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Vol. 8, No. 2

LICENSEE CONTRACTOR AND VENDOR INSPECTION STATUS REPORT

QUARTERLY REPORT
APRIL 1984 - JUNE 1984

UNITED STATES NUCLEAR REGULATORY COMMISSION

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APRIL 1984 - JUNE 1984

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Division of Quality Assurance, Safeguards and Inspection Programs
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

CONTENTS

PREFACE

A fundamental premise of the Nuclear Regulatory Commission's (NRC) nuclear facility licensing and inspection program is that a licensee is responsible for the proper construction and safe operation of nuclear power plants. The total government-industry system for the inspection of nuclear facilities has been designed to provide for multiple levels of inspection and verification. Licensees, contractors, and vendors each participate in a quality verification process in accordance with requirements prescribed by, or consistent with, NRC rules and regulations. The NRC inspects to determine whethers its requirements are being met by a licensee and his contractors, while the great bulk of the inspection activity is performed by the industry within the framework of sequential ongoing quality verification programs.

In implementing this multilayered approach, a licensee is responsible for developing a detailed quality assurance (QA) plan as part of his license application. This plan includes the QA programs of the licensee's contractors and vendors. The NRC reviews the licensee's and contractor's QA plans to determine that implementation of the proposed QA program would be satisfactory and responsive to NRC regulations.

Firms designing nuclear steam supply systems, architect engineering firms doing design work on nuclear power plants, and certain selected vendors are currently inspected on a regular basis by the NRC. NRC inspectors, during periodic inspections, ascertain through direct observation of selected activities (including review of processes and selected hardware, discussions with employees and selected record review) whether a licensee or contractor is satisfactorily implementing a QA program. If nonconformances with QA commitments are found, the inspected organization is requested to take appropriate corrective action and to institute preventive measures to preclude recurrence.

In addition to the QA program inspections, NRC also conducts reactive inspections of the licensee's contractors and vendors. These are special, limited scope inspections to verify that organizations supplying safety-related equipment or services to licensed facilities are exercising appropriate corrective/preventive measures when defects or conditions which could adversely affect the safe operation of such facilities are identified and that these organizations are complying with the NRC requirements which govern the evaluation and reporting of such conditions.

In the case of the principal licensee contractors, such as nuclear steam supply system designers and architect engineering firms, the NRC encourages submittal of a description of corporate-wide QA programs for review and acceptance by the NRC. Upon acceptance by NRC, described QA programs provide written bases for inspection on a generic basis, rather than with respect to specific commitments made by a particular licensee. Once accepted by NRC, a corporate QA program of a licensee's contractor will be acceptable for all license applications that incorporate the program by reference in a Safety

Analysis Report (SAR). In such cases, a contractors's QA program will not be reviewed by the NRC as part of the licensing review process, provided that the incorporation in the SAR is without change or modification. However, new or revised regulations, Regulatory Guides, or Standard Review Plans affecting QA program controls may be applied by the NRC to previously accepted QA programs.

The NRC Vendor Program Branch inspects the implementation of QA programs of nuclear steam supply system designers and architect engineering firms which have been submitted to and approved by the NRC in the form of Topical Reports or Standardized Programs. Upon completion of inspections confirming satisfactory implementation of QA programs, NRC will issue a confirming letter to the nuclear steam system supplier or architect engineering firm.

Licensees and applicants that have referenced the NRC approved Topical Report, or Standardized Program, in SARs (or have adopted the total QA program described in the Topical Report or Standardized Program) may, at their option, use the confirming letter to fulfill their obligation under 10 CFR Part 50, Appendix B, Criterion VII, that requires them to perform initial source evaluation audits and subsequent periodic audits to verify QA program implementation. For additional details concerning the NRC letter, refer to "SAMPLE LETTER" included in this report.

Licensees or construction permit holders may choose not to make use of a contractor's NRC accepted program, or such an accepted program may not exist. In such cases, the Vendor Program Branch inspections of nuclear steam supply system designers, architect engineering firms, or other licensee contractors, subtier contractors, or suppliers, will be based on programs developed to meet the commitments made by the licensee or construction permit holder. These inspections will not relieve the licensee or applicants from any inspection/ verification responsibilities required by Criterion VII.

The NRC currently is continuing their evaluation of proposed program for NRC acceptance of third-party (ASME) certification of Vendor QA programs. Should the proposed program be endorsed by NRC, it is anticipated that, subject to NRC audits of the third-party program, licensees and applicants would be able to use the ASME nuclear certification and inspection system to fulfill that part of their obligation under 10 CFR Part 50, Appendix B, Criterion VII, which required them to perform initial source evaluation/selection audits and subsequent periodic audits to assess the QA program implementation.

A third party category of firms consists of organizations whose QA programs or manufacturing processes have not been reviewed and approved by NRC, or by a third party (such as ASME). This category of firms is subject to NRC inspection based on the safety significance and performance of products or services provided by such firms. Since such firms will not receive a third-party review of their QA programs, results of the direct NRC inspections may not be used to fulfill the licensee's obligations under Criterion VII.

The White Book contains information normally used to establish a "qualified suppliers" list; however, the informati n contained in this document is not adequate nor is it intended to stand by itself as a basis for qualification of suppliers.

Correspondence with contractors and vendors relative to the inspection data contained in the White Book is placed in the USNRC Public Document Room, located in Washington, D.C.

Copies of the White Book may be obtained at a nominal cost by writing to the National Technical Information Service, Springfield, Virginia 22161.

ORGANIZATION: COMPANY, DIVISION
CITY, STATE

REPORT NO.: Docket/Year Sequence	INSPECTION DATE(S):	INSPECTION ON-SITE HOURS:

CORRESPONDENCE ADDRESS: Corporate Name
Division
ATTN: Name/Title
Address
City/State/Zip Code

SAMPLE PAGE (EXPLANATION OF FORMAT AND TERMINOLOGY)

ORGANIZATIONAL CONTACT: Name/Title
TELEPHONE NUMBER: Telephone Number

PRINCIPAL PRODUCT: Description of type of components, equipment, or services supplied.

NUCLEAR INDUSTRY ACTIVITY: Brief statement of scope of activity including percentage of organization effort, if applicable.

ASSIGNED INSPECTOR: Signature _____ _____
Name/VPB Section

OTHER INSPECTOR(S): Name/VPB Section

APPROVED BY: Signature _____ _____
Name/VPB Section

INSPECTION BASES AND SCOPE:

A. BASES: Pertain to the inspection criteria that are applicable to the activity being inspection; i.e., 10 CFR Part 21, Appendix B to 10 CFR Part 50 and Safety Analysis Report or Topical Report commitments.

B. SCOPE: Summarizes the specific QA program areas that were reviewed, and/or identifies plant systems, equipment or specific components that were inspected. For reactive (identified problem) inspections, the scope summarizes the problem that caused the inspection to be performed.

PLANT SITE APPLICABILITY: Lists docket numbers of licensed facilities for which equipment, services, or records were examined during the inspection.

ORGANIZATION: ORGANIZATION
CITY, STATE

REPORT NO.:	INSPECTION RESULTS:	PAGE 2 of 2

A. VIOLATIONS: Shown here are any inspection results determined to be in violation of Federal Regulations (such as 10 CFR Part 21) that are applicable to the organization being inspected.

B. NONCONFORMANCES: Shown here are any inspection results determined to be in nonconformance with applicable commitments to NRC requirements. In addition to identifying the applicable NRC requirements, the specific industry codes and standards, company QA manual sections, or operating procedures which are used to implement these commitments may be referenced.

C. UNRESOLVED ITEMS: Shown here are inspection results about which more information is required in order to determine whether they are acceptable items or whether a violation or nonconformance may exist. Such items will be resolved during subsequent inspections.

D. STATUS OF PREVIOUS INSPECTION FINDINGS: This section is used to identify the status of previously identified violations, items of nonconformance, and/or unresolved items until they are closed by appropriate action. For all such items, and if closed, include a brief statement concerning action which closed the item. If this section is omitted, all previous inspection findings have been closed.

E. OTHER FINDINGS OR COMMENTS: This section is used to provide significant information concerning the inspection areas identified under "Inspection Scope." Included are such items as mitigating circumstances concerning a violation or nonconformance, or statements concerning the limitations or depth of inspection (sample size, type of review performed and special circumstances or concerns identified for possible followup). For reactive inspections, this section will be used to summarize the disposition or status of the condition or event which caused the inspection to be performed.

SAMPLE PAGE
(EXPLANATION OF FORMAT AND TERMINOLOGY)

CONTRACTORS WITH NRC LETTERS CONFIRMING QA PROGRAM IMPLEMENTATION

(See Next Page for Example of Confirming Letter)

CONTRACTOR	TOPICAL REPORT	REVISION	DATE OF NRC LETTER
Babcock & Wilcox	BAW 10096A	Revision 4	December 30, 1983
Stone & Webster	SWSQAP 1-74A	Revision C	May 20, 1983
Westinghouse NTD	WCAP-8370	Revision 9A	April 30, 1981
Bechtel-Gaithersburg	BQ-TOP-1	Revision 3A	November 2, 1981
Bechtel-San Francisco	BQ-TOP-1	Revision 3A	June 12, 1981
Ebasco Services, Inc.	ETR-1001	Revision 8A	March 31, 1980
Combustion Engineering	CENPD-210-A	Revision 3	June 2, 1981
Gibbs & Hill, Inc.	GIBSAP 17-A	Amendment 6	February 7, 1983
United Engineers & Constructors	UEC-TR-001-3A	N/A	March 31, 1977
General Electric Co.	NEDO-11209-04A	N/A	May 24, 1983
Sargent & Lundy Engineers	SL-TR-1A	Revision 5	May 17, 1979
Bechtel-Los Angeles	BQ-TOP-1	Revision 3A	December 20, 1982
Gilbert/Commonwealth	GAI-TR-106	Revision 2A	January 24, 1984
Bechtel-Ann Arbor	BQ-TOP-1	Revision 2A	May 7, 1981

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

(ADDRESSEE)

Gentlemen:

A series of Nuclear Regulatory Commission (NRC) inspections have been conducted to review your implementation of the quality assurance program applicable to NRC applicants or licensees who have contracted for services from the (applicable corporate entity). These inspections consisted of selective examination of procedures and representative records, interview of personnel, and direct observation by the inspectors. As a result of these inspections, the NRC has concluded that the QA program described in Topical Report _____ is being implemented satisfactorily. Neither this conclusion nor the remainder of this letter applies to manufacturing activities or construction-related activities conducted at reactor sites.

Licensees and applicants that have referenced the above Topical Report in their Safety Analysis Reports (or have adopted the total quality assurance program described in that Topical Report) may, at their option, use this letter to fulfill their obligation under 10 CFR Part 50, Appendix B, Criterion VII, that requires them to perform initial source evaluation/selection audits and subsequent periodic audits to assess the quality assurance program implementation.

The NRC expression of satisfaction with the implementation of your quality assurance program does not assure that a specific product or service offered by you to your customer is of acceptable quality, nor does it relieve the applicant or licensee from the general provision of Criterion VII which requires verification that purchased material, equipment, or services conform to the procurement documents. It is recognized that in some cases this assurance can be made by the applicant or licensee without audits or inspections at your facility.

Continuing acceptability of implementation of your quality assurance program is contingent upon your maintaining a satisfactory level of program implementation, certified through periodic NRC inspection, throughout all corporate organization units and nuclear projects encompassed by your program. Should your program implementation at any time be found unacceptable you will be notified by letter and requested to correct the deficiencies promptly. In the event you fail to correct the deficiencies promptly, or if the record of deficiencies is such as to indicate generally poor program implementation, you and the applicants and licensees who have referenced your quality assurance program will be notified that the generic implementation of your program is no longer

acceptable to the NRC. All of the audit/inspection requirements of Criterion VII, Appendix B, 10 CFR Part 50, must then be implemented by the applicants or licensees. The NRC will reinstate its letter of acceptability of implementation of your quality assurance program only after our inspectors have concluded, based on reinspection, that you have again demonstrated full compliance.

Except as noted above, the conclusions expressed in this letter will be effective for 3 years from the date of issue of the letter. At that time, program performance over the previous 3-year period will be evaluated and this letter reissued, if appropriate.

The results of our inspections are published quarterly in the Licensee Contractor and Vendor Inspection Status Report (NUREG 0040), which is made available to NRC facility applicants, licensees, contractors, and vendors as well as to members of the public, by subscription.

Sincerely,

Director
Division of Quality Assurance,
Safeguards, and Inspection Programs
Office of Inspection and Enforcement

ORGANIZATION: AMERICAN INSULATED WIRE CORPORATION
PAWTUCKET, RHODE ISLAND

REPORT NO.: 99900399/84-01	INSPECTION DATE(S): 1/30-2/3/84	INSPECTION ON-SITE HOURS: 48

CORRESPONDENCE ADDRESS: American Insulated Wire Corporation
ATTN: Mr. I. S. Galkin
President
36 Freeman Street
Pawtucket, Rhode Island 02862

ORGANIZATIONAL CONTACT: Mr. W. H. Firth, Quality Assurance Manager
TELEPHONE NUMBER: (401) 726-0700

PRINCIPAL PRODUCT: Cable: Power, control, and instrumentation.

NUCLEAR INDUSTRY ACTIVITY: Less than 1 percent of total daily production.

ASSIGNED INSPECTOR: L. B. Parker 3/20/84
L. B. Parker, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S): J. J. Benson, Consultant, Sandia National Laboratories

APPROVED BY: H. S. Phillips 3/23/84
H. S. Phillips, Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: The purpose of this inspection was to perform an inspection of the American Insulated Wire Corporation (AIW) implementation of their quality assurance (QA) and equipment qualification programs and to review AIW's actions concerning previous inspection findings.

PLANT SITE APPLICABILITY:

50-518, 50-519, 50-566, 50-567

ORGANIZATION: AMERICAN INSULATED WIRE CORPORATION
PAWTUCKET, RHODE ISLAND

REPORT NO.: 99900399/80-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

Contrary to the requirements of Section 21.31 of 10 CFR Part 21, AIW did not impose the provisions of 10 CFR Part 21 on procurement of testing services.

B. NONCONFORMANCES:

1. Contrary to Criterion II of Appendix B to 10 CFR Part 50, the AIW QA manual only covered manufacturing activities and did not establish procedures for any of the 17 applicable criteria necessary to provide control over the equipment qualification program.

