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SUBJECT: Forwards response to NRC Generic Ltr 81-03 & NUREG-0313,  
 "Technical Rept on Matl Selection & Processing Guidelines  
 for BWR Coolant Pressure Boundary Piping."

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**PP&L**

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June 30, 1981

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U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION  
RESPONSE TO NRC GENERIC LETTER 81-03  
AND NUREG 0313 "TECHNICAL REPORT ON  
MATERIAL SELECTION AND PROCESSING GUIDELINES  
FOR BWR COOLANT PRESSURE BOUNDARY PIPING"  
ER 100450                                      FILE 841-9,883  
PLA-856    841-13

Attached please find PP&L's response to Generic letter 81-03 and NUREG 0313 .

Very truly yours,



N. W. Curtis  
Vice President-Engineering & Construction-Nuclear

TEG/mks

Attachment

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THE EFFECTIVE ELIMINATION OF IGSCC AT  
SUSQUEHANNA STEAM ELECTRIC STATION

Since 1975, when knowledge of intergranular stress corrosion cracking (IGSCC) in austenitic stainless steel in boiling water reactor (BWR) piping was brought to its attention, Pennsylvania Power & Light Company (PP&L) has undertaken an extensive program for the Susquehanna Steam Electric Station to effectively eliminate the possibility of IGSCC-caused downtime, and also to conform to the requirements of NUREG-0313, Rev. 1, and previous publications.

PP&L's program of IGSCC mitigation includes the following methods:

1. Replacement of susceptible materials, where practical, with materials that conform to Section III of NUREG-0313.

A. Recirculation system discharge valve bypass line (4") - replaced with carbon-limited Type 304 SS (low carbon stainless steel that meets the mechanical properties of regular grade Type 304, and has a maximum carbon content of .03%).

B. Core Spray and Head Spray-replaced with carbon limited Type 304.

C. Reactor water clean-up system (RWCU) - replaced with Type 304L SS.

D. Instrument piping and bottom drain - replaced with Type 304L SS.

Any further replacement of nonconforming material would result in what PP&L feels is an undue hardship, because it would involve replacement of already-installed large diameter (20" or larger) piping or flued heads that are imbedded in concrete.

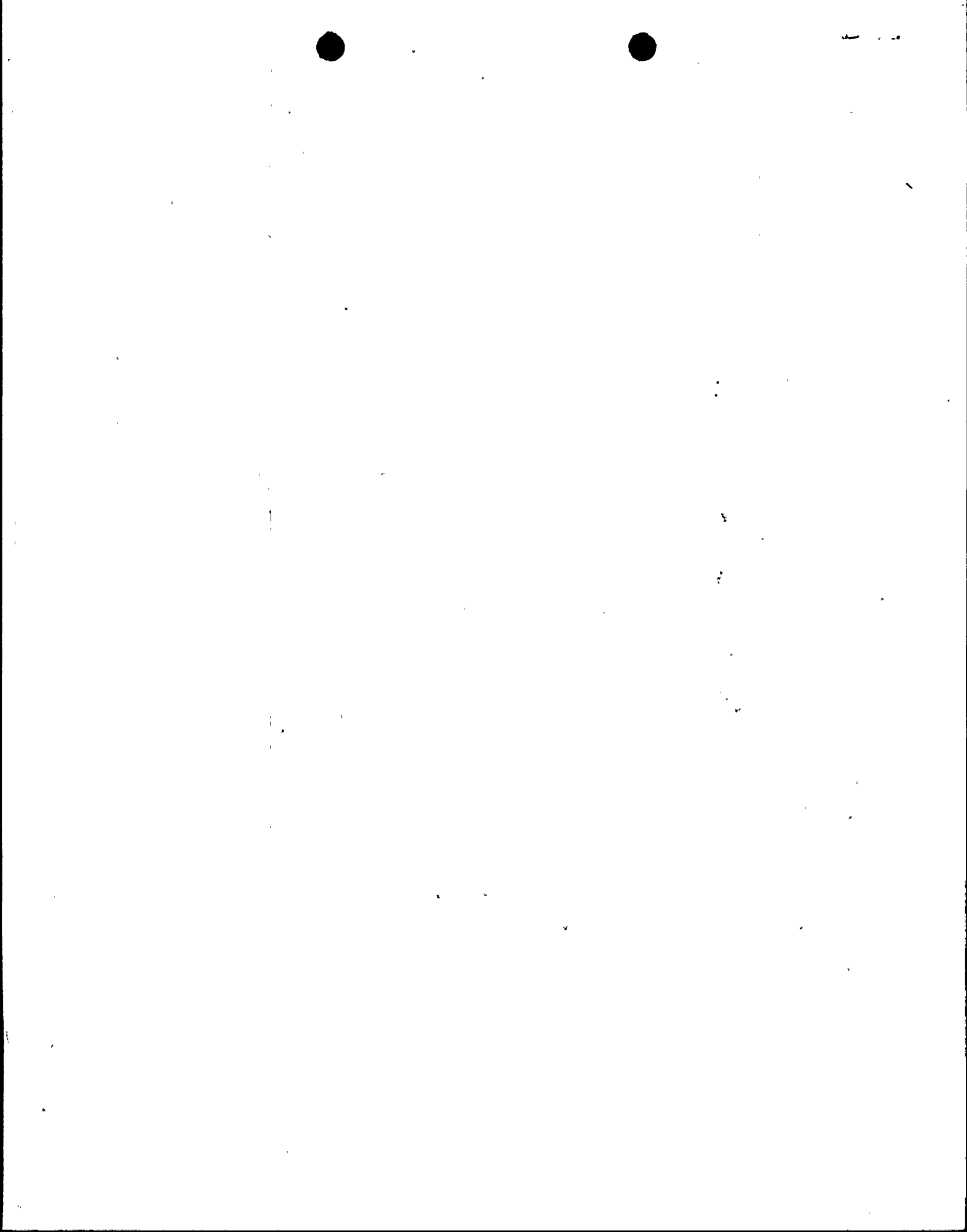
In view of the above reasons, and with consideration for the very extensive effort by PP&L that resulted with the replacement of a considerable amount of nonconforming material, PP&L requests that further material replacement requirements not be imposed (Generic Letter 81-03) because of severe undue hardship.

