UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-261/93-20

Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC, 27602

Docket Nos.: 50-261 License No.: DPR-23

Facility Name: H. B. Robinson

Inspection Conducted: September 13-17 and September 27 - October 1, 1993

Inspectors: B. R. Crowley 10/13/93
B. R. Crowley Date Signed

Approved by: 10/21/93
J. J. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted on site in the areas of: (1) Inservice Inspection (ISI), (2) Flow Accelerated Corrosion (FAC), and (3) review of corrective actions for previous inspection findings.

Results:

In the areas inspected, one violation - failure to follow procedures for calibration and certification of ET equipment - Paragraph 2.c.(7) - was identified. No deviations were identified.

In the area of ISI, weaknesses were identified relative to lack of details in administrative control procedures and coordination of examination preparation and examinations. However, in general, the program appeared to be functioning well. Examinations were being conducted in a conscientious manner by qualified personnel in accordance with approved procedures and required Codes. Level III personnel were involved with the inspection process. Neat and orderly records were being generated and maintained.

Relative to the FAC program, significant improvements were noted. Engineering Design Guidelines had been issued and Engineering was involved in the process.

Detailed site procedures and department guidelines had been issued to implement the program. All affected organizations, Operations, Maintenance, Engineering, and Chemistry were involved in the program. A knowledgeable Site FAC Coordinator was in place and ensuring that the program was properly implemented. The Technical Support Department had a positive attitude about implementing a good program. A Susceptibility Analysis of plant piping had been performed and susceptible piping walked down and Isometric Drawing prepared. The EPRI CHECMATE Model had been implemented and the Pass 1 analysis completed. An aggressive inspection program for the current outage had been implemented to obtain data to further improve the program and predict future wear.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*T. Cleary, Manager, Technical Support
*R. Crook, Senior Specialist, Regulatory Affairs
*C. Dietz, Vice President, Robinson Nuclear Power Division
*S. Farmer, Manager Inservice Inspection
C. Griffin, Senior Engineer, Nuclear Engineering Department
T. Freeman, Flow Accelerated Corrosion Coordinator
J. Lane, RCS System Engineer
*C. Osman, Principle NDE Specialist, Technical Services
I. Simpson, Supervisor, NDE Services
P. Tingen, NED Technician
*M. Vernon, Manager, NDE Services
D. Weber, Senior Inservice Inspection Specialist

Contractors

M. Baugh, QA/QC Welding Supervisor - Power Cutting Inc.

R. Brown, Manager, NDE Services - ABB Combustion Engineering Nuclear Services, Steam Generator Project Manager

S. Larson, Level III Examiner - Nuclear Energy Services (NES)

T. Roland, Modification Implementing Hanger (MIH) Coordinator - Power Plant Maintenance (PPM)

R. Valladares, Authorized Nuclear Inservice Inspector (ANII) - Hartford Steam Boiler

Other licensee employees contacted during this inspection included engineers, QA/QC personnel, craft personnel, security force members, technicians, and administrative personnel.

NRC Employees

*C. Ogle, Resident Inspector
*W. Orders, Senior Resident Inspector

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Inservice Inspection (ISI)

The inspector reviewed documents and records, and observed activities, as indicated below, to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements, and licensee commitments. The applicable code for ISI is the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, Section XI, 1986 Edition, except that the extent of examination for pipe welds, category B-J, is the 1974 Edition, Summer 1975.

The third 10-Year interval started February 19, 1992 and ends February 19, 2002. This is the second outage of the first period of the third interval.

The third 10-Year interval program was submitted in August, 1991. Additional information was provided by letters dated February 13, 1992 and June 18, 1992. A total of 18 relief requests were submitted. The NRC issued a Safety Evaluation Report (SER) on October 19, 1992. Relief Request numbers 1, 2, 3, 5, 8, 12, and 18 were granted, number 13 was granted with conditions, and all others were withdrawn by the licensee.