2. Contrary to Criterion XI of Appendix B to 10 CFR Part 50, the following were identified:

   a. No aging data was available for EPDM wire tested by Franklin Institute Research Laboratories (FIRL) which was reported by FIRL to be aged by AIW 200 hours at 150°C and 600 hours at 150°C.

   b. The data source on AIW 5585-EPR 60 percent retention of original elongation used for Arrhenius plots to determine 40-year life at 80°C and at 90°C was not available. The data was reported to have been supplied by DuPont.

   c. Long term aging data per Arrhenius techniques, which was required by TVA Purchase Order 79K5-825342, was not available or maintained.

   d. AIW personnel were unable to provide test plans to the NRC inspector describing AIW tests (thermal and irradiation aging followed by flames tests) in response to Ebasco Specification 211-73 requirements. Moreover, the NRC inspector verified that test plans were not available for any of the qualifications reviewed.

3. Contrary to AIW response letter to NRC report 99900399/80-01, there was no evidence that inprocess QC inspectors had been reinstructed as committed.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS FINDINGS:

1. (Closed) Violation (80-01): Posting according to paragraph 21.6 of 10 CFR Part 21 had not been accomplished at the Attleboro plant.

   The NRC inspector observed postings in the Pawtucket and Attleboro plants, and reviewed the QA log book which recorded nine audits had been performed on the required postings. This log book was started in March 1981 and the latest entry was in September 1983.

2. (Closed) Notice of Deviation (A. 80-01): Measures had not been established to assure that: (a) instrumentation used in the continuous vulcanizing (CV) process and (b) wiring measuring devices were properly controlled and calibrated.

   The NRC inspector: (a) reviewed AIW QA Standards and Procedures (SOP) No. 13.06 dated February 16, 1981, "Calibration of CV Temperature Indicators," and SOP No. 13.05 dated February 16, 1981, "Calibration of Wire Measuring Devices (Footage Meters)"; (b) examined the QA logs which verified that the SOPs were followed and the CV instrumentation and the footage meters were controlled and calibrated; and (c) inspected four footage meters and three sets of CV instrumentation.

3. (Closed) Notice of Deviation (B. 80-01): Three spark testers were not within calibration internal requirements.

   The NRC inspector: (a) reviewed AIW SOP 13.04, "Calibration of Spark Testers," dated February 16, 1981; (b) examined the QA logs which verified that the SOPs were followed and the spark testers were controlled and calibrated; and (c) inspected seven spark testers.

4. (Closed) Notice of Deviation (C. 80-01): Inprocess inspectors had failed to verify that the correct engineering specification (ES) was in use and had not filled out Daily Dimensional Physical Worksheet (DDPW).

The NRC inspector: (a) reviewed an internal memorandum from QA to production control personnel requiring that ES number, revision, and revision date be included on the CV machine extrusion orders; (b) examined a recommended compound profile chart which contained recommended temperatures, steam pressure, and running speeds for the CV machine, and also examined six DDPWs and the QA audit log; and (c) found no documentary evidence to verify that inprocess QC inspectors had been reinstructed in SOP requirements in this area.

The lack of reinstruction evidence of the QC inspectors resulted in nonconformance B.3.

5. (Closed) Notice of Deviation (D.80-01): Machine set-up for insulating and jacketing had not been prescribed by documented instructions.

   The NRC inspector: (a) reviewed the Process Engineering Procedure 1.01, "Set-Up Procedure for Insulations and Jackets," dated February 16, 1981; (b) examined posting of the procedure in the production office; and (c) inspected the QA log which listed the audits performed on the posting.

6. (Closed) Unresolved Item (80-01 paragraph D.3.b): Apparent lack of controls on equipment (micrometers and pin dials) that is not clearly identified as requiring calibration and functional status.

   The NRC inspector: (a) reviewed SOP 13.01, "Pin Dial Calibration Procedure," dated February 16, 1981; and SOP 13.02, "Micrometer Calibration Procedure," dated February 16, 1981; (b) examined six pin dials and six micrometers which had been issued for use; (c) reviewed a QC instruction to supervisors requesting they instruct users of pin dials and micrometers to report problems with the instruments to the QA office immediately; and (d) inspected QA log of audits in this area.

7. (Closed) Unresolved Item (80-01 paragraph E.3.b): Time was not recorded when wire/cable was immersed in water, therefore, it could not be determined that sufficient immersion time had been achieved.

   The NRC inspector inspected five chalkboards which had been installed to record immersion data. At the time of inspection, one was in use and proper data were recorded on it.

ORGANIZATION: AMERICAN INSULATED WIRE CORPORATION
PAWTUCKET, RHODE ISLAND

REPORT NO.: 99900399/84-01	INSPECTION RESULTS:	PAGE 5 of 6

E. OTHER FINDINGS OR COMMENTS:

1. Review of Test Plans/Procedures/Results: One NRC team member reviewed a total of 14 documents, 1 purchase order, correspondence, and partial test reports pertaining to qualification testing of AIW cables; however, no AIW test plans nor test procedures were produced by AIW during the NRC inspection to support AIW qualification activities (see B.2.d). The only test report available was a FIRL report on qualification tests of electrical cables in a simulated steam-line-break and LOCA environment. These cables were supplied to Paige Electric Company, reportedly for use on an Ebasco order at Carolina Power and Light Company, Shearon-Harris, Units 1-4. The report stated accelerated aging was performed by AIW; however, AIW was unable to supply any supporting documentation for this Franklin Report statement. Nonconformance B.2.a was identified and is further discussed in paragraph E.3.

   Two purchase orders from TVA, one for Hartsville and Phipps Bend nuclear plants (dated July 27, 1979) and one for Sequoyah, Watts Bar, Bellefonte, and Browns Ferry nuclear plants (dated March 28, 1978) specifying the qualification requirements (flame tests and normal operation aging) were reviewed; however, no qualification test reports were available. Nonconformance B.2.c was identified and is further discussed in paragraph E.3.

2. Observation of Testing Activities: During this evaluation, no qualification testing was being performed. AIW only has facilities for performing accelerated aging tests and flame tests; all other qualification activities are performed by outside laboratories. The aging ovens examined by an NRC team member had provisions for using strip charts for monitoring temperature continuously. No nonconformances were identified.

3. Review of Equipment Qualification Records/Documentation: One NRC team member reviewed test data available which was used by AIW to demonstrate cables supplied to Ebasco Services/Paige Electric and to TVA were qualified for IE safety use. No complete qualification reports were available and data demonstrating cable qualification were incomplete and/or not available. The documentation requirements of IEEE 323-1974, paragraph 8 and IEEE 383-1974, paragraph 1.4 have not been met. For example:

a. The Ebasco specification requires flame test samples to be subjected to simulated aging and irradiation before the flame test is conducted. No evidence of aging and/or radiation was available. In addition, the AIW sales/engineer stated AIW had never pre-aged any flame test samples (see nonconformance B.2.d).

b. EPDM wire, tested by FIRL, was reported by FIRL to have been pre-aged by AIW to 40-year simulated life before undergoing the FIRL test. No records demonstrating pre-aging were available for audit (see nonconformance B.2.a.).

c. The TVA purchase order for Hartsville and Phipps Bend required qualification tests which included "Long Term Aging per Arrhenius Technique." No aging data for these cables was available or submitted to the NRC inspector (see nonconformance B.2.c.).

d. AIW submitted Arrhenius time vs. temperature plots on elongation data for AIW 5585 EPR insulation. This data was used to determine accelerated aging required to simulate 40-year life at 80°C and at 90°C. When requested by an NRC team member for the raw data used to generate the above, AIW stated this information was supplied by DuPont; however, no DuPont letter or engineering data sheet was available (see nonconformance B.2.b.).

4. 10 CFR Part 21 Implementation: The AIW procurement system for securing equipment qualification testing services was examined by the NRC inspector. Violation A was identified.

5. QA Manual Review: The NRC inspector reviewed the QA manual to ascertain its control of the equipment qualification program. Nonconformance B.1 was identified.

ORGANIZATION: AMETEK
SCHUTTE & KOERTING DIVISION
CORNWELLS HEIGHTS, PENNSYLVANIA

REPORT NO.: 99900059/84-01	INSPECTION DATE(S): 2/13-15/84	INSPECTION ON-SITE HOURS: 20

CORRESPONDENCE ADDRESS: Ametek
Schutte & Koerting Division
ATTN: Mr. G. P. Lynam
Vice President and General Manager
2233 State Road
Cornwells Heights, Pennsylvania 19020
ORGANIZATIONAL CONTACT: Mr. G. Thomas Bailey, Quality Assurance Manager
TELEPHONE NUMBER: (215) 639-0900

PRINCIPAL PRODUCT: Instruments, valves, desuper heaters, exhausters, process jets, and turbine flow meters.

NUCLEAR INDUSTRY ACTIVITY: None.

ASSIGNED INSPECTOR: Wm D Kelley 5/24/84
Wm. D. Kelley, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S):

APPROVED BY: I. Barnes 5/25/84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of: (1) the issuance of a licensee event report by Nebraska Public Power District (NPPD) concerning the failure of a gasket in the high pressure core injection (HPCI) actuator system that had been supplied to the Cooper Nuclear Station; and (2) the issuance of a 10 CFR Part 21 report by Ametek-Schutte & Koerting Division (A-S&K) concerning the loosening of the rockshaft setscrew and the resulting
(cont. on next page)

PLANT SITE APPLICABILITY:

Gasket failure in turbine stop valve, 50-298; loosening of rockshaft setscrew in check valve, 50-213, 50-250, 50-251, 50-275, 50-282, 50-285, 50-305, 50-323, 50-334, and 50-335.

ORGANIZATION: AMETEK
SCHUTTE & KOERTING DIVISION
CORNWELLS HEIGHTS, PENNSYLVANIA

REPORT NO.: 99900059/84-01	INSPECTION RESULTS:	PAGE 2 of 5

SCOPE: (cont.) disengagement of the rockshaft from one of the bearings in a main steam check valve that had been furnished to the Carolina Power and Light Company (CP&L) H. B. Robinson Steam Electric Plant.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Status of ASME Certificate of Authorization: A-S&K management informed the NRC inspector that: (a) their ASME Certificate of Authorization for applying the "N" stamp to their products expired in 1981; however, the ASME did extend the expiration date 6 months to permit them to complete the manufacture of valves in-house; (b) they had notified their authorized inspection agency that when their current ASME Certificate of Authorization for applying the UM, U, PP, and S stamps expire in 1984 and 1986, they will not renew them; and (c) purchase orders accepted after the certificates expire, for pressure retaining parts requiring a stamp, would be subcontracted to a vendor with a current ASME Certificate of Authorization.

   In addition, A-S&K does not respond to invitations to bid if the design specifications and/or purchase documents specify Appendix B of 10 CFR Part 50 or impose 10 CFR Part 21.

2. Licensee Event Report:

   NPPD reported a gasket failure in the hydraulic oil supply to the HPCI turbine stop valve actuator. The NPPD licensee event report noted that the vendor stated an error was made in supplying the gasket material on Purchase Order No. 102121 issued in December 1975. A-S&K acknowledged to the NRC inspector that this could have occurred but there was no documentation available during the inspection to prove or disprove an error had occurred.

A-S&K supplied Terry Corporation (TC) with 37 turbine stop valves for which Miller Fluid Power (MFP) hydraulic cylinders were specified in accordance with A-S&K Data Sheet No. 68-S-014, Revision 1. MFP notified A-S&K on September 26, 1979, that they could account for 28 of the hydraulic cylinders supplied for steam stop valves shipped to TC as having leather piston seals, and they could not see any reason why the piston seal would be different for the remaining 9 cylinders.

The hydraulic cylinders had two resin impregnated leather seals - one seal was active and the second seal was inactive in the opening direction of the turbine stop valve. Failure of the active seal was the cause of the turbine stop valve failure to open. General Electric Company (GE) stated that the leather seals are compatible with the oils recommended by TC, and are acceptable for a maximum continuous service temperature of 150°F.

NPPD Requisition No. CNS-OP5-1626 dated December 1975 ordered replacement gaskets for the stop valve hydraulic cylinder from A-S&K. The attached NPPD Standard Purchase Requirements for Essential Items required: "(1) . . . the supplier to maintain a control program in compliance with 10 CFR Part 50; (2) items ordered as identical replacement by model number and manufacturer, the supplier shall verify that the model design, material, and manufacturing control have not been changed since the date or previous purchase order referenced. Certifications shall be provided as required."

A-S&K Bill of Material dated February 12, 1976, identifies the gasket material as Hydroil No. 402 which was a stock material. The statement in the remarks column states, "cut in storeroom." A-S&K letter to NPPD dated June 10, 1976, states, in part, " . . . we certify that the other items on your order are in compliance with the original manufactured parts supplied on the 10 inch Oil Operator Stop Valve as to materials of construction, and design."

An A-S&K Bill of Material for gasket Part No. 685-0019V-001 identifies the material as Hydroil No. 4029 and contains a note stating no documentation required.

The NRC inspector reviewed the GE Information Letter SIL No. 306, which described the HPCI turbine stop valve hydraulic cylinder seal failure. GE stated that the failure mode of the seal could not be positively identified; however, it was possible that the seal was at the end of its service life, or it was possible the seal was torn due to the instantaneous "catapulting" opening of the turbine stop valve which had been observed at operating plants, and is the result of improper adjustment of the steam balance chamber pressure within the turbine stop valve.

TC notified GE and A-S&K that the hydraulic cylinders at the Cooper Nuclear Station with the broken seals were 11 years old and TC had not received an order for replacement parts.

GE recommended replacement of the turbine stop valve hydraulic cylinder (MFP Model J-53) cup seals with Buna-N material (nitrite rubber) at the first convenient maintenance opportunity, and MFP recommended replacement of the piston cup seal on a 5-year cycle. Furthermore, they have changed their standard material from leather to Buna-N (nitrite rubber). GE also recommended that the teflon tubing end seal (part 59), rod seal (part 23), and the wiper (part 54) material be changed to Buna-N material.

TC informed A-S&K in their letter of January 7, 1980, that TC and GE had worked closely with MFP to improve seal materials and develop clear and concise assembly/disassembly instructions, and a copy of these instructions had been sent to A-S&K for information.

There does not appear to be a sound basis for A-S&K certifying that the replacement gasket material was identical to the original material; however, effective corrective actions relative to this problem appear to have been taken or are underway. Considering A-S&K's withdrawal from further nuclear related activity, additional inspection effort at A-S&K's facility with respect to this problem is not planned at this time.

3. 10 CFR Part 21 Report:

A-S&K reported loosening of the setscrews holding the main steam check valve rockshaft to the tail link on a valve which permitted the rockshaft to move axially and become disengaged from one of the rockshaft bushings. This disengagement occurred after they were received at the CP&L H. B. Robinson Steam Electric Station (Robinson 2). The report stated that the original valve configuration supplied to the Robinson 2 and other nuclear plants was designed and dimensioned so that, should the setscrews loosen and back out, the rockshaft could not disengage from one of its bushings.

