ENCLOSURE

UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

DIVISION OF QUALITY ASSURANCE, SAFEGUARDS, AND INSPECTION PROGRAMS
VENDOR PROGRAM BRANCH

Report No.: 50-400/84-05

Docket No.: 50-400

Licensee: Carolina Power & Light Company
411 Fayetteville Street
Raleigh, North Carolina 27602

Facility Name: Shearon Harris Nuclear Power Plant (SHNPP), Unit 1

Inspection at: Shearon Harris Nuclear Power Plant, New Hill, North Carolina

Inspection Conducted: February 6 to February 10, 1984

Inspectors: E. T. Baker — 4/2/84
E. T. Baker, Reactor Construction Engineer, IE (Team Leader) — Date Signed

E. T. Baker for — 4/2/84
D. Norman, Mechanical Engineer, IE — Date Signed

E. T. Baker for — 4/2/84
W. P. Kleinsorge, Metallurgical Engineer, Region II — Date Signed

Approved by: for
Uldis Potapovs, Chief
Vendor Program Branch
Division of Quality Assurance, Safeguards,
and Inspection Programs
Office of Inspection and Enforcement

Inspection Summary: Inspection on February 6 to February 10, 1984.

Areas Inspected: This announced inspection involved 88 inspection hours onsite in the areas of licensee implementation of the SHNPP quality assurance program with respect to The Bahnson Company (HVAC equipment supplier) and the Heating, Ventilating, and Air Conditioning (HVAC) equipment supplied by The Bahnson Company installed in the field.

Results: In the areas examined two potential enforcement actions were identified and were provided to Region II for appropriate action; one potential enforcement action was found in the area of adequate corrective action and the other was for failure to control purchased equipment. Both potential enforcement actions are based on a failure to identify and correct nonconforming conditions on HVAC equipment.

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DETAILS

1. Persons Contacted

Carolina Power & Light (CP&L)

N. J. Chiangi, Harris Plant QA/QC Manager
*D. Deal, Engineering
*G. L. Forehand, Director QA/QC
*P. Foscolo, Assistant General Project Manager
*E. M. Harris, Jr., Principle Mechanical Engineer
*K. V. Hate', Principle QA Engineer
J. Hooks, Engineering
*T. W. Johnson, Resident Engineer, HVAC
L. I. Loflin, Manager, Engineering
*D. A. McGaw, Superintendent - QA
*G. R. Osman, Principle QA/QC Specialist - NDE
*R. M. Parson, Project General Manager
W. Pere, Welding Inspector
J. Pierce, Engineering
*A. H. Rager, Resident Engineer - Hangers
*L. Rowell, Engineering
*G. M. Simpson, Principle Construction
*R. A. Stewart, Project Engineer
*M. F. Thompson, Jr., Principle Mechanical Engineer
*M. D. Vernon, Superintendent - QC
*R. A. Watson, Vice President - Harris Nuclear Project

Daniel Construction Company (DCC)

*W. D. Goodman, Project Manager

Westinghouse W

*B. Blevins, Engineering

USNRC

*J. J. Blake, Section Chief, Region II
*G. F. Maxwell, Senior Resident - Operations
*R. L. Prevatte, Senior Resident - Construction

*denotes attendees at exit meeting February 10, 1984.

NOTE: The inspectors also conferred with other licensee and contractor personnel during the course of the inspection.

2. Exit Interview

The inspection scope and findings were summarized on February 10, 1984, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and described in detail the inspection findings listed below.

At no time during this inspection was written material provided to the licensee by the inspectors.

3. Licensee Action on Previous Inspection Findings

Not applicable.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are violations or deviations. Unresolved items are discussed in paragraphs 5.d.(1), 5.d.(2), 6.a.(1), and 6.c.(1).