The site ISI organization in the Technical Support Department is responsible for the 10-Year Program and issuing the Outage Plan. The Corporate NDE Services Department is responsible for performing the inspections. A contractor, presently NES, performs the NDE inspections under the direction of the NDE Services Department. NDE procedures are provided by the contractor and are issued under the licensee's program as site procedures.

a. ISI Program Review (73051)

The inspector reviewed the documents listed below related to the ISI program to determine whether relief requests had been approved by NRR, the services of an Authorized Nuclear Inservice Inspector (ANII) had been procured and the inspector was involved in ISI activities, the plan had been approved by the licensee and to assure that procedures and plans had been established (written, reviewed, approved and issued) to control and accomplish the following applicable activities: program organization including identification of commitments and regulatory requirements, preparing plans and schedules, and qualification, training, responsibilities, and duties of personnel responsible for ISI; NDE personnel qualification requirements; and guidance for identifying and processing relief requests.

- Carolina Power and Light H B Robinson Nuclear project Unit No 2 Third Ten year Inservice Inspection program Plan, Revision 0

- CP&L PLP-025, Revision 25, In-Service Inspection Program

- CP&L Examination Program Plan For Carolina Power and Light Company H. B. robinson Unit 2 Inservice Inspection - Interval-3 Period-1 Outage-2

- CP&L SP-1235, Revision 0, Ultrasonic Linearity Verification

- CP&L SP-1216, Revision 0, Calibration of Thermometers

- CP&L SP-1221, Revision 0, Procedure for Certifying Nondestructive Examination Personnel

- NES 83A5464, Revision 1, Quality Assurance Program Plan For Inspection and Related Services For Carolina Power and Light Company

- NES 80A9003, Revision 13, NES Document Control

- NES 80A9022, Revision 10, Quality Assurance Audit Procedure

- NES 80A9054, Revision 3, Calibration of Magnetic Particle Examination Equipment

- NES 80A9069, Revision 14, Certification of Visual Examination Personnel

- NES 809084, Revision 6, Nondestructive Examination Procedure Qualification

- NES 80A9099, Revision 8, Identification, Storage, and Retention of Quality Assurance Records

Relative to review of programmatic controls, the inspector identified the following weakness:

Administrative controls were not well defined procedurally in a number of areas relative to the general operation of the ISI NDE program. The following are examples of areas with weak procedural details:

- The overall description of how the program works, including interface between the Site ISI Organization, Corporate NDE Services Department, and the contractor.

- Issue, control, and use of the outage plan.

- Process for review and approval of inspection data, including disposition of rejectable defects and sample expansion when rejectable defects are found.

- Reference system for identification and layout of welds.

- Disposition of limited examinations.

Although these areas lacked procedural details, the inspector did not identify specific problems resulting from this weakness.

b. Review of Procedures (73052)

The inspector reviewed the following NDE procedures to determine whether these procedures were consistent with regulatory requirements and licensee commitments. The procedures were reviewed in the areas of procedure approval, requirements for qualification of NDE personnel, compilation of required records, and division of responsibility between the licensee and contractor personnel. In addition, the procedures were reviewed for technical adequacy and conformance with ASME, Sections V and XI, and other licensee commitments/requirements.

- SP-1217, Revision 0, Liquid Penetrant Examination Procedure
- SP-1218, Revision 0, Magnetic Particle Examination Procedure
- SP-1223, Revision 0, Ultrasonic Examination of Piping Welds and Systems
- SP-1230, Revision 0, VT-3 Visual Examination of Nuclear Power Plant Components
- SP-1220, Revision 0, PSI/ISI Examination Areas and Volumes

During review of the MT procedure, SP-1218, the inspector noted conflicting requirements relative to verification of the strength of MT Yokes. Paragraph 8.2.2 requires verification at the beginning of each shift. Paragraph 9.1.1 states that daily verification is recommended. Based on discussions with inspection personnel and observation of inspections, the actual practice is verification prior to each inspection. Therefore, the actual practice is more conservative than the most conservative procedure requirement.

c. Observation of Work and Work Activities (73053)

The inspector observed work activities, reviewed NDE personnel qualification records, and reviewed certification records of NDE equipment/materials, as detailed below. The inspector verified: availability of and compliance with approved NDE procedures, use of knowledgeable NDE personnel, and use of NDE personnel qualified to the proper level.

(1) Liquid Penetrant Examination (PT)

The inspector observed the in-process PT examinations as indicated below. The observations were compared with the inspection attributes of the applicable procedure and the ASME B&PV Code to verify the performance of acceptable examinations.

