Station Support Department

PECO NUCLEAR
A Unit of PECO Energy

10 CFR 50.55a

PECO Energy Company
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

September 4, 1997

Docket No. 50-278

License No. DPR-56

U.S. Nuclear Regulatory Commission
Attn: Document Control Center
Washington, DC 20555

Subject: Peach Bottom Atomic Power Station, Unit 3
Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(i)

References:

1. Letter from G. A. Hunger, Jr. (PECO Energy Company) to U. S. Nuclear Regulatory Commission (USNRC), dated January 30, 1997

2. Letter from J. W. Shea (USNRC) to G. A. Hunger, Jr. (PECO Energy Company), dated March 26, 1997

3. Letter from G. A. Hunger, Jr. (PECO Energy Company) to USNRC, dated April 29, 1997

4. Letter from J. F. Stolz (USNRC) to G. A. Hunger, Jr. (PECO Energy Company), dated July 2, 1997

Dear Sir:

As discussed in the Reference 4 letter, PECO Energy Company (PECO Energy) received approval for an alternative plan for the examination of the Peach Bottom Atomic Power Station (PBAPS), Unit 3 Reactor Pressure Vessel (RPV) shell welds. Since the issuance of this approval, the U. S. Nuclear Regulatory Commission (USNRC) has issued NRC Information Notice 97-63, "Status of NRC Staff's Review of BWRVIP-05" in which the staff indicated that it would consider technically justifed requests for inspection delays of up to two operating cycles for Boiling Water Reactor (BWR) circumferencial shell welds. Therefore, attached is our request for PBAPS, Unit 3 in accordance with 10 CFR 50.55a(a)(3)(i). We request your approval by October 3, 1997, in order to support the upcoming PBAPS, Unit 3 refueling outage scheduled to begin October 3, 1997.

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If you have any questions, please contact us.

Very truly yours,

G. A. Hunger, Jr.,
Director-Licensing

Attachment

cc: H. J. Miller, Administrator, Regio . I, USNRC
W. L. Schmidt, USNRC Senior Resident Inspector, PBAPS

Docket No. 50-278
September 4, 1997

REQUEST FOR RELIEF
REACTOR PRESSURE VESSEL SHELL WELD INSPECTIONS
PEACH BOTTOM ATOMIC POWER STATION, UNIT 3

The purpose of this letter is to request relief from performing a portion of the reactor pressure vessel (RPV) examination requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1980 Edition, Winter 1981 Addenda, and the augmented examination requirements of 10CFR50.55a(g)(6)(ii)(A)(2) for the Peach Bottom Atomic Power Station (PBAPS), Unit 3. Specifically, pursuant to provisions of 10CFR50.55a(a)(3)(i), and consistent with information contained in NRC Information Notice 97-63, "Status of NRC Staff's Review of BWR . IP-05", relief is requested from the examination of the RPV circumferential shell welds (Section XI Exam Cat. B-A, Item No. B1.11) for two (2) operating cycles.

The basis for this request for inspection relief is documented in the report "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)", that was transmitted to the NRC in September 1995. The BWRVIP-05 report provides the technical basis for eliminating inspection of Boiling Water Reactor (BWR) RPV circumferential shell welds. The BWRVIP-05 report concludes that the probability of failure of the BWR RPV circumferential shell welds is orders of magnitude lower than that of the axial shell welds. The NRC staff has conducted an independent risk-informed assessment of the ar alysis contained in BWRVIP-05. This assessment also concluded that the probability of failure of the BWR RPV circumferential welds is orders of magnitude lower than that of the axial shell welds. Additionally, the NRC assessment demonstrated that inspection of BWR RPV circumferential welds does not measurably affect the probability of failure. Therefore, the NRC evaluation appears to support the conclusions of BWRVIP-05.

As discussed in the Reference 4 letter, the United States Nuclear Regulatory Commission (NRC) granted approval of an alternative plan for PBAPS, Unit 3 which includes examination of the reactor vessel shell welds to the maximum extent practical from the inner diameter, within the constraints of vessel internal restrictions. The extent of weld examination coverage anticipated is identified on Table 1 of Reference 3. It should be noted that all of the beltline region vertical welds are expected to be examined to greater than 90% weld volume coverage. In conjunction with this approved alternative examination program, PECO Energy requests relief from performing the examination of the circumferential shell welds for two operating cycles beyond the eleventh refueling outage (3R11).

