



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA ST., N.W., SUITE 3100  
 ATLANTA, GEORGIA 30303

Report Nos. 50-400/81-22, 50-401/81-22, 50-402/81-22, and 50-403/81-22

Licensee: Carolina Power and Light Company  
 411 Fayetteville Street  
 Raleigh, NC 27602

Facility Name: Shearon Harris

Docket Nos. 50-400, 50-401, 50-402, and 50-403

License Nos. CPPR-158, CPPR-159, CPPR-160, and CPPR-161

Inspection at Shearon Harris site near Raleigh, NC

Inspectors:

*[Signature]*  
 W. P. Kleinsorge \_\_\_\_\_ Dec 11, 1981  
 Date Signed

*[Signature]*  
 J. L. Coley \_\_\_\_\_ Dec. 14, 1981  
 Date Signed

Approved by:

*[Signature]*  
 A. R. Herdt, Section Chief \_\_\_\_\_ 12/15/81  
 Engineering Inspection Branch  
 Engineering and Technical Inspection Division  
 Date Signed

SUMMARY

Inspection on November 17-20, 1981

Areas Inspected

This routine, unannounced inspection involved 66 inspector-hours on site in the areas of scaffolding (Units 1-4), reactor coolant pressure boundary piping (Unit 1), safety-related piping (Unit 1), and steel structures and supports (Unit 1).

Results

Of the four areas inspected, no violations or deviations were identified in three areas; one violation was found in one area; (Violation - "Inadequate Measures to Control Construction Loads on Safety-Related Materials and Equipment" - paragraph 5.c.). No deviations were found.



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## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*H. R. Banks, Manager, CQA
- R. M. Parsons, Site Manager
- \*N. J. Chiangi, Manager, E and CQA
- \*A. M. Lucas, Senior Resident Engineer
- \*R. Hanford, Principal Engineer, Welding/Metallurgy
- \*E. E. Willett, Resident Engineer - Mechanical
- \*G. M. Simpson, Principal Construction Specialist - Inspection
- \*C. R. Osman, Principal QA/QC Specialist - NDE
- \*E. L. Betz, Project QA/QC Specialist - NDE

Other licensee employees contacted included construction craftsmen, technicians, and office personnel.

#### Other Organizations

- \*W. D. Goodman, Project Manager, Daniel Construction Company (DCC)

NRC Resident Inspector

- \*G. F. Maxwell

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on November 20, 1981 with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings listed below:

A violation concerning inadequate measures to control welding was cited at the exit interview. As a result of further evaluation, this item is now identified as three unresolved items Nos. 400/81-22-01, 400/81-22-04, 400/81-22-05 and one inspector followup item 400/81-22-06. The licensee was notified of the change by telecon on December 8, 1981.

Unresolved Item - 400/81-22-01: "Corrective Action for Process Discrepancies" - paragraph 8.a.

Violation - 400-403/81-22-02: "Inadequate Measures to Control Construction Loads on Safety Related Materials and Equipment" - paragraph 5.c.



Unresolved Item - 400/81-22-03: "Drawing Inconsistencies" - paragraph 8.b.

Unresolved Item - 400/81-22-04: "Incomplete Filled Weld Groove on RHR Heat Exchanger" - paragraph 5.b.

Unresolved Item - 400/81-22-05: "Improperly Specified Fillet Weld Size" - paragraph 7.d.(2).

Inspector Followup Item - 400, 401/81-22-06: "Field Monitoring of Welding Appears Ineffective" - paragraph 8.a.

3. Licensee Action on Previous Inspection Findings

Not inspected.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraphs 5.b., 7.d.(2), 8.a. and 8.b.