The NRC inspector reviewed five letters to licensees, three check valve assembly drawings, an installation list, four instruction drawings, an A-S&K 10 CFR Part 21 report, and a CP&L licensee event report and verified that A-S&K had notified the licensees if their valves had been or would be modified or repaired in the area of the bushing and/or rockshaft the setscrews had to be spotted into the shaft and staked to prevent their loosening.

A-S&K offered to supply the licensees with replacement rockshafts of sufficient length to prevent disengagement from the bearings if the setscrews did loosen.

ORGANIZATION: ANDERSON GREENWOOD & COMPANY
HOUSTON, TEXAS

REPORT NO.: 99900214/84-01	INSPECTION DATE(S): 3/14-16/84	INSPECTION ON-SITE HOURS: 22

CORRESPONDENCE ADDRESS: Anderson Greenwood & Company
ATTN: Mr. J. H. Elder
President
4525 South Rice Ave.
Houston, Texas 77036

ORGANIZATIONAL CONTACT: Mr. F. Pizzitola, Vice President, Quality Assurance
TELEPHONE NUMBER: (713) 688-0631

PRINCIPAL PRODUCT: Nuclear valves.

NUCLEAR INDUSTRY ACTIVITY: Approximately 15 percent of its total workload.

ASSIGNED INSPECTOR: I Barnes 5-1-84
for W. D. Kelley, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S):

APPROVED BY: I Barnes 5-1-84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of the issue of a licensee event report by Commonwealth Edison Company (CEC) concerning the failure of 1-inch piston check valves that have been furnished to the LaSalle County Station, Unit 1, to seat when the reverse differential pressure was small.

PLANT SITE APPLICABILITY:

Failure of valve to reseat (50-373).

ORGANIZATION: ANDERSON GREENWOOD & COMPANY
HOUSTON, TEXAS

REPORT NO.: 99900214/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 16.4.1 and 16.4.3 of the QA Manual (QAM), the AGCO ASME certified testing laboratory at El Camp, Texas, which performs testing services for AGCO had not been placed on the Approved Vendors List.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraphs 3.4.1.1 and 3.5.1 of the QAM, and test requirements of Sargent & Lundy Engineers (S&L), Design Specification J-2950-01, the AGCO product engineer failed to ascertain that the 72 piston check valves supplied to CEC LaSalle County Station were required to be pneumatically seat leak tested and had approved AGCO Procedure NO5-9005-022 which required a hydrostatic seat leakage test.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 paragraphs 2.0 and 4.2 and of AGCO Report No. 05-9085-001, Revision A, AGCO did not perform an evaluation to determine whether notifications were required with respect to the identified failure of AGCO piston check valves that had been furnished to the CEC LaSalle County Station, Unit 1, to meet seat leakage requirements when installed in vertical pipe runs.

C. UNRESOLVED ITEMS:

There was no documented evidence that CEC had requested discs of the new design for the 2-2 inch piston check valves furnished to the LaSalle County Station, Unit 1, or that AGCO had shipped new discs.

D. OTHER FINDINGS OR COMMENTS:

1. Licensee Event Report:

a. The NRC inspector reviewed the QAM, design specification, valve data sheets, purchase order(PO) change notice, drawings, correspondence, test procedures, and test data and verified that: (1) the PO change notice specified "ERR O-Ring Seat" for the 1/2 through 2 inch piston check valves; (2) the drawing showing the O-ring seal had been reviewed by S&L engineers (S&L), and "No

exceptions taken"; (3) the test procedure specified that water would be used in performing the seat leakage test; (4) the design specification required that the seat leakage for certain valves specified on the valve data sheet " . . . not exceed 10^{-2} ATM cc/sec and shall not be detectable by the 'soap bubble' test"; (5) the valve data sheet specified the service fluid to be "Air/Nitrogen"; and (6) the acceptance test report showed zero leakage using water as the test medium.

The AGCO failure to test the piston check valves with air or nitrogen in accordance with the requirements of the S&L design specification was identified as a nonconformance (see paragraph 8.2).

b. The NRC inspector was informed that the AGCO sales representative had observed that some of the piston check valves were installed in vertical pipe lines at the LaSalle County Station.

Information indicating possible installation in vertical pipe lines was not noted in either the Design Specification or the PO change notice. The NRC inspector did verify that the AGCO operating and maintenance instructions for the piston check valves stated, " . . . valves are normally installed in horizontal pipe runs with the bonnet near vertical. The piston valves may be installed in vertical runs provided the normal flow is upward . . . ."

The test result attached to AGCO interoffice correspondence dated May 28, 1982, records that the 1/2 inch piston check valve returned from the LaSalle County Station failed the pneumatic seat leakage test when installed in a vertical pipe line.

c. The NRC inspector reviewed shipping notices and verified that: (1) 50-1/2, 16-3/4, 4-1, and 2-2 inch piston check valves had been shipped to CEC LaSalle County Station; (2) 1-1/2 inch valve had been returned to AGCO; (3) 1-1 inch replacement valve had been shipped to LaSalle County Station; and (4) 70 redesigned discs for the 70-1/2, 3/4, and 1 inch valves had been shipped to LaSalle County Station. There was no documented evidence that the customer had requested discs of the new design for the 2-2 inch valves or that AGCO had supplied new discs. This item is considered unresolved (see paragraph C).

d. The NRC inspector reviewed interoffice correspondence, test results, photographs, and drawings and ascertained that: (1) a substantial amount of trash was found trapped between the disc and seat of the returned valve; (2) the returned valve in the "as received" and "as received but cleaned up" condition could not be leak tested when installed in a vertical pipe line due to the high leakage; and (3) AGCO concluded the piston check valve would be redesigned by changing both the method of attachment of the O-ring to the disc and the tolerances and shape of the piston.

e. The NRC inspector reviewed drawings and test results and verified that: (1) the piston check valve with the new disc had been pneumatically tested three times in both the horizontal and vertical pipe line positions, at a reduced pressure, and all six tests reported seat leakage as zero number of bubbles.

f. There was no documented evidence that AGCO personnel had evaluated the failure of the valve to meet the leakage requirements in the vertical pipe line position for required notification with respect to 10 CFR Part 21 requirements. This was identified as a nonconformance (see paragraph B.3).

2. Design and Document Control:

a. The NRC inspector reviewed the applicable section of the QAM, a design specification, three drawings, two implementing procedures, and a PO and its change orders. It was verified that design and document control practices were in accordance with the requirements of the QAM and implementing procedures.

b. The NRC inspector reviewed paragraph 3.5.4 of the QAM, the Quality Control Manual for AGCO Flow Test Facilities, and correspondence from the National Board of Boiler and Pressure Vessel Inspectors. It was verified that the AGCO test facilities at El Camp, Texas, had been recertified as an ASME Testing Laboratory and that certain employees had been accepted as Authorized Observers.

There was no documented evidence that the El Camp, Texas, test facility had been audited by the QA manager and maintained on the Approved Vendor List. This was identified as a nonconformance (see paragraph B.1).

3. Manufacturing Process Control:

The NRC inspector reviewed the QAM and the following documents applicable to parts in process in the shop: (a) drawing, (b) move ticket, (c) operation inspection log, (d) operation reject log, and (e) fabrication control sheet. Valve parts and assembly operations were observed, and it was verified that the parts were machined in accordance with the approved drawing and controlled by move tickets. The inprocess inspection had been performed as specified, and rejected parts tagged.

ORGANIZATION: ATWOOD AND MORRILL CO., INC.
SALEM, MASSACHUSETTS

REPORT NO.: 99900049/84-01	INSPECTION DATE(S): 4/2-5/84	INSPECTION ON-SITE HOURS: 87

CORRESPONDENCE ADDRESS: Atwood and Morrill Co., Inc.
ATTN: Mr. John Covey
QA Manager
285 Canal Street
Salem, Massachusetts 01970

ORGANIZATIONAL CONTACT: Mr. John Covey, QA Manager
TELEPHONE NUMBER: (617) 744-5690

PRINCIPAL PRODUCT: Nuclear valves.

NUCLEAR INDUSTRY ACTIVITY: Approximately 50 percent of total production.

ASSIGNED INSPECTOR: J. Barnes for D. E. Norman, Reactive Inspection Section (RIS) — Date: 5-10-84

OTHER INSPECTOR(S): J. Hamilton, RIS
D. Huszagh, Consultant

APPROVED BY: J. Barnes — I. Barnes, Chief, RIS — Date: 5-10-84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B.

B. SCOPE: The purpose of this inspection was to evaluate the implementation of the QA program for valves provided to the domestic nuclear industry.

PLANT SITE APPLICABILITY:

Cracked shafts: 50-244, 50-247/286, 50-255, 50-266/301, 50-344, 50-348/364.
Nondestructive examination (NDE) not performed: 50-348/364, 50-390/391, 50-412, 50-413/414, 50-438/439, 50-460/397/508/513/509, 50-491/492/493, 50-510.

ORGANIZATION: ATWOOD AND MORRILL CO., INC.
SALEM, MASSACHUSETTS

REPORT NO.: 99900049/84-01	INSPECTION RESULTS:	PAGE 2 of 8

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.6 of Section 4 of the Quality Assurance Manual (QAM), heat treat services were obtained from New England Metallurgical Co., Industrial Heat Treat Co., and Lindberg Heat Treat Co. during periods of time when the companies were not listed on the Approved Vendors List (AVL).

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 9.3.1 of Section 9 of the QAM, the applicable procedure for torquing of bolts in valve assembly (i.e., Procedure No. 00-71-030) was not identified on Shop Process Orders (SPOs) and there were no requirements for verification of bolt torque values by the inspection activity.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 2.4.2.2 and 2.5.7 of Section 2 of the QAM, no documented instructions or employee training records were available with respect to performance of valve assembly operations.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 5.4.1 of Section 5 of the QAM, and paragraph 7.10 in TVA specification 84K71832474, procedures for Atwood and Morrill (A&M) Sales Order No. 15159 did not include provisions for either removal of the valve packing after hydrostatic testing or attachment of suitably packaged packing to the valve for shipment.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Identified Hardware Deficiencies:

   a. Several instances of cracked shafts have been identified in main steam line isolation valves since 1976. The latest identification occurred recently at Farley, Unit 1, when several valves were found which contained shafts that were cracked in the packing gland area. The cracks originated at keyway areas in the hardened ASTM A 276, Type 410 shafts.

On March 20, 1984, A&M notified licensees at the following sites of a potential shaft cracking problem:

(1) Point Beach Nuclear Plant

(2) Palisades Nuclear Plant

(3) Indian Point Station, Units 2 and 3

(4) Robert Emmett Ginna Nuclear Power Plant

(5) Joseph M. Farley Nuclear Plant, Units 1 and 2

(6) Trojan Nuclear Plant

The letter suggested that shafts be removed at the first opportunity and be subjected to: (1) a visual examination, (2) a hardness test at 6 inch intervals along the shaft length, and (3) a liquid penetrant (PT) examination over the entire shaft length. It was stated to the NRC inspector that shafts found to be cracked would be replaced with items fabricated from SA 564, Grade 630, material.

While the cause of cracking has not been definitely determined, the following areas were stated to be possibilities:

(1) Heat Treating - Evaluation shows that the shaft material could eventually crack after heat treatment if not properly positioned in a well controlled furnace.

(2) Valve Slamming - Under partial load the valve is prone to slamming closed. This apparently was not a consideration in the valve design.

(3) Vibration - System induced vibrations are present in operating plants and cause cyclic loading of valves which was not a design consideration.

b. A&M notified customers at seven nuclear power plant sites on August 23, 1983, that valves had been identified which had certain deficiencies. The valves had been shipped or had been accepted for shipment at A&M. The deficient categories were:

(1) Charpy impact test of load key material not performed.

(2) PT and/or magnetic particle (MT) examination of castings (bodies, discs) and finished machined surfaces not performed.

(3) Radiographic examination of critical areas not performed.

(4) PT and/or MT of disc casting under hard facing not performed.

(5) Castings purchased from vendors not on the AVL.

As of March 30, 1984, various corrective actions had been taken by A&M to correct the nonconformances for 106 of the 160 valves involved. The status of the remaining valves is as follows:

(1) WPPSS Nuclear Project - Twenty-six nonconforming valves are located at WPPSS. A&M has requested approval of their proposed corrective action; however, no reply has been received from the licensee. Nonconformances include:

(a) Discs were purchased from a vendor which was no longer on the AVL and an audit of vendor was unacceptable.

(b) PT or MT examinations of machined surfaces of the valve body were not performed or were incomplete.

(2) Cherokee Nuclear Station - Six nonconforming valves are located at the site and/or at A&M. Corrective action is in progress. The nonconformance consisted of a failure to perform PT examinations of finished machine surfaces of the valve body.

(3) Bellefonte Nuclear Plant - Four nonconforming valves remain at Bellefonte. Corrective action is in progress. Nonconformances consisted of a failure to perform PT examinations of finished machine seat bore and the as-cast surface of the cover.

(4) Beaver Valley Power Station - Eighteen nonconforming valves remain at the site. Corrective action is in progress. Nonconformances consisted of a failure to perform PT and/or MT examinations of some machined surfaces on the body and disc, and some as-cast surfaces.

Proposed corrective actions for the above valves include:

(1) Discs purchased from an unapproved vendor would be replaced.

(2) Valves which had not been PT or MT examined would either be derated using a 0.7 quality factor in accordance with NC-2571 to exempt NDE requirements, or be returned to A&M where required NDE and retesting would be performed.

2. QA Program Implementation: The NRC inspectors verified the implementation of the quality assurance program by examining records and files, conducting interviews with personnel, and making visual inspections and observations. Comments are as follows:

a. Organization: The NRC inspector reviewed A&M's organization including functional responsibilities and authorities. The review included an examination of the company and QA organization charts. The examination revealed that the QA manager reports directly to the VP of Operations and had the authority and organizational freedom required.

b. Design Control: The NRC inspector interviewed the engineering manager with respect to product design, design checks, and engineering review. A design package for an 18 inch, 900 lb. ASME Class 1 "testable" check valve which was currently in production, was reviewed. Included in the review was an evaluation of the contractual technical requirements and their translation into vendor procurement documents, drawings, procedures, and instructions necessary to manufacture the valve. The design practices and their translation into fabrication procedures and instructions appear to be properly implemented.

c. Procurement Document Control: A review of four procedures was performed to assure that procedures were approved by responsible management and reviewed by quality assurance personnel. A review of two customer contracts, three A&M purchase orders for materials, one purchase order change notice, one procurement supplement, and three procedures was performed to assure that customer and quality assurance program requirements were properly included or referenced in procurement documents and that implementing instructions were prepared.

