

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-277/85-34  
50-278/85-14

Docket No. 50-277  
50-278

License No. DPR-44  
DPR-56

Priority --

Category --

Licensee: Philadelphia Electric Company

2301 Market Street

Philadelphia, Pennsylvania 19101

Facility Name: Peach Bottom Atomic Power Station, Units 2 and 3

Inspection At: Delta, Pennsylvania

Inspection Conducted: June 17-19, and August 12-16, 1985

Inspectors:

E. H. Gray  
E. H. Gray, Lead Reactor Engineer  
M&PS, DRS

9/4/85  
date

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Sept. 4, 1985  
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Approved by:

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9/6/85  
date

Inspection Summary: Inspection on June 17-19 and August 12-16, 1985  
Report Nos. 50-277/85-34 and 50-278/85-14.

Areas Inspected: Routine, announced inspection of the licensee's program for detection of intergranular stress corrosion crack progression to the scope of NRC Generic Letter 84-11, progress toward modification and inspections of the

nitrogen inerting system and observations of in-service inspections and welding in progress on Unit 3. The inspection included 133 hours on site by three inspectors (19 for Unit 2; 114 for Unit 3).

Results: No violations were identified.

## DETAILS

### 1. Persons Contacted

#### Philadelphia Electric Company (PECO)

- \*\*\*T. Anderson, UT Level III
- G. Bird, QA Auditor
- K. Fisher, ISI Engineer
- \*R. Fleischmann, Manager PBAPS
- \*\*A. Fulvio, Technical Engineer
- \*\*\*T. Hinkle, ISI Supervisor
- J. Moore, Construction QC
- J. Pizzola, QA Engineer
- J. Stanley, ISI-Engineer
- \*\*D. Smith, Superintendent Operations
- \*\*T. Wilson, QA Site Supervisor

#### General Electric Company (GE)

- D. DiFilippo, QC Supervisor
- W. Dobrzynski, UT Level III (Overlay)
- R. Joffee, UT Level III
- R. LeBre, Project Manager
- P. Mayo, Project Supervisor (84-11 and Weld Repairs)
- J. McClure, Lead Welding Supervisor
- P. Patterson, UT Level II
- J. Phelps, QC Supervisor
- E. Reczek, UT Level III
- D. Richardson, UT Level III

#### Southwest Research Institute (SWRI)

- V. Morton, UT Level II
- J. Johanson, UT Level II

- \* - Present at Exit Meeting of June 19, 1985
- \*\* - Present at Exit Meeting of August 15, 1985
- \*\*\* - Present at Exit Meeting of August 16, 1985

### 2. Licensee Action on Previous Inspection Findings

(Open) Unresolved Item (50-277/85-05-01): Evaluation of ultrasonic indications. During the 1985 Unit 2 refueling outage the inspector questioned the use of the term "reflective interface" as it was applied to the evaluation of ultrasonic indications. The licensee agreed with the need for clarification and more precise terminology regarding the evaluations and requested that those indications which were attributed to a reflective interface be re-evaluated. The new evaluations are included in the ISI final report which is currently in the licensee's review process. This

item will remain open pending completion of the licensee's review and subsequent NRC review.

(Closed) Allegation on Production Welding Done by Welding Engineering and Weld Technician personnel on Peach Bottom Unit 3. During an interview of July 12, 1983 one weld foreman alleged that both a Weld Engineer and Weld Machine Technician had briefly performed production machine welding. In subsequent interviews the Weld Engineer and Weld Technician denied that they performed production welding. The NRC welding specialist during the 1985 outage examined welding qualifications in progress, and observed welding operator training and production machine welding. Documentation and controls to establish if only qualified welders are used for production work were reviewed.

The 1985 Outage Welding Qualification and Training Sequence is first a 6-G position manual GTAW (Gas Tungsten Arc Weld) pipe test followed with a 5-G position machine GTAW pipe butt weld. The third step is a machine weld proficiency mock-up including the use of optics where applicable to simulate field conditions.