This independent NRC assessment utilized the FAVOR code to perform a probabilistic fracture mechanics (PFM) analysis to estimate RPV failure probabilities. Three key assumptions in the PFM analysis are: the neutron fluence was that estimated to be end-of-license mean fluence, the chemistry values are mean values based on vessel types, and the potential for beyond design basis events is considered. Although BWRVIP-05 provides the technical basis supporting the relief request, the following information is provided to show the conservatisms of the NRC analysis relative to the PBAPS, Unit 3 vessel.

For plants with RPVs fabricated by Babcock & Wilcox, the mean end-of-license neutron fluence used in the NRC PFM analysis was 5.3×10^{17} n/cm^2. However, at PBAPS, Unit 3, the highest fluence anticipated at the end of the requested relief period (October, 2001 (3R13)) is 4.5×10^{17} n/cm^2. Thus, embrittlement due to fluence effects is much lower, and the NRC analysis as described at an August 8, 1997 meeting with industry, is conservative for PBAPS, Unit 3 in this regard. Therefore, there is conservatism in the already low circumferential weld failure probabilities as related to PBAPS, Unit 3.

The following table illustrates that the PBAPS, Unit 3 plant has additional conservatism in comparison to the NRC's Independent Assessment Fracture Analysis limiting case (i.e., B&W SN 2 in Table 7-7). The chemistry factor, ΔRT_{NDT}, margin term, mean ART, and upper bound ART are calculated consistent with the guidelines of Regulatory Guide 1.99, Rev. 2.

Parameter Description	PBAPS, Unit 3 Comparative Parameters at 18 EFPY (Bounding Circ. Weld)	NRC Independent Assessment Limiting Fracture Analysis Parameters
Fluence, n/cm^2	4.5×10^{17}	1.25×10^{18}
Initial RT_{NDT}, °F	-50	-5
Chemistry Factor	147	190
Cu %	0.11	0.287
Ni %	0.96	0.60
ΔRT_{NDT}	40.4	87.9
Margin Term	40.4	62.2
Mean ART	-9.6	82.9
Upper Bound ART	30.8	145.1

As shown above, each parameter used in the limiting NRC Independent Assessment report (excluding Ni%) bounds the circumferential shell weld

information for PBAPS, Unit 3 at 18 EFPY, the EFPY at the end of the requested deferral period. (The combination of the Ni% and Cu% determines the Chemistry Factor, which is itself bounded by the NRC Independent Assessment.)

At the August 8, 1997 meeting, the NRC staff indicated that the potential for, and consequences of, non-design basis events not addressed in the BWRVIP-05 report should be considered. In particular, the NRC staff stated that non-design basis, cold, over-pressure transients should be considered. It is highly unlikely that a BWR would experience a cold, over-pressure transient. At the August 8, 1997 meeting, the NRC staff described several types of events that could be precursors to BWR RPV cold, over-pressure transients. These were identified as precursors because no cold, over-pressure event has occurred at a U. S. BWR. Also at the August 8 meeting, the NRC staff identified one actual cold, over-pressure event that occurred during shutdown at a non-U. S. BWR. This event apparently included several operational errors that resulted in a maximum RPV pressure of 1150 psi with a temperature range of 79°F to 88°F.

As provided in the following discussion, PECO Energy has in place procedures which monitor and control reactor pressure, temperature, and water inventory during all aspects of cold shutdown which would minimize the likelihood of a Low Temperature Over-Pressurization (LTOP) event from occurring. Additionally, these procedures are reinforced through operator training.