5. Heating, Ventilating, and Air Conditioning (HVAC) Air Cleaning Units

The inspectors performed detailed inspections of six safety related HVAC Air Cleaning Units manufactured by The Bahnson Company for CTI-Nuclear (CTIN) to be supplied to Carolina Power and Light (CP&L). The inspections as indicated below, were conducted using criteria established to the applicable Ebasco Specification (CAR-SH-BE-31), CTIN Drawings, Seismic Qualification Reports, and CP&L drawings, to determine whether the fabrication, receiving inspection, handling, and storage were consistent with applicable drawings, procedures, specifications and regulatory requirements. All the Air Cleaning Units had been accepted by CP&L.

a. Welding (Visual Inspection)

The inspectors made a visual examination of selected welds on the below listed units relative to the following: location, length, size and shape; weld surface finish and appearance; transitions between different wall thicknesses; weld reinforcement -- height and appearance; joint configuration of permanent attachments and structural supports; removal of temporary attachments; arc strikes and weld spatter; finish-grinding of machining of weld surface -- surface finish and absence of wall thinning; surface defects -- cracks, laps, and lack of penetration, lack of fusion, porosity, slag, oxide film and undercut exceeding prescribed limits.

Identification	System and Type
1A - SA	HVAC Air Cleaning Unit E-6
1B - SB	HVAC Air Cleaning Unit E-6
2A - SA	HVAC Air Cleaning Unit E-6
2B - SB	HVAC Air Cleaning Unit E-6
1A-SA-1B-SB	HVAC Air Cleaning Unit R-2
2A-SA-2B-SB	HVAC Air Cleaning Unit R-2

During the inspection the following conditions were observed:

(1) The weld requirements for attaching the High Energy Particulate Absorption (HEPA) filter rack (Item 2 on CTIN Drawing 32735A) to the unit housing are for a continuous fillet weld and an interrupted (2-10) flair bevel weld, (shown in Section C-C of the drawing).

Contrary to the above, both HEPA filter racks are attached to the unit housing with an intermittent (2-10) fillet weld and a continuous flair bevel weld. This condition existed on both R-2 units examined.

(2) The weld requirement for attaching Item 27 to Item 28, both 3" x 3" x 3/16" angle, on CTIN Drawing 32629 is a square bevel partial penetration butt, welded from both sides, (shown in section Z-Z of the drawing).

Contrary to the above, the welds attaching Item 27 to Item 28 are welded from one side only. This condition exists in four places on the 1B-SB E6 unit examined.

(3) The inspectors reviewed the documentation packages for the Air Cleaning Units to determine whether or not the nonconformances noted above had been documented and evaluated. There was no documentation to indicate that the nonconformances had ever been detected.

The inspectors informed CP&L management that failure to identify and evaluate nonconforming welds in purchased equipment is contrary to 10 CFR 50, Appendix B, Criterion VII as implemented by CP&L PSAR section 1.8.5.7. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR. This is an example of the findings which led to Potential Enforcement Action 1.

b. Welding (Liquid Penetrant Examination)

The inspectors selected a portion of a weld for reexamination that, fabrication records indicated, had been liquid penetrant examined by Bahnson as required by Ebasco specification CAR-SH-BE-31. This reexamination was made to determine whether the surface was suitable for liquid penetrant examination and acceptable to the applicable acceptance criteria.

The weld selected was a portion of the continuous flair bevel weld attaching the upstream HEPA filter rack to the top of the 2A-SA-2B-SB R2 unit housing. This examination was performed by a CP&L, Level II, liquid penetrant examiner, using the solvent removable method in accordance with CP&L Procedure 201 Revision 2. (This was the same type of liquid penetrant examination performed by Bahnson - color contrast, solvent removable.)

As a result of the liquid penetrant examination, the inspectors observed the following conditions:

(1) The surface was suitable for liquid penetrant examination.

(2) An area of lack of fusion at the toe of the weld between the weld and the HEPA filter rack was identified.

(3) An area of undercut at the fusion line between the weld and the HEPA filter rack was identified. Later measurement, by a CP&L welding inspector, revealed the undercut to be in excess of 1/64".

(4) Paragraph 16, of the HVAC Addendum A, to Ebasco Specification CAR-SH-BE-31, "Air Cleaning Units", prohibits any lack of fusion, and undercut in excess of 1/64". The inspectors reviewed the documentation packages for the Air Cleaning Units to determine whether or not the nonconformances noted in (2) and (3) above had been documented and evaluated. There was no documentation to indicate that the nonconformance had ever been detected.

The inspectors informed CP&L management that failure to identify and evaluate nonconforming welds in purchased equipment is contrary to 10 CFR 50, Appendix B, Criterion VII as implemented by CP&L PSAR section 1.8.5.7. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR. This is an example of the findings which lead to Potential Enforcement Action 1.

c. Bolting (Visual Inspection)

The inspectors made a visual examination of selected connections for appropriate fastener material type, size, traceability, and material.

