 hours	"
21	5 days, 20 hours	"
22	1 day, 4 hours	"
23	3 days, 20 hours	"
24	0 days, 16 hours	"
25	0 days, 8 hours	"
26	2 days, 20 hours	"
27	0 days, 8 hours	"
28	0 days, 16 hours	"
29	0 days, 16 hours	"
30	2 days, 4 hours	"
31	4 days, 4 hours	"
32	0 days, 12 hours	"
33	0 days, 8 hours	"

Cycle	Duration	Mode
34	1 day, 0 hours	Rated Flow
35	10 days, 4 hours	"
36	0 days, 8 hours	"
37	5 days, 16 hours	"
38	4 days, 16 hours	"
39	0 days, 16 hours	"
40	2 days, 0 hours	"
41	7 days, 12 hours	"
42	0 days, 8 hours	"
43	2 days, 16 hours	"
44	41 days, 20 hours	"
45	0 days, 8 hours	"
46	2 days, 12 hours	"
47	0 days, 4 hours	"
48	3 days, 20 hours	"
49	17 days, 8 hours	"
50	3 days, 0 hours	"
51	42 days, 0 hours	"
52	0 days, 4 hours	"
53	21 days, 0 hours	"
54	25 days, 8 hours	"
55	3 days, 12 hours	"

Pump S/D for major maintenance on the bowl assembly.

QSP25P005-B

Longest interval of availability: 12/8/77 to beyond 8/13/79

Cycle	Duration	Mode
1	2 days, 8 hours	Rated Flow
2	0 days, 20 hours	"
3	0 days, 8 hours	"
4	1 day, 4 hours	"
5	0 days, 16 hours	"
6	1 day, 4 hours	"
7	3 days, 16 hours	"
8	0 days, 4 hours	"
9	0 days, 4 hours	"
10	10 days, 8 hours	"
11	0 days, 8 hours	"
12	0 days, 4 hours	"
13	3 days, 12 hours	"
14	2 days, 16 hours	"
15	2 days, 8 hours	"
16	5 days, 20 hours	"
17	1 day, 4 hours	"
18	1 day, 0 hours	"
19	2 days, 12 hours	"
20	0 days, 20 hours	"
21	0 days, 20 hours	"
22	1 day, 12 hours	"

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Cycle	Duration	Mode
23	1 day, 8 hours	Rated Flow
24	1 day, 0 hours	"
25	1 day, 20 hours	"
26	0 days, 20 hours	"
27	6 days, 20 hours	"
28	1 day, 0 hours	"
29	5 days, 4 hours	"
30	0 days, 8 hours	"
31	50 days, 12 hours	"
32	0 days, 20 hours	"
33	1 day, 8 hours	"
34	21 days, 16 hours	"
35	5 days, 20 hours	"
36	1 day, 12 hours	"
37	0 days, 20 hours	"
38	1 day, 4 hours	"
39	0 days, 16 hours	"
40	1 day, 8 hours	"
41	1 day, 4 hours	"
42	1 day, 8 hours	"
43	1 day, 4 hours	"
44	3 days, 20 hours	"
45	1 day, 0 hours	"
46	0 days, 16 hours	"
47	0 days, 8 hours	"
48	0 days, 8 hours	"
49	0 days, 4 hours	"
50	0 days, 12 hours	"
51	0 days, 12 hours	"
52	0 days, 12 hours	"
53	1 day, 0 hours	"
54	14 days, 12 hours	"
55	13 days, 20 hours	"
56	3 days, 0 hours	"
57	1 day, 0 hours	"
58	1 day, o hours	"
59	1 day, 8 hours	"
60	5 days, 4 hours	"
61	2 days, 4 hours	"
62	3 days, 20 hours	"
63	7 days, 16 hours	"
64	1 day, 16 hours	"
65	1 day, 20 hours	"
66	0 days, 4 hours	"
67	5 days, 0 hours	"
68	2 days, 8 hours	"
69	2 days, 16 hours	"
70	1 day, 20 hours	"
71	7 days, 16 hours	"
72	18 days, 8 hours	"
73	0 days, 8 hours	"