5. Independent Inspection Effort (Units 1-4)

a. Construction Progress

The inspectors conducted a general inspection of the power block construction, site and the pipe fabrication shop, to observe construction progress and construction activities such as welding, nondestructive examination, material handling and control, housekeeping and storage.

b. Visual Examination of Welds (Unit 1)

With regard to the above inspection, the inspectors accompanied by a representative of the licensee on November 17, 1981 noted two incomplete filled weld grooves on full penetration welds. The welds in question are on the two installed residual heat removal heat exchangers. The heat exchangers including the welds in question were fabricated by a vendor, Joseph Oats Company. The ASME B and PV Code Section III subsection NC and ND, the applicable code for the heat exchangers, requires full penetration weld thickness to equal the thickness of the adjacent base material. The heat exchangers are N-stamped components and such were inspected by the stamp holder. The licensee only inspects N-stamped items for shipping damage and not for Code compliance. Therefore, unacceptable weld conditions on vendor provided components could have been installed in the plant.



The inspectors indicated that the licensee may have a problem in the area of receiving inspection and vendor surveillance. The licensee indicated that they would look further into the matter. The inspectors stated that the above would be an unresolved item identified as 400/81-22-04: "Incomplete Filled Weld Groove on RHR Heat Exchanger".

c. Scaffolding (Units 1-4)

With regard to the above inspection, the inspectors accompanied by a representative of the licensee noted on November 19, 1981 approximately 12 examples of unauthorized scaffolding supported by installed safety-related and balance of plant piping, conduit, and cable trays. It was determined that the scaffolding was installed without proper authorization due to craft misinterpretation of site rigging requirements. CP&L Procedure WP-21, Revision 3, "Inspection of Equipment and Rigging for General Lifting", paragraph 4.4 requires approval prior to imposing any construction loads on permanent plant equipment. The inspectors stated that the above indicated inadequate measures to protect safety related materials and equipment.

Failure to establish adequate measures to control storage and preservation of materials and equipment to prevent damage is in violation of 10 CFR 50 Appendix B Criterion XIII. This violation will be identified as 400-403/81-22-02: "Inadequate Measures to Control Construction Loads on Safety Related Materials and Equipment".

Within the areas examined, no violations or deviations were identified except as described in paragraph 5.c.

6. Reactor Coolant Pressure Boundary Piping (Unit 1)

The inspectors observed welding work activities for reactor coolant pressure boundary (RCPB) piping. The applicable code for the installation of RCPB piping is the ASME B&PV Code, Section III, Subsection NB, 1974 Edition through the winter 1976 addenda.

The inspectors observed in-process welding activities of RCPB piping field welds as described below to determine whether applicable code and procedure requirements were being met.

a. Welding

The below listed welds were examined in process to determine work conducted in accordance with traveler; welder identification and location; welding procedure; WPS assignment; welding technique and sequence; materials identity; weld geometry; fit-up; temporary attachments; gas purging; preheat; electrical characteristics; shielding gas; welding equipment condition; interpass temperature;





interpass cleaning; process control systems; identity of welders; qualifications of inspection personnel; and weld history records.

<u>Weld Number</u>	<u>System</u>
49-FW-1	Incore Instrumentation
45-FW-1	Incore Instrumentation
6-FW-1	Incore Instrumentation
RC-1-FW-5	Reactor Coolant
RC-1-FW-2	Reactor Coolant
RC-1-FW-1	Reactor Coolant

b. Welder Qualifications

The inspectors reviewed the CP&L program for qualification of welders and welding operators for compliance with QA procedures and ASME Code requirements.

- (1) The following welder qualification status records and "Records of Performance Qualification Test" were reviewed relative to the weld joints listed in paragraph nos. 6.a., 7.a, 7.d, 8.a, 8.b, and 8.e.

