APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-458/89-42 Operating License: NPF-47

Docket: 50-458

Licensee: Gulf States Utilities (GSU)

Facility Name: River Bend Station

Inspection At: St. Francisville, Louisiana

Inspection Conducted: November 13 through 17, 1989

Inspectors: for L. D. Gilbert, Reactor Inspector, Materials and Quality Programs Section, Division of Reactor Safety — 12-21-89 Date

R. C. Stewart, Reactor Inspector, Materials and Quality Programs Section, Division of Reactor Safety — 12-20-89 Date

Approved: I. Barnes, Chief, Materials and Quality Programs Section, Division of Reactor Safety — 12-21-89 Date

Inspection Summary

Inspection Conducted November 13 through 17, 1989 (Report 50-458/89-42)

Areas Inspected: Routine, unannounced inspection including followup on NRC Bulletin 87-02, engineering and technical support activities, and inservice testing.

Results: Temporary Instruction (TI) 2500/27 inspection regarding NRC Bulletin 87-02 fastener test data identified that the licensee had appropriately resolved the test discrepancy associated with one of the two fasteners listed in the TI for followup at RBS. An unresolved item was identified (paragraph 2.2) regarding the adequacy of corrective actions taken in response to the test discrepancy associated with the second fastener.

A satisfactory audit program was found to be in place with respect to assessment of engineering and technical support activities. In addition to the audit program, it was noted that a second safety system functional inspection was scheduled to be performed in January 1990. A followup item was identified (paragraph 3.2) regarding incomplete implementation of procedural requirements for training of technical staff. This item, for which a written response has been requested, indicates that weaknesses exist in administrative controls for verification of completion of specified training.

Review of a limited number of valve inservice test (IST) surveillance procedures and generated test data indicated that the procedures were detailed and prescribed the required acceptance criteria. An unresolved item was identified (paragraph 4.4), however, regarding the failure of the IST program to include certain main steam isolation valve positive leakage control system check valves and solenoid valves.

DETAILS

1. Persons Contacted

GSU

*J. C. Deddens, Senior Vice President
*L. L. Dietrich, Supervisor Nuclear Licensing
*D. N. Lorfing, Supervisor Nuclear Licensing
*T. C. Crouse, Manager Quality Assurance
*G. K. Henry, Director, Quality Operations
*G. R. Kimmell, Director, Quality Services
*I. M. Malik, Supervisor Operations Quality Assurance
*C. W. Walling, Field Engineering
*M. F. Sankovich, Engineering
*D. R. Banks, Engineering
*V. Bacanskas, Design Engineering
*R. A. Ludwig, Senior Mechanical Engineer
*H. H. Northrop, Materials
*W. M. Searcy, Quality Assurance
*D. D. Castleberry, Quality Assurance
*M. S. Feltner, Nuclear Licensing
*R. E. Barnes, Field Engineering
*K. E. Suhrke, Manager, Project Management
*T. L. Weir, Materials
*A. Soni, Design Engineering
J. E. Spivey, Senior QA Engineer
R. J. Backen, Supervisor Quality Systems

NRC

*E. Ford, Senior Resident Inspector

The inspectors also interviewed other licensee employees during the inspection.

*Denotes attendance at exit interview conducted on November 17, 1989.

2. Followup to NRC Bulletin 87-02 (Fastener Testing to Determine Conformance with applicable Material Specifications) Temporary Instruction (TI) 2500/27

TI 2500/27 was issued on May 22, 1989, for the purpose of evaluating the adequacy of certain licensees' root cause analyses and the implementation of corrective actions in response to NRC Bulletin 87-02. This TI required followup at RBS with respect to the following two safety-related fasteners that were found to be significantly out of specification during licensee testing in response to NRC Bulletin 87-02:

Sample No.	Description
RBS-12N-X	ASTM A 194 Grade 2H Galvanized 3/4-10 Heavy Hex Nut
RBS-16N-X	ASTM A 563 Grade DH 1 1/4-8 Heavy Hex Nut

