

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-499/88-24

Construction Permit: CPPR-129

Docket: 50-499

CP Expiration Date: December 1989

Licensee: Houston Lighting & Power Company (HL&P)  
P.O. Box 1700  
Houston, Texas 77001

Facility Name: South Texas Project, Unit 2 (STP)

Inspection At: STP, Matagorda County, Texas

Inspection Conducted: April 5 through May 2, 1988

Inspectors: *for* *D. M. Hunnicutt*  
D. L. Garrison, Resident Inspector, Reactor  
Project Section D, Division of Reactor  
Projects

*6/3/88*  
Date

*D. M. Hunnicutt*  
D. M. Hunnicutt, Senior Reactor Inspector  
Reactor Project Section D, Division of  
Reactor Projects

*6/3/88*  
Date

Approved: *for* *D. M. Hunnicutt*  
G. L. Constable, Chief, Reactor Project  
Section D, Division of Reactor Projects

*6/3/88*  
Date

Inspection Summary

Inspection Conducted April 5 through May 2, 1988 (Report 50-499/88-24)

Areas Inspected: Routine, unannounced inspection including tagging status of equipment, cable protection, followup on previous inspection findings, followup on licensee reported significant construction deficiencies, review of 10 CFR Part 21 reporting program, reactor vessel and internal work observation, reactor vessel and internal QA review, standby diesel generator expansion seals replacement, and safety-related piping installation observations.

Results: Within the seven areas inspected, three apparent violations were identified (improper tagging of equipment, paragraph 2; inadequate cable protection, paragraph 3; and inadequate housekeeping, paragraph 10).

DETAILS

1. Persons Contacted

HL&P

- \*J. S. Phelps, Supervising Engineer, Project Compliance
- \*S. M. Head, Support Licensing Engineering
- \*W. G. Wellborn, Supervising Project Engineer
- \*S. D. Phillips, PEG Engineer
- \*K. M. O'Gara, Project Compliance
- \*T. J. Jordan, Project Quality Assurance Manager
- \*G. Ondriska, Startup Engineer
- \*A. R. Mikus, General Supervisor
- \*T. Quirk, General Supervisor, Records Management System

Bechtel

- \*R. D. Bryan, Field Construction Manager
- \*R. H. Medina, Quality Assurance Supervisor

Ebasco

- \*R. Abel, Quality Program Site Manager
- \*R. C. Sisson, Site Resident Engineer

In addition to the above, the NRC inspectors also held discussions with various licensee, architect engineer (AE), constructor and other contractor personnel during this inspection.

\*Denotes those individuals attending the exit interview conducted on April 22, 1988.

2. Tagging Status of Equipment - Unit 2 (50071)

Numerous procedures on the site required tagging to reflect the correct status of the items tagged. During the inspection in the "B" Isolation Valve Cubicles (IVC), five instances were observed by the NRC inspectors where the tagging on valves and components did not reflect the current status of the tagged equipment. The observed incorrect tagging is listed below:

- o One tag indicated a valve to be temporarily installed. The valve was permanently installed.
- o Two tags indicated parts were removed or to be removed and had been on the equipment for three years. The required action was found to be abandoned.

- ° One gate valve was found with only the body intact in the line. No status or tagging was on or near the valve.
- ° One secondary system hydrostatic test tag was observed which should have been removed before the primary hydrostatic test was performed.

During the review of the procedures, the NRC inspector concluded that clarification in some instances was needed for removal and change of status. This problem could be a plant generic problem. The licensee's failure to maintain current status tags on equipment (tags that were invalid or did not correctly identify the status of components) is an apparent violation (499/8824-01) of NRC requirements and licensee commitments.

3. Cable Protection - Unit 2 (51065 and 51063)

During the inspection of the "B" Isolation Valve Cubicle on April 20 and 21, 1988, and previous inspections of the electrical switchgear rooms in the electrical auxiliary building, the NRC inspectors observed that there were numerous (more than 25) instances of failure to install cable softeners over the sharp edges on some of the cable trays. The sharp edges on cable trays were observed in the cable trays where electrical cables were routed from one cable tray to another cable tray. Licensee procedures are clear concerning this item. The NRC inspection results indicated that failure to install cable softeners could be a generic plant problem. The licensee's failure to provide cable softeners, where required, to preclude damage to electrical cable jacket material is an apparent violation (499/8824-02) of NRC requirements and licensee commitments.