A review was made of the documentation used to assure material and services were procured from qualified vendors. With respect to the main steam check valves reported with cracked shafts, selected AVLs and supporting quality survey reports were reviewed to verify that the vendors were qualified.

A&M's records showed that the valve shafts were heat treated January 1973 and September 1973 by New England Metallurgical Co. of Boston, Massachusetts; March 1974 by Industrial Heat Treat Co.; and September 1979 by Lindberg Heat Treat Co. However, heat treat records that accounted for all valve shafts involved were not reviewed by the NRC inspector during this inspection.

A review of the applicable AVLs revealed that New England Metallurgical Co. was identified on the September 1972 AVL, but was removed from the June 1973 AVL and was not listed on the February 1974 AVL. Industrial Heat Treat Co. was not identified on any AVLs after September 1972 and Lindberg Heat Treat Co. was last approved for use in April 1978.

A&M vendor survey form prepared November 17, 1978, recommended Lindberg Heat Treat Co. be dropped from the AVL. The reason given was that no furnace temperature survey had ever been conducted to assure that the temperature within the working zone varied no more than the specified 25 degrees.

Nonconformance B.1 was identified in this area of the inspection.

d. Instructions, Procedures, and Drawings: The NRC inspector interviewed the production control manager respecting the formulation, issuing and control of instructions, procedures, and drawings. Three SPOs for valves presently being fabricated were reviewed. It was found that there were no written instructions nor records of personnel training for assembly and adjustment of valves. It was also found that the SPO made no mention of a bolt torque procedure.

Within this area of inspection, nonconformances B.2 and B.3 were identified.

e. Document Control: A review was performed of eight procedures and four drawings at A&M work stations to assure that the documents reviewed and approved by authorized personnel, were the correct revision, and had not been improperly marked up.

f. Control of Special Processes: The NRC inspector interviewed the QA manager, production superintendent, and assembly and testing foreman regarding fabricating processes. Welding procedures and welder qualifications were also reviewed and it was verified that welders were qualified and that approved procedures were in use in the welding area.

g. Inspection: The NRC inspector reviewed several in-process and completed SPOs to evaluate the adequacy of the QA program in the inspection of activities affecting quality.

h. Control of Measuring and Test Equipment: A review of one procedure, four gage control records, and two certifications from two calibration service vendors was performed to assure that measuring and testing equipment were properly identified, controlled, and calibrated at specific intervals.

i. Handling, Storage, and Shipping: A review was made of six procedures and one drawing to verify procedures and instructions were established. Activities relevant to material protection were observed for two valves to verify implementation. A review was made of two contracts and two procedures to verify that handling, storage, and shipping procedures were responsive to customer requirements. Nonconformance B.4 was identified in this area of the inspection.

j. Inspection, Test, and Operating Status: Several SPOs for valves in different states of fabrication were reviewed by the inspector to evaluate the adequacy of the QA prog am in respect to determining the status of inspections and tests performed on the items.

k. Nonconforming Materials, Parts, or Components: The NRC inspector reviewed Nonconforming Material Reports (NCRs) for 1983 and 1984 to evaluate the adequacy of the QA program in identifying and controlling material which did not conform to requirements, in all respects.

l. Corrective Action: The inspector reviewed records relating to actions by A&M (i.e., Minutes of Corrective Action Boards, Semiannual reports, and corrective action requests) for 1983 and 1984 for the correction of identified weaknesses or breakdowns in the QA program.

m. QA Records: The NRC inspector reviewed data packages for nuclear valve Nos. 6-14412-03A and 1-15008-01 in respect to evaluating compliance with Code requirements in delivered valves.

n. Reporting of Defects: A review was made of one procedure to verify that controls have been established to assure implementation of 10 CFR Part 21 requirements and two posting areas were examined to assure compliance with 10 CFR Part 21 posting requirements. A review was made of three records of evaluated deviations, not resulting in a report to the Commission, to verify that the condition was reported to the purchaser and that a responsible officer of the company concurred that this was acceptable action.

ORGANIZATION: BBC BROWN BOVERI, INCORPORATED
SWITCHGEAR PRODUCTS DIVISION, TULSA OPERATIONS
TULSA, OKLAHOMA

REPORT NO.: 99900329/84-01	INSPECTION DATE(S): 3/26-30/84	INSPECTION ON-SITE HOURS: 56

CORRESPONDENCE ADDRESS: BBC Brown Boveri, Incorporated
Switchgear Products Division
ATTN: Mr. D. D. Duvall, Vice President,
BBC Brown Boveri, Incorporated
Norristown Road and Route 309
Spring House, PA 19477
ORGANIZATIONAL CONTACT: Mr. D. R. Purkey, Manager, Quality Assurance
TELEPHONE NUMBER: (918) 627-2796

PRINCIPAL PRODUCT: Switchgear.

NUCLEAR INDUSTRY ACTIVITY: None.

ASSIGNED INSPECTOR: W. E. Foster — 4/30/84
W. E. Foster, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S): D. A. Weber, Consultant

APPROVED BY: I. Barnes — 4/30/84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: Appendix B to 10 CFR Part 50 and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the 10 CFR Part 21 report dated December 22, 1982, relating to deficient welds in low voltage switchgear enclosures sent to the Perry nuclear facility.

PLANT SITE APPLICABILITY:

Deficient welds - Docket Nos. 50-546/547; 50-440/441.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Brown Boveri Electric, Incorporated, Switchgear Systems Division's (BBE, SSD) (current identification in the heading) corrective action response letter dated November 9, 1981, concerning Items A, G, H, and I in the Notice of Nonconformance, Report No. 99900329/81-01, personnel had not been advised or had failed to comply with the stated corrective action as evidenced by:

   a. The lack of entries in the daily and weekly log regarding "Time of Inspection" for February 22 and January 16, 1984, respectively; and "Quality of Work" for 1984. Data recording is required by paragraph 2.1.6.1 of Manufacturing Procedure (MP) No. 2.1.

   b. First stage cleaning solution exceeding the upper temperature limit of 120°F required by paragraph 2.1.3.2 of MP 2.1. Records indicated temperatures of 128°F on February 21, 1984, and 122°F on March 12, 1984.

   c. Crimping tool calibration records revealed calibration periods greater than the 6-month requirement for the following tools with Serial Nos. (S/N): (1) 113, calibrated January 27, 1983, and January 31, 1984; (2) 108, calibrated March 3, 1983, and January 31, 1984; (3) 162, calibrated December 1982, and October 1983; (4) 145, calibrated December 1982, and August 1983; (5) 163, calibrated December 1982, and August 1983; (6) 101, calibrated December 1982, and August 1983; and (7) S/N 153 last calibrated in August 1983.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.6 of Quality Assurance Procedure (QAP) No. 18.2, Revision 6, the 18 criteria of Appendix B to 10 CFR Part 50 had not been audited a minimum of once each calendar year at the Tulsa, Oklahoma, facility as evidenced by the lack of entries for Criterion V on the audit checklist for the audit conducted in 1983.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.2.3.1 of QAP No. 7.1-T, Revision 2, revision information had not been entered in the required space for the majority of approximately 40 history cards that were reviewed. Further, incorrect revisions were reflected in the cards for Part Nos. 29473 and 81709-A, Elliott Precision.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 3.6.7 and 3.2.4.3 of the Quality Assurance Manual (QAM), Addendum No. 1, there were no detailed procedures at the Tulsa Operations for control of engineering standards (ES) as evidenced by nonpresentation of the requested detailed procedures.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.1 of QAP No. 10.7, Revision 3, inspection of crimped terminals had not been performed on a sample plan basis as evidenced by the nonpresentation of requested records of inspection of crimped terminals. Forms presented to the inspector on which the inspections would be documented, contained no information that was correlative to sample inspection (i.e., contained no lot or sample size and disposition of the lot).

C. UNRESOLVED ITEMS:

1. The "Distribution" block is blank on Engineering Procedure No. 3700-031.1, revised April 8, 1983, titled "Procedure for Control of S.O. Drawings." This procedure was developed as a result of the 1983 Internal Audit finding that there were no procedures available which described the "entire drawing distribution system from Engineering to Manufacturing." As there was no distribution indicated for this procedure, the NRC inspector was unable to assess the implementation of the procedure.

2. QAP 7.1-T, Revision 2, paragraph 3.2.3.1 identifies the information to be recorded on the "Vendor History Cards." An example of the history cards is shown in the QAM, Revision 2, Section 3.7, page 2. The NRC inspector noted that there were several other columns on the history cards which were not addressed. For example, there are

three columns for the "1st Sampling," three columns for the "2nd Sampling," eight columns for "Defects," and eight rows for "Characteristics." When reviewing the history cards for Elliott Precision and Sooner Bolt and Supply Co., the NRC inspector noted recordings in these columns were inconsistent from one card to another. For the columns noted above, some cards had no entries, some had partial entries, and some cards were completely filled out. In general, for those history cards that were not completely filled out, the NRC inspector was unable to verify "Sampling" (i.e., sample size, defects allowed, defects found, 1st and 2nd sample), and/or the part "Characteristics" that were checked for "Defects." There were no apparent procedures that required recording of this information.

One of the Elliott Precision history cards contained no drawing or drawing revision number and the AQL number was recorded in the column marked "Level." The NRC inspector was informed that this card contained specialty items and did not justify individual cards. There were no apparent procedures which described the use of a history card for recording the receipt of specialty items. With several different parts shown on the same history card, the NRC inspector was unable to determine the effectiveness of receiving inspection in general, and specifically, the "Characteristics" that were checked for defects.

On one of the history cards for Sooner Bolt and Supply, the block for the "Drawing Number and Revision" contained the drawing title (Std. Flat Washer). The drawing for this part was noted on the upper left side of the history card as 6A2101. A review of this drawing showed 11 dash numbers representing 11 variations to that part. The PO column on the history card showed a release number followed by the dash number for the part variation received. There were no apparent procedures which described the use of a history card for the purpose of showing the receipt of several variations of the same part. The NRC inspector was unable to determine the effectiveness of Receiving Inspection.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (Report No. 81-01) A copy of 10 CFR Part 21 was not availabe in the office of the QA Manager or at the facility.

   The NRC inspector verified that a current copy of 10 CFR Part 21 and a copy of NUREG 0302 were available.

2. (Closed) Nonconformance (Item A, Report No. 81-01): Paragraph 4.10 had not been added to QAP No. 18.2, Revision 3, dated December 12, 1979, nor did the QAP include information that explained the purpose of "self audits."

   The NRC inspector verified that paragraph 4.11 of QAP No. 18.2, Revision 6, addressed "self audits"; the same is true of paragraph 3.18.2 of the QAM, Addendum No. 1. During the evaluation, the following were observed: (a) the lack of evidence of personnel advisement, and (b) incomplete internal audit for 1983. These are detailed in paragraphs B.1 and B.2, respectively.

3. (Closed) Nonconformance (Item B, Report No. 81-01): Required information had not been entered on the history card, as evidenced by the lack of a history card for the part identified on Inspection Report No. 50051, dated May 11, 1979; QAP No. 7.1-T, Revision 1, dated August 2, 1979, did not reflect the type of information to be recorded on the history card; and a memo was not posted in the receiving area to identify items that do and do not require a recorded history.

   The NRC inspector determined that: (a) Inspection Report No. 50051 was no longer available; therefore, it was not possible to determine if a history card was required; (b) QAP No. 7.1-T, Revision 2, paragraph 3.2.3.1, now describes the information to be recorded on history cards; and (c) Receiving Inspection now has a list of vendors that require history cards. The NRC inspector verified BBE's commitment to prevent recurrence by reviewing interoffice memo (IOM) dated March 8, 1984, which covered employee training classes and included QAP No. 7.1-T.

   During the review of the history cards the NRC inspector noted that many of the cards did not indicate a drawing revision number. This is detailed in paragraph B.3.

4. (Open) Nonconformances (Items C, D, and E, Report No. 81-01): These items involved jackshaft rework.

   The NRC inspector was informed that records were no longer available at the Tulsa facility but were available at the Spring House, Pennsylvania, facility. These items will be evaluated during a future inspection at the Pennsylvania facility.

5. (Closed) Nonconformance (Item F, Report No. 81-01): (a) The Kocher thickness test readings had not been taken at the beginning of each work shift and the results entered in the Silver Plate Record, as evidenced by the lack of recorded data for the period of November 12, 1980, through February 10, 1981. (b) The inspector's stamp or other identity had not been entered in the appropriate column for data recorded during the period of September 21, 1979, through November 10, 1980.

   The NRC inspector reviewed QAP No. 10.5, Revision 4, titled, "Kocher Thickness Standard Average," and reviewed all log entries for 1983 up to March 28, 1984, and found no nonconformances.

6. (Closed) Nonconformance (Item G, Report No. 81-01): The operator responsible for the cleaning of assembled and nonassembled materials prior to the finishing/painting process had not inspected and recorded, on a daily basis, the required information as evidenced by: (a) the first stage record which reflected a last entry of April 6, 1981; and (b) the third stage record which reflected entries of April 2, 6, 7, and 9, 1981.

   The NRC inspector verified that Manufacturing Procedure (MP) No. 2.1, paragraphs 2.1.3.5 and 2.1.3.5a, Revision 23, required that third stage cleaning be accomplished on a weekly basis. The evaluation disclosed: (a) a lack of documentation regarding personnel advisement; and (b) failure to maintain cleaning logs as required. These are detailed in paragraph B.1.

7. (Closed) Nonconformance (Item H, Report No. 81-01): The procedure summaries shown in paragraphs 2.4.8 through 2.4.10 of MP No. 2.4, had not been posted at the silver plating station.

   The NRC inspector verified that: (a) MP No. 2.4, Revision 7, required that summaries in paragraphs 2.4.8 through 2.4.10 be readily available at the work station; and (b) the procedure and the summaries were, in fact, readily available at the work station.

   There were no documents to indicate that personnel had been advised regarding procedures review and compliance. This is detailed in paragraph B.1.

8. (Closed) Nonconformance (Item I, Report No. 81-01): Crimping tools had not been calibrated as required every 6 months.

   The NRC inspector reviewed the records of crimping tools currently in use and verified that the proper calibration of all crimping tools had been checked and confirmed during a followup audit between February 1-3, 1982. However, it was noted that some crimping tools had calibration periods greater than 6 months between 1982 and 1984, and one crimping tool (S/N 153) was overdue for calibration.

   There were no documents to indicate that personnel had been advised regarding procedure review and compliance. These conditions are detailed in paragraph B.1.

9. (Closed) Unresolved Item (Report No. 81-01): There was no apparent criteria regarding thread protrusion through nuts; consequently, acceptability of bolt/screws/stud and nut installations could not be determined.

