

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-498/88-51
50-499/88-51

Operating License: NPF-76
Construction Permit: CPPR-129

Dockets: 50-498
50-499

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

Facility Name: South Texas Project (STP), Units 1 and 2

Inspection At: STP, Bay City, Matagorda County, Texas

Inspection Conducted: July 25-29, August 8-12, and August 29 through
September 1, 1988

Inspectors: Joseph P. Stewart, for 9/20/88
K. B. Vickrey, Reactor Inspector, Operational Programs Section Date

P. C. Wagner 9/20/88
P. C. Wagner, Reactor Inspector, Plant Systems Section Date

Approved: Joseph P. Stewart, for 9/20/88
J. W. Gagliardo, Chief, Operational Programs Section Date

Inspection Summary

Inspection Conducted July 25-29, August 8-12 and August 29 through
September 1, 1988

Areas Inspected: Routine, unannounced inspection of records review, procedures review, instrumentation components and systems, work observations, as-built verification, and heat shrinkable tubing.

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

DETAILS1. Persons ContactedHL&P

J. Bailey, Manager, Engineering and Licensing
 M. L. Duke, Staff Engineer
 J. E. Geiger, General Manager, Nuclear Assurance
 A. W. Harrison, Supervising Project Engineer
 S. M. Head, Supervising Project Engineer
 T. J. Jordan, Project Quality Assurance (QA) Manager, Unit 2
 A. R. Mikus, General Superintendent, Construction
 D. Parker, Startup Engineer
 G. L. Parkey, Plant Superintendent, Unit 2
 M. F. Polishak, Lead Engineer, Project Compliance
 D. M. O'Gara, Project Compliance Engineer
 S. L. Rosen, General Manager, Operations Support
 J. A. Slabinski, Operations Quality Control (QC) Supervisor, Unit 2
 W. G. Westermeyer, General Manager
 M. Wisenburg, Plant Superintendent, Unit 1
 S. Phillips, Project Compliance Engineer

Bechtel Engineer Corporation (BEC)

L. W. Hurst, Assistant Project Manager
 K. P. McNeal, Project QA Engineer
 C. F. O'Neil, Engineering Manager, Unit 2

Ebasco Service, Inc.

R. A. Moore, Assistant QC Site Superintendent
 P. E. Phelan, QC Structural and HVAC Supervisor
 E. P. Rosol, Site Manager
 R. C. Sisson, Site Resident Engineer

All the above listed personnel attended the exit interview.

The NRC inspectors also contacted other licensee personnel including administrative, maintenance, operations, and QA personnel.

2. Records Review (51065)

The NRC inspectors reviewed ten receiving inspection report (RIP) records for electrical cables. The purpose of the inspection was to determine whether adequate preparation, control, review, and evaluation of records had been made; whether the records reflected that requirements had been

met; and whether the records system documentation was functioning properly. The RIPs listed below were reviewed by the NRC inspectors:

11735	12048	12553	12661	12704
12708	12764	13757	15036	15300

The NRC inspectors found the RIPs were complete, controlled, properly reviewed, and that the records and certifications met applicable standards.

No violations or deviations were identified.

3. Procedures Review (52051)

The NRC inspectors reviewed the FSAR to determine the applicable requirements for the installation of electrical and instrumentation equipment at the STP. The FSAR chapters reviewed by the NRC inspectors were:

- ° 3.10N, Seismic Qualification of Seismic Category I Instrumentation and Electrical Equipment
- ° 3.12, Conformance with NRC Regulatory Guides
- ° 7.1, Instrumentation and Controls
- ° 8.3, Onsite Power Systems

The NRC inspectors also reviewed STP Standard Site Procedure (SSP)-53, "Instrumentation Installation," to verify that the applicable requirements had been incorporated. Revision 2 of SSP-53 has been further revised by Interim Change Notices (ICNs) through No. 19 dated August 18, 1988.

