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October 5, 1988

W3P88-1802  
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U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Subject: Waterford 3 SES  
Docket No. 50-382  
License No. NPF-38  
Response to NRC Bulletin No. 88-08  
Thermal Stresses in Piping Connected to  
Reactor Coolant Systems

NRC Bulletin 88-08 requested licensees to review reactor coolant systems (RCSs) to identify any connected, unisolable piping that could be subjected to temperature distributions which could result in unacceptable thermal stresses. In addition, the subject Bulletin requests licensees to take action if necessary, to ensure that the piping will not be subjected to unacceptable thermal stresses.

Both NRC Bulletin 88-08 and related Information Notice 88-01 describe a dual purpose Charging/HPSI (High Pressure Safety Injection) pump system that subjected welds near the reactor coolant system (RCS) to thermal fatigue and failure. The Westinghouse dual-purpose system arrangement does not exist at Waterford 3. Waterford uses two separate and independent systems for Charging and HPSI. The Charging Pumps replace RCS inventory during normal plant operations. The relatively lower head HPSI reacts strictly to a Safety Injection Actuation Signal (SIAS) following a Loss-of-Coolant Accident (LOCA) and injects borated water after a partial RCS depressurization.

Other system arrangements, however, could pose a similar concern to the one found at Farley Unit-2; a failure could occur because of thermal stresses in any piping arrangement that meets all of the following criteria:

1. Pipe connected to the RCS with stagnant fluid.
2. Welds connect a fitting to a horizontal spool piece close to RCS loop; located so that the weld experiences a large temperature gradient.
3. Hypothetical up-stream block-valve leakage allowing a check valve to admit relatively cold coolant to the RCS.

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Meeting all three criteria simultaneously creates abnormal and excessive thermal stresses that could result in the failure of unisolable connections of piping.

The following Waterford 3 systems could meet all three criteria, assuming certain valves leak.

- A. The Auxiliary Spray System's piping and valves arrangement mimics the Farley System described in Bulletin 88-08. (See Figure 1.) The Charging Pumps feed both charging lines to the RCS, as well as the Auxiliary Spray line. During normal charging operation, valves V-1 and V-2 isolate Auxiliary Spray from entering the main spray line. Either V-1, or V-2, could leak and, thus, either could admit charging coolant to the Auxiliary Spray line at a temperature below 450°F (possibly as low as 152°F during minimum letdown -- maximum charging operations). The main spray pipe normally operates at 550°F. Leakage past either valve could induce pipe temperature oscillations of approximately 100°F.
- B. A bypass line between the charging header and HPSI piping exists with two normally closed block isolation valves (V-1 and V-2 on Figure 2). If V-1 and V-2 leak, combined with a leak at either V-3, or V-4, or V-5 or V-6; 120°F (normal charging temperature) fluid could create temperature stratification in an unisolable horizontal pipe line. The RCS piping normally operates at 550°F. Bypass valve pulsating leakage, admitting coolant at 120°F to the RCS, could result in a Bulletin 88-08 described failure. Note, the above mathematically-improbable hypothesis requires three valves, (normally closed, in-series) to leak before cooler fluid reaches the RCS.

As a result of this concern, the appropriate welds downstream of valves V-6 and V-7 on the Auxiliary Spray line shown in Figure 1 shall receive non-destructive tests (NDE) before the end of the next refueling outage. For stainless steel piping (re: Bulletin 88-08, Supplement 2), Waterford ultra-sonic tests (UT) for thermal-fatigue failures shall include: (1) sufficient instrument gain (possibly higher than the required ASME sensitivity); (2) use of multiple-angle beam transducers on surfaces that have geometric discontinuities or weld conditions that limit scanning; (3) records of any indication of a suspected flaw, regardless of amplitude; and (4) NDE personnel with demonstrated ability to detect and evaluate cracked stainless steel welds. Those inspections should identify any repairs necessary.

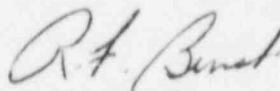
Due to the configuration of the Charging and HPSI System interconnection (see B above and Figure 2) it is highly unlikely that fluid leakage could create temperature stratification. Therefore, an evaluation by Waterford 3 design engineers concluded that NDE tests on this line is unnecessary.

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LP&L will continue to monitor the subject Auxiliary Spray line by performing NDE on the welds most likely to be affected by thermal cycling. The frequency of the examinations will be determined following a review of the previous exam results. This monitoring program should be sufficient for this piping to assure the integrity of the subject welds.

Should you have any questions, please feel free to contact me or Larry Laughlin at (504) 464-3499.