2.1 RBS-12N-X

Initial testing of this sample nut found both acceptable chemical composition and hardness properties. Proof load testing produced, however, a value of 36,000 lb versus a material specification required value of 58,450 lb. A second proof load test was performed on another sample nut which resulted in a value of 54,600 lb. The testing laboratory (Massachusetts Materials Research, Inc.) informed the licensee that examination of the failed nut showed that shearing of the stripped threads had occurred down to at least the midpoint on most threads. The microstructure was also reported to consist of fine tempered martensite with no defects present, which is indicative of correct heat treatment practices being used by the nut manufacturer, Bethlehem Steel. As a result of the thread failure location, and test data showing acceptable chemical composition, hardness properties, and evidence of correct heat treatment, the licensee reviewed the proof load testing methodology with the testing laboratory. The testing laboratory confirmed that a standard 0.75 inch mandrel had been used for the tests. Use of this size of mandrel did not take into account that nuts intended for hot-dipped galvanized applications were required by the material specification to be tapped oversize by at least 0.021 inches for this size of nut.

The licensee concluded that the proof load test results were invalid in that the undersized mandrel would preclude full thread load bearing by the nut, and would result in premature test failure. The nuts were determined to be acceptable for use at RBS, based on acceptable chemistry and hardness properties and evidence of proper microstructure and heat treatment. The inspector concurred with the licensee conclusions.

2.2 RBS-16N-X

Analysis of this sample nut found that the chemical composition was in compliance with material specification requirements. The Brinell hardness number (BHN) of the sample was found, however, to be 220, which was below the 248-352 BHN range required by the material specification. A hardness test was performed on a second sample nut which produced a value (i.e., 277 BHN) that was in compliance with material specification requirements. A proof load test was not performed because the testing equipment did not have sufficient capacity to perform the test. The proof load test was not a mandatory specification requirement for this size of nut.

The licensee determined that the ASTM A 563 Grade DH nuts were acceptable for use at RBS. The rationale used to support this determination was: (a) an ASM Metals Handbook reference that nut dimensions are such that the shear area of the threads is greater than the tensile stress area of the

bolt by more than 100 percent, thus permitting use of a nut of significantly lower tensile strength than the bolt; and (b) conversion of the 220 BHN value to an equivalent tensile strength resulted in a value greater than the minimum tensile strength of the two types of bolt (i.e., ASTM A 325 and ASTM A 193 Grade B7) used in structural applications with this grade of nut.

The inspector did not see any information that would indicate the licensee validated the accuracy of the ASM Metals Handbook reference statement in regard to the specific sample nut. A root cause analysis for the discrepant product was not documented, and no actions had apparently been taken to identify locations of use. During review of Condition Report 88-0054, which was issued in regard to the NRC Bulletin 87-02 test failures, the inspector noted that attached information from the testing laboratory reported finding a ferrite and pearlite microstructure in the original RBS-16N-X sample nut. This microstructure indicates that the nut may not have received the hardening and tempering heat treatment cycles required by the material specification, and could explain the reason for the low hardness value.

The inspector questioned engineering personnel regarding their basis for utilizing the 220 BHN value for comparing nut strength to bolt strength values, in that this discrete value was not necessarily the worst case condition in the received material. At the request of the inspector, the licensee performed Equotip hardness tests on a sample of six nuts from this particular procurement. Three of the nuts were selected from a group of seven in the remaining warehouse stock, which the inspector noted were darker in appearance than the majority and also were stamped in a different manner with respect to material grade identification. The average equivalent BHN values obtained from this testing ranged from 166 to 186 BHN, with no difference noted between the nuts of darker appearance and those representative of the majority. The nuts were then buffed to smooth the surface (and which would also remove surface decarburized material) and the Equotip hardness tests repeated. The average equivalent BHN values obtained after surface conditioning ranged from 200 to 232 BHN.

The inspector additionally noted that the vendor, Hardware Specialty Co., was the subject of NRC Information Notice 89-22, which pertained to questionable certification of fasteners. Actions taken by the licensee, to date, in response to this Information Notice had not been completed as of this TI followup.

GSU management committed to the inspector at the exit interview to review the adequacy of the actions taken in response to the identification of an out-of-specification hardness value for Sample No. RBS-16N-X. This subject is considered an unresolved item pending completion of the licensee review and NRC followup (458/8942-01).

3. Engineering and Technical Support Activities

3.1 Audit of Design Engineering (40702 and 40704)

The inspector reviewed the following documents to verify that administrative controls exist and that they provide measures to assure that audits are scheduled and performed by independent and qualified personnel, including individuals with specific technical expertise when needed.