Based on these reviews and observations made during facility tours, the NRC inspectors developed a number of questions related to the electrical and instrumentation and controls (I&C) areas of the STP. These questions were discussed with applicant QC and Bechtel engineering personnel. Three significant areas discussed were:

a. Raceway Percent Fill

The NRC inspectors questioned how the values for conduit and cable tray percentage of cable fill were monitored and how that information was considered for electrical cable current carrying capability (ampacity) and raceway support requirements. The NRC inspectors were informed that the cable routing computer program monitors the percentage of fill and produces a printout when a raceway exceeds the normally allowed values. The designs for both the ampacity and supports were based on the maximum allowable values and; therefore, only those cases that exceed the normally allowed values need to be

individually evaluated. The computer program also accounts for the heat retention and added weight effects of the addition of a Thermolag coating which may be applied to the raceway for fire protection considerations.

b. Electrical Cable Splices

The NRC inspectors also questioned the acceptability and analyses of the splices installed in the electrical cables. (Regulatory Guide (RG) 1.75 recommends that cable splices in raceways be avoided.) The majority of the cable splices within the reactor containment building are connections of field run cables to the electrical penetration assemblies (EPAs). The EPAs are the seal around the electrical cables that penetrate the building wall. At the STP, a field run cable may also be spliced to another field cable for further routing or to an electrical component.

The NRC inspectors were informed that all of the splices were made using an approved splice kit and were located inside splice boxes or equipment. Therefore, the NRC inspectors determined that the splices were of a qualified design and, since the splices were not located within a raceway, did not require a FSAR analysis to satisfy RG 1.75.

c. Unsupported Cable Lengths

The NRC inspectors questioned the STP limits for maximum allowable lengths of unsupported electrical cable. The NRC inspectors were informed that the requirements shown on facility drawing 5-E-03-0E-0100, sheet 48, "Electrical Cable Entry at Equipment - Notes and Details," Revision 4, were applied to all cable installations. Note 10 of the drawing states, "The straight line support to support distance for cables in free air shall not exceed 5 feet." Note 11 states, "The straight line distance between the termination point and the first cable or conductor support point shall not exceed 5 feet for No. 6AWG and larger wire size, or 3 feet for wire smaller than No. 6AWG."

The NRC inspectors were further informed that the applicant had not performed an in-depth analysis of the adequacy of the above values, but had accepted them on engineering judgement as being good construction practice.

Because the NRC inspectors' interpretation of the National Electric Code (NEC) and IEEE Standard 420, "IEEE Trial Use Guide for Class 1E Control Switchboards for Nuclear Power Generating Stations," suggested that shorter distances between supports should be required, they requested an NRC position on the acceptability of the implemented requirements. The NRC inspectors were informed on August 16, 1988, that the NRR technical staff had reviewed the electrical cable support requirements being implemented at the STP

and had found them to be acceptable. Since the NRC technical staff concurred with the applicant's position, the NRC inspectors had no further questions.

No violations or deviations were identified.

4. Instrumentation Components and Systems (52053/52055)

The NRC inspectors selected 13 instruments from a listing of safety-related instruments for evaluation. The instruments were selected to provide a variety of types, system usage, and locations. After two of the instruments were physically inspected on July 28, 1988, the receiving inspection reports (RIRs) for those instruments were reviewed to ensure proper control of the receipt storage, identification and handling, and that the proper instruments had been installed. The NRC inspectors verified that the model numbers and serial numbers of the installed instruments were the same as those documented in the RIRs. The NRC inspectors reviewed the RIRs for five additional selected instruments to verify record completeness and to ascertain model numbers and serial numbers for comparison with future field observations.

The NRC inspectors physically inspected eight additional instruments on August 9, 1988, and the last three instruments on August 10, 1988.

The instruments were inspected for correct location, configuration, and mounting, including the correct mounting and support of associated tubing, in addition to verifying the correct instrument type and identification. The NRC inspectors checked the instruments and the associated tubing for observable damage and noted two instances of improper slope of the tubing. The NRC inspectors informed applicant personnel of the problems and reviewed the actions taken.

a. Pressure Transmitter C2-SI-PT-0863

The tubing between the last support and the instrument was bent downward resulting in a reverse slope. The applicant initiated nonconformance report (NCR) SJ-03816 for this condition.

b. Level Transmitter C2-CC-LT-4508

The tubing on both the high pressure and low pressure sides of this transmitter were bent downward resulting in less than the required 1/2 inch per foot slope. The applicant initiated NCR SJ-03817 for this condition.

The NRC inspectors observed that the above conditions were likely to have been caused by unrelated construction activities following the installation of the instruments and tubing. In addition, the NRC inspectors were informed by applicant personnel that the instrument tubing would be reinspected as part of the area turnover walkdowns. The NRC inspectors found the above actions to be acceptable.