Examinations Observed

Drawing	Welds/Component
CPL-125	1BC
CPL-125	3
CPL-125	4

(2) Magnetic Particle (MT) Examination

The inspector observed the in-process MT examinations as indicated below. The observations were compared with the inspection attributes of the applicable procedure and the ASME B&PV Code to verify the performance of acceptable examinations.

Examinations Observed

Drawing	Welds/Component
CPL-205	6
CPL-212	7
CPL-212	7LS

(3) Ultrasonic (UT) Examination

The inspector observed the in-process UT examination of weld 7 on drawing CPL-212. The observations were compared with the inspection attributes of the applicable procedure and the ASME B&PV Code to verify the performance of acceptable examinations.

(4) Visual (VT) Examination

The inspector observed the in-process VT examinations as indicated below. The observations were compared with the inspection attributes of the applicable procedure and the ASME B&PV Code to verify the performance of acceptable examinations.

Examinations Observed

Drawing	Support/Component
CPL-245	Hanger A
CPL-247	Hangers b, E, and G

(5) Eddy Current (ET) Examination

The Inspector observed the in-process ET data acquisition for the steam generator (SG) tubes listed below. The data acquisition was compared with the applicable procedure and the ASME B&PV to verify acceptable data acquisition activities.

Examinations Observed

SG	Tube Row/Column
A	R35/C38
A	R33/C38
A	R30/C38
A	R35/C38
B	R11/C38
B	R9/C38
B	R6/C38
B	R12/39
B	R16/39
C - observed calibration activities	

In addition to these observations, the inspector reviewed the scan plans and discussed the planned inspection program with licensee and contractor personnel. The planned inspection will include BOBBIN coil inspection of approximately 45% of tubes in each SG. This will complete BOBBIN coil inspection of 100% of all tubes since the SGs were replaced. In addition, Rotating Pancake Coil (RPC) inspections will be performed on any questionable tube and selected tubes previously identified with manufacturing burnish marks.

(6) Personnel Qualification/Certification

The inspector reviewed personnel qualification documentation as indicated below for examiners who performed the examinations detailed in paragraphs (1), (2), (3), (4), and (5) above. These personnel qualifications were reviewed in the following areas: employer's name; person certified; activity qualified to perform; current period of certification; signature of employer's designated representative; basis used for certification; and, annual visual acuity, color vision examination, and periodic recertification.

Examiner Records Reviewed

Method	Level	Employer	Number
PT	II	NES	5
PT	I	NES	1
MT	II	NES	4
UT	II	NES	3

Examiner Records Reviewed

Method	Level	Employer	Number
VT	II	NES	2
ET	II	ABB	3

In addition, qualification documentation for 1 level III examiner (PT, MT, and UT) was reviewed.

(7) Equipment Certification Records

Equipment/material certification records, as listed below, for equipment/materials used in the inspections detailed in paragraphs (1), (2), (3), (4), and (5) above were reviewed to ensure compliance with applicable requirements.

Equipment Type	Equipment Identification
Penetrant Cleaner	Batch 92D02P
Penetrant	Batch 93E01K
Penetrant Developer	Batch 92A01P
Magnetic Particles	Batch 83L067
UT Transducer	Serial M12411
UT Transducer	Serial E18404
UT Instrument	Serial 27276-3702
UT Instrument	Serial 27276-749
UT Instrument	Serial 27276-807
UT Couplant	Batch 093001
ET Calibration Standard	Serial Z-8554
ET Calibration Standard	Serial Z-8555
ET Calibration Standard	Serial Z-8556
ET MIZ-18A RDAU	Serial 020
ET MIZ-18A RDAU	Serial 023
ET MIZ-18A RDAU	Serial 056

During review of the above certification records, the inspector noted that the on site certification records for the MIZ-18A ET equipment at the job site had expired for two sets of equipment. Three sets of equipment (serial numbers 023, 056 and 195), one in each steam generator, were being used. After further investigation, the ET contractor located the current certification for equipment serial numbers 023 and 056 off-site at their offices. However, certification records for equipment serial number 195 could not be found. Attachment 8.3, paragraph 7.0 of CP&L Procedure SP-1240, Revision 0, Steam generator Eddy Current Testing During RFO 15, requires that the MIZ-18A equipment be certified and that documentation of calibration be provided prior to the start of the inspection. Failure to follow procedure requirements for calibration and certification of ET equipment is in violation of 10 CFR 50, Appendix B, Criterion 5, and is identified as Violation (VIO) 261/93-20-01, Failure to Follow Procedures for Calibration and

Certification of ET Equipment. As immediate corrective action, the ET contractor replaced equipment serial number 195 with a set of qualified/certified equipment and re-inspected the SG tubes that had been inspected with serial number 195 equipment.