Very truly yours,



R.F. Burski  
Manager  
Nuclear Safety & Regulatory Affairs

RFB:SEF:ssf

Attachment

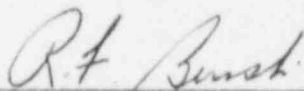
cc: R.D. Martin, NRC Region IV  
J.A. Calvo, NRC-NRR  
D.L. Wigginton, NRC-NRR  
NRC Resident Inspectors Office  
E.L. Blake  
W.M. Stevenson

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the matter of )  
 )  
Louisiana Power & Light Company ) Docket No. 50-382  
Waterford 3 Steam Electric Station )

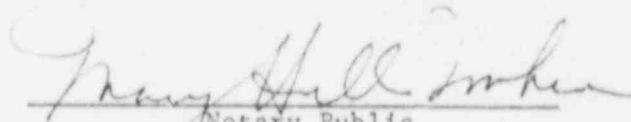
AFFIDAVIT

R.F. Burski, being duly sworn, hereby deposes and says that he is Nuclear Safety and Regulatory Affairs Manager of Louisiana Power & Light Company; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached response to NRC Bulletin No. 88-08; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

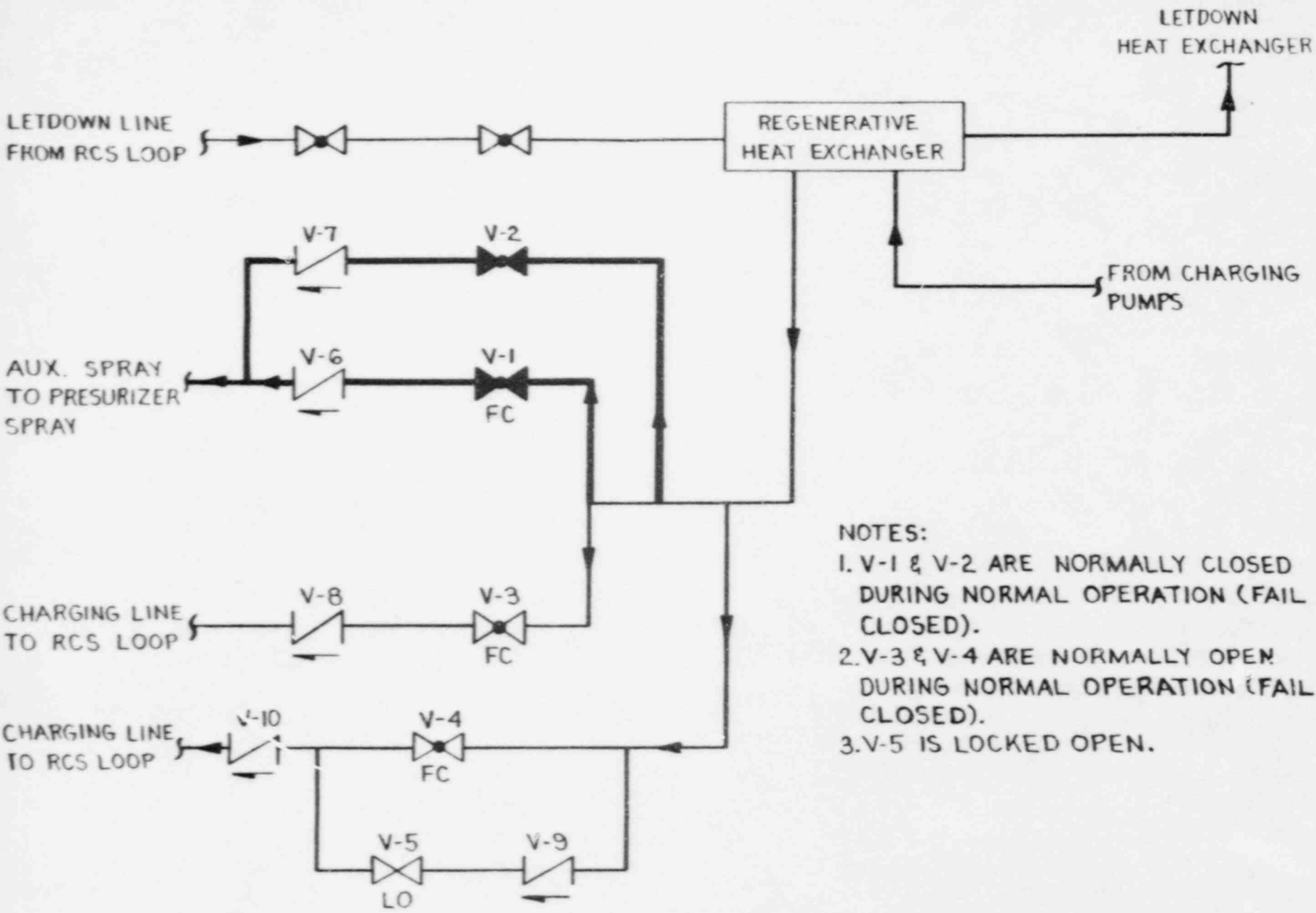
  
\_\_\_\_\_  
R.F. Burski  
Nuclear Safety & Regulatory Affairs -  
Manager

STATE OF LOUISIANA) ) ss  
PARISH OF ORLEANS )

Subscribed and sworn to before me, a Notary Public in and for the Parish and State above named this 5th day of October, 1988.