   The NRC inspector verified that (a) BBE SSD Workmanship Criteria dated January 18, 1983, addressed bolt/screws/stud and nut installations, and (b) such installations were in accordance with the workmanship criteria.

10. (Closed) Unresolved Item (Report No. 81-01): QAP No. 10.5, Revision 1, required the tester be checked and readings be recorded at the beginning of each work shift; however, there was no requirement to record the time that the tester was checked. Consequently, it could not be determined that recorded readings had been taken at the beginning of each work shift.

    The NRC inspector's review of QAP No. 10.5, Revision 4, revealed that it is also silent regarding identification of the time when readings of the tester were taken. However, there is only one work shift at the present time.

11. (Closed) Unresolved Item (Report No. 81-01): QAP No. 10.9-T, Revision 1, required the use of "Shop Work Cards"; however, the system had been replaced by one which used "Piece Part Move Tickets." No procedure had been initiated to define the latter system; consequently, implementation could not be assessed.

    The NRC inspector verified that: (a) QAP No. 10.9-T, Revision 2, addresses "Piece Part Move Tickets"; and (b) adherence to the QAP was in order.

12. (Closed) Unresolved Item (Report No. 81-01): QAP No. 10.7, Revision 2, required 100 percent inspection of crimped terminals as part of the final switchgear checklist. Crimped terminals were not to be disconnected from their terminations, and it was not apparent to the NRC inspector how the specified characteristics could be evaluated.

    The NRC inspector verified that QAP No. 10.7, Revision 3, requires sample inspection. Requested records of such inspection were not presented; however, the forms to be used were presented. It was noted that the forms were the same as has always been used, and they contain no provision for lot size, sample size, or disposition of the lot. This was identified as a nonconformance which is detailed in paragraph B.5.

13. (Closed) Unresolved Item (Report No. 81-01): Section 3.12 of the QAM, Revision 1, was silent regarding an evaluation of crimping tools found out of calibration. The NRC inspector's primary concerns were: (a) the lack of a requirement to evaluate out-of-tolerance crimping tools; and (b) the number and condition of the crimped terminals produced with an out-of-tolerance crimping tool.

    The NRC inspector verified that QAP No. 12.8, Revision 2, addressed both concerns, and tasks were being accomplished in accordance with QAP No. 12.8.

E. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 21 Report - BBE filed a 10 CFR Part 21 report on December 22, 1982, with the NRC, Headquarters. The report indicated that required spot or equivalent arc welds had not been added at the corners of the rear vertical and horizontal channels of low voltage switchgear enclosures that had been furnished to the Marble Hill Nuclear Station (MHNS). The report identified Perry Nuclear Power Plant (PNPP) as suspect regarding this deficiency and included a commitment by BBE to "arrange for and conduct an inspection of the low voltage switchgear at this location." While the suspected deficiency was not identified, the inspection did reveal "nonconforming spotwelds along the top corner braces of several of the low voltage frames." The nonconforming spotwelds were actually missing spotwelds (one of two) in top corner braces with cutouts which precluded placement of the missing spotwelds. An interoffice memorandum states that: (a) the "condition can remain as is with no

possibility of adverse effects," and (b) "absence of a weld on several frames will have no effect on the seismic capability of the equipment." The document also identifies individuals responsible for conducting the evaluation. The NRC inspector was informed that one of them is the Manager-Product Analysis and Qualification. The document reflected only one signature and no other documents were presented to support the aforementioned statements.

The foregoing information was extracted from Vendor Inspection Report No. 99900740/83-01. The NRC inspector was informed that the enclosures that exhibited the top corner braces with cutouts were manufactured at the Chalfont, Pennsylvania, facility. The NRC inspector was also informed that: (1) inspection of the remaining 26 enclosures at MHNS revealed apparent gas metal-arc spotwelds at locations where resistance spotwelds were missing; and (2) the decision to proceed with correction by placement of equivalent arc welds remained intact because the burden of proving/disproving the existence and adequacy of the gas metal-arc spotwelds was too great.

The 10 CFR Part 21 report states, in part, "The arc welds were not added at the time of fabrication." A BBE letter dated November 18, 1982, to Sargent and Lundy states, in part, "To correct the Nonconformance (sic) of missing weld inspection records, the switchgear will be sample inspected in the field [MHNS] for spotweld and equivalent arc weld locations in accordance with BBE drawings and inspection criteria." The NRC inspector did not determine why the arc welds were not added during fabrication and will evaluate this during the inspection scheduled at the Spring House facility, April 16-19, 1984.

Public Service of Indiana Corrective Action Request No. 283PSI0080 exhibits a date of October 28, 1983, for "Verification of Completion of Corrective Action"; however, the body of the report is not clear regarding addition of the arc welds to the remaining 26 enclosures.

The inspection at the PNPP revealed fewer missing spotwelds than the inspection at the MHNS. However, there is disagreement between the Cleveland Electric Illuminating (CEI) Company report to the NRC, Region III and BBE letters to CEI. The NRC inspector was informed that the enclosures for MHNS were manufactured at the Chalfont, Pennsylvania, facility; consequently, further evaluation will be conducted during the inspection scheduled for April 16-19, 1984.

Preventive measures regarding spotwelds include revision of drawings and engineering standards, and initiation and revision of a quality assurance procedure for inspection of spotwelds.

During this area of the inspection, it was noted that two incomplete engineering standards were filed in the engineering manuals, but were corrected. This is detailed in paragraph B.4.

During the exit interview, the NRC inspector stated that the nonconformance would not require a corrective action response because the documents had been corrected. Subsequent to the inspection, the NRC inspector reversed that decision due to the limited review of engineering standards and a lack of confidence that the incompletion was restricted to the observed documents. This reversal was the subject of a telephonic message provided to Mr. E. W. Rhoads via his secretary, on April 12, 1984.

2. Crimping Tools - The NRC inspector noted 5 crimping tools currently in use: S/Ns 103, 108, 111, 113, and 153. Located with record cards were two typed sheets of paper listing the crimping tools currently in use and the date of their last calibration; however, the list did not contain the last calibration date for all listed tools. For example, the list showed no calibration date for S/N 153, while the record card showed the last calibration occurred in August 1983. The record card for this tool was filed with those tools not in use. The QA Manager stated that S/N 153 had not been calibrated because it was assigned to an individual who was on leave and the tool was presumed to be locked up in the individual's tool box.

In addition, it was noted that the tools not in use were stored in a box at another location of the plant. Most of these tools had orange tags on the handles that had "ok" and initials written on them. However, in the same box were tools that did not have tags. It was explained that the tools in the box were calibrated tools not in use that could be checked out for use in the plant. It was also stated that the tools without tags were also calibrated tools but there was no explanation as to why these tools did not have orange tags. The apparent lack of controls regarding crimping tools will be evaluated during a future inspection.

3. Methodology - In an effort to assess the effectiveness of the corrective actions and preventive measures, the following areas were evaluated: (a) manufacturing process control, (b) change control, (c) control of nonconformances and corrective action, (d) control of measuring and test equipment, (e) audits, and (f) implementation of 10 CFR Part 21.

The inspection was accomplished by evaluating the following documents for requirements and/or implementation of requirements: 7 drawings, 3 specifications, 23 procedures, 1 quality assurance manual, 9 internal memoranda, 10 letters, and numerous other documents identified as : (a) logs, (b) history cards, (c) electrical bills of material, (d) checklists, (e) inspection reports, (f) move tickets, (g) calibration records, and (h) workmanship criteria.

ORGANIZATION: BBC BROWN BOVERI, INCORPORATED
SWITCHGEAR PRODUCTS DIVISION
SPRING HOUSE, PENNSYLVANIA

REPORT NO.: 99900740/84-01	INSPECTION DATE(S): 4/16-19/84	INSPECTION ON-SITE HOURS: 32

CORRESPONDENCE ADDRESS: BBC Brown Boveri, Incorporated
Switchgear Products Division
ATTN: Mr. D. D. Duvall
Vice President-BBC Brown Boveri, Inc.
Norristown Road and Route 309
Spring House, Pennsylvania
ORGANIZATIONAL CONTACT: Mr. E. W. Rhoads, Manager, Quality Assurance
TELEPHONE NUMBER: (215) 628/7400

PRINCIPAL PRODUCT: Switchgear.

NUCLEAR INDUSTRY ACTIVITY: This information was not obtained during this inspection.

ASSIGNED INSPECTOR: W. E. Foster — 5/18/84
W. E. Foster, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): D. A. Weber, EG&G Consultant

APPROVED BY: W. E. Foster for — 5/18/84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Appendix B to 10 CFR Part 50 and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the issuance of 10 CFR Part 50.55(e) reports. The reports pertained to: (1) potential deficiency of secondary disconnects in 480 volt switchgear that had been furnished to the Shearon Harris Nuclear Power Plant (SHNPP), Units 1 and 2; (2) deficient welds in hardware that had been furnished to the: (a) Perry Nuclear Power Plant (PNPP), Units 1 and 2; and (b) SHNPP, Units 1 and 2;
(cont. on next page)

PLANT SITE APPLICABILITY:

(a) Secondary disconnect deficiency, 50-400; (b) deficient welds, 50-440, 50-441, 50-400, 50-401; and (c) deficient ITE-32D relays, 50-450.

ORGANIZATION: BBC BROWN BOVERI, INCORPORATED
SWITCHGEAR PRODUCTS DIVISION
SPRING HOUSE, PENNSYLVANIA

REPORT NO.: 99900740/84-01	INSPECTION RESULTS:	PAGE 2 of 6

SCOPE: (cont.) and (3) deficient ITE-32D relays in 4KV switchgear that had been furnished to the River Bend Station (RBS), Unit 1.

A. VIOLATIONS:

Contrary to Section 21.6 of 10 CFR Part 21 dated August 31, 1983, the posted notice identified the location where the full text of 10 CFR Part 21 was available for examination; however, the available copy of 10 CFR Part 21 was not current; the latest date reflected was February 25, 1981.

This is a Severity Level V violation (Supplement VII).

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.3.1.7 of Quality Assurance Procedure (QAP) 11.1, Revision 5, the ITE-32D and ITE-50 relays in the 67 relay circuits installed in the RBS 4KV switchgear had not been tested with rated current and/or voltage as required to determine proper operating characteristics and performance in the overall circuit. This requirement also existed in previous revisions of QAP 11.1.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.1 of QAP 10.7, Revision 3, the inspection records of crimped terminals did not contain evidence that the inspection was performed on a sample plan basis using MIL-STD-105D. For example, there was no evidence of the lot size or sample size.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (Report No. 82-01): Brown Boveri Electric, Incorporated (BBE) (currently identified as noted in the heading) had not prepared records of evaluations with respect to the deficiencies identified with the Westinghouse relays, Types CO-6 and SA-1.

   The NRC inspector verified that records of evaluation had been prepared by BBE for the Westinghouse relays, Types CO-6 and SA-1.

2. (Closed) Unresolved Item (Report No. 83-01): Lack of adequate supporting documentation regarding evaluation of nonconforming conditions, notification to customers, and corrective actions.

The NRC inspector verified that BBC had adequate supporting documentation regarding the above.

3. (Closed) Nonconformance (Report No. 82-01): BBE had not completed records of evaluation with respect to a wiring isolation discrepancy in the low voltage switchgear at the Palo Verde Nuclear Project and had not instructed their personnel to initiate records of evaluation when applicable.

   The NRC inspector verified that BBE had completed the record of evaluation and a procedure had been initiated.

4. (Closed) Nonconformance (Report No. 81-02): Crimped terminal lugs on nuclear switchgear had not been 100 percent inspected as required by the QAP 10.7, Revision 2.

   The NRC inspector verified that QAP 10.7, Revision 3, had deleted the requirement of 100 percent inspection and replaced it with an inspection sampling plan. However, the NRC inspector determined that records were nonexistent regarding conformance with the sampling plan. This has been identified as a nonconformance and is detailed in paragraph B.

5. (Closed) Nonconformances (Items C, D, and E, Report No. 99900329/84-01): These items involved jackshaft rework at the Tulsa, Oklahoma, facility and were revealed during the 1981 inspection at that facility. In an attempt to effect evaluation during the 1984 inspection, the NRC inspector was informed that records were no longer available at the Tulsa facility but were available at the Spring House, Pennsylvania, facility.

   In summary, the nonconformances were: (1) lack of company records to substantiate task accomplishment; (2) noninitiation of a Welding Procedure Specification (WPS) and Procedure Qualification Record for the welding performed; and (3) nonsubmittal of documents to the customer for approval 6 weeks prior to rework of jackshafts on Purchase Order No. Q262810.

   Records at Spring House did not address the total issues. The prime example-Brown Boveri's corrective action response letter dated July 29, 1981, indicated that the job specific welding procedure in conjunction with Welding Procedure A-2/77 constituted the WPS. This could not be verified by the NRC inspector because he was informed that the latter document is no longer available.

Despite the foregoing, the NRC inspector's review of the available records provided a measure of assurance that the customer was completely involved with the task. While details were not available, "NRC Inspections" was one of the topics on the agenda of the "QA/SCD Engineering Seminar" scheduled for November 19-20, 1981.

E. OTHER FINDINGS OR COMMENTS:

1. Followup on Regional Requests:

a. Carolina Power and Light Company (CP&L) filed a final 10 CFR Part 50.55(e) report on April 29, 1983, with the Nuclear Regulatory Commission, Region II (NRC, RII). The report indicated that a design deficiency existed in the secondary disconnects of 480 volt switchgear that had been furnished to SHNPP, Unit 1, from April 1982 to November 1982.

The NRC inspector was informed that the secondary disconnects were originally assembled with the circuit breaker cradles in Columbia, South Carolina. Later, the secondary disconnects were ordered separately for installation at the Chalfont, Pennsylvania, facility. In the meantime, the secondary disconnect receptable on the circuit breaker was modified but the disconnect on the cradle was not modified. This change was not detected at Chalfont because the devices used to check circuit breaker alignment were not modified.

The NRC inspector was unable to obtain documentation that reflected installation and inspection of the secondary disconnects on the circuit breakers and/or cradles furnished to CP&L and the effectivity point of the circuit breaker modification. This will be evaluated during a subsequent inspection at Columbia, South Carolina.

The NRC inspector verified the adequacy of the corrective action; however, the reason for the modification could not be verified and preventive measures could not be assessed; consequently, this item will remain open until such assessment has been accomplished.

b. CP&L filed a 10 CFR Part 50.55(e) report on June 3, 1983, with the NRC, RII. The report indicated that welding deficiencies (undersize, undercut, incomplete fusion, etc.) had been detected

in: (a) air terminal, (b) transformers, and (c) a current limiting reactor of 480 volt switchgear that had been furnished to SHNPP, Unit 1. The report stated that: (a) BBE had repaired major defects; (b) minor defects would be modeled in an impending seismic test; and (c) welding deficiencies had not been completely addressed by BBE.