No violations or deviations were found in this area.

d. Review of Quality Records

The inspectors reviewed the documentation packages for the 1A-SA-1B-SB and 2A-SA-2B-SB R-2 HVAC air cleaning units to determine conformance with procurement, storage, and fabrication specifications, and regulatory requirements. The review revealed the following conditions:

(1) Records for the liquid penetrant examination performed by Bahnson on July 16, 1982, and partially reexamined as described in paragraph c, above revealed the following statement:

"Item 2 to housing, Typ. area, 100%, reject
RW July 16, 1982, Repair Accept July 16, 1982."

It should be noted that there are two number 2 items installed in each R2 unit and there are welds on both the upstream and downstream sides of each item 2, attaching them (Item 2) to the unit housing, that require liquid penetrant examination, as specified by CTIN drawing 32735-A Section C C. At the time of this inspection, it could not be determined whether the above statement meant that all of the welds attaching all of the Item 2s to the

housing of the 2A-SA-2B-SB R-2 unit had been repaired or just some of them. The licensee indicated that they would investigate the above matter and make a determination as to the number of welds repaired. Pending NRC review of the licensee's investigation, this matter will be identified as unresolved item 400/84-05-01: "HVAC Weld Repairs."

(2) The 2A-SA-2B-SB R2 unit was subjected to a vigorous receipt inspection by CP&L which resulted in the issuance of DDR-1053. DDR-1053 accepted "as-is" all weld defects including two cracks, on the 2A-SA-2B-SB R2 unit. At the time of this inspection the licensee could not provide a justification for leaving the two cracks uncorrected in the unit. Pending resolution of the above issue this matter will be identified as unresolved item 400/84-05-02: "Cracks in R2 HVAC Unit."

(3) The "Preventative Measures" block of the Corrective Action Report for DDR-1053 was marked "NA", Not Applicable, with an accompanying note which stated that preventative measures were not applicable because the Air Cleaning Unit inspected and rejected was the last unit in production. No reinspection of previously received units of Bahnson equipment was initiated. The inspectors informed CP&L management that failure to perform adequate corrective action is contrary to 10 CFR 50, Appendix B, Criterion XVI, as implemented by CP&L PSAR section 1.8.5.16. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR. This is an example of the findings which led to Potential Enforcement Action 2.

6. Heating, Ventilating, and Air Conditioning (HVAC) Air Handling Units

The inspectors performed detailed inspections of 17 of the 47 safety related HVAC Air Handling Units manufactured by The Bahnson Company for CP&L's Shearon Harris Project. The inspections were conducted using criteria established in the applicable Ebasco Specification (CAR-SH-BE-08), Bahnson Drawings (drawing only available for four units), and Seismic Qualification Reports to determine whether the fabrication, receiving inspection, handling and storage were consistent with applicable drawings, procedures, specifications and regulatory requirements. All the Air Handling Units inspected had been accepted by CP&L.

a. Welding (Visual Inspection)

The inspectors made a visual examination of accessible welds on the below listed units relative to the following: location, length, size, and shape; weld surface finish and appearance; weld reinforcement-height and appearance; joint configuration of permanent attachments and structural supports; arc strikes and weld splatter; finish grinding or machining of weld surface - surface finish and absence of wall thinning; surface defects - cracks, laps, lack of penetration, lack of fusion, porosity, slag and undercut exceeding prescribed limits. During the inspection the following conditions were observed:

Identification	Defect Description
AH-5 (1A-SA)	Missing floor to frame welds, missing weld on cooling coil frame
AH-5 (1B-SB)	Lack of fusion, burn through on side panel frames
AH-6 (1A-SA)	None
AH-7 (1A-SA)	Crack in skin to frame weld; weld craters, lack of fusion, burn through, overlap in skin to frame welds and side panel frames
AH-15 (2A-SA)	No weld symbol on drawing for skin to cooling coil frame channel stitch weld
AH-17 (1-4A-SA)	Stitch fillet weld on fan housing did not extend to end of joint, end weld less than 2" long, lack of fusion, insufficient weld reinforcement, unconsumed weld rod protruding from weld joint, tack welds not removed or incorporated into final weld in panel frame welds and skin to frame welds
AH-17 (1-4B-SB)	In addition to nonconformances noted under AH-17 (1-4A-5A), floor panel joints were mismatched, roof skin to cooling coil frame welds were corroded, one fan housing anchor bolt missing, and 7 cooling coil mounting bolts were an incorrect material
AH-19 (1A-SA)	Missing nut on coiling coil mounting bolt, missing cooling coil mounting bolt
AH-19 (1B-SB)	Missing welds on side panel framing
AH-20 (1A-SA)	None
AH-20 (1B-SB)	None
AH-25 (1X-SB)	Missing welds on cooling coil frame and side panel frames, undercut and lack of fusion on skin to frame welds, missing side panel frame welds, missing cooling coil mounting bolts
AH-28 (1A-SA)	Lack of fusion, weld craters in side panel frames and skin to frame welds, pitch on stitch weld more than 10" center to center
AH-28 (1B-SB)	Missing 2 welds on cooling coil channel
AH-29	Missing side panel frame welds, missing cooling coil mounting bolts, skin to frame welds less than 2" long