  
\_\_\_\_\_  
Notary Public

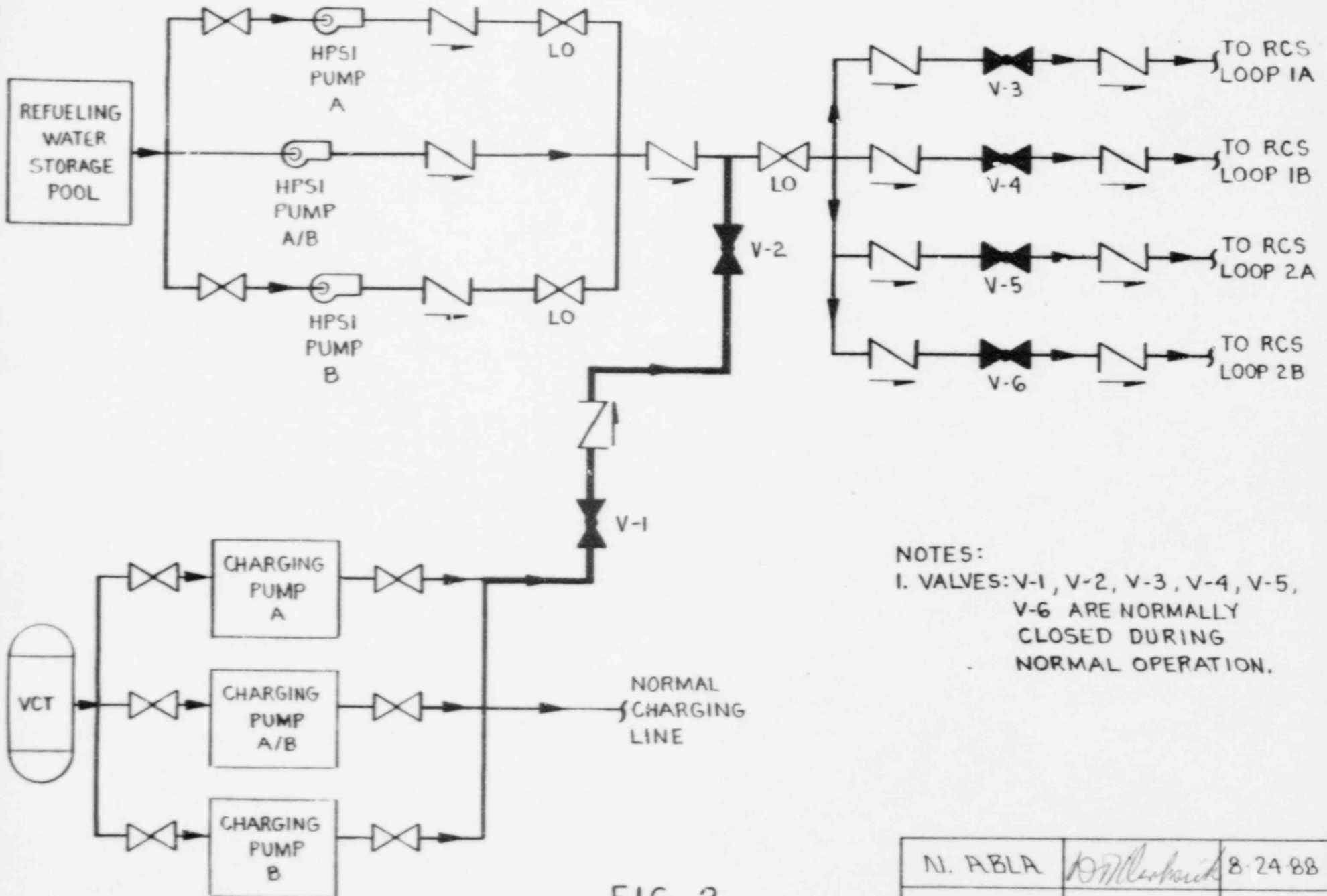
My Commission expires life.



- NOTES:
1. V-1 & V-2 ARE NORMALLY CLOSED DURING NORMAL OPERATION (FAIL CLOSED).
  2. V-3 & V-4 ARE NORMALLY OPEN DURING NORMAL OPERATION (FAIL CLOSED).
  3. V-5 IS LOCKED OPEN.

FIG. 1

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NOTES:  
 I. VALVES: V-1, V-2, V-3, V-4, V-5, V-6 ARE NORMALLY CLOSED DURING NORMAL OPERATION.

FIG. 2

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