

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-277/84-21
50-278/84-17

Docket No. 50-277
50-278

License No. DPR-44
DPR-56 Priority -- Category C

Licensee: Philadelphia Electric Company
2301 Market Street
Philadelphia, Pennsylvania

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

Inspection At: Delta, Pennsylvania

Inspection Conducted: July 2-6, 1984

Inspectors: Samuel D. Reynolds Jr.
S. D. Reynolds Jr., Lead
Reactor Engineer, M&PS, EPB

8/13/84
date

Approved by: Jacques Durr
J. P. Durr, Chief, Materials and
Process Section, EPB, DETP

8/16/84
date

Inspection Summary: Inspection on July 2-6, 1984 (Combined Report
50-277/84-21; 50-278/84-17

Areas Inspected: Routine unannounced inspection of the licensee program for recirculating and RHR pipe replacement. The inspection involved 27 hours onsite and 4 hours in the regional office by one region-based inspector.

Results: No violations were identified.

8409120478 840820
PDR ADOCK 05000277
G PDR

DETAILS

1.0 Persons Contacted

Philadelphia Electric Company (PECO)

*D. Smith, Assistant Station Supervisor
F. Hoelzle, Construction Engineer, Construction Department
J. DeLong, Materials Engineer, Engineering and Research Department
*J. Austin, Supervisor Engineer, Construction Department
J. Hadara, Superintendent Mechanical Section, Maintenance
A. Donell, Electrical Production, QC
C. Cuthbert, Electrical Production, QA
K. Mandl, Electrical Production, QA
J. Pizzola, Engineering and Research, QA
A. Trapuzzano, Electrical Production, QA

Chicago Bridge and Iron (CB&I)

K. Schoenleber, Site Manager
C. Halfast, Project Manager
C. May, Welding and QA Manager (Newcastle Office)
D. Neimeyer, Subcontract Welding Engineer
K. Czadrik, QA Manager
B. Ebersole, QA Technician

W. Smith, Welding QA Supervisor
J. Corullon, Welding QA Supervisor

Nuclear Regulatory Commission (NRC)

*J. H. Williams, Resident Inspector

*the above designated personnel were in attendance at the exit interview on July 6, 1984

2.0 Background

The purpose of this inspection was to followup inspection 50-277/84-13 and determine current status and acceptability of the licensee's actions to replace piping which was degraded by intergranular stress corrosion cracking. (IGSCC) A portion of the inspection involved resolution of previous unresolved items concerning the pipe replacement and other items related to induction heating stress improvement (IHSI) and weld overlay repairs conducted on piping which was degraded by IGSCC.

3.0 Licensee Commitment to Proposed ASME SCIX QW360 Changes

Licensee commitments to follow the proposed ASME Section IX (SCIX) QW 360 changes which relate to orbiting machine gas tungsten arc welding (GTAW) operator performance qualifications were reviewed. The CB&I commitment to

the licensee meets all of the applicable proposed essential variables except for specific test assembly welding for welding remote with TV optics. The welding operators would be qualified "on the pipe" in the 2G and 5G positions. Certain welders (who conducted remote welding on special mockup tests) would be evaluated by technically qualified and experienced personnel and approved by CB&I Supervisor to weld remotely.

The response to the inspectors questions on a commitment to follow the proposed SCIX changes to QW 360 (as discussed in 50-277/84-13 paragraph 2.0) is indicated in Appendix A of CB&I letter to PECO (Halfast to Tutton - Letter No. ENC-113) dated 5/14/84. This letter modifies the paragraph 6.5 minimum requirements.

4.0 Licensee Action on Previous Inspection Findings

- a. (Closed) Unresolved Item (50-277/84-13-01) This item is related to the method that CB&I will follow to provide "directions to the welding operators" and some specific questions concerning the basic WPS documents related to the CB&I pipe joint welding.