4. Followup on Licensee Reported Significant Construction Deficiencies (10 CFR 50.55(e)) (36100 and 92700)

(Closed) Incident Review Committee (IRC) No. 398

This item involved a finding that if the standby diesel generator (SDG) was being operated in the testing mode and a loss of offsite power (LOOP) occurred, the electrical supply breakers to the 480 VAC load centers would be tripped. Then, since the SDG would be running at design speed, the breakers would be signaled to close shortly thereafter. The signal to close prior to full spring recharge would cause the antipump feature on the electrical supply breakers to the 480 VAC loads to lock out the breakers. The breaker lockout would prevent energizing of all 480 VAC loads connected to the affected train.

Configuration control package (CCP) 2-E-ST-833, Revision 0, dated August 20, 1987, was issued to add an Agastat relay (6-second setting) in the LOOP control circuit from the sequencer to ensure that the DG breaker does not close until the 480 VAC circuit breaker closing springs are charged. Site electrical discipline personnel had been reinstructed in the proper design methods associated with conditions to prevent recurrence. This item is considered closed.

(Closed) IRC No. 400

This item involved concerns related to inadequate cooling of the Unit 2 high voltage cubicle panels for the SDG. HL&P completed and installed a design modification to provide additional cooling for the Unit 2 SDG panels. A 100-hour test run of the SDG was completed successfully. No recurrence of overheating conditions were observed. This item is considered closed.

(Closed) IRC No. 402

This item involved a finding that some motor shaft-to-pinion gear keys sheared (failed) in Limitorque Model SMB-0-25 operators. The shearing of the keys was apparently due to the keys being machined from incorrect or defective material. Twelve motor shaft-to-pinion gear keys in valve operators in Unit 2 (Deficiency Evaluation Report 87-046) were replaced with keys manufactured from AISI 1018 steel. According to the material specifications, AISI 1018 steel is the correct material. This item is considered closed.

(Closed) IRC No. 403

This item involved Class 1E electrical cable splices which utilize Raychem insulation material and which had been identified as nonconforming after final QA acceptance. Three different problem areas were identified by the licensee. The licensee reviewed the completed cables and terminations; reviewed a computer resort of cables and terminations to validate previous data; reviewed data on electrical penetration termination cards to assure that electrical splices to electrical penetrations had been reinspected; reviewed the transfer of data from master splice lists to the reinspection data lists to identify any omissions; and reviewed the qualifications and work performed by off-project Bechtel personnel to assure that the methodology and reviews had been performed correctly. This item is considered closed.

(Closed) IRC No. 408

This item involved the failure of tubes in the component cooling water (CCW) heat exchangers. The tube failures resulted from shell side flow induced vibrations. Design modifications to the heat exchangers were required to prevent further damage. In each CCW, 30 tubes were removed in the areas above and below the impingement plate. Two hundred sixty-four tubes were rodded with steel rods inserted to dampen vibration and to decrease the vibration level in the adjacent inboard tubes. The vacated tube sheet holes and the rodded tubes were plugged with plugs manufactured from aluminum bronze material (similar to and compatible with the tubesheet cladding and essential cooling water (ECW) piping materials). The ECW flow (design flow rate was 15,000 gpm) and pressure drop through the heat exchanger tubes have been recalculated for the modified condition of the heat exchangers. The seismic qualification and the weight increase due to the modification of the heat exchangers have been reevaluated.

Other safety-related heat exchangers have been evaluated to determine if any of these heat exchangers would be susceptible to the problems observed in the CCW heat exchangers. None of the heat exchangers evaluated were found to be susceptible to these identified problems. The changes that have been made to the CCW heat exchangers to resolve the vibration induced problems do not alter previous FSAR commitments. This item is considered closed.

(Closed) IRC No. 410

This item involved an 8-inch pneumatic operated butterfly valve that was found to "fail closed" instead of "fail open" during system testing (system flush) in Unit 2. Nonconformance Report (NCR) SN-03566 was dispositioned to change couplings on the pneumatic operator. The replacement of those couplings changed the failure position from "close" to "open." The licensee checked pneumatic operated butterfly valves of similar design to assure that correct couplings had been installed. No other valves have failed in an incorrect position. This item is considered closed.

(Closed) IRC No. 411

This item involved loose valve-shaft-to-actuator keys on motor operated valves (MOV's). During performance of preventive maintenance on MOV's in the reactor containment building, the electrical maintenance division found that keys used to key the motor actuator to the valve stem on butterfly valves were loose or out of place on some MOV's. The licensee identified the manufacturer of these 12- and 16-inch diameter butterfly valves. The licensee identified a total of 42 MOV's to be inspected for loose or missing keys in the keyways. The licensee replaced the loose keys with "snug tight" keys in the respective keyways. The licensee also followed up on an NRC issued Information Notice (IEN) 85-67, "Valve-Shaft-to-Actuator Key May Fall Out of Place When Mounted Below Horizontal Axis" and an NRC Circular (IEC), "Valve-Shaft-to-Actuator Key May Fall Out of Place When Mounted Below Horizontal Axis." This item is considered closed.