The NRC inspector was informed that the welds in the air terminal and current limiting reactor chambers were made in Chalfont, the welding deficiencies were resolved satisfactorily at the plant site, and the records (documentation) are maintained at the site. Also, the welds in the transformer chamber were made at the Bland, Virginia, facility, were resolved by personnel from Bland at the plant site and the scheduled seismic test had not yet been performed. This item will remain open pending completion of the seismic test and an inspection at the Bland, Virginia, facility.

c. Gulf States Utilities (GSU) filed a 10 CFR Part 50.55(e) report on February 3, 1984, with the NRC, RIV. The report indicated that the JTE-32D relay primary current transformer windings T1 and T2 were found reversed. The ITE-32D directional relays are mounted in switchgear manufactured at Chalfont and supplied to RBS. The NRC inspector noted that paragraph 3.3.1.7 of QAP 11.1 requires each switchgear mounted relay to be tested with rated current and/or voltage to determine its operating characteristics and performance in the overall circuit. The NRC inspector further determined that the ITE-32D and companion ITE-50 relays (identified as a 67 Directional Time-Overcurrent Relay Circuit) installed in the RBS 4KV switchgear had not been tested with rated current and/or voltage as required.

This has been identified as a nonconformance and is detailed in paragraph B.

d. The Cleveland Electric Illuminating Company filed a 10 CFR Part 50.55(e) report on April 27, 1983, with the NRC, RIII. The report indicated that one low voltage switchgear enclosure was without the required spot or equivalent arc weld at the corner of the rear vertical and horizontal channels of equipment that had been furnished to PNPP. The report stated that BBE had elected to submit a rework/repair procedure rather than perform an evaluation to justify its usage.

The NRC inspector verified that BBE had submitted a rework/repair procedure.

2. Followup on 10 CFR Part 21 Reports: BBE filed 10 CFR Part 21 and followup reports dated April 27 and November 3, 1983, respectively, with the NRC, Headquarters. Both reports addressed problems with the Westinghouse manufactured Type SA-1 Relay. The initial report indicated that a silicon controlled rectifier in the trip output circuit could cause a random trip. The latter report identified a leaky tantalum capacitor and a repeat of previously identified problems. These relays had been furnished to several nuclear generating stations.

   BBC had notified its customers and informed them of the availability of corrective measures.

3. Implementation of 10 CFR Part 21: The NRC inspector verified the posting of Section 206 at the Chalfont facility and that the posting identified the location where the full text of 10 CFR Part 21 was available for examination. However, the available copy of 10 CFR Part 21 was not current; the latest date reflected was February 25, 1981. This has been identified as a violation.

4. Methodology: In an effort to assess the effectiveness of the corrective actions and preventive measures, the following areas were evaluated: (a) manufacturing process control, (b) nonconformances and corrective actions, (c) change control, and (d) records.

   The inspection was accomplished by evaluating the following documents for requirements and/or implementation of requirements: 10 drawings, 8 procedures, 18 internal memoranda, 1 letter, 4 quality control correction lists, 2 electrical bills of material, 6 records, and other related documents identified as specifications and catalogs. The findings associated with this activity are detailed in paragraphs A and B.

ORGANIZATION: BBC BROWN BOVERI, INC.
PROTECTIVE RELAY OPERATIONS
HORSHAM, PENNSYLVANIA

REPORT NO.: 99900743/84-01	INSPECTION DATE(S): 4/17-19/84	INSPECTION ON-SITE HOURS: 32

CORRESPONDENCE ADDRESS: BBC Brown Boveri, Inc.
Switchgear Products Division
ATTN: Mr. D. D. Duvall, Vice President-BBC, Inc.
Norristown Road and Route 309
Spring House, PA 19477

ORGANIZATIONAL CONTACT: Mr. R. R. Conrad, Manager - Quality Assurance
TELEPHONE NUMBER: 215/674-5990

PRINCIPAL PRODUCT: Protective relays.

NUCLEAR INDUSTRY ACTIVITY: Details were not obtained during this inspection; however, supplying spares and reworking delivered hardware are ongoing.

ASSIGNED INSPECTOR: W. E. Foster — 5/18/84
W. E. Foster, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): D. A. Weber, Consultant

APPROVED BY: W. E. Foster for — 5/18/84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Appendix B to 10 CFR Part 50 and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the issuance of 10 CFR Parts 21 and 50.55(e) reports. The latter reports pertained to: (1) a defective solid-state trip unit that had been furnished to Grand Gulf Nuclear Station Unit 1; and (2) defective TE-32D relays in 4kv switchgear that had been furnished to River Bend Station, Unit 1. The former reports (cont. on next page)

PLANT SITE APPLICABILITY: (a) Defective solid-state trip unit, 50-416; (b) Defective 4kv switchgear (ITE-32D), 50-458; (c) Possible misoperation of ITE-27N Undervoltage Relays, 50-438, 439, 50-390, 391, 50-259, 260, 50-296, 50-327, 328, 50-389, 50-458, 459, 50-397, and 50-245; and (d) Potential circuit overstress of ITE-27B Battery Ground Detector Relay, 50-458, 459, 50-424, 425, 426, 427, and 50-312.

ORGANIZATION: BBC BROWN BOVERI, INC.
PROTECTIVE RELAY OPERATIONS
HORSHAM, PENNSYLVANIA

REPORT NO.: 99900743/84-01	INSPECTION RESULTS:	PAGE 2 of 8

SCOPE: (cont.) pertained to: (1) possible misoperation of ITE-27N undervoltage relays that had been furnished to numerous nuclear generating stations; and (2) potential circuit overstress of ITE-27B battery ground detector relays that had been furnished for use at numerous nuclear generating stations.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Engineering Standard Practices (ESP) No. 203 dated April 15, 1982, drawing release form No. 840047, dated April 16, 1984, had not been processed as required. The release form displayed initials of the same person in the "Design Engineer" and "Engineering Manager" spaces as opposed to different persons as indicated in the ESP.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 3 of the Quality Assurance Manual (QAM), dated January 5, 1984 (and its previous edition), the following drawing revisions had not been checked and approved as evidenced by the lack of initials or signatures in appropriate spaces of revision numbers 1 through 4, dated September 1983 to April 1984, for Drawing Nos. 611262 and 611709. Also, Drawing No. 612239-A, dated April 16, 1984, had the initials of the same person in the "Checked" and "Approved" spaces

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.3 of engineering test specification No. RC-3123A, dated September 14, 1983, pickup points had not been recorded on data sheets for ITE-27N relays serial Nos. 1124 through 1134, which had been reworked the latter part of March 1984, installing resistors (R11 and R12) of different values.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.5 of Quality Assurance Procedure (QAP) No. 10.1H dated November 19, 1978, completed item inspection and test had not provided a measure of overall quality of the ITE-32D relays furnished to the Chalfont operation for installation into switchgear destined for River Bend Nuclear Station as evidenced by nonoperability of the relays at River Bend.

ORGANIZATION: BBC BROWN BOVERI, INC.
PROTECTIVE RELAY OPERATIONS
HORSHAM, PENNSYLVANIA

REPORT NO.: 99900743/84-01	INSPECTION RESULTS:	PAGE 3 of 8

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (Item A, Report No. 82-01): Data had not been entered in the data sheets, dated March 27, 1982, to indicate the change to 48VDC control power. The voltage value recorded in the data sheet, dated March 27, 1982, for catalog No. 211B6175D, serial No. 3001, did not satisfy the minimum requirement of 115 volts.

   The NRC inspector verified that appropriate masters of test procedures and data sheets had been revised. The identified data sheets had not been corrected; the Quality Assurance (QA) Manager informed the NRC inspector that he did not understand this was to be accomplished. The QA Manager committed to correct the identified documents; during the exit meeting he informed the NRC inspector that the task was underway.

2. (Closed) Nonconformance (Item B, Report No. 82-01): Engineering drawings released to accomplish modifications of customer returned hardware had not been controlled in accordance with QAP No. 3.4H, Revision 0.

   The NRC inspector did not evaluate engineering drawings released to accomplish modifications of customer returned hardware during this inspection. Based upon the corrective action response letter, dated January 11, 1983, and the interview with the QA Manager, it is the NRC inspector's judgment that modification drawings will be controlled in the same manner as other released drawings.

3. (Closed) Nonconformance (Item C, Report No. 82-01): Wave solder and subassembly inspections had not been documented as required by QAP No. 10.9H, Revision 0.

   The NRC inspector verified that QAP No. 10.9H has been revised to reflect wave solder touch up rather than wave solder inspection. It was management's decision that touch-up more accurately defined the task.

4. (Closed) Nonconformance (Item D, Report No. 82-01): Reinspection of affected characteristics (component removal/replacement and hand soldering) had not been performed on hardware returned by the Tennessee Valley Authority for modification.

   The NRC inspector verified that QAP No. 16.4H dated January 28, 1983, had been initiated to control modification programs including reinspection.

5. (Closed) Nonconformance (Item E, Report No. 82-01): Management and supervisory personnel had not assured that all activities affecting quality had been prescribed in a documented form.

   The NRC inspector verified that QAP indices had been revised to reflect active documents and personnel had been reminded that procedures must reflect practices.

6. (Closed) Nonconformance (Item A, Report No. 83-01): Drawing No. 605143, Revision 9, had not been signed and dated by the engineer requesting the work.

   The NRC inspector verified that: (1) the aforementioned drawing had been revised and reflected appropriate initials; and (2) a memorandum had been initiated reinstructing personnel to comply with revision control procedures.

7. (Closed) Nonconformance (Item B, Report No. 83-01): The QAM had not established measures for evaluation of retained documented test results by responsible authority to assure that test requirements had been satisfied.

   The NRC inspector verified that the QAM had been clarified by addition of a statement that shows the interface with the "Quality Assurance Certification Procedure."

E. OTHER FINDINGS OR COMMENTS:

1. Followup on Regional Requests -

   a. Mississippi Power and Light (MP&L) Company filed a final 10 CFR Part 21 report on March 30, 1984, with the Nuclear Regulatory Commission, Region II (NRC, RII). The report indicated that a capacitor of less than required voltage

rating had been installed in a solid state trip unit that had been furnished to the Grand Gulf Nuclear Station, Unit 1. Further, the report indicated that the deficiency was limited to a single unit which was one of several that had been upgraded by Brown Boveri.

During this inspection, the following conditions were noted: (a) the capacitor was of the improper value also, (b) the particular trip device had been subjected to audit inspection; and (c) the incorrect capacitor had not been detected by the installer, tester, or auditor.

Records indicate that the device was reworked and returned to MP&L. The NRC inspector was informed that activities to preclude recurrence included: (a) verbal instructions to testers to use controlled stock only for Class 1E hardware; and (b) purge of stock. In response to query, the NRC inspector was informed that the auditor is no longer at the facility.

b. Gulf States Utilities (GSU) Company filed an interim discrepancy report on February 3, 1984, with the NRC, RIV. The report indicated that an evaluation was in progress concerning ITE-32D relays. On February 24, 1984, GSU telephonically reported a potential 10 CFR Part 50.55(e) condition stating that BBC furnished switchgear was wired incorrectly.

A BBC letter dated January 20, 1984, to the NRC, Headquarters, states, in part:

> It was reported that the ITE 32D tripped instantly on being energized. It was determined that the primary current winding of transformers T1 and T2 were reversed. GSU corrected this condition in the field with instructions from Brown Boveri. Four (4) ITE 32D relays were involved.
>
> This assembly error was not picked up in test due possibly to a polarity or contact monitoring mistake. Test methods are being changed to provide better controls to prevent a recurrence.

During this inspection, the following conditions were noted: (a) the engineering drawing for silk screen and the remainder of the printed circuit boards reflected reversed polarity for the connection of transformers T1 and T2; test data sheets for the relays were dated May 21, 1980; (c) the test specification used to test the ITE-32D relays reflected numerous penciled changes; (d) the test specification required that trip direction be recorded; however, it was only verified as evidenced by a check in the data sheets as opposed to an arrow to symbolize direction; and (e) the silk screen drawing had been revised from the correct to the incorrect polarity indication for T1 and T2 connections. The current revision is correct. The NRC inspector was informed that: (a) the reason for the change of the drawing which resulted in the incorrect configuration could not be determined; (b) an engineering memorandum had been in existence during manufacture (May 1980) to provide instructions for connecting T1 and T2 correctly; and (c) testing should have detected the reversal.

Preventive measures included: (a) stock purge; (b) purchasing correct printed circuit boards, and (c) reviewing test methods.

c. BBC filed a 10 CFR Part 21 report dated March 13, 1984, with the NRC, Headquarters. The report indicated that BBC had "determined that there is a possibility of misoperation of the ITE-27N Undervoltage Relay" by its "failure to drop out on certain undervoltage conditions." The report states that the following conditions must be satisfied to effect misoperation: "1) The AC signal voltage is above the PICKUP level set on the relay. 2) There is a sudden loss of the AC voltage to below 20% of the set pickup level. 3) The sudden loss of AC voltage must occur on a certain portion of the AC 60 Hz. waveform."

The report also states, "No reports of such misoperation have been received from the users listed in the attachment [locations of Class 1E applications]. This problem is due to excessive feedback around operational amplifier U2."

Records indicate that: (a) customers had been notified; (b) eleven relays for Millstone Nuclear Power Station, Unit 1, had been reworked and returned to the customer (Gould, Incorporated-Finksburg, Maryland); and (c) the Tennessee Valley Authority will return 40 relays for rework from the Watts Bar Nuclear Plant to BBC.

In response to query, the NRC inspector was informed that the potential misoperation was not detected during design activity due to the difficulty of forseeing that the three occurrences would align. The NRC inspector was made aware that BBC testing detected the problem. Preventive measures include redesign and attendant drawing revisions.

2. Followup on a 10 CFR Part 21 Report - BBC filed a 10 CFR Part 21 report dated January 5, 1984, with the NRC, Headquarters. The report indicated that a recent design review of the ITE-27B battery ground detector relay revealed "that a portion of the solid-state circuitry can be overstressed under certain operating conditions." The report also states that: (1) the relay normally operates an alarm circuit; (2) no failures had been reported; and (3) nonanticipation that a failure could create a substantial safety hazard; "however operations personnel should be alerted to this potential condition to avoid confusion."

   The NRC inspector was informed that: (1) only one customer has contacted BBC and has elected replacement rather than modification; and (2) testing activities have been reviewed with the intent of identifying and revising areas that do not adequately duplicate service life.