CB&I and PECO have committed to provide supplementary information to give more explicit parameters than is practically possible in the WPS. The WPS will be the controlling SCIX document. The supplementary information will be in the form of welding technique sheets which take the form of the face of the Dimetrics Gold Track II pendant (controller). The welding technique sheet is not meant to be a formal document in the QA program, but will be a "living technique sheet" and may be changed as required. A welding data log is required by SI 13 for each pass (GEC-4.3) for record of (heat input) sensitization data (GE requirement).

CB&I has responded to the licensee concerning this unresolved item by letter number ENC-113 dated 5/14/84, Halfast (CB&I) to Tutton (PECO) which was reviewed by the inspector.

The specific responses to questions concerning references to QW paragraphs in SCIX are as follows:

1. QW 404.3 (non-essential) welding qualifications have been conducted with 0.045 "diameter filler metal, however, GAPCO has also had experience with smaller 0.035" filler metal. The WPS permits both sizes. The "pendant" technique sheet will indicate to the operators the filler metal size. The Welding QC Supervisor is authorized to change this document and therefore change the filler metal size if welding conditions indicate the smaller size is required to improve wire feed conditions. The volume of metal melted will be similar and adjusted by the wire feed rate.
2. QW 405.3 (Supplementary essential variable). This is not a (SCIX) requirement for austenitic stainless steel welding. The welding

direction for the orbital welding will be shown on "pendant" technique sheet.

3. QW 408.3 (non-essential). The specific cup size will be indicated on the "pendant technique" sheet. The Welding QC Supervisor conducts an informal surveillance of the gas delivery effectiveness.
- b. (Closed) Unresolved Item (278/83-08-01) The inspector raised a question concerning a few loose electrodes that were observed in the GE trailer near the area where GE was conducting training of operators. The GE and licensee response was that the GE Welding Procedure PB-83-7.0 Revision 1 applies to filler metals "released for production" and no welding production was in progress at the time the filler metals were observed. The location where the electrodes were observed was also outside the power plant buildings. The inspector had no further questions. This item is considered closed.
 - c. (Closed) Unresolved Item (278/83-08-02) In this item the inspector questioned the acceptability of the licensee and GE's procedures to adequately provide "measures to control a special process". The inspector reviewed the licensee's activities in the QA audit area. The licensee's Nuclear Production Control Manual, Issue 2, dated 4/1/82 delegates QC Surveillance of the IHSI to GE. Their QA audits plus the GE Surveillance proved to be adequate for control of the IHSI operations following some initial "learning curve problems". The inspector reviewed the mechanics of a licensee "Stop work" based on minor over temperature recordings which were attributed to loose thermocouple connections. The inspector also noted that GE revised their initial temperature in ECN NH15912 range (band) requirements from a 125C band to a 175C band (in ECN NH15912) which is acceptable on an engineering basis to provide adequate ID surface compression and which minimized heat treating cycles that required engineering disposition.
 - d. (Closed) Inspection Follow Item (277/83-08-03) The inspector reviewed the licensee's engineering responses to item 6(b) to (e), 6(g) to (i), and 6 (k to m) and found them to be satisfactory. The details are as follows:
 - 6(b) All partial or multiple cycle IHSI heat treatments require GE Engineering review and approval. The potential for hose failure is negligible and if the failure occurred the resulting thermal cycle would have minimal metallurgical or mechanical effect on the weldment.
 - 6(c) The licensee waived mandatory hold points on IHSI because they were satisfied that GEQC personnel would provide adequate review, check and sign off of each operation.

- 6(d) The licensee defined "t" as the engineering design minimum pipe wall thickness and "R" as the normal pipe (schedule) radius.

The licensee stated that the coil length and pipe ID surface heated band are greater than required, but result in the ID surface compression area greatly exceeding the weld HAZ.