Also, certification of UT characteristics for transducer serial number M14135, used for inspection of weld 7 on Drawing CPL-212 was not available at the site. Although not a code requirement to have this certification, it is industry practice to obtain this certification from the transducer manufacturer to ensure proper sound characteristics and repeatability of inspection results. The licensee stated that they will obtain the certification or, if not available, determine the transducer characteristics and certify the transducer.

(8) Steam Generator Feedwater Nozzle to Reducer Welds

During a previous inspection (See NRC Inspection Report 50-261/92-92-14), the NRC inspector questioned the UT inspection of the "C" SG Feedwater nozzle to reducer weld. The weld had been re-examined to look for thermal fatigue cracks based on cracking being found at another utility. Based on concerns of the inspector relative to disposition of indications as geometry in the area where cracking would be expected, the weld and base material were re-inspected at the time of the 92-14 inspection. In addition to UT using a number of different transducers, the weld and adjacent base material were radiographed (RT). Based on the additional UT inspection of the questionable areas (16" to 32" clockwise looking toward the SG), and comparison of the RT film to the original fabrication RT film, it was concluded that the indications were caused by geometry.

During the current inspection, the following UT inspections were performed:

- Loop A - Welds 1 (Reducer to Nozzle), 2 (Elbow to Reducer), and 4 (Pipe to Elbow) were inspected using 0°, 45° shear wave, and 60° shear wave transducers. The inspections included the entire surface of the reducer and half of the elbow base material inspecting for thermal fatigue cracking.

- Loops B and C - The entire surface of the reducers and half of the surface of the elbows were UT inspected using 0°, 45° shear wave, and 60° wave transducers inspecting for thermal fatigue cracks. These inspections included welds 1 and 2.

- Loop C - The questionable area noted above (16" to 32" clockwise) was inspected using 45° L-Wave and 60° L-Wave transducers.

- Techniques and personnel with demonstrated capability to detect thermal fatigue cracks were used for these inspections.

The inspector reviewed the UT shear wave inspection data and observed the UT L-Wave inspections on the "C" loop. In addition, the original fabrication RT film and the RT film from the 1992 inspection were reviewed. Apparently the indications have not changed since the last inspection. It appears that the indications are geometric reflections from the reducer counterbore. The RT film show a machining groove at the intersection of the counterbore and counterbore taper. The licensee plans to continue to inspect these areas during future outages. In addition, the licensee has contacted Structural Integrity Associates to: (1) make a proposal for monitoring the effectiveness of their control of the thermal fatigue cracking in the feedwater piping, and (2) determine the best alternatives for material and configuration for pipe replacements.

During observation of examination activities, the inspector noted a general weakness relative to coordination of examinations and preparation (scaffold erection, insulation removal, cleaning, determination of Health Physics (HP) requirements, etc.) and performance of examinations. The following are examples:

- In attempting to inspect the pipe hangers identified in paragraph (4) above, the examiners found that the required clearances between the hangers and the pipe could not be verified because the insulation had not been adequately removed. Also, a significant amount of time was spent locating the hangers.

- About 3 hours was spent inside the radiation control area (RCA) to perform PT inspection of the 3 welds identified in paragraph (1) above. These are 2" diameter welds and are located in a high radiation area. The cleaners entered the RCA to clean the welds at the same time as the NDE examiners entered the RCA to perform the inspection. HP did not swipe the area and determine the full dress requirements until the cleaners and examiners were ready to enter the high radiation area. Requirements were added for paper outer clothing after everyone was dressed, inside the RCA, and ready to enter the high radiation area. Although the full 3 hours was not spent in the high radiation area (much of the time was spent waiting in low dose areas), the time inside the RCA could have been decreased significantly with better planning.

- During MT and UT examination of Main Steam system weld 7 on drawing CPL-212, the inspector noted that other welds in the same area required the same inspection, but could not be inspected because of lack of cleaning, insulation removal, or scaffold erection. This caused repeated calibrations and/or entries into the RCA.

d. Inservice Inspection Data Review and Evaluation (73755)

In addition to review of in-process data for the inspections observed in paragraph c. above, the inspector reviewed P-Scan UT inspection data for SG girth weld 5 on SG "A".

