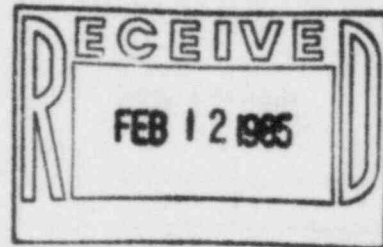


The Light company

Houston Lighting & Power P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

February 8, 1985
ST-HL-AE-1183
File No.: G12.221

Mr. Robert D. Martin
Regional Administrator, Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011



South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Final Report on
Reactor Vessel Nozzle Weld Overlay

Reference: ST-HL-AE-1170 dated January 14, 1985

Dear Mr. Martin:

On December 11, 1984, Houston Lighting & Power (HL&P) notified your office, pursuant to 10CFR50.55(e), of an item regarding undocumented Unit 1 reactor vessel nozzle weld overlays. In the letter referenced above, HL&P requested an extension until February 8, 1985 for the initial 30-day report.

Our evaluation has concluded that this item does not meet the criteria for reportability. Attached is our Final Report.

If you have any questions concerning this matter please contact Mr. Michael E. Powell at (713) 993-1328.

Very truly yours,

A handwritten signature in cursive script that reads "J. H. Goldberg".

J. H. Goldberg
Group Vice President, Nuclear

JSP:y d

Attachment

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PDR ADOCK 05000498
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W2/JSP/b

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1/1

cc:

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Revised 1/25/85

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Final Report on
Reactor Vessel Nozzle Weld Overlay

I. Summary

On December 11, 1984, HL&P notified the NRC of a potentially reportable item associated with a stainless steel weld overlay on the inconel portion of one reactor vessel nozzle on Unit 1. The stainless steel weld overlay was found when Ebasco repaired an ASME code rejectable indication in a field weld originally performed by the previous construction contractor. No quality assurance record can be found of any repair welding. The other Unit 1 reactor vessel nozzles and the Unit 1 primary side nozzles of the steam generators were inspected to determine if any other stainless steel weld had been overlaid on inconel. No other occurrences were found beyond those on the original nozzle. Based upon the review of documentation and examination of other nozzles, HL&P has concluded that this is an isolated occurrence of a failure to comply with procedural requirements. Westinghouse evaluated the impact on safety due to such overlays and concluded that no safety hazard exists.

II. Description of Deficiency

A localized area of small surface cracks on the inconel portion of the No. 1 outlet reactor vessel nozzle was discovered by liquid penetrant testing during the process of repairing an indication found in a field weld as part of the Ebasco reinspection and repair of Brown & Root ASME welds. The areas adjacent to field weld FW0001 were acid etched to define the base metal/weld interface since the reactor vessel nozzles have stainless steel safe ends welded to the nozzle by shop inconel welds. During the process of the acid etching, it was observed that the area of small surface cracks also exhibited an overall different shade of silver-grey than the surrounding inconel. An insitu material chemistry analysis was performed using the Texas Nuclear Alloy Analyzer (TNAA) on the area of surface cracking and the surrounding weld material. This evaluation determined that the localized area of surface cracking was stainless steel repair.

An additional investigation was performed to determine if any other such stainless steel weld overlay existed on the other Unit 1 reactor

vessel and steam generator primary nozzles. Westinghouse (W) NDE Level II and III inspectors performed the examination of all eight (8) Unit 1 reactor vessel and eight (8) steam generator primary nozzles. Additional surface cracking was detected adjacent to field welds FW0001 and FW0017. The following is a summary of the examination of the welds.

FW0001

The localized area of small surface cracks was initially discovered adjacent to the weld by liquid penetrant testing. An analysis using the TNAA indicated that stainless steel weld filler was used in this area. The cause of the surface cracking was the use of low nickel alloy weld filler over the high nickel inconel base weld material which is known to produce a metallurgical condition that is highly susceptible to cracking.

