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ST-HL-AE-1060
File No.: G3.12/C10.9/D7

Mr. John T. Collins
Regional Administrator, Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Dr., Suite 1000
Arlington, Texas 76012

Dear Mr. Collins:

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Response to Notice of Violation

Pursuant to the provisions of 10CFR2.201, enclosed is Houston Lighting & Power Company's response to the Notice of Violations A and B in Dockets 50-498/83-22, 50-499/83-22 dated January 5, 1984.

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

Very truly yours,

S. W. Oprea, Jr.
Executive Vice President

MEP/mg
Attachments: 1) Response to Notice of Violation A (8322-01)
2) Response to Notice of Violation B (8322-02)

W2/NRC2/o

IE01
1/1

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South Texas Project
Response to Notice of Violation A (8322-01)
50-498/83-22
50-499/83-22

I. NRC's Statement of Violation

10 CFR Part 50, Appendix B, Criterion XVI, states that in the case of significant conditions adverse to quality, measures shall assure that corrective action shall be taken to preclude repetition.

Contrary to the above, the NRC inspector identified on October 24-27, 1983, that corrective action taken to prevent recurrence of nonconforming threads on site fabricated anchor bolts (a) did not provide for determining undersize major or minor thread diameters, and (b) machining practices resulted in threads which could not be gauged to determine if they were undersized. As a result, all fabricated anchor bolts and threaded embed rods manufactured in the past 5 years, since the installation of recurrence control, are indeterminate in their acceptability to the dimensional requirements of ANSI B1.1.

This is a Severity IV Violation (Supplement IID) (8322-01).

Additional technical information is provided in Section 3 of the referenced Inspection Report.

II. Reply

Introduction

As set forth in more detail below, the commitments applicable to the fabrication of anchor bolts at the South Texas Project (STP) are those set forth in ANSI B1.1-1974 and ASA B1.1-1960, which is referenced in ANSI B1.1. While we acknowledge that Federal Standard H28/6 referenced in the subject Inspection Report also contains acceptable gauging requirements, these do not represent the commitments applicable at STP, and they do not void gauging practices that comply with ANSI-ASA. We also believe that the machining practices employed at the site were conducted in a manner which was acceptable when gauging threads per the standards to which STP was committed.

As we have previously informed the NRC, a comprehensive Anchor Bolt/Embed Evaluation Program (the Evaluation Program) has been undertaken at STP. The Evaluation Program includes a measurement/test plan to determine the acceptability of anchor bolt and embedment threads manufactured at the site by both Brown & Root (B&R) and Ebasco. Evaluation of measurements representative of anchor bolts produced at STP is in progress and the Evaluation Program is scheduled for completion by April 1, 1984. To preclude future dissertations on this subject we have discontinued fabrication of anchor bolts on site.

We recognize that the NRC will want to review the details of the Evaluation Program and its results before reaching any conclusions. However, as described briefly below, an engineering evaluation of the preliminary results to date indicates that the quality of the anchor bolts fabricated at the site provides additional support for our position that the gauging and machining practices were acceptable and that the bolts would perform their intended structural function.

Gauging of Anchor Bolts

Our review of site documentation, calibration records and SWR's demonstrates that B&R purchased GO and NO-GO thread ring gauges for the field fabrication activities which were first used at the site on October 20, 1978.

The standard applicable to the fabrication of anchor bolts at STP is ANSI B1.1 1974, which was adopted for STP in 1978 (as identified in the B&R Specification for Miscellaneous Steel for Category I Structures) prior to the issuance of ANSI B1.3-1979, and is reflected in HL&P's commitment for recurrence control in ST-HL-AE-364 dated July 31, 1979. ANSI B1.1-1974 provides that until acceptability criteria are republished, the criteria as defined in ANSI (ASA) B1.1-1960 may be used as a guideline. The referenced ASA standard provides guidance on screw thread acceptability and tolerances. Section 5 of ASA B1.1-1960 states that, "General practice as to the dimensional acceptability of threads shall be based on the following interpretations of pitch diameter limits of size and specifications of gauges and gauging practices: ... For referee purposes the dimensional acceptability of threads at the maximum material limits shall be based on gauging with "GO" thread plug and ring gauges conforming as closely as practicable to the limits of size of the thread and to the thread form and length specified for such gauges in ASA B1.2...". In addition, Section 5 also identifies that dimensional acceptability at the minimum material pitch diameter limits shall be based on the use of "LO" (or NO-GO) thread ring gauges. Based upon this guidance, we believe that the use of GO and NO-GO thread ring gauges to determine the dimensional acceptability of site fabricated anchor bolt threads was proper. Since 1978, threads fabricated at STP have consistently been measured for acceptability through use of pitch diameter thread ring gauges.