No violations or deviations were identified.

5. Work Observations (51053/52053)

The NRC inspectors made frequent tours of the Unit 2 Reactor Containment, Mechanical and Electrical Auxiliary, Fuel Handling, Turbine Generator, and Diesel Generator building to evaluate work in progress, equipment storage and protection, and general housekeeping activities.

No violations or deviations were identified.

6. As-Built Verification (37051)

The NRC inspectors traced two electric cables (A2RC05C1WG and C2AF05C3WC) with a tone generator and cable route tracer. Each cable's actual installation relative to routing was compared to the design and construction records (drawings and pull cards). Each cable's identification for each conductor at its termination points were compared to the design documentation. The NRC inspectors determined that the final design drawings and specifications reflected as-built conditions for both cables.

No violations or deviations were identified.

7. Heat Shrinkable Tubing (25017)

The NRC inspectors evaluated the adequacy of the heat shrinkable tubing (HST) installed at the STP. The evaluation consisted of review of procedures, installation records and personnel qualifications, and physical examination of sampled HST installations. The HST performs both electrical insulation and environmental sealing function over electrical connections.

The NRC inspectors noted that the applicant had determined that potential problems had existed with the installed HST at the STP and had initiated a review and reinspection effort to identify any problems. The applicant had then revised the affected procedures and specifications to preclude recurrence of the identified problems.

The NRC inspectors reviewed:

- ° Specification 5E189ES1004 - Cable Splicing, Termination, and Supports, Revision 10, dated April 26, 1988
- ° Specification 5E530ES1035 - Cable Terminating Material, Revision 6, dated June 9, 1986
- ° Standard Site Procedure (SSP)26 - Termination of Electrical Cables, Revision 2, dated December 18, 1987

The NRC inspectors observed that SSP-26 required HST installation be performed and documented by craftsmen, engineers, and QC inspectors who have attended a documented training course. The installation details were

contained in Attachment 4 to SSP-26 and in facility drawing 6317-00051-RF. The NRC inspectors found the details contained on the drawing to be sufficient to ensure an acceptable HST installation and to include the manufacturer's recommendations.

The NRC inspectors selected a sample of 25 HST installations from a computer listing of facility electrical terminations. From the sample population, the NRC inspectors selected 12 installations for physical inspection. The installations were selected to provide a variety of sizes, systems and locations.

The NRC inspectors reviewed the records for the 25 sampled HST installations to verify that the correct materials had been utilized and noted the names of the craftperson installing the HST and the QC inspector verifying the installation. Following the physical inspection of selected installations, the NRC inspectors reviewed the training records for a sample of six craft and six QC inspectors to verify that these persons were qualified for HST installation/inspection. One of the craft personnel had been selected because the NRC inspectors had noted a rejection of one of his installations. The installation had been made prior to the commitment to train involved personnel and had been reworked to an acceptable status. The craft person involved in the rejected installation had not been authorized to install HST after the commitment. In addition, the applicant performed a reinspection of all HST installations not performed by qualified personnel and replaced any installation determined to be inadequate.

The NRC inspectors performed physical inspections of ten HST installations (two of the selected samples were inaccessible because of testing operations). A number of the installation locations contained multiple splices, e.g., electrical penetration splice boxes, and more than the sampled splices were observed. A total of approximately 75 splices were inspected to verify that the HST was of adequate length to insulate and seal the splice, that the outer surface was smooth and exhibited a glossy appearance, that the sleeve was shrunk to a tight fit over the conductor, cable or shim, and that there was a visible flow of the red adhesive at each end of the sleeve.

In addition to the above HST installations, the NRC inspectors also verified the adequacy of five reduction splices located inside the Train A Remote shutdown Transfer Cabinet which were observed during a plant tour. The NRC inspectors found all of the inspected splices and HST installations to be acceptable.

No violations or deviations were identified.

8. Exit Interview

The NRC inspectors met with the licensee representatives denoted in paragraph 1 on July 29, August 12, and September 1, 1988, and summarized the scope and findings of the inspection. The licensee did not identify as proprietary any of the information provided to or reviewed by the NRC inspectors. An NRC resident inspector was present at all meetings.