- 6(e) The licensee responded that review of records indicated that none of the circumferential welds were made with the submerged arc welding process. The licensee also stated that selection of the welds to be given IHSI treatment would not have been affected by the process or techniques used to weld the joints.
- 6(g) The licensee indicated that the GE assumed surface ID temperature took into consideration the effect of low flow and potential steam pockets.
- 6(h) The licensee stated that the fine coil adjustment "waiver" is based on satisfactory "pretreatment thermal cycle" performance and the Heat Engineers knowledge and experience or specific coil configuration performance.
- 6(i) The licensee adequately informed the Region of the results of the post IHSI UT examination and its relationship with welds with known IGSCC. All welds with detectable cracks following IHSI in Unit 3 were repaired with the overlay technique. The ALN 4060 was not used for acceptance or rejection criteria.
- 6(k) The licensee supplied details on the stress rule index analysis and provided the formula.
- 6(l) The licensee stated that GE engineering analysis indicated that 10 thermal cycles would have negligible effect on mechanical properties on ASME fatigue design usage factors. There were no multiple thermal cycles that approached 10 in number.
- 6(m) The licensee stated (in effect) that this question was not applicable to the Peach Bottom IHSI program because no IGSCC was detected prior to IHSI. If IGSCC had been known before IHSI each joint to be given IHSI would have been evaluated on a case to case basis by GE. (or the joint would have been repaired by the overlay technique).

Inspector Follow Item (277/83-08-03) is considered closed.

5.0 Review of Licensee Action in Response to Generic Letter 84-11

The licensee responded to the subject letter in a Daltroff (PECO) to Eisenhut (NRC) letter dated June 4, 1984.

In the case of Unit 2, the licensee response is piping replacement with 316L for the RWCJ and core spray system inside containment, and 316NG for the entire recirculation system, the RHR shutdown cooling piping (out to, but not including penetrations), a portion of the RHR head spray piping and the reactor water cleanup (RWCJ) penetration and a portion of its piping outside containment.

The new piping conforms to NUREG-0313 (non-susceptible material). No augmented ISI will be required.

Future ISI will be performed in accordance with the 2nd 120 month ISI program for Unit 2.

For Unit 3 the licensee will take advantage of the SCXI "operation without repair" as modified by the NRC. Reinspections will be performed in accordance with 2(a) through (e) of the generic letter. The number of welds selected meets the minimum requirements of generic letter. The specific welds selected for examination are indicated in the letter.

The licensee stated (in response to item 3 of the generic letter) that Southwest Research Institute UT personnel will perform the required examinations and the qualification of these specific personnel were validated at the EPRI NDE Center on 4/14-15/83 to IEB 83-02.

The licensee has committed to the use of moisture detection devices. The welds in Units 2 and 3 which are instrumented are indicated in the PECO letter. The extent of the use of the moisture detection system is to be determined based on study of the system and evaluation of experience with apparatus installed.

The results of Bulletin inspections not previously submitted is indicated in two letters to the NRC (Daltroff to Murley)

- a. "Supplement IV to Peach Bottom Unit 2 Response to IEB 83-02" dated 2/21/84
- b. "Supplement II to Peach Bottom Unit 3 Response to IEB 83-02" dated 8/30/83

The remedial measures taken when cracks are discovered is discussed in the PECO letter. In the case of Unit 2, "susceptible" material is being replaced with non-susceptible material during the current outage. In the

case of Unit 3, if new cracks or significant growth of old cracks are discovered, the scope of inspections will be expanded per IEB 83-02. New cracks will be evaluated and analyzed on a case by case basis with evaluations performed in accordance with SCXI IWB 3600.

Review of the licensee actions indicates they have responded to the generic letter and addressed items 5(a) through 5(e) as requested and their response meets the minimum acceptable response requirements. The use of the generic letter to continue operation versus the replacement of pipe in Unit 3 is currently under study by the licensee.

No violations were identified.

6.0 Replacement Pipe Procurement

The inspector reviewed the status of the recirculation piping procurement. The licensee has made the decision to procure the material as seamless pipe from Sumitomo (through GE) rather than use domestically produced induction bent welded pipe. This is also discussed in 50-277/84-13 paragraph 3.0.