<u>Welder Symbol</u>	<u>Application</u>
B-43	Reactor Coolant Pressure Boundary Piping
B-22	Reactor Coolant Pressure Boundary Piping
B-17	Reactor Coolant Pressure Boundary Piping
B-44	Reactor Coolant Pressure Boundary Piping
B-46	Reactor Coolant Pressure Boundary Piping
A-92	Reactor Coolant Pressure Boundary Piping
A-60	Safety Related Piping
B-7	Safety Related Piping
C-11	Safety Related Piping
C-53	Safety Related Piping
C-89	Safety Related Piping
SI-33	Steel Structures and Supports
SI-86	Steel Structures and Supports
SI-88	Steel Structures and Supports
SA-33	Steel Structures and Supports
B-47	Steel Structures and Supports
C-17	Steel Structures and Supports

- (2) The following performance qualification tests were observed in progress:

<u>Welder ID</u>	<u>WPS</u>
66/1656	1A4
32/952	8B1PL



66/1663	8B2
66/1667	8B2

(3) The below listed welder performance radiographs were reviewed.

<u>Date</u>	<u>Welder ID</u>	<u>Assembly Type</u>
11/20/81	66-923	2.375" X 0.436" Pipe
11/20/81	66-943	2.375" X 0.436" Pipe
09/17/81	32-1541	1" X 6" Plate
11/12/81	66-1647	1" X 6" Plate
08/12/81	32-592	1" X 6" Plate
11/20/81	66-1663	2.375" X 0.436" Pipe

c. Welder Filler Material Control

The inspectors reviewed the CP&L program for control of welding materials to determine whether materials are being purchased, accepted, stored and handled in accordance with QA procedures and applicable code requirements. The following specific areas were examined:

- Purchasing procedures, receiving, storing, distributing and handling procedures, material identification, inspection of welding material issuing stations.
- Welding materials purchasing and receiving records for the following materials were reviewed for conformance with applicable procedures and code requirements:

<u>Heat/Lot No.</u>	<u>Type</u>	<u>Size</u>
422N7921	E-7018	3/32"
761463	ER-308L	1/16"
D-3875	ER-308	1/8"
C 3017	ER-308	3/32"
464920	ER-308	0.045"
A 2556	INCONEL	0.045"
762162	INCONEL	3/32"
763212	INCONEL	1/8"
464802	ER-308	3/32"
422H8211	E 7018	1/8"
401N3761	E 7018	3/32"
05108	ER-308	1/8"
661C107	ER-70S6	3/32"
45458	ER-70S6	1/8"

Within the areas examined, no violations or deviations were identified.



## 7. Safety-Related Piping (Unit 1)

The inspectors observed welding activities for safety related-piping as described below to determine whether applicable code and procedure requirements were being met. The applicable code for safety-related piping is the ASME B&PV Code, Section III, Subsections NC and ND, 1974 Edition with addenda through winter 1976. The inspector observed in-process welding activities of field welds as described below to determine whether applicable code and procedure requirements were being met.

### a. Welding

The below listed welds were examined in process to determine work conducted in accordance with traveler; welder identification and location; welding procedures; WPS assignment; welding technique and sequence; materials identity; weld geometry; fit-up; temporary attachments; gas purging; preheat; electrical characteristics; shielding gas; welding equipment condition; interpass temperature; interpass cleaning; process control systems; identity of welders; qualifications of inspection personnel; and weld history records.

<u>Weld Number</u>	<u>Size</u>	<u>System</u>
1-CT-16-SW-1	12" X .0406"	Containment Spray
1-SW-8-FW-281	24" X .0375"	Service Water

### b. Welder Qualification

Welder qualification is discussed in paragraph 6.b.