B&R anchor bolt thread inspection was specified in Procedure A040KCCP-15, "Fabrication and Erection of Miscellaneous Steel," which also provides documentation requirements. In accordance with the foregoing interpretation of applicable commitments, B&R used the pitch diameter GO and NO-GO thread ring gauges described above. The procedure required inspection of the first 5 bolts of each setup and random inspection of 20 percent of the remaining quantity. Documentation of such inspections is found at the job site.

When Ebasco assumed construction responsibilities at STP, including field fabrication of anchor bolts, it continued the practice of inspecting field fabricated anchor bolts with pitch diameter GO and NO-GO thread ring gauges. The inspections were made in accordance with Ebasco Procedure QCP 10.7, "Miscellaneous Metal Fabrication Inspection." Paragraph 5.1 of this procedure in summary provides for the inspection of anchor bolts to verify

items delineated on applicable drawings and specifications (which reference ANSI B1.1). The inspections were documented in "Miscellaneous Metal Fabrication Inspection Report" (Attachment A to QCP 10.7).

The notice of violation states that inspections at STP "did not provide for determining undersize major or minor thread diameters", and the Inspection Report asserts that "a minimum of two gauges are necessary; one to check the major diameter, and another to check the PD." (Page 4, citing Federal Standard H-28/6, Section 2, "Gages and Gaging for Unified Screw Threads, Basic Principles.") Although the Report acknowledges that the minor diameter is a reference diameter set by the geometric relationship of the major diameter, pitch diameter, thread angle, etc., it asserts that, "These relationships could vary with the tools and manufacturing procedures used at STP, necessitating measurements to verify minor diameter also."

The Report thus seems to raise two questions: (1) whether the use only of pitch diameter thread ring gauges at STP violated applicable commitments because at least one other type of gauge should also have been employed, and (2) whether equipment and practices used at STP necessitated additional measurements to verify thread attributes.

It is apparent that the Report's statement that two types of gauges should be used is based upon application of Federal Standard H-28/6. Although that Standard recommends the types of gauging practices mentioned in the Report, these provisions are not applicable to STP. As described above, the governing thread standard for STP is ANSI B1.1-1974/ASA B1.1-1960, and not Federal Standard H-28/6. Our interpretation of the ANSI/ASA standards is that they are satisfied by inspection of the finished product with pitch diameter thread ring gauges and that additional verification of major diameter minimum material limits is not required.

There is an established geometrical correlation between major and pitch diameter. Appendix C of ANSI B1.1 (1974) provides an equation for tensile stress area in terms of major diameter or pitch diameter with no need for measurement of minor diameter. For a given pitch angle (60°) and pitch diameter, the minor diameter and major diameter may be determined on the basis of this equation. Since the pitch angle is determined by the die, it would take considerable distortion in the thread cutting process to significantly change the pitch angle. There is no evidence of such extensive distortion.

HL&P has also considered whether the tools and manufacturing procedures used at STP necessitated measurement of additional thread attributes. Taking into account the age of the Landis machine used onsite to cut the threads and some of the questions raised in the Inspection Report and discussed under "Manufacturing Practices" below, differing judgments could be reached on this matter. HL&P believes that this matter can best be evaluated in light of the end product achieved through the manufacturing practices that were used. This is being evaluated in the ongoing Anchor Bolt/Embed Evaluation Program.

The preliminary results of the Bechtel Anchor Bolt/Embed Evaluation Program have demonstrated that the anchor bolts manufactured onsite have the requisite strength for their intended function.

Manufacturing Practices

The notice of violation also states that "machining practices resulted in threads which could not be gauged to determine if they were undersized".

The particular practice observed during the inspection of resetting the thread cutting dies at locations where the GO gauge would not pass does not invalidate the subsequent use of the LO gauge to determine undersize conditions. An interview with the involved Ebasco machinist was conducted by the Bechtel Anchor Bolt/Embed Evaluation Program Project Engineer. He explained that the Landis machine had a tendency, at times, to increase its pitch slightly as indicated by periodic checks. To correct this condition, the machinist would check the pitch with a machinist scale when he partially completed the thread and, if there was a slight variance, he would readjust the lead to correct the pitch. The machinist would then run the die over the threads to dress the threads. This process does not result in any significant metal removed if it is performed by a qualified machinist, which was the case.