The welder and welding operator training and qualification process is administered by the Welding Supervisor (Technician). During observation of production welding in August 1985 the inspector noted the primary welder to be at the remote video optics station with full control of welding variables. A second qualified welder was stationed near the welding operation to perform minor machine adjustments. Both welders communicate by way of audio headsets. The weld station and front and back of the weld puddle are monitored by video optics. A QC inspector reviews the machine settings against the weld procedure settings on a regular basis of approximately four times each shift. Video presentation of welding is available for welders, QC inspection, supervision and others to view during welding performance. The NRC inspector concluded that GE has in place positive controls to have production welding accomplished by only qualified welders.

In the case of the 1983 allegation, it is questionable if even limited production welding was performed by a weld machine technician or weld engineer (supervision) due to conflicting statements. However, the quality level of such production welding is not subject to question if it did occur since it would have been performed by personnel responsible for weld machine development, welder training, qualification or control of production welding. This is particularly true in the case of automatic welding where manual manipulative skill is accomplished by welding equipment and not the welder. This situation is recognized by the ASME Code in that qualification is required for welding operators only for each welding process used.

The weld overlays made in 1983 were found acceptable to the design engineering required nondestructive examination method and visual acceptance standards. Ultrasonic examination of five of the fifteen weld overlays

made in 1983 is scheduled as part of the Generic Letter 84-11 IGSCC Mitigation Response Plan. The NRC inspector concluded the allegation led to no findings of either engineering or plant safety significance.

This allegation is closed.

3. Licensee Response to NRC Generic Letter 84-11 - Unit 3

Based on the results of Intergranular Stress Corrosion/Cracking (IGSCC) inspections conducted of BWR recirculation system piping pursuant to IE Bulletins 82-03 Revision 1, and 83-02, and the NRC August 26, 1983 Orders, the Commission mandated an ongoing program for similar reinspections at all operating BWRs. Generic Letter 84-11 was issued to define the reinspection program required of all operating BWR licensees.

The inspectors reviewed the scope of the licensee's program to ascertain that the mandated actions were included, and to determine the status of the licensee's response to the Generic Letter.

The activities during the current outage include the examination of welds not previously examined, the reinspection of welds which were previously found not cracked, and the inspection of overlays on welds where the circumferential crack length exceeded 10% of the circumference. The requirement to examine all unrepaired cracked welds was not applicable at Peach Bottom 3 because all known cracked welds were previously repaired in 1983. An additional requirement to examine IHSI-treated welds which were not ultrasonically examined subsequent to IHSI treatment was not applicable because all welds so treated had been examined after IHSI treatment.

The following General Electric Company (G.E.) procedures governed the IGSCC examinations being performed by G.E. at Peach Bottom 3:

- TP-508 1203 Revision 3, "Ultrasonic Examination Procedure for the Detection of Cracks in Full Structural Overlayed Pipe Weld Heat Affected Zones".
- ESD-UT-1 Revision 3, "Automated Inspection of Stainless Steel Piping for IGSCC".
- ESD-UT-2 Revision 1, "Manual Techniques for Determining the Through Wall Dimension of Planar Flaws".
- AMIGSCC-W810 Revision 1, Appendix 1, Revision 7, "Thermal Sleeve Ultrasonic Examination".
- AMIGSCC-810 Revision 1, Appendix II, "Auto Sizing With ESD-UT-1".

The ultrasonic examination were done by G.E. personnel using the mechanized Ultra Image III System. Flaw sizing was done manually using techniques and equipment which were qualified at the EPRI NDE Center at

Charlotte, North Carolina. The G.E. personnel who conducted the examinations and who evaluated the resulting data were found to be qualified and were listed on the EPRI register of qualified examination personnel.

The inspector's discussions with various examination personnel indicated that they were familiar with the examination equipment and with the governing procedures.

The examinations performed during the current refueling outage have disclosed cracks in certain welds and, based on this, the licensee has increased the size of the examination sample in accordance with the provisions of I.E. Bulletin 83-02.

Southwest Research Institute (SWRI), the licensee's ISI vendor, has been given the responsibility for performing overchecks of welds found defective by the automated G.E. examinations.

Using the G.E. examination data, SWRI personnel manually re-examine portions of the weld to verify the condition reported by G.E. SWRI initially re-examined entire welds but, for ALARA considerations, the practice was stopped after the results of several re-examinations showed good correlation with the original G.E. examination results.

The SWRI individuals were found to be qualified to detect the presence of intergranular stress corrosion cracking (IGSCC), and were listed on the EPRI register of qualified personnel.