2. Elimination of lines whose functions are no longer required.

A. Control Rod Drive Hydraulic Return.

3. Use of low carbon corrosion resistant weld build-up (shop method) for field welds.

A. Recirculation system risers.



4. Design improvement to eliminate crevices.

A. Recirculation system inlet safe ends (extensive modification to replace all safe ends and thermal sleeves).

5. Solution heat treatment.

A. Recirculation system risers (shop welds).

In addition to the mitigation methods listed above, PP&L has used several more, some of which are listed under Section V of NUREG-0313, as follows:

6. Dissolved oxygen control

A. During normal plant operation - PP&L has relocated the control rod drive (CRD) pump intake from the condensate storage tank to the condensate makeup/reject line. This results in using CRD water with the lowest oxygen concentration available (essentially water of feedwater quality).

B. During all phases of operation/shutdown except normal operation, oxygen levels are reduced by the use of a mechanical vacuum deaerator. The deaerator is expected to maintain an oxygen content of less than 250 PPB during start-up, hot standby and shutdown.

7. Welding Parameters

A. Block welding was prohibited.

B. Interpass temperature was limited to 350°F maximum.

C. No preheat was used (in excess of a working range of 60°F to 150°F).

8. Ferrite Control

All of the weld metal and all of the type 304/316 castings were specified to have not less than 5% ferrite content. This level is generally recognized as sufficient to provide immunity from the initiation of IGSCC.

Use of induction heating stress improvement (IHSI)

IHSI is a method of eliminating or substantially reducing residual tensile stresses on the inside surface of the piping. These tensile stresses are primarily caused by welding and have been identified as one of the three major causes of IGSCC. PP&L is presently considering the use of IHSI for 108 welds on No. 1 unit that do not conform to Section III of NUREG-0313. These welds are among a total of 110 welds of 4" diameter and larger that are presently scheduled to receive augmented inservice inspection (ISI) in accordance with Section IV.B.1.b of NUREG-0313.

The 110 welds are as follows:

1. Recirculation system discharge valve bypass line - 4-4" welds (HAZ, s on weldolets).
2. Recirc. risers - 10-12" welds (HAZ's on sweepolets/reducers).
3. Core spray - 4-12" welds (HAZ's on 316 SS flued heads).
4. RWCU - 6-4" welds (HAZ's on weldolets/flued heads).
5. Residual Heat Removal (RHR) system - 41 welds (20", 24").
6. Balance of recirculation system - 45 welds (4", 22", 28").

For No. 2 unit, PP&L intends to use the IHSI process for 103 out of a total of 105 non-conforming welds. All 105 welds are also presently scheduled for augmented ISI.

The 105 welds are as follows:

1. Recirculation system discharge valve bypass line - 4-4" welds (HAZ's on weldolets).
2. Recirc. risers - 10-12" welds (HAZ's on sweepolets/reducers).
3. Core spray - 4-12" welds (HAZ's on 316 SS flued heads).
4. RWCU - 2-4" welds (HAZ's on weldolets).
5. Residual Heat Removal (RHR) system-40 welds (20", 24").
6. Balance of recirculation system - 45 welds (4", 22", 28").

The only other known welds that do not conform to Section III are numerous small (< 2" diameter) socket welds, used mostly on instrument piping. Because of the difficulty with reflected signal interpretation due to their small size, they are exempt from the type of inspection (ultrasonic) that is meaningful for detecting the inside-surface originating IGSCC, and therefore, PP&L believes that augmented ISI is not required for these small welds.

The SSES leak detection system has been reviewed for NUREG-0313 compliance and it is our determination that the design conforms to the requirements of Section IV.B.1.a.