As noted in NRC Inspection Report 50-261/92-13, UT indications were identified in girth weld 5 for SGs "A" and "C" using manual UT equipment in 1990. The indications appeared to be fabrication flaws, but some exceeded the criteria of ASME Section XI, IWB-3500. Based on flaw specific analysis, the indications were found to be acceptable for the next 18 month operation cycle. Because of the severe access restriction in obtaining reliable manual UT data, in refueling outage (RFO) 14 in 1992, the licensee contracted with Siemens Nuclear Power Services Inc. (SNPS) to perform a mechanical/semi-automated P-Scan UT inspection of selected indications in both SGs. This inspection was considered more reliable, accurate, and repeatable than the manual inspection because of the severe access restriction. This inspection showed the indications to be smaller than thought based on the manual inspection. Using the more accurate sizing of the P-scan inspections, the indications met ASME Section XI, IWB-3500 without the requirement for analysis. In addition to the P-Scan UT inspection, the licensee MT inspected some of the inside of the SG "A" weld at some of the indication locations which appeared to be open to the surface. Only minor fabrication type flaws were found.

During the current outage, the licensee had SNPS re-perform the P-Scan UT examination on 5 selected indications in the "A" SG girth weld to verify that the flaws have not changed. Although there was some small changes in the indication sizes (some dimensions slightly larger and others slightly smaller), the licensee concluded that the changes were within the accuracy of the inspection method and setup. The final conclusion was that the indications are acceptable fabrication flaws and do not warrant further special inspection monitoring. These welds will revert back to the normal inspection schedule.

The inspector reviewed the preliminary P-Scan data and inspection results for the current outage and a comparison with the previous inspection results. It appears that licensee action for the SG girth weld indications has been appropriate.

RESULTS

In the areas inspected, one violation, as detailed in paragraph c.(7), was identified relative to use of non-certified SG tube ET equipment.

Weaknesses were identified relative to lack of details in administrative control procedures (paragraph a. above) and coordination of examination preparation and examinations (paragraph c. above). However, in general, the program appeared to be functioning well. Examinations were being conducted in a conscientious manner by qualified personnel in accordance with approved procedures and required Codes. Level III personnel were involved with the inspection process. Neat and orderly records were being generated and maintained.

3. Flow Accelerated Corrosion (FAC) Program (49001)

In response to Generic Letter (GL) 89-08, Erosion/Corrosion Pipe Wall Thinning, licensee's have implemented long term Erosion/Corrosion (E/C) or FAC programs. The licensee's FAC program was evaluated in an inspection documented in NRC Inspection Report 50-261/92-13. During that inspection the inspector identified a weak program, specifically citing lack of corporate involvement and organization of the program. The licensee acknowledged a weak program and indicated that improvements were planned. The purpose of the current inspection was to evaluate the status of the program and determine if an adequate program was in place. The following is a summary of the inspection activities and results:

a. General

Based on discussions with licensee personnel, review of the documents listed in paragraph b. below, and observation of the inspections listed in paragraph c. below, the following actions have been completed by the licensee:

- A full time individual had been assigned as the Site FAC Coordinator. A full time position at the corporate level has been posted in the Nuclear Engineering Department (NED).

- Corporate Design Guides have been issued to define the program and site implementing procedures and guides have been issued. Corporate is involved in defining the program and resolving inspection findings.

- ABB Impell was contracted in late 1992 through early 1993 to walkdown systems, perform a susceptibility analysis for plant systems, provide isometric drawings for susceptible systems, and perform a CHECMATE Pass 1 Analysis.

- CP&L Nuclear Assessment Department (NAD) performed an assessment of the FAC program corporate wide, including Robinson. Their report, NAD 93-504 was issued on September 9, 1993. The assessment identified a number of weaknesses in the program. The weaknesses have been corrected or plans are in place for correction.

- For the current outage, the Robinson inspection plan includes approximately 285 inspection locations in large bore piping plus approximately 65 locations in small bore piping. The selection of locations for inspection was based on the Pass 1 CHECMATE analysis, plant experience, industry experience, and engineering judgement. The inspection results will be entered into the CHECMATE model to perform the Pass 2 analysis.