The inspectors observed the mechanized ultrasonic examination of thermal sleeve weld 2 BHD-TS, and 12" diameter jet pump riser weld 2-AHG-3, and found that the examinations were done in accordance with the applicable procedure. The data, collected on a computer disc, included information regarding: calibration; examination frequency; transducer; material thickness; sound velocity through the material dimensions of the weld segment represented by the data; weld identification; and, the identification of the examination personnel. In addition to the information saved on the disc, notes pertinent to the examination were included on the examination data sheet which was part of the permanent examination record.

The inspector requested that the technical adequacy of procedure TP-508 1203 be demonstrated on samples of overlaid welds containing known cracks. A G.E. Level III individual performed the demonstration in the inspector's presence using two overlaid cracked samples, and successfully detected the cracks in the samples. Based on the demonstration results, the inspector stated that the procedure was considered acceptable for its intended use.

The inspectors found that the licensee's program regarding Generic Letter 84-11 meets the intent of the letter and is being implemented by qualified personnel using equipment and procedures which have been proven capable of performing their intended function.

No violations were identified.



#### 4.0 TI 2500/12 Actions Taken By The Licensee to Prevent Damage to Plant Components By Liquid Nitrogen

The boiling water reactor (BWR) Mark I and II containments operate with a drywell atmosphere inerted with nitrogen to reduce oxygen to concentration of less than 4% by volume ( $\text{LN}_2$ ). The nitrogen is generally provided by vaporizing liquid nitrogen ( $\text{LN}_2$ ) from a storage tank located outside the reactor building. One of the important aspects of operation of the nitrogen inerting system is to have adequate vaporization and heating of the  $\text{LN}_2$  to prevent cooling of carbon steel piping and components in the drywell or torus to a temperature below which the material ceases to behave in a ductile manner. The General Electric Service Information letter (SIL) No. 402 dated February 14, 1984, outlines this problem and provides five recommendations for action to prevent material damage caused by the malfunction of the nitrogen inerting system. The five recommendations, the status of the actions taken by the licensee in response to GE SIL No. 402, and the inspector's findings are listed below.

##### 4.1 Recommendation 1 - Evaluate Inerting System Design

###### -- Action

Evaluate the design of the nitrogen inerting system. Investigate the potential for introducing cold (less than 40°F) nitrogen and the orientation of the nitrogen port relative to the vent header, downcomers, or other equipment in the wetwell and drywell which may be in the path of the injected nitrogen. Assure that the temperature monitoring devices, the low temperature shutoff valve, and overall system design are adequate to prevent the injection of cold nitrogen into the containment.

###### -- Licensee Status and Inspector Findings

The PECO Mechanical Engineering Division reviewed the design of the systems at Peach Bottom that are used to vaporize liquid nitrogen. This review was completed in August of 1984 and included the containment inerting system and also the containment atmospheric dilution System. Results revealed that if cold nitrogen was accidentally injected into the torus, it would not impinge directly upon any safety related equipment. Therefore, the licensee concluded that no immediate safety problems existed. However, to improve the capability to prevent, detect and mitigate the consequences of cold nitrogen delivery a modification (Mod Request 1418) is scheduled to be completed in February of 1986.

#### 4.2 Recommendation 2 - Evaluate Inerting System Operation

-- Action

Review the operating experience of the inerting system to assure that the vaporizer, the low temperature shutoff valve and the temperature indicators have functioned properly. Evaluate the plant calibration, maintenance and operating procedures for the inerting system. Assure that cold nitrogen injection would be detected and prevented.

-- Licensee Status and Inspector Findings

In a letter to the Region I Regional Administrator dated March 30, 1984, the licensee indicated that the LN<sub>2</sub> vaporizer, low temperature shutoff valve, and the low temperature switch were verified to be functioning properly. Additionally, in this letter the licensee committed to functionally test these protective features once a year."

However, documented records of the 1984 functional test were not available during this inspection and the subsequent routine (yearly) test had not been performed to date. However, a modification package (MOD 84-037) had been issued in April 1984, to effect system changes that would permit a nitrogen inerting system routine test and the licensee indicated that the nitrogen inerting system will be functionally tested when the Modification Acceptance Test (MAT) is performed for MOD 84-037. Further, a routine test procedure for the system will be developed upon completion of MOD 84-037.