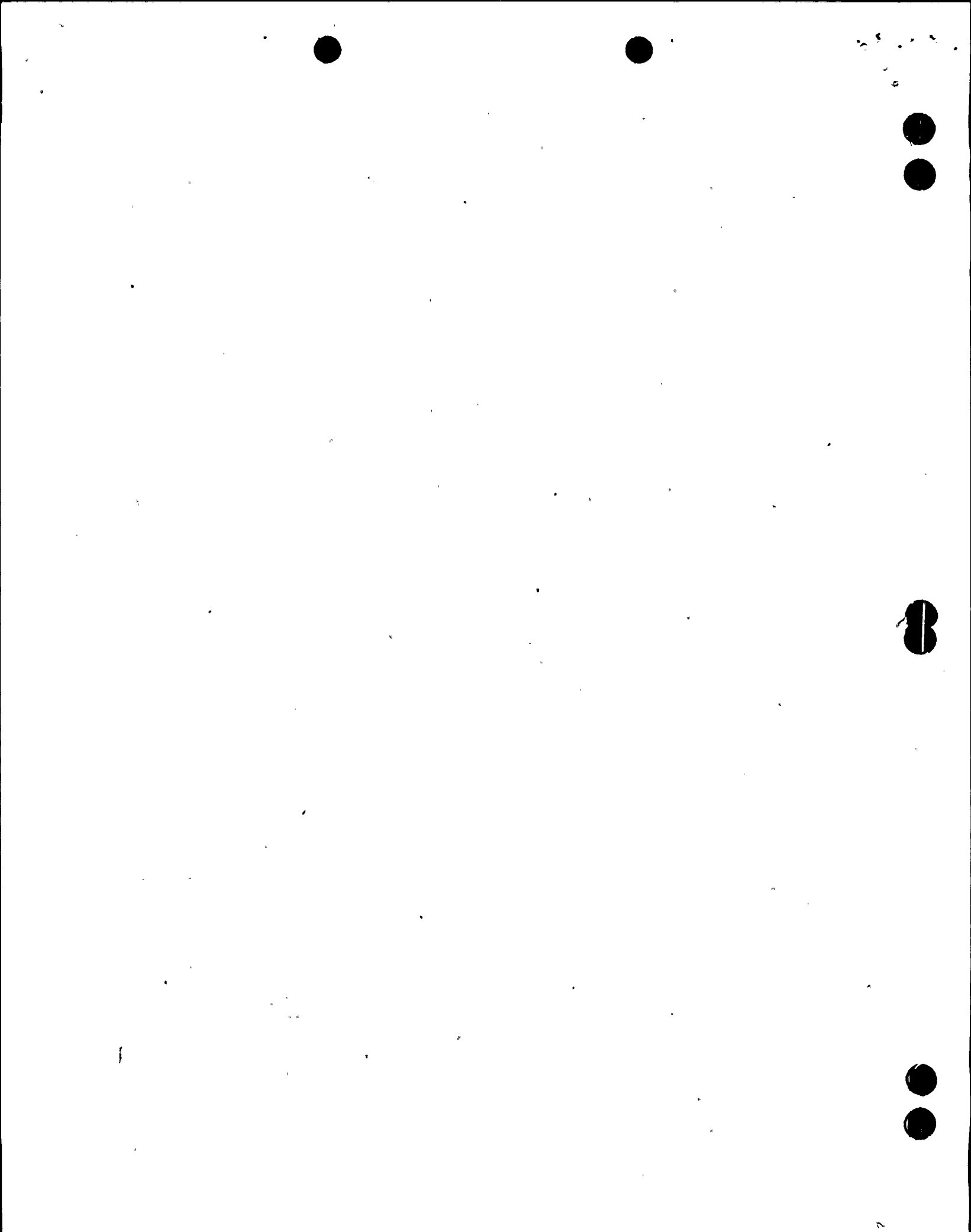
### c. Welder Material Control

Welder material control is discussed in paragraph 6.c.

### d. Visual Inspection of Welds

The inspector visually examined completed and accepted safety-related welds as described below to determine whether applicable code and procedure requirements were being met.

- (1) The below listed welds were examined relative to the following: location; length, size and shape; weld surface finish and appearance, including inside diameter of pipe welds when accessible; transitions between different wall thickness; weld reinforcement -- height and appearance; joint configuration of permanent attachments and structural supports; removal of temporary attachments; arc strikes and weld spatter; finish-grinding or 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.