Identification	Defect Description
AH-85 (1A-SA)	None

(1) The Bahnson Company considers their drawings proprietary information and therefore CP&L did not have copies of the drawings. CP&L did request that The Bahnson Company supply drawings for three units selected by the NRC inspectors, units AH-15, AH-28, and AH-85. The remaining units were inspected for weld location and joint design based on typical weld details contained on the drawings for units AH-15, AH-28, and AH-85. At the time of this inspection, it could not be determined, except for units AH-15, AH-28, and AH-85, with 100% confidence that the welds listed as missing in the remaining units were required by the drawings for the specific unit. However, the welds listed as missing on side panel frames were typically required to be welded all the way around and were actually only welded on two or three sides. The licensee indicated that they would investigate the above matter and make a determination as to the number and location of missing welds. Pending NRC review of the licensee's investigation, this matter will be identified as unresolved item 400/84-05-03: "Missing HVAC Welds", except for those welds found missing on Unit AH-28 (1B-SB) [see para. 6.a.(3)].

(2) Inspection of weld quality was based on Ebasco Specification CAR-SH-BE-05, Addendum A, "Quality Assurance Requirements for Nuclear Safety Related HVAC Equipment", which invokes AWS D1.1 and specifically prohibits cracks, craters, lack of fusion, and undercut which exceeds 1/64". As noted in the listing above there were seven Air Handling Units which did not meet the acceptance criteria for welds.

(3) The inspectors reviewed the documentation packages for the Air Handling Units to determine whether or not the missing welds in Unit 28 (1B-SB) and the weld quality nonconformances in the other units had been documented and evaluated. There was no documentation to indicate the nonconformances had ever been detected. The inspectors informed CP&L management that failure to identify and evaluate nonconforming welds in purchased equipment is contrary to 10 CFR 50, Appendix B, Criterion VII as implemented by CP&L PSAR section 1.8.5.7. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR. This is an example of the findings which lead to Potential Enforcement Action 1.

b. Bolting (Visual Examination)

(1) The inspectors made a visual examination of selected connections for appropriate fastener material type, size, and material traceability. One instance of substituting carbon steel bolts for stainless steel bolts and four

instances of missing fastener hardware were discovered by the inspectors.

(2) The inspectors informed CP&L management that failure to identify nonconforming bolted connections and fastener materials in purchased equipment is contrary to 10 CFR 50, Appendix B, Criterion VII as implemented by CP&L PSAR section 1.8.5.7. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR. This is an example of the findings which lead to Potential Enforcement Action 1.

c. Review of Quality Records

(1) The inspectors reviewed the Ebasco procurement specification, Bahnson general arrangement drawing and Bill of Material (BOM) for unit AH-17 (1-4A-SA) to establish material requirements. The Certified Material Test Reports (CMTR) or Certificates of Compliance (COC) supplied with the documentation package for the unit were then compared with the material requirements. The review revealed the following conditions:

(a) The BOM and procurement specification were inconsistent on material requirements in the following areas:

- Interior Casing (Fan and Coil Sections) Specification required 20ga ASTM A240, Type 304. The BOM specified 20ga 304 stainless steel with no ASTM designation.

- Floor (Coil and Fan Sections) Specification required 20ga ASTM A240, Type 304. The BOM specified 10 ga 304 stainless steel with no ASTM designation.

- Drain Pan Liner Specification required 10ga ASTM A240, Type 304. The BOM specified 20ga stainless steel with no ASTM designation.