The Leakage Pressure Test and the Hydrostatic Pressure Test procedures which have been used at PBAPS, have sufficient procedural guidance to prevent a cold, over-pressurization event. The Leakage Pressure Test is performed at the conclusion of each outage, while the Hydrostatic Pressure Test is performed once every ten years. The leakage and hydrotests are infrequently-performed, complex tasks, and the test procedures are considered Plant Evolution / Special Tests. As such, a requirement is included in them for operations management to perform a "pre-briefing" with all essential personnel. This briefing details the anticipated testing evolution with special emphasis on: conservative decision making, plant safety awareness, lessons learned from similar in-house or industry operating experiences, the importance of open communications, and, finally, the process in which the test would be aborted if plant systems responded in an adverse manner. Vessel temperature and pressure are required to be monitored throughout these tests to ensure compliance with the Technical Specification pressure temperature curve. Also, the procedures require the designation of a Test Coordinator for the duration of the test who is a single point of accountability, responsible for the coordination of testing from initiation to closure, and maintaining Shift Management and line management cognizant of the status of the test.

Additionally, to ensure a controlled, deliberate pressure increase, the rate of pressure increase is administratively limited throughout the performance of the test. If the pressurization rate exceeds this limit, direction is provided to remove the CRD pumps, which are used for pressurization, from service.

With regard to inadvertent system injection resulting in an LTOP condition, the high pressure make-up systems (High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems, as well as the normal feedwater supply (via the Reactor Feedwater Pumps)) at PBAPS are all steam driven. During reactor cold shutdown conditions, no reactor steam is available for the operation of these systems. Therefore, it is not possible for these systems to contribute to an over-pressure event while the unit is in cold shutdown.

In the case of low pressure system initiation, the PBAPS, Unit 3 pressure-temperature limit curves for hydrostatic testing (PBAPS, Unit 3 Technical Specifications Figure 3.4.9-1), permit pressures up to 313 psig at temperatures from 70°F up to 100°F. Above 100°F, the permissible pressure increases immediately to above 500 psig and increases rapidly with increasing temperature. The shutoff head for the PBAPS Core Spray and Residual Heat Removal Pumps are approximately 379 psig and 361 psig respectively. Therefore, the potential for an over-pressurization event which would significantly exceed the pressure-temperature limits, due to an inadvertent actuation of these systems, is very low.

Procedural control is also in place to respond to an unexpected or unexplained rise in reactor water level which could result from a spurious actuation of an injection system. Actions specified in this procedure include preventing condensate pump injection, securing ECCS system injection, tripping CRD pumps, terminating all other injection sources, and lowering RPV level via the RWCU system.

In addition to procedural barriers, Licensed Operator Training has been held which further reduces the possibility of the occurrence of LTOP events. During Initial Licensed Operator Training the following topics are covered: Brittle fracture and vessel thermal stress; Operational Transient (OT) procedures, including the OT on reactor high level; Technical Specifications training, including Section 3.4.9, "RCS Pressure and Temperature (P/T) Limits"; and, Simulator Training of plant heatup and cooldown including performance of surveillance tests which ensure pressure-temperature curve compliance. In addition, operator training has been provided on the expectations for procedural compliance, as provided for in the Station's Operations Manual.

In addition to the above, continuous review of industry operating plant experiences is conducted to ensure that the PECO Energy procedures consider the impact of actual events, including LTOP events. Appropriate adjustments to the procedures and associated training are then implemented, to preclude similar situations from occurring at PBAPS.

Based upon the above, the probability of a cold over-pressure transient is considered to be less than or equal to that used in the NRC analysis described at the August 8 meeting and is conservative for PBAPS, Unit 3.

The NRC staff has recently transmitted a Request for Additional Information (RAI) regarding the BWRVIP-05 report to the BWR Vessel and Internals Project (BWRVIP). The BWRVIP plans to provide a response to that RAI in the near future that will include additional information on the BWRVIP Probabilistic Fracture Mechanics (PFM) analysis, comparisons to the NRC staff PFM analysis and additional information regarding beyond design basis cold over-pressure transients. PECO Energy will work with the BWRVIP to resolve the longer term issues in this area, but believes BWRVIP-05 and the NRC analysis provide sufficient basis to support this relief request.

Based on the documentation in BWRVIP-05, the risk-informed independent assessment performed by the NRC staff and the discussion above, PECO Energy believes a delay for two (2) cycles, which corresponds to October, 2001 (3R13), in completing the inspection of the RPV circumferential shell welds at PBAPS, Unit 3 is justified.