<u>Weld No.</u>	<u>System</u>
1-CT-16-90	Containment Spray
1-CT-16-89	Containment Spray
1-CT-16-88	Containment Spray
1-SW-33-271	Service Water
1-CH-92-250	Chilled Water
1-CH-92-251	Chilled Water
1-CH-92-252	Chilled Water
1-CH-92-253	Chilled Water
1-CH-92-254	Chilled Water

- (2) Quality records for the below listed welds were examined relative to the following: records covering visual and dimensional inspections indicate that the specified inspections were completed; the records reflect adequate quality; history records are adequate.

<u>Weld No.</u>	<u>System</u>
1-CT-16-90	Containment Spray
1-CT-16-89	Containment Spray
1-CT-16-88	Containment Spray
1-SW-33-271	Service Water
1-CH-92-252	Chilled Water

With regard to the inspection above, the inspectors noted on the following: the Weld Data Reports (Traveler) for chilled water system socket weld joints 1-CH-92-FW-250 through FW-255, with 0.179" wall thickness, specified 3/16" (0.1875") fillet leg size. The above is contrary to ASME Section III which requires 0.195" minimum fillet leg size for 0.179 wall socket weld joints. At the time of this inspection, it could not be determined whether any undersize socket weld joints had been accepted as a result of the incorrectly specified fillet weld leg size. The licensee indicated that they would look further into the matter. The inspectors stated that the above would be identified as unresolved item 400/81-22-05: "Improperly Specified Fillet Weld Size".

Within the areas examined, no violations or deviations were identified.





## 8. Steel Structures and Supports (Unit 1)

The inspectors observed welding work activities for steel structures and supports as described below to determine whether applicable code and procedure requirements were being met. The applicable code for fuel pool liner welding is the ASME B&PV Code Section III Subsection ND, 1974 Edition through the winter 1976 addenda. The applicable code for remainder of the below listed welding is AWS D1.1-75.

## a. Welding Inside Containment

The inspectors observed in-process welding activities of structural field welds inside of containment as described below to determine whether applicable code and procedure requirements were being met.

The following welds on the main steam restraint for loops B&C steam generators were examined in process to determine work conducted in accordance with traveler; welding procedures available; welding technique; sequence; and weld geometry:

<u>Pieces Welded</u>	<u>Item Jointed</u>	<u>Generator Loop #</u>
J.T. #507G2	I-Beam	Loop C
PC #515C1 to PC #512G3	Column to I-Beam	Loop C
PC #514C1 to PC #512G5	Column to I-Beam	Loop C
PC #512G2 to PC #519M5	Web to Flange	Loop C
PC #5234 to PC #544M1	Column to I-Beam	Loop B
PC #530D3 to PC #525M1	Knee Brace to Column	Loop C
PC #514C1 to PC #530D3	Column	Loop C
PC #506G1 to PC #525M1	Beam	Loop C
PC #513C2 to PC #507G1	Column to Beam	Loop C

On November 17, 1981, the NRC inspectors noted an 18" crack in the weld for structural members Nos. 525M1 to 506G1. The inspectors also observed a linear indication (apparently an extruded seam) approximately 2-½" long on structural member No. 507G1 starting in the heat affected zone of the weld. Visual inspection is required as the final inspection for the above welds. This inspection had not been performed by the licensee prior to the NRC inspectors conducting their surveillance of this work. Both indications were observed on the main steam restraint tower for loop C steam generator. The indications were confirmed by an informational magnetic particle examination, conducted by the licensee, at the request of the NRC inspectors.