No violations or deviations were identified.

5. 10 CFR Part 21 Reporting (36100)

An inspection and review of site documents was initiated by the NRC inspector to verify that the requirements included in 10 CFR Part 21 were being adhered to and that licensee documentation and implementation of the 10 CFR Part 21 process functioned as required by NRC regulations and licensee commitments. The licensee controls were adequate to assure that the reporting, disposition, evaluation, and records management met NRC requirements and licensee commitments.

The NRC inspector randomly selected 12 licensee 10 CFR Part 21 packages for review. The packages selected are listed below. (NOTE: Those 10 CFR

Part 21 packages identified with an "\*" before the 10 CFR Part 21 identification number had previously been reviewed by an NRC inspector.)

<u>ID Number</u>	<u>Title</u>
*8604642	Yokogawa AB 40 Voltmeters and Ammeters
8400551	Circuit Breaker Failures During IEEE-323 Testing (IEN 83-72)
P21-87-28	Improper Seating of Agastat GP Series Relays
*P21-87-29	Inadequate Instructions to Maintain Torque Switch Balance (IEB 85-03)
*P21-87-31	Haughto-#620 Lubricant Attacks and Degrades Aluminum in Valves
P21-87-51	Erratic Behavior of Static "0" Ring Differential Pressure Switches" (IEN 86-47)
*P21-87-53	Failure of Neodyn Pressure Switches Used in Valve Operators for PORVs (main steam power operated relief valve actuator hydraulic pressure switches)
P21-86-02	Pipe Support Tolerance and Installation Procedures
P21-87-50	Improper Electrical Manhole Duct Seal Design
P21-86-03	Defective Emergency Head Lever Supplied for Auxiliary Feed Pump
P21-87-16	Damaged Insulation on Valve Operator DC Motor Caused Motor Failure (IEN 87-08)
*P21-87-19	Design Defect in Valve Operators Manufactured Prior to 1975

No violations or deviations were identified.

6. Reactor Vessel and Internals Work Observation - Unit 2 (50053)

a. Observations and Evaluations

The NRC inspectors performed direct observations and independent evaluations of the licensee's work performance, work in progress, and completed work. These observations determined that activities related to the reactor vessel, internals, and reactor vessel head had been accomplished in accordance with NRC requirements and facility SAR commitments. The licensee was in the process of completing electrical wire installation on the reactor vessel closure head guide

tubes and related components. The wiring in progress was being performed in accordance with procedures and general construction practices.

b. Installed Reactor Vessel Protection

The installed reactor vessel was being protected in accordance with approved procedures. A protective covering over the top of the reactor vessel assured that foreign objects and debris would not fall into the reactor vessel. Personnel access into the covered reactor vessel was controlled. No personnel entryway into the reactor vessel was provided through to the covering over the reactor vessel into the reactor vessel.

c. Installation of Reactor Vessel Closure Head Components

The NRC inspectors verified that the reactor vessel closure head assembly disconnect devices and the instrument port columns were installed in accordance with approved procedures and the following drawings:

- ° CE E 12173-101-003, "Closure Head Assembly," Revision 3, dated December 1973.
- ° Westinghouse 6123E44, "Instr Port Column, Seal, Loading and Hydrostatic Test Assembly," Revision 3, dated March 1, 1978.
- ° Westinghouse 1455E38 "(TG) South Texas Report No. 1 Reactor General Assy." Sheet 2 of 3, Revision 0, dated September 27, 1978. (NOTE: Drawing for Unit 1 is used for Unit 2.)
- ° Westinghouse 1209E92, "Interface Feature Critical 4 XLR Reactor Internals," Sheet 1 of 6, Revision 3, dated February 13, 1978.

d. Weld Inspection of Reactor Vent Piping

The NRC inspector performed an inspection of the 1-inch piping from the near center of the reactor vessel head including two manual relief gate valves and the balance of piping, including the four Target Rock solenoid operated relief valves. The Target Rock valves were identified by their respective serial numbers: 103, 105, 108, and 110. The inspection determined that the weld quality and the installed piping and valve configurations were in accordance with design and construction requirements. No indications of damage or inadequate installation were identified. Visual inspections of welding and general installation indicated that the welding, components, and reactor vessel closure head were in satisfactory condition.