3. Implementation of 10 CFR Part 21 - The NRC inspector verified that the latest edition of 10 CFR Part 21 was in the possession of the Quality Assurance Manager. The posted notice did not contain information regarding the location of 10 CFR Part 21 and applicable procedures; however, this information was inserted within 5 minutes of its being identified.

4. Methodology - In an effort to assess the effectiveness of the corrective actions and preventive measures, the following areas were evaluated: (a) change control, (b) manufacturing process control, (c) nonconformances and corrective action, and (d) records.

ORGANIZATION: BBC BROWN BOVERI, INC.
PROTECTIVE RELAY OPERATIONS
HORSHAM, PENNSYLVANIA

REPORT NO.: 99900743/84-01	INSPECTION RESULTS:	PAGE 8 of 8

The inspection was accomplished by evaluating the following documents for requirements and/or implementation of requirements: six drawings, six procedures, two internal memoranda, five letters, one quality assurance manual, one purchase order, five test specifications, three engineering standard practices, two certificates of conformance, and numerous other documents identified as: inventory authorization records, data packages, and design certification files. Findings associated with this activity are detailed in paragraph B.

ORGANIZATION: BABCOCK & WILCOX, A MCDERMOTT COMPANY
UTILITY POWER GENERATION DIVISION
LYNCHBURG, VIRGINIA

REPORT NO.: 99900400/84-01	INSPECTION DATE(S): 3/13-16/84	INSPECTION ON-SITE HOURS: 28

CORRESPONDENCE ADDRESS: Babcock & Wilcox, A McDermott Company
Utility Power Generation Division
ATTN: Mr. D. E. Guilbert, Vice President and
General Manager
P. O. Box 1260
Lynchburg, Virginia 24505
ORGANIZATIONAL CONTACT: Mr. F. R. Fahland, Nuclear QA Manager
TELEPHONE NUMBER: (804) 385-2597

PRINCIPAL PRODUCT: Nuclear steam supply systems.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities is approximately 58 percent of the 2505 employees of the Utility Power Generation Division. Principal activities include the design and procurement of five projects, Bellefonte, Midland, and Washington Public Power Supply System, and providing engineering services under service contracts and fuel reload contracts.

ASSIGNED INSPECTOR: Richard P. Nguyen 4-4-84
R. P. Nguyen, Reactor Systems Section (RSS) Date

OTHER INSPECTOR(S):

APPROVED BY: C. J. Hale 4/9/84
C. J. Hale, Acting Chief, RSS Date

INSPECTION BASES AND SCOPE:

A. BASES: Topical report BAW-10096A.

B. SCOPE: Followup on previous inspection findings and development, certification, and use of computer codes.

PLANT SITE APPLICABILITY:

50-438 and 50-439

ORGANIZATION: BABCOCK & WILCOX, A MCDERMOTT COMPANY
UTILITY POWER GENERATION DIVISION
LYNCHBURG, VIRGINIA

REPORT NO.: 99900400/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Section 5 of topical report BAW-10096A and the requirements of procedure NPG-0902-06: (1) the certification file of program R4ANSYS/0D did not contain the authorization form No. BWNP-20367, and (2) no written notification was provided when the computer code R4ANSYS/0B was removed from the active computer program information listing.

2. Contrary to Section 5 of Topical Report BAW-10096A and the requirements of procedure NPG-0903-03, the manuals of programs FELCON version 17/2 and RADAR version 23/1 did not have signed title pages to indicate that these manuals had been reviewed by the responsible managers.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-01): Certain records of the verification of the computer program ANSYS were not maintained in records management file 2A4, but were stored in an uncontrolled file.

During this inspection, the inspector verified that the certification file for computer program ANSYS was placed in the records center and the records of additional training of personnel in this area were available. In addition, the NRC inspector also verified that:

a. A total of 47 active and 23 inactive computer code QA files were reviewed by Babcock & Wilcox (B&W) to assure that proper documentation was in place.

b. All these QA files were transmitted to central files for duplication.

Within this area of the inspection, one nonconformance was identified (see paragraph B.1 above).

2. (Closed) Nonconformance (83-02): The full certified version 17.0 of the STALUM computer program did not have the controlled manual.

   The NRC inspector verified that all actions committed to in B&W response letter to NRC Inspection Report No. 99900400/83-02 has been taken as follows:

   a. The STALUM program users manual, NPGD-TM-376, was updated by Revision T for version 17.0 on October 14, 1983, and released after certification.

   b. No information was entered into the computer program information (CPI) listing until after completion of the certification documentation and publication and distribution of the controlled program manual.

3. (Closed) Nonconformance (83-02): B&W failed to identify the incorrect values listed in the stiffness matrix for bar member as tabulated on page 2.3 of the STALUM computer program manual.

   During this inspection, the inspector verified that the following actions had been taken by B&W:

   a. The incorrect value listed in the stiffness matrix was corrected in Revision T to manual No. NPGD-TM-376 on October 14, 1983.

   b. Engineering and programming personnel were directed by their managers to put additional emphasis on reviewing the content and accuracy of computer program documentation (B&W Internal Memo No. 2A231-GJE, dated January 20, 1984).

4. (Closed) Nonconformance (83-02): Steps were not taken to notify users, perform an evaluation, and determine and document the need to remove or revise the certification level of STALUM program when an error was discovered.

   During this inspection, the NRC verified the following:

   a. On October 25, 1983, the responsible engineer notified, in writing, the responsible unit manager, requesting the assessment of the impact of error.

b. On November 8, 1983, the unit manager notified the user's manager, in writing, that the impact of the error had been analyzed.

c. The analysis was documented to the responsible engineer on January 23, 1984.

d. Appropriate training was provided to the responsible engineers on January 20, 1984.

5. (Open) Nonconformance (83-02): B&W failed to verify that the NUPIPE program functions are consistent with the equations and models as described in the program.

The inspector verified the commitments made by B&W in their response to NRC Inspection Report No. 99900400/83-02 as follows:

a. Four test cases on two models were run using NUPIPE program and the answers were compared with hand calculations.

b. An additional fifth test case reflecting an actual B&W piping run was executed to demonstrate NUPIPE capability to successfully execute large models.

c. The waiver of certification for computer program equations and models, consistent with program functions, was executed on January 11, 1984.

d. Additional hand calculations for a branch connection configuration was made and placed in the NUPIPE certification file.

A further review of the NUPIPE certification file indicated that the new certification date is February 29, 1984; however, the CPI listing dated January 27, 1984, still lists March 14, 1983, as the certification date. This item, therefore, remains open pending the revision of the CPI listing to reflect the new certification date of February 29, 1984.

6. (Open) Nonconformance (83-02): B&W failed to: (1) document the calculations performed to establish the sump pH values used in Tables 6.3-1 and 6.3-2 of the Bellefonte FSAR, and (2) consider the effect of "dead" volumes on these values.

The NRC verified that:

a. B&W calculation document No. 32-4578-00, "SYMMET3 Input Data - Design Calculation," was revised to add the input and output results.

b. Mixing of fluids from the reactor building spray and reactor coolant system in the emergency sump was assumed in the calculation code.

c. A notation was added to the calculation file stating that the basis for the reactor building sump pH values do not now agree with the reactor building cavity design in that complete mixing of all fluids in the emergency sumps do not occur.

d. Training of the system design engineering unit in the use of procedure No. NPG-0402-01, Revision 17, "Preparing and Processing VPGD Calculations," was conducted on January 22, 1984.

e. B&W is working with TVA to solve the sump pH imbalance problem.

f. As part of corrective action, B&W systems design engineering will review other analyses of the Bellefonte reactor building spray system that supports system performance, as reported in the FSAR, to confirm that the analyses performed reflect the actual plant design. This review will be completed by March 30, 1984, and the inspector will review this commitment in a future inspection.

E. OTHER FINDINGS OR COMMENTS:

Computer Codes: The purpose of this area of inspection is to verify the implementation of the B&W computer services quality assurance procedures by examining five additional computer programs.

The following is a summary of findings and comments within this area of inspection.

1. Program RADAR: According to B&W documentation, RADAR is a digital computer code designed to analyze slow reactor transients. It was written primarily to handle a reactor flow coastdown followed by a scram and is capable of analyzing the following types of problems:

a. Transient calculation of thermal and hydraulic knowing the flow as a function of time.

b. Transient calculation of thermal and hydraulic knowing the core pressure drop as a function of time.

During this inspection the NRC inspector reviewed the program certification file, the verification test cases, and the theoretical and user manuals to verify that B&W had followed their procedures in using computer programs for the engineering analysis and design of safety-related systems or components. The nonconformance identified in paragraph B.2 above related to this item.

2. Program FELCON: The B&W FELCON computer manual indicated that the general purpose of this computer code is to solve the thermal conduction problems by finite element method. The problem is to determine the temperature distribution of a complex two-dimensional body with various boundary conditions.

The inspector examined the certification file for the above-mentioned computer program to verify it contained: (1) a description of the program version and option validated; (2) test problems, including boundary condition, mathematical models, and key parameters; and (3) an evaluation of the program validity with an analysis of any identified errors.

One nonconformance was identified within this area of inspection (see paragraph B.2 above).

3. Programs LYNX2, CONTEMP-LT, and CRAFT2: The review of LYNX2, CONTEMP-LT, and CRAFT2 program manuals revealed the following:

a. LYNX2 is used to perform a thermal-hydraulic design analysis of a large array of rods and subchannels with interbundle and intersubchannel crossflow.

b. CONTEMP-LT performs the analysis for reactor containment pressure-temperature.

c. CRAFT2 analyses the transient response of a water reactor to a loss-of-coolant.

This review of the certification files and program manuals of these computer codes indicated that B&W had followed their procedures and instructions in development, certification, and use of the above mentioned computer programs.

ORGANIZATION: BABCOCK & WILCOX, A MCDERMOTT COMPANY
UTILITY POWER GENERATION DIVISION
LYNCHBURG, VIRGINIA

REPORT NO.: 99900400/84-02	INSPECTION DATE(S): 4/30-5/4/84	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: Babcock & Wilcox, A McDermott Company
Utility Power Generation Division
ATTN: Mr. D. E. Guilbert, Vice President
and General Manager
P. O. Box 1260
Lynchburg, Virginia 24505
ORGANIZATIONAL CONTACT: Mr. F. R. Fahland, Nuclear QA Manager
TELEPHONE NUMBER: (804) 385-2597

PRINCIPAL PRODUCT: Nuclear steam supply systems.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities is approximately 58 percent of the Utility Power Generation Division. Principal activities include the design and procurement of five projects, Bellefonte, Units 1 and 2; Midland, Units 1 and 2; and Washington Public Power Supply System, Unit 1 and providing engineering services under contracts and fuel reload contracts.

ASSIGNED INSPECTOR: A. R. Johnson, Equipment Qualification Section (EQS) — Date: 5/30/84

OTHER INSPECTOR(S): J. Benson, NRC Consultant (Sandia National Laboratory)

APPROVED BY: C. J. Hale, (Acting) Chief, EQS — Date: 5/30/84

INSPECTION BASES AND SCOPE:

A. BASES: Topical report BAW-10096A, Revision 4.

B. SCOPE: Evaluation of equipment qualification (EQ) documentation on selected safety-related items used within the containment and harsh environment during and following a loss-of-coolant accident (LOCA) or high energy line break (HELB).

PLANT SITE APPLICABILITY:

50-269, 50-270, 50-287, 50-329, 50-330, 50-438, 50-439, and 50-460.

ORGANIZATION: BABCOCK & WILCOX, A MCDERMOTT COMPANY
UTILITY POWER GENERATION DIVISION
LYNCHBURG, VIRGINIA

REPORT NO.: 99900400/84-02	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance (84-01): The certification file of program R4ANSYS/OD did not contain the authorization form No. BWNP-20367, and no written notification was provided when the computer code R4ANSYS/OB was removed from the active computer program information listing.

   This item will be reviewed during a subsequent inspection.

2. (Open) Nonconformance (84-01): The manuals of programs FELCON version 17/2 and RADAR version 23/1 did not have signed title pages to indicate that these manuals had been reviewed by the responsible managers.

   This item will be reviewed during a subsequent inspection.

3. (Open) Nonconformance (83-02): Babcock & Wilcox (B&W) failed to verify that the NUPIPE program functions are consistent with the equations and models as described in the program. The commitments made by B&W in their response to NRC Inspection Report No. 99900400/83-02 were verified during the NRC inspection of March 13-16, 1984 (Inspection Report No. 99900400/84-01).

   A further review during the 84-01 NRC inspection indicated that the new certification date was February 29, 1984; however, the CPI listing dated January 27, 1984, still listed March 14, 1983, as the certification date. This item will be reviewed during a subsequent inspection.

4. (Open) Nonconformance (83-02): B&W failed to: (1) document the calculations performed to establish the sump pH values used in Tables 6.3-1 and 6.3-2 of the Bellefonte FSAR, and (2) consider the effect of "dead" volumes on these values. The commitments made by B&W in their response to NRC Inspection Report No. 99900400/83-02 were verified during the 84-01 NRC inspection.

   B&W is working with TVA to solve the sump pH imbalance problem. As part of corrective action, B&W systems design engineering will review other analyses of the Bellefonte reactor building spray system that supports system performance, as reported in the FSAR, to confirm that the analyses performed reflect the actual plant design. This item will be reviewed during a subsequent inspection.

E. OTHER FINDINGS OR COMMENTS:

1. The NRC inspector and Sandia National Laboratory (SNL) consultant (NRC inspection team) evaluated five EQ documentation packages to determine whether they met regulatory requirements of 10 CFR Part 50, Appendix B, NUREG 0588, 10 CFR Part 50.49, Reg. Guide 1.89, and the requirements of IEEE 323-1974 and IEEE 382-1980. The five EQ documentation packages of safety-related equipment reviewed were used within the containment/harsh environment during and following a LOCA/HELB. The NRC inspection team performed a technical evaluation and review of B&W's methodology and engineering analysis as applied to the EQ documentation packages in certifying licensee's safety-related Class 1E incore thermocouple and connector assemblies, pressurizer heater connector assemblies, and in-containment type actuator assemblies for their intended use.

   All the above Class 1E equipment was included within the B&W scope of supply. The EQ documentation represented type testing having been, and currently undergoing testing, at National Technical Systems - Hartwood, Wyle Laboratories - Huntsville, and Limitorque Corporation - Lynchburg. The NRC inspection team's review included examination of B&W qualification requirements specifications, equipment specifications, service acquisition specifications, QA specifications, applicable document lists, QA audit plans, QA audit reports, technical audit items checklists, EQ implementation review checklists, qualification review and criteria checklists, notice of deviations, laboratory test reports, laboratory test procedures, document release notices, purchase orders, and various letters involving type testing of Class 1E equipment.