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Cycle	Duration	Mode
74	3 days, 4 hours	Rated Flow
75	0 days, 12 hours	"
76	6 days, 20 hours	"
77	0 days, 16 hours	"
78	2 days, 12 hours	"
79	0 days, 8 hours	"
80	0 days, 4 hours	"
81	0 days, 8 hours	"
82	1 day, 16 hours	"
83	1 day, 16 hours	"
84	0 days, 16 hours	"
85	0 days, 4 hours	"
86	1 day, 12 hours	"
87	0 days, 20 hours	"
88	0 days, 12 hours	"
89	0 days, 12 hours	"
90	0 days, 12 hours	"
91	8 days, 0 hours	"
92	1 day, 8 hours	"
93	4 days, 0 hours	"
94	0 days, 4 hours	"
95	9 days, 8 hours	"
96	0 days, 12 hours	"
97	1 day, 4 hours	"
98	0 days, 12 hours	"
99	3 days, 4 hours	"
100	3 days, 8 hours	"
101	0 days, 16 hours	"
102	0 days, 4 hours	"
103	14 days, 8 hours	"
104	11 days, 4 hours	"
105	5 days, 12 hours	"
106	2 days, 4 hours	"
107	1 day, 8 hours	"
108	0 days, 20 hours	"
109	35 days, 8 hours	"

8/13/79 is the cutoff for this research

QSP25P008-A

Longest interval of availability: 12/1/77 to beyond 8/13/79

Cycle	Duration	Mode
1	0 days, 4 hours	Rated Flow
2	0 days, 8 hours	"
3	1 day, 20 hours	"
4	23 days, 0 hours	"
5	0 days, 16 hours	"
6	2 days, 0 hours	"
7	1 day, 16 hours	"

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Cycle	Duration	Mode
8	0 days, 4 hours	Rated Flow
9	0 days, 8 hours	"
10	0 days, 20 hours	"
11	0 days, 12 hours	"
12	0 days, 16 hours	"
13	1 day, 4 hours	"
14	0 days, 4 hours	"
15	0 days, 4 hours	"
16	23 days, 4 hours	"
17	18 days, 4 hours	"
18	0 days, 8 hours	"
19	6 days, 12 hours	"
20	0 days, 4 hours	"
21	6 days, 0 hours	"
22	0 days, 12 hours	"
23	0 days, 4 hours	"
24	0 days, 12 hours	"
25	1 day, 0 hours	"
26	1 day, 8 hours	"
27	5 days, 16 hours	"
28	0 days, 16 hours	"
29	1 day, 0 hours	"
30	2 days, 8 hours	"
31	6 days, 16 hours	"
32	1 day, 4 hours	"
33	1 day, 8 hours	"
34	4 days, 0 hours	"
35	0 days, 8 hours	"
36	0 days, 12 hours	"
37	0 days, 16 hours	"
38	0 days, 8 hours	"
39	0 days, 8 hours	"
40	0 days, 4 hours	"
41	0 days, 12 hours	"
42	0 days, 12 hours	"
43	2 days, 20 hours	"
44	0 days, 12 hours	"
45	7 days, 8 hours	"
46	0 days, 16 hours	"
47	0 days, 20 hours	"
48	1 day, 12 hours	"
49	5 days, 16 hours	"
50	1 day, 20 hours	"
51	0 days, 4 hours	"
52	0 days, 16 hours	"
53	0 days, 8 hours	"
54	7 days, 12 hours	"
55	2 days, 8 hours	"
56	8 days, 0 hours	"
57	1 day, 16 hours	"
58	0 days, 4 hours	"
59	0 days, 4 hours	"