- Quality Assurance Instruction No. QAI-2.0, "Planning and Scheduling GSU Quality Assurance Audits," Revision 2
- Quality Assurance Instruction No. QAI-2.1, "Audit Performance, Reporting and Followup," Revision 6
- Quality Assurance Procedure No. QAP-1.3, "Quality Assurance Indoctrination and Training Program Procedure," Revision 7

To assess the implementation of the audit program, the inspector reviewed the 1988 and 1989 audit schedules for the area of activity designated as design and modification control program. Audits were scheduled for December 1988 and December 1989; this complies with the audit frequency requirements of the Technical Specifications. In addition to the 1989 scheduled audit, the licensee has selected the standby liquid control system for a safety system functional inspection (SSFI) to be performed in early 1990; this SSFI will place special emphasis on drawing control and update. The 1988-1989 audit schedules were prepared and approved as specified in Section 17.2.18.2 of the Updated Safety Analysis Report. Since the 1989 audit had not been performed, the December 1988 audit, Audit No. 88-12-I-DCON, was selected for review. This audit included an SSFI of the plant instrument air system to assess its operational readiness. The audit, which contained negative findings, was reported to senior management. The inspector selected five findings of the audit for review of the responses. The responses were considered to be thorough, and corrective actions were implemented in a timely fashion. Two additional responses that were still open were noted as having been reported to senior management in the October QAFR Status Report as being delinquent for not implementing the corrective actions specified in the response to the finding. It was noted during the review of the QAFR Status Report and the Trend Analysis Report for the first half of 1989 that the quantity and timeliness of corrective actions for audit findings were being tracked and trended. The inspector also reviewed the qualifications and certifications for selected members of the audit team which included lead auditor, auditors and technical specialists.

No violations or deviations were identified during this portion of the inspection.

3.2 Training (41400)

The inspector reviewed the following licensee procedures to verify that administrative controls exist which provide for indoctrination and training of technical staff:

- Engineering Department Procedure EDP-AA-10, "Training Requirements for Engineering Department Personnel," Revision 6
- Station Support Procedure TPP-7-025, "Technical Staff and Management Training Program," Revision 0, including Interim Procedure Change IPC-7-025-0-2

3.2.1 Implementation of Procedure EDP-AA-10

During initial assessment of implementation of Procedure EDP-AA-10, the inspector was informed that the Master Training Matrix (MTM), which was required by the procedure to be issued, at a minimum, on a semiannual basis, was not being updated. Updating was indicated as not being performed because of initiatives that were in progress as part of the INPO accreditation program. Specifically, job task analyses had been started by the training staff to aid in development of training requirements for each job function. The inspector noted, however, that the last issue of the MTM was January 1987 and that an interim procedure change had not been made relative to discontinuance of updating of the MTM.

The inspector selected for verification of procedure implementation a requirement in Procedure EDP-AA-10 to perform ongoing on-the-job training in regard to processing of design change documents. This requirement stemmed from a prior commitment made to the NRC in 1985.

The inspector requested from the training staff records of personnel who had received training in Revision 4 and the current Revision 5 of Procedure ENG-3-006, which incorporated the requirements of procedures (i.e., EDP-AA-54 and EDP-AA-64) that were still identified in Procedure EDP-AA-10 as being applicable. Computer printouts were provided which showed that a total of 120 engineering staff had received training on Revision 4 in May 1988 and a total of 77 regarding Revision 5 in March 1989. An additional printout was provided of personnel reviewing Revision 4 as required reading. This printout contained the names of 21 individuals that were members of the engineering staff. No printout was received regarding personnel reviewing Revision 5 as required reading. Review of 1989 engineering organization charts identified that the two main engineering organizational groups (i.e., Design Engineering and Field Engineering) contained a total staff of approximately 170 in the job classifications denoted by the MTM as requiring training in the design change procedures. It would thus appear that a significant fraction of the engineering staff did not either receive formal training on Revisions 4 and 5 of ENG-3-006, nor did they perform the required reading review.