Additional testing by liquid penetrant performed on the nozzle area adjacent to FW0001 revealed two additional areas similar to the first. An evaluation of documentation from visual examination and acid etching concluded that both were extensions of the field weld.

A review of the records of the former construction contractor, the vessel manufacturer and the present construction contractor found no separate documentation of these repairs adjacent to FW0001. Based on the review of records and the fact that the overlays are contiguous with the field weld and are of the same material, HL&P believes that these overlays were performed by the former construction contractor and represent repair adjacent to a field weld that extended onto the inconel weld due to their proximity.

FW0017

Three areas of shallow surface cracking were found by liquid penetrant examination in the safe end adjacent to the shop weld. Specialists from W and Combustion Engineering (CE) reviewed them visually and by etching and concluded that they were contiguous with the shop weld. According to the CE shop welding procedure, limited repairs adjacent to welds are permitted without separate documentation. The W review indicates that the areas adjacent to FW0017 were Gas Tungsten Arc Weld (GTAW) passes of inconel made in the manufacturer's shop. It is concluded that the shallow surface cracking was due to heat input and induced stresses on shop repairs caused by field welding. The areas of cracking are not contiguous with the field weld nor do they show evidence of being stainless steel.

Additional Review and Follow-up

During the examinations described above, Bechtel and Ebasco personnel investigated the records available at the jobsite. This effort included a review of the QA vault records, including PT and RT reports, past

NCR's, B&R and Ebasco welding procedures, weld data cards, and Ebasco personnel time records and discussions with Ebasco personnel. Although no separate documentation pertaining to the weld overlays adjacent to FW0001 was found, the numerous QC and QA records on various conditions, including in process repairs during welding, demonstrated the QC/QA program was working.

Since all reactor coolant system nozzle areas of the Unit 1 reactor have been re-examined, no concern about undetected stainless steel weld overlays remains. In addition, field records of all Unit 1 reactor nozzle welds were reviewed and no other indications of overlays found. As an additional precaution, Unit 1 Steam Generator recirculation system connections were liquid penetrant examined by Westinghouse Level II and III examiners and no indications found. HL&P believes that the repair was likely performed during field welding and thus treated as an extension of that weld. The fact that the extension of stainless steel weld material was overlapped onto the inconel was probably not observed due to the similarity in color between inconel and stainless steel and to the relative narrowness of the stainless steel safe-end (approximately 0.5 inches). Since no evidence was found from the examinations that this occurred in other nozzles, HL&P has concluded that the repair was an extension of the field weld which overlapped onto the inconel and that the overlays associated with FW0001 were an isolated occurrence. Unit 2 components have not been welded to the reactor coolant piping and thus were not examined.

III. Corrective Action

The stainless steel weld material adjacent to FW0001 was removed and weld repaired using inconel weld material.

The indications adjacent to the shop weld on FW0017 will be removed and any necessary repairs will be performed in accordance with applicable welding procedures.

IV. Recurrence Control

Although current procedural requirements prohibit occurrences of this type, guidance has been provided on the welding procedure identification sheet used by construction welding and QC personnel. This guidance addresses concerns with specific field welds for primary nozzles with safe ends (on the reactor vessel and steam generator) with minimal separation of material types.

V. Safety Analysis

Since the examination of the other Unit 1 reactor vessel and steam generator primary nozzles did not reveal any other occurrence of such stainless steel weld overlays, and the review of the QA vault records shows that both constructors' QC programs were working, HL&P has concluded that this is an isolated occurrence and, therefore, not a significant breakdown in the Quality Assurance Program.

Westinghouse was requested to perform an evaluation of the impact on safety resulting from such stainless steel welding over the inconel material. W reviewed the depth of the stainless steel overlay that was removed and determined that substantial margin exists relative to the limiting sizes of circumferential and through-wall flaw. W had previously analyzed by fracture mechanics and limit load methods. Based on the Westinghouse evaluation, no safety hazard exists even if the indications were to have remained undetected. All indications, however, are being repaired to comply with applicable codes and specifications.