In addition, the inspectors reviewed a licensee Deficiency and Disposition Report (DDR. No. 717) dated November 10, 1981. The DDR reported an 18" indication on the restraint structure for loop C (piece

Nos. 513C2 to 506G2). This indication extended from the field weld into the base material. DDR No. 717 had not been dispositioned as to defect cause at the time of the inspectors' inspection. The licensee, however, expressed the opinion that the indication could have been caused by welding over base metal seam like the 2-½" indication reported by the inspectors above. After the NRC identification of the 18" crack, the licensee evaluated this crack and concluded that stresses caused by a process discrepancy such as insufficient preheat or an inadequate welding sequence may have been the cause of the crack. The licensee is changing the welding sequence, preheat temperature, and requiring magnetic particle examinations in lieu of visual exams for completed welds, made by the licensee. The inspectors stated that if stress is caused by a deficient welding process vendor accepted welds on this structure may also be affected. The licensee did not commit to reinspection of any vendor accepted welds at this time, but will evaluate the entire problem. The inspectors stated that the above would be an unresolved item identified as 400/81-22-01: "Corrective Action for Process Discrepancies."

As a result of the inprocess type discrepancies noted above, the inspectors reviewed the licensee's field welding monitoring checklist to determine whether the field monitoring program had identified similar process discrepancies during in-process surveillance. The review of the field welding activity monitoring checklist (Exhibit 4 of CQA-22) revealed that, excluding discrepancies written at the rod issue stations, the field monitor checklist had identified only one welding discrepancy in 18 months. As a result of the items identified in this report the inspectors felt that this checklist may not be totally effective. The inspectors will look further into the matter during a subsequent inspection. The above will be inspector followup item 400, 401/81-22-06: "Field Monitoring of Welding Appears Ineffective".

- b. The inspectors observed in-process welding activities of structural field welds outside of containment as described below to determine whether applicable code and procedure requirements were being met.

The following welds were examined in process to determine work conducted in accordance with traveler; welding procedures available; welding technique and sequence; weld geometry; fitup; electrical characteristics; and equipment condition:

<u>Weld No.</u>	<u>Drawing</u>	<u>Structure</u>
FW-335	SK-A-G-0165 Rev. 2	Fuel Pool Liner
FW-336	SK-A-G-0165 Rev. 2	Fuel Pool Liner
FW-55	SK-A-G-0173 Rev. 1	Fuel Pool Liner
FW-433	SK-A-G-0173 Rev. 1	Fuel Pool Liner
--	A-1-216-1-PD-H-740	Pipe Support
--	A-1-216-1-PD-H-737	Pipe Support

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With regard to the inspection above, the inspectors noted that drawing SK-A-G-0165 Rev. 2, the weld map for the new fuel pool, does not appear to correctly depict the location and orientation of welds. The above drawing is used only as an aid for joint identification and not for construction. The information contained on this drawing was taken from controlled drawings. The licensee indicated that they would look into the matter. The inspectors stated that the above would be unresolved item 400/81-22-03: "Drawing Inconsistencies".

c. Welder Qualification

Welder qualification is discussed in paragraph 6.b.

d. Welding Material Control

Welding material control is discussed in paragraph 6.c.

e. Visual Inspection of Welds

The inspectors visually examined completed and accepted safety-related welds as described below to determine whether applicable code and procedure requirements were being met.

- (1) The following welds were examined relative to the following: location, length, size and shape; weld surface finish and appearance; transitions between different wall thickness; weld reinforcement -- height and appearance; joint configurations of permanent attachments and structural supports; removal of temporary attachments; arc strikes and weld spatter; finish-grinding or 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.

<u>Weld No.</u>	<u>Item</u>	<u>Drawing No.</u>
27A2	Shelf Tray to Embed Plate	CAR-2168-G148501
23A2	Beam Weld	CAR-2168-G148501
23A4	Structural Platform to Embed	CAR-2168-G148501
39A2	Platform Support	CAR-2168-G148501
27A2	Shim Plate to Embed Plate	CAR-2168-G148501

- (2) Quality records for the above welds were examined relative to the following: records covering visual and dimensional inspections indicate that the specified inspections were completed; the records reflect adequate weld quality; history records are adequate.

Within the areas examined, no violations or deviations were identified.