That significant variation along the length did not take place has been substantiated by detailed measurements of sample bolts (selected at random) recently made by the Site Calibration Laboratory. For 13 samples, 11 of which were A-36 and 2 of which were A-193, measurements of major diameter and pitch diameter at 0^{o} and 90^{o} orientation were made at 1-inch intervals. The measurements do not substantiate that there was a resetting problem. They do indicate that use of the Landis machine may have resulted in a slightly higher population of threads that do not meet some requirements of the ANSI Standard than would normally be expected. However, the preliminary results of the Bechtel Anchor Bolt/Embed Evaluation Program have demonstrated that manufacturing practices employed at the STP site resulted in anchor bolts which are technically adequate.

Conclusions

On the basis of the statements relating to gauging and machining practices, the notice of violation concluded that "all fabricated anchor bolts and threaded embed rods manufactured in the past 5 years, since the installation of recurrence control, are indeterminate in their acceptability to the dimensional requirements of ANSI B1.1."

Not withstanding our discussion of manufacturing practices above, we appreciate the importance of demonstrating that there is no question concerning the acceptability of the field fabricated bolts and embed rods, the thread attributes are being thoroughly reviewed as part of the Anchor Bolt/Embed Evaluation Program, which we have described to NRC-Region IV during our presentation on September 19, 1983. Although the current preliminary results of the Evaluation Program are available for NRC review, the final results and analyses will be submitted to the NRC on April 1, 1984.

III. Corrective Steps Which Have Been Taken and the Results Achieved

Same as IV below.

IV. Corrective Action Which Will be Taken to Avoid Further Violations

Field fabrication of all (safety-related and nonsafety-related) anchor bolts and embed rods at STP has been discontinued; no further consideration of inspection or machining practices is required. With respect to purchased anchor bolts and embeds, an enhanced material control program is being developed as described in our response to the Notice of Violation B (8322-02).

V. Date When Full Compliance Will be Achieved

Activities at STP are in full compliance at the present time.

Determination of the acceptability of field fabricated bolts and embeds is part of the ongoing Anchor Bolt/Embed Evaluation Program which, as stated in our letter of December 1, 1983 (ST-HL-AE-1032) is scheduled for completion by the end of the first quarter of 1984.

South Texas Project
Response to Notice of Violation B (8322-02)
50-498/83-22
50-499/83-22

I. NRC's Statement of Violation

10 CFR Part 50, Appendix B, Criterion XVI, states that conditions adverse to quality be promptly identified and corrected.

Contrary to the above, the following conditions adverse to quality were identified on nonconformance reports (NCR), but corrective action was not taken to promptly identify and correct the nonconformance.

1. Nonconformance Report (NCR), BS-00086, initiated March 2, 1983, identified 119 hex head bolts purchased on Purchase Order (PO) 35-1197-6017 (for ASME, Section III-NF pipe supports) that were removed from stock and returned to the vendor because of cracks and/or fractures in their heads. The PO shows these bolts as Item 39, and that 1500 were received and accepted. The Brown & Root (B&R) data processing run, dated March 22, 1982, showed no bolts on this PO, suggesting that the bolts were not under B&R warehouse control on that date. The licensee did not offer documentation to disposition the reinspection for rejection/acceptance of the remaining 1381 hex head bolts.

2. Nonconformance Report AC-0038, initiated August 22, 1983, identifies a 6'-5/16" length of 9" wide flange structural steel (ASTM A36-77, Heat 86710) which had apparent linear indications. PO 35-1197-22915 indicates that the piece was part of approximately 1285 linear feet received by B&R on May 14, 1980. The NCR disposition was to scrap the 6'-5/16" piece and evaluate on a case-by-case basis, pieces of the remaining 1278 feet of material in which linear indications were identified. Corrective actions did not adequately address:

   (a) specific actions to be taken to verify that the remaining material is either not installed in safety-related applications or found suitable for use in such applications; and

   (b) a review of receipt inspection procedures to ensure that such defects will be identified at the point of receipt.