The inspector reviewed the GE purchase order placed on Sumitomo (205-84D020 Rev. 00 dated 5/10/84) for 11-12" riser pipes and 4-12" header end pipes. Also reviewed were GE ECN 19280, GE specification 23A4136 dated 4/13/84 and report of GE Audit of Sumitomo WRP 84-17 for audit performed on 3/21-25/84.

Discussions were held with Mr. John DeLong, a qualified licensee materials expert who reviewed the Sumitomo and Dai-ichi High Frequency Industry operations and witnessed almost all of the induction bending. He stated that the material was electric furnace melted, argon oxygen decarbonization processed and centrifugally cast.

Prior to bending, the material was machined on the ID and OD and belt sanded on the bend area. The residual element control was described as excellent, the inclusion count very low, oxidation negligible and excellent grain size control. Metallography indicated no microfissuring on the test bends. Penetrant examination of the bent polished OD surface resulted in no defects.

The pipe was qualified (by test) for bending at temperatures of 1850-2050F and actually bent at about 1950F.

Equipment calibration, review of NDE paperwork, review of travelers, and tests conducted for sensitization indicated all manufacturing operations to be fully satisfactory.

The inspector reviewed the PECO Energy Conversion Research Section (Metallurgical Specialist's) trip report for "Technical and Manufacturing Surveillance" of the recirculation piping made by Sumitomo and bent by Dai-Ichi Chiba. The following tests and/or procedures were witnessed by the licensee:

- (1) Product Chemical Analysis
- (2) Mechanical Tests - room temperature and 550°F elevated temperature test
- (3) Metallography - material grain size, inclusion content, and presence of defects in bend areas
- (4) Ultrasonic Inspection
- (5) Liquid Penetrant Inspection
- (6) Dimensional Measurements
- (7) Witness of Induction Bending of Header and Riser Elbows
- (8) Results of Sensitization Tests

Japan Inspection Company (JIC) witnessed all the operations for GE. The inspection reports indicate a high level of manufacturing control from the initial alloying of the melt through the final OD surface PT and special GE (E50YP42) high sensitivity UT for microfissuring. The metallographic examination shows very low inclusion count and lack of microfissuring.

The official material documents were not reviewed by the inspector.

No violations were identified.

7.0 Quality Control

The inspector conducted a cursory review of the licensee's QA Plan, Volume 3 which refers to the Electrical Production (EP) QA activities, and Volume 1 which applies to Engineering and Research (E&R) QA activities.

A meeting was held with representatives (indicated in paragraph 1.0) of both QA Departments. EP has an auditor and Site Supervisor assigned permanently to Peach Bottom. EP conducts non-preplanned surveillance inspections and programmatic audits. The EP QC group consists of about 6 people who are in training. The E&R QA function has no QC personnel as all of these functions are subcontracted. The E&R QA group does conduct "in process audits" which are essentially hands on QC type inspections, but are handled as audits.

The official copies of audits for both EP and E&R are at corporate headquarters. Some of the audit information is available through the use of a data search system at the site.

The inspector commented that there appeared to be some semantic problems with the system as activities that EP classified as QC functions were classified by E&R as QA Surveillance functions.

No violations were identified.

8.0 Review of Welding Documents

The inspector reviewed the weekly temperature check records for filler metal storage ovens which according to the CB&I QA documents permits this to be checked with tempilstiks.

The inspector reviewed CB&I Special Instruction #20, Rev. 0 dated 5/9/84 which provides additional controls over welder and welding operator performance qualification to insure no stand-ins have occurred during qualification. The welders are required to present two forms of identification, one which must be a picture type. The methods of identification are recorded. The welder taking his first qualification will have a Picture Welder Qualification Card taken which shows the welder, his S.S. number, and his signature. The welder and the Welding QA Supervisor sign the performance qualification record.

The inspector reviewed CB&I procedures CTIN Rev. 1 (Cutting procedure), GFWT Rev. 0 (General Field Welding Table) GWPS-GTAWX Rev. 2 (GTAW general welding procedure), GWPS-SMAWX, Rev. 2 (SMAW general welding procedure), MP-1, Rev. 0 (Marking procedure for location of root welds).