3.2.1.1 Completion of EDP-AA-10 Required Reading Lists

The inspector performed (subsequent to the onsite inspection) a sampling review of implementation of EDP-AA-10 with respect to completion by engineering staff of required indoctrination and safety-related activities reading lists. The engineering staff selected for review of this activity consisted of a systems engineer and a senior systems engineer from Field Engineering, an electrical engineer from Design Engineering, and a nuclear engineer from Engineering Analysis. Review of computer printouts provided by the training staff identified the following status with respect to completion of indoctrination and safety-related activities reading lists:

3.2.1.1.1 Systems Engineer

The initial training record for this individual was dated February 6, 1984. Comparison of required reading list completions against Procedure EDP-AA-10, Revision 6 (June 29, 1987) requirements showed most of the 1987 required indoctrination reading list had not been completed but that only 9 of the 26 safety-related activities required reading list had been completed. This was not considered of particular significance by the inspector, in that the individual had been employed for a considerable period prior to the date of Procedure EDP-AA-10, Revision 6, and the inspection did not review the requirements of earlier procedure revisions. The inspector did note, however, that there were no records to indicate that rereading and completion of the safety-related activities reading checklist, which was required by the procedure to be performed every 2 years, had been accomplished.

3.2.1.1.2 Senior Systems Engineer

The initial training record for this individual was dated October 3, 1987, which postdated the approval date of EDP-AA-10, Revision 6. Nine out of the 45 required indoctrination training list documents were not indicated by the computer system as having been reviewed. The computerized records also did not indicate that any of the required safety-related activities reading list had been completed.

3.2.1.1.3 Electrical Engineer

The initial training record for this individual was dated July 31, 1984. The records did not indicate that the 1987 required indoctrination reading list had been completed. Six of the 26 documents listed in the safety-related activities reading list were documented as having been reviewed during November and December 1986. As discussed in 3.2.1.1.1 above, this was not

considered of particular significance because of the employment period and a review not being made of requirements of earlier procedure revisions. As also identified in 3.2.1.1.1 above, there were no records, however, to indicate that the procedure required rereading and completion of the safety-related reading checklist every 2 years had been performed.

3.2.1.1.4 Nuclear Engineer

The initial training record for this individual was dated August 1, 1986. The records indicated that 4 out of the 45 documents listed in the indoctrination reading list and 1 out of 26 in the safety-related activities reading list had not been reviewed. As in 3.2.1.1.1 and 3.2.1.1.3 above, there were no records for this individual to indicate that the procedure required rereading and completion of the safety-related activities reading checklist every 2 years had been performed.

3.2.2 Implementation of Procedure TPP-7-025

The inspector selected for verification of procedure implementation a requirement in Procedure TPP-7-025 to perform annual training of technical staff and management on unreviewed safety question determinations. Technical staff were defined by the procedure, which became effective on June 24, 1987, as including Chemical Engineering, Design Engineering, Field Engineering, Mechanical Maintenance Engineering, Radiological Engineering, Radwaste Engineering, and Reactor Engineering disciplines. The inspector requested from the training staff records of personnel who had received training an performance of unreviewed safety question determinations. Computer printouts were provided which showed that a total of 126 people had received training since the June 24, 1987, effective date of the procedure, with only 2 of this number appearing to be maintaining annual training. The total number indicated that a significant fraction of engineering staff and management have not received training on this subject.

3.2.3 Summary

The results of this review indicate that current procedural requirements for training of technical staff are not being fully implemented. The findings indicate that weaknesses exist in administrative controls for verification of completion of specified training. The licensee is being requested to review this matter and provide a written response. Review of the licensee actions is considered an inspector followup item (458/8942-02).

4. Inservice Testing (73756)

During this inspection, the inspector conducted a document review of selected inservice testing (IST) surveillance test reports associated with the following IST activities:

4.1 Check Valve Disassembly - Inspection

For check valves that cannot be exercised during plant operations, the licensee has established a sampling and inspection program involving grouping similar valves and testing a specified sample during each refueling outage. The licensee's IST program identified 27 check valves in this category.

The inspector selected the following four check valves for records review:

- HVAC Chilled Water, Valve HVK-V97, Maintenance Work Order, R101034, dated August 22, 1987 (work conducted during refueling outage RF-1)
- HVAC Chilled Water, Valve HVK-V48, Maintenance Work Order, R101033, dated August 29, 1987 (work conducted during refuel outage RF-1)
- Penetration Valve Leakage Control System (PVLCS) Valve LSV-V-120, Maintenance Work Order, R110473, dated August 29, 1987 (work conducted during refueling outage RF-1)
- PVLCS Valve LSV-V114, Maintenance Work Order R123305, dated May 1, 1989 (work conducted during refueling outage RF-2)

The inspector observed that each work order contained checklists and step-by-step sign-offs including QC hold points. Inspection records also included: as found conditions, torquing, cleanliness, and material traceability verification. The work accomplished during disassembly and inspection of the check valves was clearly described and documented in the work order.