e. Review of Data Packages

The NRC inspectors reviewed the data packages for the two manually operated globe valves and for each of the four solenoid operated globe valves. The solenoid valves were manufactured by Target Rock. These six valves and the associated piping were designed to meet the primary system requirements, including design operating pressure of 2485 psig and 650°F. The results of the review of the data packages for the four Target Rock manufactured solenoid valves are as follows:

<u>Component</u>	<u>Material Spec. No.</u>	<u>Material</u>
Body	ASME SA 182	SS316L
Bonnet	ASME SA 479	SS316
Disc	ASME SA 564	SS17-4ph
Indicator tube	ASME SA 479	SS316

The data packages for these six valves were complete and contained the information required by ASME, Westinghouse, and the licensee to fully document the material, testing, welding, and inspections performed on each of these six valves. The data packages also met the requirements stated in Regulatory Guide (RG) 1.88, "Collection, Storage and Maintenance of Nuclear Power Plant Quality Assurance Records."

f. Procedure and SAR Review

The NRC inspectors determined that the inspection, installation, and wiring in progress were in accordance with licensee approved procedures and the SAR (Chapters 1, 3, 4, 5, and 17, including appropriate codes and standards referenced in these SAR Chapters).

g. Containment Vessel Housekeeping

The licensee was adhering to the recommendations stated in RG 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants" in the general area of the reactor vessel internals and reactor vessel head laydown areas.

No violations or deviations were identified.

7. Reactor Vessel and Internals QA Review - Unit 2 (50051)

The NRC inspectors determined that the licensee's onsite QA responsibilities relative to the reactor vessel and internals installation had been established and implemented. The licensee had established an audit program (including plans, procedures, and schedule) covering safety-related work and control functions related to the reactor vessel, reactor vessel closure head, and internals. The licensee and each contractor had an established program to assure that craft, examination,

and inspection personnel associated with the reactor vessel, reactor vessel closure head, and internals had been trained and qualified to perform the designated tasks. The licensee had developed appropriate and adequate procedures. These procedures assured that activities associated with the reactor vessel, reactor vessel closure head, and internals were controlled and performed in accordance with NRC requirements and SAR commitments (SAR Chapters 1, 3, 4, 5, and 17 and the codes and standards referenced in these SAR Chapters).

These procedures included precautions to preclude damage or mishandling of equipment and components. The installation of the reactor vessel internals and the reactor vessel closure head were properly addressed.

No violations or deviations were identified.

8. Standby Diesel Generator Expansion Seals (Bellows) Replacement - Unit 2 (50073)

During the licensee's prerequisite testing (initial startup) of the "A" SDG, leaks were discovered in cylinder liner expansion seals (bellows) on cylinders 10R, 5R, 2L, 3L, and 4L. Each of the three Unit 2 SDGs is a V-type, 20 cylinder, Model KSV, manufactured by Cooper-Bessemer.

These bellows are designed to allow the cylinder liners to expand and contract. The bellows are a cooling water jacket pressure boundary secondary seal between the cylinder liners and the cylinder block. The secondary seal prevents jacket water cooling system fluid from entering the diesel lube oil sump. The primary seal is the metal to metal contact of the liner to the engine block.

The NRC inspectors performed 19 separate inspections during the expansion seals (bellows) removal and replacement activities on the "A" SDG. The NRC inspectors visually inspected all 20 of the bellows that were removed for replacement by contractor personnel. Visual inspection by the NRC inspectors verified that the bellows removed from cylinder 10R had a through wall hole about 1/4 inch in diameter and that the bellows removed from cylinders 5R, 2L, 3L, and 4L had through wall pin holes. Replacement of all 20 bellows on "A" SDG and related work activities was completed by the contractor on April 22, 1988.

The licensee shipped the two bellows that were removed from cylinders 10R and 10L to the Bechtel Material Laboratory for analysis. The analysis reported that both bellows exhibited evidence of Microbiological Induced Corrosion (MIC) and transgranular stress corrosion cracking.

The licensee prepared a detailed report for submittal to the NRC. The licensee's report was submitted to the NRC on May 11, 1988. This report discussed the discovery of MIC in the jacket water cooling systems, piping replaced, bellows replacement, an evaluation of storage history, Unit 1

storage history and inspection activities, and overall conclusions of Units 1 and 2 SDG inspection, repair, replacement, and analysis activities.

No violations or deviations were identified.