The applicable ASME documents are indicated in CB&I ACD-34540 Rev. 0 and reference ASME SCII, SCIII (Div 1 NCA, NB, and NF), SCV, SCIX and SCXI (IWA 4000, IWA 7000, IWB 4000 and IWB 7000) to 1980 winter 1981. The piping base metal is to 1980 through to Winter 1980. Acceptance criteria for welds to existing piping shall be to USAS B31.1 - 1967.

The inspector reviewed CB&I Performance Qualification Test (Pipe Welding) form WL105 (Front) Rev. Jan 82 which will be used for recording the satisfactory completion of the test assemblies.

The inspector reviewed the CB&I file of CB&I welders previously qualified under their QA program who may be used to weld using manual processes. The photographs and welders signatures were noted. The CB&I welder qualification welder identification document list was reviewed.

Revision #3 of WPS GTAW-ER308L(A)-34540 and Revision #4 of WPS GTAW - ERTOS-3(A) - 34540 were reviewed. These revisions reflect the clarification of the variable requirements indicated in 50-277/84-13 paragraph 2.0.

The inspector reviewed SI #8, 13 and 14. The inspector questioned the ability of SI #13 paragraph to control heat input to the base metal because it did not include a method of determining how much filler metal is melted per linear inch of weld bead. This is considered an Inspector Follow Item pending clarification of the effect of filler metal volume melted on heat input of manual GTAW operations. This does not apply to machine GTAW as the filler metal volume is controlled. (50-277/84-21-01)

The inspector noted that page 4 of 4 of SI #13 included a requirement for the welding operators to record heat input data on each weld pass.

SI #14 indicates in paragraph 4.0 the guidelines for repair of defects during performance qualification testing. The inspector noted the semantic errors in paragraphs 4.10 and 4.11 where the process is referred to as automatic welding where in fact it is handled as machine welding.

No violations were identified.

9.0 Machine Cutting

CB&I severed N1 suction line from the N1 Nozzle Safe end on 7/5/84 at azimuths 180° and 0°. The inspector witnessed some of the machining operations remotely on the TV optics system. The cutting equipment then was moved to the pipe side of the "dutchman" which will be removed for fabrication of the decon caps. The inspector reviewed the applicable CB&I drawings (34540, DWG 6 Rev. 2; 34541 ER, DWG ER302, Rev. 5 and ER303, Rev. 5)

No violations were identified.

10.0 Mockups

The inspector verified the mockups discussed in 50-277/84-13 paragraph 4.0. This included mockups of the N13B, isolation valve, isolation valve support, N12, N2, mockups of pieces to be removed in containment, N1, decon cap installation, fabricated decon caps, and mockup of the 2G and 5G plasma arc cutting setup. The observations made by the inspector verify the commitments in SI #8. The inspector reviewed the Training File documentation of the mockup training for machine cutting and plasma cutting which refer to a very large number of hours of training. The mockup demonstration file was reviewed.

No violations were identified.

11.0 Jet Pump Instrumentation Nozzle Welds #105A and 285B

The licensee addressed the UT examination of this weld joint in both Units; and the weld overlay repair (and NDE of the weld overlay) of the subject welds in Unit 3, in the Daltroff (PECO) to Eisenhut (NRC) letter dated 6/20/84. Included in this letter is an attachment on the UT indications, GE fracture mechanics evaluation and overlay weld repair design and a licensee safety evaluation report on the impact of the subject weld IGSCC on safe plant operation. The inspector reviewed the penetrant examination (PT) results in the pre-clad, 1st overlay, and final overlay conditions. No indications were observed.

Engineering is currently evaluating their response to the IGSCC on the subject welds in Unit 2.

No violations were identified.

12.0 Exit Interview

The inspector met with licensee representative (denoted in Paragraph 1) on July 6, 1984. The inspector summarized the scope and findings of the inspection. No written information was given to the licensee by the inspector during the course of the inspection.