Other licensee actions taken as a result of Recommendation 2 and reviewed by the inspector included (1) revision of procedure 5.3.9.1.F, "Startup and Operation of Nitrogen Storage System" (2) development of an additional non-licensed operator training lesson plan, LP-NLDCT-84-03B, and an auxiliary operator training manual sign-off and (3) issuance of shift meeting notes to licensed operators.

#### 4.3 Recommendation 3 - Test for Drywell/Wetwell Bypass Leakage

-- Action

Perform a bypass leakage test as soon as convenient to confirm the integrity of the vent system to provide indication that the vent system integrity is intact and that no gross failure exists.

-- Licensee Status and Inspector Finding.



As documented in Inspection Report 50-277/84-03, the licensee satisfactorily performed tests (ST12.6, Primary Containment Drywell to Torus Bypass Area Test) for Unit 2 and Unit 3 on February 5-6, 1984 and verified that the direct leakage path between the drywell atmosphere and the torus free air volume was within Technical Specification limits.

#### 4.4 Recommendation 4 - Inspection Nitrogen Injection Line

-- Action

Conduct an ultrasonic test (UT) as soon as convenient of all accessible welds in the nitrogen injection line from the last isolation valve to the wetwell and drywell penetrations. Also UT the containment penetrations and the containment shell within 6 inches of the penetration.

-- Licensee Status and Inspector Findings:

During the month of April 1984, the licensee performed UT examinations on the Unit 3 nitrogen injection line and no rejectable indications were recorded. The examinations were conducted in accordance with ASME section XI requirements. The scope, documentation and data records of the examinations were complete and reviewed in part by the inspector. Similar UT examinations and a final report for Unit 2 was completed in May of 1985.

Supplementary visual inspections of the containment inerting piping for Units 2 and 3 were conducted by the licensee in February of 1984. The inspector independently walked down the system and found no problems.

#### 4.5 Recommendation 5 - Inspect Containment

-- Action

Perform a visual inspection of the vent header, downcomers and other equipment in the containment which might be expected to be affected by the injection of cold nitrogen. The vent header should be inspected on the outside and the inside. Also inspect the containment shell or steel liner for at least 6 inches around the nitrogen penetration.

-- Licensee Status and Inspector Findings:

The results of the licensee's inspection of the Unit 2 and Unit 3 vent header were reviewed and found acceptable by the resident inspector as documented in Inspection Reports 50-277/84-03 and 50-278/84-25. Although, when requested, the licensee could not

provide records of the containment inspection for review. Based on a phone discussion between the Plant Manager and a Region I Section Chief on August 23, 1985, the inspector learned that the licensee had not visually examined the exterior surface of the vent header during the 1984 inspection. Subsequently, this area was inspected by the licensee with satisfactory results achieved by August 23, 1985.

#### 4.6 Conclusion

The licensee was found to have responded to each of the recommendations of GE SIL No. 402 in the PECO letter to the Region I Regional Administrator dated March 30, 1984. However, TI 2500/12 will remain open pending completion of the letter's proposed actions, including completion of: (1) the additional system improvements in Modification Request 1418; (2) performance of the MAT for MOD 84-03; and, (3) development of the nitrogen inerting system routine functional test procedure. (50-277/85-34-01)

#### 5. QA/QC Activities

PECO QA Audit Department recently performed an audit of the PBAPS Unit 2, first 10 year interval ISI Program activities. The areas audited included non-destructive examination procedures and reports, program scope completion, and equipment calibration. The audit report was found to include (a) the scope of the investigation, (b) applicable standards, guidelines and code requirements (c) acceptable and unacceptable findings (d) topic areas re-audited and (e) actions taken on QA Division ISI/NDE open items. QA Division open items were found to be closed via subsequent QA audit, verification or procedure review. Closure would include verification of completeness and review of commitment dates.

No violations were identified.

#### 6. Unresolved Item

Unresolved items are matters about which more information is required in order to determine if they are violations or deviations. An unresolved item is discussed in paragraph 4.

#### 7. Exit Interview

Exit meetings were held with licensee representatives on June 19, August 15 and August 16, 1985. The inspectors summarized the scope and findings of the inspection. No written information was provided to the licensee by the inspectors during the course of the inspection.