In addition to the above completed actions, the Site FAC Coordinator identified the following further program improvements planned to be completed in the next six Months:

- The NAD assessment noted that the Isometric Drawings are not plant controlled drawings. The drawings will be converted to plant controlled documents, errors corrected, and replacement materials identified.

- The 1994 budget has budgeted funds to: develop Isometric Drawings for unmodelled, susceptible piping; fund CHUG participation, and perform additional inspections in small bore and isolable lines.

- Backup FAC Coordinator will attend CHECMATE training in November.

- Modify Work Request (WR) computer program (AMMS) to flag piping replacements in secondary plant to help track replacements.

- The Chemistry Group belongs to EPRI water chemistry group. The Cycle 16 Plan includes raising Ph (additional hydrazine) and consideration of ethanol amine treatment.

- Plans are to develop a budget for replacement of small bore lines with stainless steel for turbine shell drains, crossunder drains, and steam dump bypass (keep-warm) piping.

b. Review of Procedures

The inspector reviewed the following documents which define the FAC program

- NED Design Guide DG-VII.5, Revision 0, Corporate Program for Flow Accelerated Corrosion

- NED Design Guide DG-VII.6, Revision 0, CHECMATE Modelling Guideline

- NED Design Guide DG-VII.7, Revision 0, Guideline for FAC Component Selection, Sample Expansion, and Evaluation

- ABB Impell Corporation Calculation No. 0132-00142-02, H. B. Robinson Unit 2 Systems Elimination Calculation

- PLP-051,, Revision 1, Flow Accelerated Corrosion (FAC) monitoring Program

- RFO-15 Project Plan - Erosion/Corrosion Monitoring Program

- CP&L NAD Report NAD 93-504, Corporate Flow Accelerated Corrosion Assessment Report

- Technical Support Guideline TSG-210, Revision 0, FAC Program Implementation

- NDEP-427, Revision 0, Interim Change 1, Digital Ultrasonic Thickness Measurement (Panametrics Model 26DL Plus) for Erosion/Corrosion Detection and Monitoring

- NDEP-1012, Revision 0, Gridding of Components for Erosion/Corrosion

c. Observations and Reviews

In addition to review of the above program, procedures, and plans, the inspector observed in-process activities and reviewed other aspects of the FAC program as detailed below:

- In-process grid layout was observed for components FW 10-14, FW 9-15, FW 11-17, FW 10-8, and FW 11-20 on Isometric Drawing FW-02. In addition, UT thickness measurement were observed for components FW 9-14 and FW 9-15 on Isometric Drawing FW-02. Personnel qualification and certification records for 5 NDE examiners who performed this work were reviewed.

- The inspector attempted to review records and determine the extent of previous problems with through-wall piping leaks due to FAC. Records were not readily available to determine the exact number of through-wall leaks. However, based on discussions with System Engineering personnel, since issue of Revision 3 (early 1989) to the Temporary Modification procedure, MOD 18, any repair to a leak with liquid sealant would require issue of a Temporary Modification. Therefore, the inspector reviewed the Temporary Modification Log to obtain some indication of the past through-wall leaks due to FAC. This indicates something less than 10 through-wall leaks in the last 4 to 5 years. It is not clear that all of these leaks

were due to FAC. Based on this log, only one of these leaks were in 6" diameter piping. The others were in small diameter (less than 2") piping. Although not a complete picture, since this does not include piping thinned and replaced before leaking, this does give some indication of previous FAC problems at Robinson.

- The inspector examined licensee's past practice and future plans for material replacements for FAC degraded piping, i.e., practices for replacing "like for like" or upgrading to better materials. Although the type material used for past replacements is not readily available without extensive review of modification and maintenance history records, the Site FAC Coordinator had performed some records reviews of past pipe replacements and recorded the information on the Isometric Drawings. A review of this data indicated use of the following materials:

Date	Size and System	Material(s) Used
10/84	3" - Htr. Drains and Vents (Reheat Excess Stm to No. 6 FW Heaters)	Carbon Steel
10/88	"	Carbon and Stainless
10/84	3" and 6" - Heater Drains	Carbon Steel
11/88	"	Carbon and Stainless
5/87	8" - Heater Drains	Carbon Steel
-	Feedwater Recirc Piping	Stainless
-	Steam Generator Blowdown Piping	Stainless
1990	High Pressure Extraction Steam Piping	2-1/4 Cr-Mo
5/87	Feedwater Heater Drains Downstream of Cont. Vlvs.	Carbon Steel
5/92	Discharge on Heater Drain Pumps	Carbon Steel

From the above it is obvious that there was not always an attempt to upgrade materials for piping replacements. In the past, the plant could replace "like for like" as long as the original design was met. As noted above, in the past, the FAC program was relatively weak and it appeared there was not much emphasis on upgrading materials.