No violations or deviations were identified.

4.2 PVLCS (Quarterly) Valve Operability Test and Stroke Time Acceptability

The licensee's IST Procedure STP-255-300, "Penetration Valve Leakage Control System (PVLCS) Valve Operability Test," prescribes the step-by-step requirements in verifying that valve operability and isolation times are within the limits of Section 4.6.1.1.0.b of the Technical Specifications (TS). The test involved the following motor operated valves:

Division I	Division II
LSV-MOV19A	LSV-MOV19B
LSV-MOV11A	LSV-MOV11B
LSV-MOV13A	LSV-MOV13B
LSV-MOV15A	LSV-MOV15B
LSV-MOV16A	LSV-MOV16B

The inspector examined test data results for the above Divisions I and II valves conducted March 1, April 6, April 16, and August 1, 1989. The

inspector observed that all valves were tested in the open and closed position and that all valve test values were within the upper and lower acceptance range limits.

No violations or deviations were identified.

4.3 PVLCS Check Valve Exercise Test - Each Refueling

Article IWV-3521 of the ASME Section XI Code requires check valves to be exercised at least once every 3 months. The pressure of the PVLCS air supply is not capable of exercising the check valves against the normal system pressure for the associated containment isolation valve. The licensee has identified 24 check valves in Relief Request No. 4 of the IST program to be exercised during each refueling as an alternate test to the above ASME Code requirement. IST Procedure STP-255-3601, "Penetration Valve Leakage Control System Functional and Valve Operability Test," is conducted each refueling outage and includes simulated actuation of the system throughout its operating sequence. The procedure is intended to verify that each automatic valve actuates to its correct position and that a sealing pressure greater than or equal to 22 psig is established in each sealing valve. Testing of the check valves and seal valves to this procedure complies with the testing requirements of TS 4.6.1.10.c. The inspector examined IST procedure test data results for the following periods:

- Test conducted October 21, 1985 (Baseline)
- Test conducted December 2, 1987
- Test conducted June 1, 1989

The inspector observed that the tests conducted during the periods noted above were performed in accordance with Procedure STP-255-3601 and the system's 24 check valves were exercised to the open position as the procedure prescribes. However, during review of the RBS USAR, Section 9.3.6.3.1, PVLCS normal operation, the inspector noted that it stated in part, "Injection lines lead from the injection headers to the process line valves to be pressurized. Any leakage from the process line valves is prevented from proceeding to the isolation valves by check valves . . . ." Further, ASME Section XI, IWV-3522, requires that "check valves shall be exercised to the position required to fulfill their function . . . . " It may be that the PVLCS check valves are intended to provide a dual safety function (i.e., open/close). However, only the open position is being exercised during each refueling. This matter is being referred to the Office of Nuclear Reactor Regulation (NRR) for clarification of IST test requirements. This subject is considered an inspector followup item pending receipt of an NRR response (458/8942-03).

4.4 Drawing Review - MSIV Positive Leakage Control

During the inspector's PVLCS review, the inspector observed that Drawing PID-27-20B, "MSIV Positive Leakage Control," Revision 13, identified check Valves V112 and V118, and solenoid Valves SOV26A and 26B. These

valves appeared to perform a safety function; however, they did not appear in the IST program.

In discussing this matter with the cognizant IST coordinator, the inspector was advised that the specific components were scheduled to be removed from the PVLCS during a prior modification (MR 86-0203). However, the modification package did not reflect the valve deletions. Therefore, the IST coordinator indicated that the matter would require further investigation. This matter is considered an unresolved item pending licensee clarification as to the safety significance and status of these valves (458/8942-04).

5. Unresolved Item

An unresolved item is one about which additional information is required in order to determine whether or not the item is acceptable, a violation, or a deviation. Two unresolved items were identified during this inspection which are discussed in paragraphs 2.2 and 4.4 of this report.

6. Exit Interview

An exit interview was conducted on November 17, 1989, with those personnel denoted in paragraph 1 in which the inspection findings were summarized. No information was presented to the inspectors that was identified by the licensee as proprietary.