9. Safety-Related Piping Observations - Unit 2 (49063 and 49065)

The NRC inspector performed an inspection of safety related piping to assess the licensee's program for welding off-site fabricated spool pieces into completed systems and to determine the adequacy of inspection to the specifications.

a. Work Observation

The NRC inspector selected the main steam and feedwater systems for the "B" train in the "B" bay of the Isolation Valve Cubicles (IVC). The following portions of the completed systems were inspected:

- ° Main steam line from the north wall to containment penetration M-3 which included the following:
  - (1) Main steam isolation valve - FSV 7424
  - (2) Main steam isolation valve bypass - FV 7422
  - (3) Five safety valves (PSV 7420 through PSV 7420D)
  - (4) Manual steam dump valve - MS-0038
  - (5) Remote operated steam dump valve - PV-7421
  - (6) Five main steam line hangers (Numbers HL-5010 through HL-5014)
  - (7) Main steam manifold and balance of piping - Feedwater line from the north wall to the containment penetration including:
    - a) Feedwater Check Valve - FW-0065
    - b) Feedwater bypass and Valve - FV-7147
    - c) Feedwater Control Valve - FV-7142
    - d) Balance of uninsulated piping

The following isometric drawings were reviewed and compared to installed components during the inspection of the above:

- ° 2G369 PMS 646, Sheet 7, Revision 6
- ° 5G369 PMS 646, Sheet 2, Revision 7
- ° 2G3818 FW 1030, AA2, Sheet 1, Revision 2
- ° 2G3618 FW 1053, AA2, Sheet 1, Revision 2

Five main steam line hangers (Numbers HL-5010 through HL-5014) were found to be installed in accordance with the following drawings:

- ° MS-9002-HL5010, Sheet 1, Revision 7
- ° MS-9002-HL5011, Sheet 1, Revision 6
- ° MS-9002-HL5012, Sheet 1, Revision 6
- ° MS-9002-HL5013, Sheet 1, Revision 4
- ° MS-9002-HL5014, Sheet 1, Revision 2

The NRC inspectors visually examined the piping systems for correct length, size, and configuration. The pipe hangers were inspected for location, configuration, welding, and hanger type. The valves were examined for data plate information, identification, visual damage, installation assured flow in the proper direction, and general condition.

The NRC inspectors determined that the two piping systems inspected had been installed in accordance with the procedures and drawings.

b. Record Review

The NRC inspectors reviewed the code data packages for the spool pieces and valves in the safety-related portions of two systems (main steam and feedwater) inspected. The following records were found to be properly stored, retrievable, and representative of this particular segment of the installation.

Valves

- 30 inch Atwood and Morrill - Main steam isolation valve - FSV-7424
- 4 inch WMK - Main steam isolation bypass - FV-7422
- 6 inch Dresser - Main steam safety - BT02199 - PSV-7420 C
- 8 inch Anchor Darling - Main steam dump - MS-0038
- 8 inch WMK - Main steam dump - PV-7421
- 18 inch Anchor Darling - Feedwater control - FV-7142
- 18 inch Anchor Darling - Feedwater check valve - FW-0066
- 2 inch Valtek - Feedwater bypass - FV-7147A

Piping

- 30 inch MS-1002-GAZ
- 3 inch FW-1053-AAZ

No violations or deviations were identified during the inspection of the piping systems. However, the inspection was expanded to include construction activities in the "B" IVC, and the results of the inspection are documented in paragraph 10 below.

10. Housekeeping - Unit 2 (50073 and 49063)

During an inspection of the IVC's, the NRC inspectors observed excessive amounts of construction debris, abandoned tools, and various supplies

scattered about. Also, the inspector noted dirt in cable trays, under grates and on beams and flanges. This is an apparent violation of the licensee's Construction Site Procedure (CSP) 12, "General Instruction for Housekeeping During Construction," RG 1.39, and American National Standards Institute (ANSI) N45.2.3. The licensee is committed to RG 1.39 and ANSI N45.2.3. The NRC inspectors determined that the lack of appropriate housekeeping activities in this area could result in routine work being performed in an inefficient manner that could produce low quality results that would not be in conformance with NRC requirements and licensee commitments. This unsatisfactory level of housekeeping was evident in the IVC area only. The licensee's failure to maintain minimum housekeeping standards in the IVC area is an apparent violation (499/8824-03) of the above requirements and commitments.

11. Exit Interview (30703)

The NRC inspector met with licensee representatives (denoted in paragraph 1) on April 22, 1988, and summarized the scope and findings of the inspection. Other meetings between NRC inspectors and licensee management were held periodically during the inspection to discuss identified concerns. The licensee did not identify as proprietary any of the information provided to or reviewed by the inspectors during this inspection.