Today, the general policy is to replace small diameter FAC degraded piping with Stainless Steel and large diameter with Cr-Mo material. The improved FAC program requires input from Technical Support (FAC Coordinator) and NED on dispositioning FAC degraded piping and pipe replacements. Any change in material requires Engineering approval through the Modification Process. The improved program should ensure that high priority is given to material upgrades whenever materials are replaced.

- At the completion of the inspection, 185 of the 285 large bore piping locations had been inspected. Forty-one of the 185 required NED evaluation (less than 0.875 X t_{nom}). However, only 4 were predicted to be below minimum wall before the next RFO. These are being evaluated for replacement.

RESULTS

No violations or deviations were identified.

Significant improvements were noted in the FAC program. Engineering Design Guidelines had been issued and Engineering was involved in the process. Detailed site procedures and department guidelines had been issued to implement the program. All affected organizations, Operations, Maintenance, Engineering, and Chemistry were involved in the program. A knowledgeable Site FAC Coordinator was in place and ensuring that the program was properly implemented. The Technical Support Department had a positive attitude about implementing a good program. A Susceptibility Analysis of plant piping had been performed and susceptible piping walked down and Isometric Drawing prepared. The EPRI CHECMATE Model had been implemented and the Pass 1 analysis completed. An aggressive inspection program for the current outage had been implemented to obtain data to further improve the program and predict future wear.

The inspector noted the following areas where further improvement is needed:

- The Outage Plan needs more formal details on how the plan is developed, issued, controlled, and implemented, especially the interface with NDE Services and the flow of data and inspection results. Before the end of the inspection, the FAC Coordinator was working on procedure changes to provide more details for the Outage Plan.

- Modification Procedures need to provide for FAC Coordinator review of modification and change documents for systems susceptible to FAC to obtain his input and keep him informed of changes to the systems.

- A draft interface procedure for Corporate and Sites had been written, but not issued. This procedure needs to be issued to define interface agreements and assure that Design Guides will continue to be implemented.

- Corrective actions for the weaknesses identified in the NAD Assessment need to be completed, especially upgrading the Isometric Drawings to plant controlled drawings.

4. Observation of Miscellaneous Work Activities (55050 and 37700)

During observation of ISI and FAC in-plant activities, the inspector examined the following work activities:

a. Modification M-1104, Pipe Support Work

This Modification covers extensive re-work of pipe supports in systems through-out the plant. The inspector discussed the work with the contractor (PPM). Completed Auxiliary Feedwater (AFW) system supports SS-2225 and SS-2228 in the Turbine Building were inspected. In addition, the completed work packages, including Seismic Weld Data Reports, for these supports were reviewed. In-process work (layout work and preparation for fitup) was observed and in-process records were reviewed for AFW Support SS-2288.

Also, completed work packages for supports SS-2232, SS-2233, and SS-2234, which involved changing the length of the extension piece on the pipe support struts by cutting and re-welding, were reviewed. The records included drawings, weld records and detailed work instructions, including verification of transfer of identification on the studs (weldless EYE) after cutting.

RESULTS

The completed supports were painted and detailed inspections of welds were not possible. However, general workmanship of the supports and welds appeared to be very good.