3. Nonconformance Report HC-00409, initiated April 11, 1983, concerns improper threading of a 5/8" diameter anchor bolt identified as bolt "D". The corrective action was to cut off the improperly threaded section of the bolt and weld on a properly threaded section. The original anchor bolt material should have been A36, but it was fabricated during the period when A36 and A193 material were comingled. Since no documentation exists to verify the original bolt material, it was indeterminate. If the material was A193, the weld joining a properly threaded section to the old bolt could be defective. The corrective action did not address

(a) that repaired anchor bolt "D" was fabricated by B&R and had not been verified as being the correct material by design, ASTM A36, and not ASTM A193, which would not be acceptably welded using the procedure for A36;

(b) that no known procedure exists or existed to prevent improper weld repair of A36 anchor bolts which had been improperly manufactured of A193 by B&R and accepted by B&R; and

(c) whether adequate procedures existed for the initial, improper rethreading; and if a review was performed to assure that no other cases of improper rethreading existed.

This is a Severity Level IV Violation (Supplement IID) (8322-02).

Additional technical information is provided in Section 4 of the referenced Inspection Report.

II. Reply

In response to the three Nonconformance Reports (NCR's) which are cited above, we provide the following response to each.

(1) NCR BS-00086

NCR BS-00086 was prepared following the discovery of 119 defective hex head bolts purchased for ASME Section III-NF pipe supports. These 119 bolts were part of a shipment of 1500 bolts. During the process of stamping the bolt heads to identify them for safety related applications, the 119 defective bolts were identified and dispositioned on the NCR to return to the vendor. The remaining bolts showed no visual defects and were stamped and returned to the warehouse. The stamping of the remaining 1381 bolts is documented by entries in the Material Marking Log on 3/4/83, 3/22/83 and 4/1/83. These 1381 bolts were verified to be in warehouse B, on 1/17/84 as documented in the Material Marking Log. Although it is not known why these bolts did not appear on the B&R material processing run dated March 22, 1982, they were in the warehouse at that time. It is recognized that this omission resulted in an incorrect warehouse inventory at that time, but there was no uncontrolled disbursement of the bolts.

Documentation of the disposition of the remaining 1381 bolts was not offered at the time of the NRC inspection because no such documentation had been generated since the remaining 1381 bolts were not found to be unacceptable.

(2) NCR AC-00038

Laminations are not uncommon irregularities found in A36 rolled plate, rolled structural shapes and bars. Laminations are associated with non-metallic inclusions and/or imperfections introduced in the ingot during the steel-making process which subsequently, during the rolling process, may be transformed into thin, elongated stringers oriented parallel to the rolling plane. The material inclusions that initiate the irregularities are randomly distributed within each ingot or among the ingots of a given heat number, but are considered to be more prevalent within the upper portion of the ingot where the normal cropping of the ingot may not effectively remove all the inclusions. These types of irregularities are related to the physical conditions encountered in the normal manufacture of certain grades of rolled steel shapes, and are not related to the chemical composition or mechanical properties characteristic to a certain heat. Accordingly, the detection of such irregularities is not uncommon.

As stated above, the laminations are oriented parallel to the rolling plane and accordingly do not affect adversely the ability of the material to resist in-plane axial and shear stresses which are of primary importance for the structural function of the material. The only concern is in the case of highly stressed, heavily welded connections in restrained configurations that are conducive to lamellar tearing. In these specific cases the laminations could promote tearing and thus indirectly initiate a structurally-significant defect within the material. The physical conditions conducive to lamellar tearing characteristically are large weldments of material over one-inch thick and of a restrained configuration with heavy welding onto a surface parallel to the rolling plane. When these conditions are unavoidable by design, all or some of the following specific provisions are prescribed through the specifications and/or design drawings:

1. Configuration of weld joints is controlled to avoid weld fusion boundaries parallel to the rolling plane.

2. Use of alternate types or grades of steel is prescribed.

3. Supplementary criteria for thru-thickness tensile tests are prescribed for rolled shapes.

4. Welding sequences are planned to minimize weld shrinkage stresses.

Normal practice at STP is to check the exposed surfaces of A36 members for the presence of laminations. Should they be discovered, standard practice is to either remove the laminations from the exposed surface or, in the event that cannot be accomplished, the member is scrapped. These inspections are routinely carried out by Quality Control during the weld fitup inspection. The existence of laminations in a member that go undetected because they are not continuous to an exposed surface do not constitute a concern for the structural integrity of the member.

NCR AC-00038 was dispositioned by indicating that the remaining portion of the lot of W6X9 material was acceptable "as is", because in the course of subsequent use of that material any laminations detected would be dealt with in accordance with the practices outlined above.