(b) The following questions or inconsistencies resulted from reviewing the data package:

- An Edcomb Metals COC was for 18-8 Type 304 stainless steel with no ASTM designator.

- No material CMTR's or COC's were provided for the fan housing which was supplied by Westinghouse and required to be ASTM A283.

- COC's or CMTR's for the following materials, specified in the BOM could not be found;

  Unit Casing Exterior - 14ga ASTM A366

  Interior Casing in fan and coil sections - 20ga Type 304 stainless steel

Drain Pan Liner - 20ga Type 304 stainless steel

- The Ebasco release for shipment report was signed and stated that there were no special conditions and deviations from purchase contract; however, there was an open DDR (No. 80-0070) and attached correspondence permitting shipment with open documentation and without fan motors.

The inspectors did not identify any violations, but did inform the licensee that the material substitutions identified by the NRC are considered unresolved items. Pending the licensee's evaluation and NRC review during a subsequent inspection, this matter will be identified as unresolved item 400/84-05-04: "Material Substitutions".

(2) CP&L instituted a 100% receipt inspection at the Shearon Harris Plant site in approximately September 1982. Bahnson supplied air handling units AH-85, AH-86, AH-92, and AH-93 were received after the institution of the 100% receipt inspection program. The inspectors reviewed the CP&L receipt inspection reports and accompanying deficiency documentation reports. CP&L had rejected all the units for a combination of nonconforming weld quality, weld joint configuration, and missing welds. At the time of the inspection, Units AH-85, AH-86, and AH-93 had already been repaired and accepted by CP&L. However, CP&L had not performed any kind of reinspection on air handling units received prior to instituting the 100% receipt inspection.

The inspectors informed CP&L management that failure to perform adequate corrective action is contrary to 10 CFR 50, Appendix B, Criterion XVI, as implemented by CP&L PSAR section 1.8.5.16. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR. This is an example of the findings which led to Potential Enforcement Action 2.

(3) The inspectors reviewed reports of Ebasco facility evaluations and Bahnson commitment to corrective actions to cited deficiencies for 1977, 1978, 1980, and 1983. The review revealed the following conditions:

The corrective actions committed to by Bahnson indicated a lack of adequate measures to prevent recurrence of the problems; however, most commitments were never questioned by Ebasco and there was no evidence that Ebasco performed followup to review implementation of corrective action until the next facility evaluation was performed. The following areas of Bahnson's QA program were repetitively cited by Ebasco and reflects a lack of adequate corrective action by Bahnson and a lack of vendor control by Ebasco:

- Failure to maintain adequate vendor program control for nuclear suppliers

- Failure to maintain adequate controls of procedures and personnel relating to performance of the quality function including NDE.

This is an example of the findings which led to Potential Enforcement Action 2.

ATTACHMENT A

Documents Reviewed

The documents listed below were reviewed by the inspection team members to the extent necessary to satisfy the objectives of the inspection. References to specific documents are contained within the body of the report.

1. Ebasco specification CAR-SH-BE-08
2. Addendum A to CAR-SH-BE-08
3. Ebasco specification CAR-SH-BE-31
4. Addendum A to CAR-SH-BE-31
5. Seismic Qualification Report 9Q-BE-08-20-S1
6. Seismic Qualification Report 9Q-BE-08-20-S1B1
7. Seismic Qualification Report 9Q-BE-08-20-S1B2
8. Documentation Package for AH-5 (1A-SA) and (1B-SB)
9. Documentation Package for AH-15 (2A-SA)
10. Documentation Package for AH-17 (1-4A-SA) and (1-4B-SB)
11. Documentation Package for AH-85 (1A-SA)
12. Documentation Package for AH-93
13. Documentation Package for R2 (1A-SA-1B-SB)
14. Documentation Package for R2 (2A-SA-2B-SB)
15. CTIN Drawing 32735A
16. CTIN Drawing 32629
17. Bahnson Drawings for AH-15, AH-28, and AH-85
18. Bahnson WPS GMI-1/2/3
19. Bahnson WPS GM8-1/2
20. Bahnson WPS GT 1-1
21. Bahnson WPS GT 8-4
22. Bahnson WPS SMI-6/7/8
23. Reports for Ebasco Facility Evaluation at Bahnson for years 1977, 1978, 1980, and 1983
24. Drawing 2728-1-7 (Air Handling Unit AH-17)