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Cycle	Duration	Mode
60	33 days, 0 hours	Rated Flow
61	5 days, 0 hours	"
62	0 days, 12 hours	"
63	0 days, 4 hours	"
64	0 days, 16 hours	"
65	0 days, 20 hours	"
66	0 days, 8 hours	"
67	0 days, 12 hours	"
68	0 days, 4 hours	"
69	0 days, 12 hours	"
70	0 days, 4 hours	"
71	1 day, 0 hours	"
72	0 days, 12 hours	"
73	0 days, 16 hours	"
74	0 days, 4 hours	"
75	6 days, 12 hours	"
76	2 days, 8 hours	"
77	1 day, 16 hours	"
78	2 days, 20 hours	"
79	1 day, 8 hours	"
80	0 days, 16 hours	"
81	1 day, 12 hours	"
82	0 days, 16 hours	"
83	1 day, 4 hours	"
84	0 days, 4 hours	"
85	1 day, 0 hours	"
86	1 day, 16 hours	"
87	0 days, 8 hours	"
88	6 days, 0 hours	"
89	0 days, 8 hours	"
90	0 days, 8 hours	"
91	3 days, 8 hours	"
92	2 days, 4 hours	"
93	1 day, 4 hours	"
94	1 day, 0 hours	"
95	8 days, 16 hours	"
96	2 days, 0 hours	"
97	1 day, 8 hours	"
98	2 days, 0 hours	"
99	8 days, 0 hours	"
100	1 day, 12 hours	"
101	9 days, 12 hours	"

8/13/79 is the cutoff for this research.

QSP25P009-A

Longest interval of availability: 12/1/77 to 12/7/78

Cycle	Duration	Mode
1	10 days, 4 hours	Rated Flow
2	0 days, 8 hours	"
3	0 days, 20 hours	"

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Cycle	Duration	Mode
4	1 day, 12 hours	Rated Flow
5	0 days, 4 hours	"
6	0 days, 12 hours	"
7	9 days, 12 hours	"
8	0 days, 4 hours	"
9	0 days, 16 hours	"
10	16 days, 4 hours	"
11	34 days, 16 hours	"
12	0 days, 8 hours	"
13	2 days, 12 hours	"
14	0 days, 16 hours	"
15	0 days, 8 hours	"
16	1 day, 12 hours	"
17	0 days, 12 hours	"
18	0 days, 4 hours	"
19	0 days, 8 hours	"
20	1 day, 0 hours	"
21	1 day, 0 hours	"
22	0 days, 8 hours	"
23	0 days, 8 hours	"
24	5 days, 16 hours	"
25	1 day, 12 hours	"
26	21 days, 20 hours	"
27	2 days, 16 hours	"
28	18 days, 20 hours	"
29	3 days, 8 hours	"
30	0 days, 16 hours	"
31	0 days, 8 hours	"
32	0 days, 8 hours	"
33	0 days, 4 hours	"
34	0 days, 12 hours	"
35	0 days, 12 hours	"
36	0 days, 4 hours	"
37	1 day, 0 hours	"
38	0 days, 12 hours	"
39	2 days, 12 hours	"
40	0 days, 8 hours	"
41	7 days, 8 hours	"
42	0 days, 12 hours	"
43	0 days, 12 hours	"
44	0 days, 16 hours	"
45	0 days, 20 hours	"
46	0 days, 4 hours	"
47	3 days, 12 hours	"
48	1 day, 20 hours	"
49	1 day, 0 hours	"
50	1 day, 0 hours	"
51	1 day, 4 hours	"
52	16 days, 0 hours	"
53	14 days, 12 hours	"
54	3 days, 12 hours	"

Pump S/D for major maintenance on the bowl assembly (repaired on site).