All work documents reviewed were detailed and had many QC hold points and inspections required. All required sign-offs had been completed.

b. Welding

The inspector observed fitup and tack welds on Service Water System piping weld FW-9 on Weld Map HVH-1-6-CW22. The work was being performed by contractor PCI. The weld is an ASME Class 3 weld and the applicable code is the ASME B&PV, Section III, Subsection NC. In addition to observation of the in-process work and review of in-process documentation, the inspector reviewed supporting records for the following:

- Welding Material Test Reports

  3/32" ERNiCrMo-3 - Heat # PCI-1357
  1/8" ERNiCrMo-3 - Heat # PCI-1358

- Welder Qualification Records

  Welders M255 and M289

- Visual (VT) Qualification Records

  1 VT Examiner Who Inspected the Fitup

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

5. Licensee Action on Previous Inspection Findings (92701, 92702)

   a. (Closed) IFI 261/92-13-01, Erosion/Corrosion Program Improvement

      This item involved concerns relative to a poor FAC program. The FAC program has been significantly improved and now appears to be moving toward a first class program. See paragraph 3. above for details of inspection efforts in this area.

   b. (Closed) IFI 261/92-09-02, Corrosion on Exterior Surfaces of Service Water Lines at the Intake Structure

      See NRC Inspection Report 50-261/92-13 for documentation of a previous inspection of this item. As noted in report 92-13, the licensee evaluated the damage to the subject Service Water lines and determined that the lines should be replaced in RFO 14. During the 92-13 inspection, the inspector observed the degraded condition of the piping and noted the licensee had no preventive maintenance program to monitor the condition of the subject exposed piping.

      During the current inspection, the inspector visually observed the newly installed piping as well as other service water piping nearby. The piping was painted and appeared to be in good condition. Based on discussions with System Engineering personnel, the previous piping had been insulated, which allowed moisture to collect between the piping and the insulation since the piping is an outside environment. This contributed to the corrosion degradation of the piping. The insulation has been deleted which should preclude moisture collection and also allow easy access for monitoring the condition of the piping. The licensee has also implemented a PM Task for periodic monitoring of the piping for coating and corrosion damage. This periodic monitoring requirement (WR/JO 94HSE001, Route 2 S B2 001) was reviewed by the inspector. Also, Licensee Technical Support personnel pointed out that an External Corrosion Program is planned which will cover monitoring this type piping for degradation.

c. (Open) IFI 265/90-24-01, Welds not Identified on Inservice Inspection Isometric Sketches

This item concerned missing welds on ISI Isometric sketches used to identify configuration, weld location and weld population in the ISI program. The licensee's letter of response, dated December 20, 1990, indicated that corrective actions will include verification of the accuracy of the Isometric Drawings by physical walkdown and other appropriate means and drawing revisions as necessary. This action is to be completed by the end of the first period of the third 10-Year interval or June, 1995. The inspector discussed the status of this action with the Site Senior ISI Specialist. He indicated that the work is about 65% complete.

6. Exit Interview

The inspection scope and results were summarized on October 1, 1993, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection findings. The violation listed below was found after the exit interview and was identified to Regulatory Affairs personnel as an Unresolved Item (URI) before the inspector left the site. After further review in Region II Offices and after additional information was provided by the licensee, licensee Regulatory Affairs Specialist (D. Crook) was contacted by phone and informed that the URI would be changed to a Violation. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

(Open) Violation 261/93-20-01, Failure to Follow Procedures for Calibration and Certification of ET Equipment.

7. Acronyms

AFW	Auxiliary Feedwater
ANII	Authorized Nuclear Inservice Inspector
ASME	American Society of Mechanical Engineers
CrMo	Chromium Molybdenum
E/C	Erosion/Corrosion
EPRI	Electric Power Research Institute
ET	Eddy Current Examination
FAC	Flow Accelerated Corrosion
GL	Generic Letter
HP	Health Physics
ISI	Inservice Inspection
MT	Magnetic Particle Examination
NAD	Nuclear Assessment Department
NDE	Nondestructive Examination
NED	Nuclear Engineering Department
NES	Nuclear Energy Services
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation

PCI	Power Cutting, Inc.
PLP	Plant Procedure
PPM	Power Plant Maintenance
PT	Liquid Penetrant Examination
QA	Quality Assurance
QC	Quality Control
RCA	Radiation Control Area
RDAU	Remote Data Acquisition Unit
RFO	Refueling Outage
RII	NRC Region II
RPC	Rotating Pancake Coil
R&R	Repair and Replacement
SER	Safety Evaluation Report
SG	Steam Generator
SNPS	Siemens Nuclear Power Services, Inc.
SP	Special Procedure
TI	Technical Instruction
t_{nom}	Nominal Pipe Wall Thickness
TS	Technical Support
URI	Unresolved Item
UT	Ultrasonic Examination
VT	Visual Examination
VIO	Violation
WR	Work Request