(3) NCR HC-00409

(a) In view of the concern expressed in the notice of violation and the Inspection Report that repaired anchor bolt "D" might have been fabricated from ASTM A-193 rather than ASTM A-36, the relevant fabrication documentation was reviewed. This review established that the anchor bolt was originally fabricated on SWR 3252, which called for two 5/8" diameter x 27" Type II anchor bolts. It was fabricated with round rod from Heat 18154, which is A-36. It was also tested on TDS 156 as A-36. Thus, we are satisfied that anchor bolt "D" was fabricated from A-36.

(b) The notice of violation expressed a concern that no specific procedure existed to prevent improper weld repair of bolts believed to consist of A-36 material but mistakenly fabricated by B&R from A-193. The likelihood of weld repairs under these circumstances appeared to be sufficiently limited when the comingling of A-36 and A-193 material was discovered that an explicit procedure for this purpose was not considered to be necessary. This consideration is supported through a review of associated anchor bolt NCR's and SWR's which has identified this as the single instance of a weld repair of field fabricated bolts. If any weld repair were required, an NCR would have to be generated.

To ensure that no possibility of welding A-36 to A-193 will occur during a welding repair of anchor bolts in the future, a provision will be added to the construction specification for field erection, and a note will be added to the "general notes" design drawing. This provision and note will require that whenever a design change requires field welding to an existing embedded anchor bolt, the bolt material will be confirmed to be A36 or other weldable material. The material identification shall be performed prior to welding. The above provisions and note will be added by February 29, 1984.

(c) The notice of violation expressed a concern as to whether adequate procedures existed for the improper rethreading and whether it was an isolated case. The attempt to rethread the anchor bolt was a departure from STP practice as evidenced by the review of NCR's discussed above. At STP when damaged threads are discovered in the field, they are dispositioned by means of an NCR. The repair instructions are contained in the NCR dispostion.

III. Corrective Steps Which Have Been Taken and Results Achieved

Specific corrective steps are discussed in Section II above.

IV. Corrective Action Which Will be Taken to Avoid Further Violations

For items (1) and (2) above no action is necessary with respect to future activities.

For item (3) above, as described in (3) (b) of Section II, the action pertinent to future activities is the addition of a provision to the construction specification for field erection and the addition of an appropriate note to the "general notes" design drawing.

The Nonconformance Reports (NCRs) listed in this Statement of Violation indirectly pertain to various aspects of the STP material control program. We believe that our present program provides adequate control of safety-related materials. Nevertheless, in view of the importance of identifying remedial actions to address the broader implications of the STP material control problems under our former contractor, a commitment in our December 31, 1979 Third Interim Report Concerning Improper Anchor Bolt Material (ST-HL-AE-400), and industry problems exemplified by IE Bulletin 83-07 titled, "Apparently Fraudulent Products Sold by Ray Miller, Inc.", HL&P has initiated a program to review previous and current material control practices and to develop additional controls that can be implemented effectively. This program will draw upon work that has already been accomplished by a materials control task force that was formed to evaluate some of the recommendations made by the INPO audit of STP construction activities in the fall of 1983. This task force completed work and recommended a number of improvements in mid-January 1984. The following important improvements to STP material control will be undertaken.

- o Reinstitute the transfer of heat code identifiers on non-ASME safety-related high strength miscellaneous structural shapes and materials when this material is cut during site fabrication. (For ASME material this is already being done).

- Undertake user testing on non-ASME safety-related A36 bulk shapes and plate. Samples of each heat received from each vendor will be tested. This material will then be hard marked (stamped) to indicate that it is A36. The hard marks will be transferred during site fabrication activities.

- Undertake user testing for hardness and tensile strength on samples, by shipment, of bulk safety-related threaded fasteners. These fasteners will be stamped to indicate grade (type) and class consistent with ASME III size restrictions.

- Undertake user testing for hardness and tensile strength on samples of safety-related anchor bolts by shipment. Anchor bolts will be stamped to indicate material type. Site fabrication of all anchor bolts (safety-related and non safety-related) has been discontinued.

In addition to the above programmatic changes, the review of the materials control program and practices will entail the following specific tasks:

1. Review the present material control program, practices and procedures. Determine where existing procedures can be simplified.

2. Determine what further modifications may be appropriate.

3. Publish a report of findings and recommendations along with the details of the implementation of the changes described above.

The report of the materials control program re-evaluation, the detailed implementation plan and schedule will be available by March 21, 1984. We suggest that a meeting be held between the licensee and Region IV at the STP site to review the report.

V. Date When Full Compliance Will be Achieved

STP is in full compliance.