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QSP25P010-A

Longest interval of availability: 12/1/77 to 11/25/78

Cycle	Duration	Mode
1	0 days, 4 hours	Rated Flow
2	4 days, 16 hours	"
3	0 days, 8 hours	"
4	1 day, 8 hours	"
5	0 days, 20 hours	"
6	0 days, 12 hours	"
7	0 days, 8 hours	"
8	21 days, 20 hours	"
9	0 days, 12 hours	"
10	0 days, 16 hours	"
11	1 day, 16 hours	"
12	0 days, 16 hours	"
13	0 days, 8 hours	"
14	2 days, 8 hours	"
15	0 days, 8 hours	"
16	2 days, 12 hours	"
17	0 days, 4 hours	"
18	0 days, 4 hours	"
19	0 days, 20 hours	"
20	0 days, 12 hours	"
21	1 day, 0 hours	"
22	1 day, 4 hours	"
23	1 day, 16 hours	"
24	6 days, 0 hours	"
25	0 days, 4 hours	"
26	43 days, 20 hours	"
27	2 days, 8 hours	"
28	1 day, 20 hours	"
29	8 days, 20 hours	"
30	0 days, 4 hours	"
31	2 days, 20 hours	"
32	0 days, 16 hours	"

Pump S/D for major maintenance on bowl assembly.

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Service Water Pumps

Q1P16P001-A

Longest interval of availability: 4/3/78 to 2/20/79

Cycle	Duration	Mode
1	8 days, 8 hours	Rated Flow
2	195 days, 4 hours	"
3	32 days, 0 hours	"
4	63 days, 12 hours	"

S/D to replace packing

Q1P16P001-B

Longest interval of availability: 4/4/78 to 8/2/79

Cycle	Duration	Mode
1	9 days, 12 hours	Rated Flow
2	0 days, 16 hours	"
3	139 days, 0 hours	"
4	9 days, 8 hours	"
5	114 days, 16 hours	"
6	44 days, 16 hours	"
7	48 days, 8 hours	"
8	37 days, 16 hours	"

S/D to check and adjust impeller list setting.

Q1P16P001-C

Longest interval of availability: 12/1/77 to 5/5/79

Cycle	Duration	Mode
1	86 days, 20 hours	Rated Flow
2	0 days, 20 hours	"
3	0 days, 4 hours	"
4	0 days, 12 hours	"
5	0 days, 4 hours	"
6	0 days, 8 hours	"
7	1 day, 8 hours	"
8	34 days, 0 hours	"
9	0 days, 8 hours	"
10	0 days, 8 hours	"
11	1 day, 4 hours	"
12	15 days, 16 hours	"
13	0 days, 8 hours	"
14	1 day, 4 hours	"
15	29 days, 0 hours	"
16	32 days, 12 hours	"
17	0 days, 12 hours	"
18	0 days, 12 hours	"
19	0 days, 12 hours	"
20	9 days, 8 hours	"
21	0 days, 20 hours	"
22	5 days, 0 hours	"
23	28 days, 20 hours	"
24	0 days, 4 hours	"
25	6 days, 4 hours	"
26	0 days, 4 hours	"
27	0 days, 4 hours	"
28	0 days, 12 hours	"
29	1 day, 4 hours	"
30	0 days, 8 hours	"
31	67 days, 12 hours	"
32	8 days, 4 hours	"

S/D to replace packing

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Q1P16P001-D

Longest interval of availability: 4/5/78 to 6/25/79

Cycle	Duration	Mode
1	16 days, 16 hours	Rated Flow
2	149 days, 20 hours	"
3	51 days, 20 hours	"
4	0 days, 4 hours	"
5	120 days, 12 hours	"
6	15 days, 16 hours	"
7	59 days, 4 hours	"
8	20 days, 8 hours	"

S/D to replace packing

Q1P16P001-E

Longest interval of availability: 4/6/78 to 8/2/79

Cycle	Duration	Mode
1	77 days, 8 hours	Rated Flow
2	279 days, 0 hours	"
3	10 days, 0 hours	"
4	61 days, 4 hours	"
5	24 days, 8 hours	"
6	4 days, 0 hours	"
7	10 days, 4 hours	"
8	8 days, 16 hours	"

S/D to check and adjust impeller lift setting.

Unit 2

Unit still under construction.

Files have been established to collect the identified items listed in the bulletin. An evaluation will be conducted within 60 days of this letter to identify any actions needed to improve performance and/or reliability of these pumps.

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