The EQ documentation packages were examined to verify the following:

a. The test equipment included a description of all materials, parts, and subcomponents.

b. Equipment interfaces were described.

c. The same equipment was used for all phases of testing and represented a standard production item.

d. Evidence that tests were performed in accordance with a written test procedure.

e. Test acceptance criteria were established as described in the applicable codes, standards, and B&W specifications.

f. All prerequisites for the given test, as outlined in Gilbert/Commonwealth specifications, letters, and contracts with the licensee have been met.

g. Environmental conditions were established and described; e.g., pressure and temperature profiles, radiation, and thermal accelerated aging factors.

h. Test equipment and instrumentation were described for recording test data.

i. Test results were adequately documented and reviewed/evaluated by B&W to assure that test requirements had been satisfied.

During the inspection it was observed by the NRC inspection team that B&W's qualification review and criteria checklists, used by B&W engineering during their supplier EQ document reviews (review of test procedures, test plans, test reports, etc.) were not controlled. These checklists did meet the requirements of NUREG 0588, 10 CFR Part 50.49, and IEEE 323; however, they did not require review and approval by the engineering project and QA managers nor were they included in the EQ documentation packages. B&W is in the process of formally controlling their qualification review and criteria checklists.

No nonconformances were identified.

ORGANIZATION: BABCOCK & WILCOX, A MCDERMOTT COMPANY
UTILITY POWER GENERATION DIVISION
LYNCHBURG, VIRGINIA

REPORT NO.: 99900400/84-02	INSPECTION RESULTS:	PAGE 5 of 5

2. The NRC inspection team reviewed the B&W procurement activities which assure control of the licensee's procured services through supplier inspections, surveys, and source audits. The B&W supplier audit checklists, used by the B&W QA audit and program department, addressed the requirements of the B&W service acquisition and qualification requirements specifications. The test program requirements of these B&W specifications satisfied the regulatory requirements of Reg. Guide 1.89,. Reg. Guide 1.97, Reg. Guide 1.100, 10 CFR Part 50.49, NUREG 0588, and industry standards IEEE 323/344/382.

No nonconformances were identified.

ORGANIZATION: THE BAHNSON COMPANY
WINSTON-SALEM, NORTH CAROLINA

REPORT NO.: 99900791/84-01	INSPECTION DATE: 2/2/84	INSPECTION ON-SITE HOURS: 12

CORRESPONDENCE ADDRESS: The Bahnson Company
ATTN: Mr. John D. Canup
Quality Assurance Manager
P. O. Box 10458
Winston-Salem, North Carolina 27108

ORGANIZATIONAL CONTACT: Mr. J. D. Canup, Quality Assurance Manager
TELEPHONE NUMBER: (919) 724-1581

PRINCIPAL PRODUCT: Heating, Ventilation, and Air Conditioning (HVAC) Components

NUCLEAR INDUSTRY ACTIVITY: Commercial nuclear production of The Bahnson Company totals less than 1% of the company production.

ASSIGNED INSPECTOR: E. W. Merschoff, Senior Vendor Program Inspector — 4/17/84 Date

OTHER INSPECTOR: E. Baker, Vendor Program Inspector

APPROVED BY: U. Potapovs, Chief, Vendor Program Branch — 4-20-84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made in order to follow-up on previous inspection findings from inspections at The Bahnson Company (82-01) and the Millstone 3 Nuclear Power Plant construction site (50-423/84-01); and in order to collect information needed to conduct an inspection of Bahnson supplied HVAC equipment at the Shearon Harris Nuclear Power Plant construction site (50-400/84-05).

PLANT SITE APPLICABILITY: Shoreham, Zimmer, Wolf Creek, Callaway, WPPSS 1 and 4, LaSalle County, V.C. Summer, Shearon Harris, Catawba, Oconee, TVA Yellow Creek, Palo Verde, Millstone 3, and Comanche Peak.

ORGANIZATION: THE BAHNSON COMPANY
WINSTON-SALEM, NORTH CAROLINA

REPORT NO.: 99900791/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS

None

B. NONCONFORMANCES:

1. 10 CFR 50, Appendix B, Criterion IX requires measures be established to control special processes, and paragraph 6.02 of Addendum A to Ebasco specification CAR-SH-BE-08, "Quality Assurance Requirements For Nuclear Safety Related HVAC Equipment", Revision 5 specifies the acceptance criteria for welds.

   Contrary to the above, welding is not adequately controlled to assure quality. Specifically, welds examined on air handling units at the Shearon Harris Nuclear Plant exhibited numerous defects which exceed the established acceptance criteria.

2. 10 CFR 50, Appendix B, Criterion VIII requires identification and control of material, and paragraph 6.04 of Addendum A to Ebasco specification CAR-SH-8E-08, "Quality Assurance Requirements For Nuclear Safety Related HVAC Equipment", Revision 5, requires that the Seller provide, "Certification that materials used conform to the requirements of appropriate ASTM material specifications."

   Contrary to the above, certification that materials used conform to the requirements of appropriate ASTM specifications are not always provided.

3. 10 CFR 50, Appendix B, Criterion VII and ANSI N.45.2.13 as referenced in Addendum A, "Quality Assurance Requirements for Nuclear Safety Related HVAC Equipment" require that suppliers of purchased equipment material or services be assessed prior to awarding a purchase order and at least once a year while supplying equipment.

   Contrary to the above, The Bahnson Company is not qualifying suppliers in accordance with their quality assurance procedures in that they did not survey the Charlotte facility of Piedmont Welding Supply Company prior to placing purchase orders with them in 1979 and did not perform an assessment of the Charlotte facility until 1983. The audit performed in 1983 revealed that the Charlotte facility, for all intent and purpose, did not have a quality program.

4. 10 CFR 50, Appendix B, Criterion V, as referenced in Addendum A to Ebasco specification CAR-SH-BE-08, "Quality Assurance Requirements for Nuclear Safety Related HVAC Equipment" requires that activities affecting quality be prescribed by documented instructions, procedures or drawings and contain criteria for determining that activities have been satisfactorily accomplished.

Contrary to the above, drawings do not contain criteria for determining that activities have been satisfactorily accomplished in that drawings for Unit AW-15 (2A-SA) supplied to SHNP did not contain a symbol indicating the type of weld used to fasten the cooling coil support channel to the roof panel and drawing 2908-1-30 for Millstone Unit 3HVC-ACU3A indicated that both self tapping stainless steel screws and 1/4" ASTM A193 Gr B8 bolts were to be used in mounting the cooling coils. The seismic qualification report called for 1/4" ASTM A193 Gr B8 bolts.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (Report No. 82-01): Procedures for evaluating deviations had not been generated by the vendor.

   The NRC inspector reviewed The Bahnson Company procedure, "Reporting of 10 CFR 21 Defects and Noncompliance", effective January 3, 1983 and determined that it meets the requirements of 10 CFR Part 21 for evaluating deviations.

2. (Closed) Nonconformance (Report No. 82-01): The Quality Assurance Program does not provide the control necessary to assure proper processing, inspection, and test of items during manufacturing, specifically:

   a The unit inspection sheet does not provide a means to track all operations and inspections required to be performed.

   b. There is no provision for documenting rejection of work which fails to comply with requirements.

   The NRC inspector reviewed changes made to the Quality Assurance Program to provide the control necessary to assure proper processing, inspection, and testing of items during manufacturing. Additionally, travelers prepared after these changes to the Quality Assurance program were made were reviewed to assure that inspections and operations were being tracked and that provisions were established for documenting rejectable work.

3. (Closed) Nonconformance (Report No. 82-01): An individual qualified to Magnetic Particle Level I was performing magnetic particle inspections of welds with no supervision from a Level II inspector.

The Bahnson Company no longer performs magnetic particle tests on its nuclear work and has no pending orders that will require it. However, The Bahnson Company has reemphasized the requirement in their quality assurance manual for proper supervision of personnel performing quality related tests and inspections.

E. OTHER FINDINGS OR COMMENTS

1. Welding is not adequately controlled to assure quality (Nonconformance 1). Specifically, during an inspection of Bahnson supplied equipment at the Shearon Harris Nuclear Plant (Inspection Report: 50-400/84-05) the following conditions were observed:

Identification	Defect Description
AH-5 (1A-SA)	Missing floor to frame welds, missing weld on cooling coil frame
AH-5 (1B-SB)	Lack of fusion, burn through on side panel frames
AH-6 (1A-SA)	None
AH-7 (1A-SA)	Crack in skin to frame weld; weld craters, lack of fusion, burn through, overlap in skin to frame welds and side panel frames
AH-15 (2A-SA)	No weld symbol on drawing for skin to cooling coil frame channel stitch weld
AH-17 (1-4A-SA)	Stitch fillet weld on fan housing did not extend to end of joint, end weld less than 2" long, lack of fusion, insufficient weld reinforcement, unconsumed weld rod protruding from weld joint, tack welds not removed or incorporated into final weld in panel frame welds and skin to frame welds
AH-17 (1-4B-SB)	In addition to nonconformances noted under AH-17 (1-4A-5A), floor panel joints were mismatched, roof skin to cooling coil frame welds were corroded, one fan housing anchor bolt missing, and 7 cooling coil mounting bolts were an incorrect material
AH-19 (1A-SA)	Missing nut on coiling coil mounting bolt, missing cooling coil mounting bolt

ORGANIZATION: THE BAHNSON COMPANY
WINSTON-SALEM, NORTH CAROLINA

REPORT NO.: 99900791/84-01	INSPECTION RESULTS:	PAGE 5 of 6

Identification	Defect Description
AH-20 (1A-SA)	None
AH-20 (1B-SB)	None
AH-25 (1X-SB)	Missing welds on cooling coil frame and side panel frames, undercut and lack of fusion on skin to frame welds, missing side panel frame welds, missing cooling coil mounting bolts
AH-28 (1A-SA)	Lack of fusion, weld craters in side panel frames and skin to frame welds, pitch on stitch weld more than 10" center to center
AH-28 (1B-SB)	Missing 2 welds on cooling coil channel
AH-29	Missing side panel frame welds, missing cooling coil mounting bolts, skin to frame welds less than 2" long
AH-85 (1A-SA)	None

(1) The Bahnson Company considers their drawings proprietary information and therefore CP&L did not have copies of the drawings. CP&L did request that The Bahnson Company supply drawings for three units selected by the NRC inspectors, units AH-15, AH-28, and AH-85. The remaining units were inspected for weld location and joint design based on typical weld details contained on the drawings for units AH-15, AH-28, and AH-85. At the time of this inspection, it could not be determined, except for units AH-15, AH-28, and AH-85, with 100% confidence that the welds listed as missing in the remaining units were required by the drawings for the specific unit. However, the welds listed as missing on side panel frames were typically required to be welded all the way around and were actually only welded on two or three sides. The licensee indicated that they would investigate the above matter and make a determination as to the number and location of missing welds. Pending NRC review of the licensee's investigation, this matter will be identified as unresolved item 400/84-05-03: "Missing HVAC Welds", except for those welds found missing on Unit AH-28 (1B-SB) [see para. 6.a.(3)].

(2) Inspection of weld quality was based on Ebasco Specification CAR-SH-BE-05, Addendum A, "Quality Assurance Requirements

for Nuclear Safety Related HVAC Equipment", which invokes AWS D1.1 and specifically prohibits cracks, craters, lack of fusion, and undercut which exceeds 1/64". As noted in the listing above there were seven Air Handling Units which did not meet the acceptance criteria for welds.

(3) The inspectors reviewed the documentation packages for the Air Handling Units to determine whether or not the missing welds in Unit 28 (1B-SB) and the weld quality nonconformances in the other units had been documented and evaluated. There was no documentation to indicate the nonconformances had ever been detected. The inspectors informed CP&L management that failure to identify and evaluate nonconforming welds in purchased equipment is contrary to 10 CFR 50, Appendix B, Criterion VII as implemented by CP&L PSAR section 1.8.5.7. 10 CFR 50.55(f)(1) requires CP&L to implement the QA program documented in the PSAR.

2. Certification that materials used conform to the requirements of appropriate ASTM specifications are not always provided (Nonconformance 2). For example, the Bahnson General Arrangement Drawing and Bill of Material (BOM) for Unit AH-17 (1-4A-SA) supplied to the Shearon Harris Nuclear Power Plant was not consistent with procurement specification requirements in the following instances:

   - Interior Casing (Fan and Coil Sections) specification required 20g ASTM A240, Type 304. The BOM specified 20ga 304 stainless steel with no ASTM designation.

   - Floor (Coil and Fan Sections) specification required 20ga ASTM A240, Type 304. The BOM specified 10ga 304 stainless with no ASTM designation.

   - Drain Pan Liner specification required 10ga ASTM A240, Type 304. The BOM specified 20ga stainless steel with no ASTM designation.

3. Followup on Millstone Nuclear Power Station Unit 3 unresolved items 423/84-01-02 and 423/84-01-03.

   During this inspection of the Bahnson facility, traceability for the ¼" SB-402 plate and weld filler material used to fabricate the Millstone HVAC units was confirmed by the NRC inspector. However, the as-built drawings used to establish this material traceability are not being stored in accordance with regulatory guide 1.88 and ANSI N45.2.9 because no such requirement was placed on The Bahnson Company by Millstone 3.

ORGANIZATION: BAILEY CONTROLS COMPANY
WICKLIFFE, OHIO

REPORT NO.: 99900224/84-01	INSPECTION DATE(S): 4/16-18/84	INSPECTION ON-SITE HOURS: 15

CORRESPONDENCE ADDRESS: Bailey Controls Company
ATTN: Mr. M. A. Keyes
President
29801 Euclid Avenue
Wickliffe, Ohio 44092

ORGANIZATIONAL CONTACT: Mr. K. J. Kohler, Manager of Contract Quality Engineering
TELEPHONE NUMBER: (216) 585-5800

PRINCIPAL PRODUCT: Recording and indicating devices, sensors, and control systems.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities by Bailey Controls Company (Bailey) is approximately 5 percent at all facilities. Major purchase order agreements are with Bechtel Corporation for Hope Creek Nuclear Generator Plant and Babcock and Wilcox for Bellefonte. These orders presently extend through the first quarter of 1986.

ASSIGNED INSPECTOR: J. W. Hamilton — 6-13-84
John W. Hamilton, Reactor Inspection Section (RIS) — Date

OTHER INSPECTOR(S):

APPROVED BY: I. Barnes — 6-13-84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of the 10 CFR Part 50.55(e) report by Tennesse Valley Authority (TVA) concerning electronic equipment containing: (1) built-in indicators with crazed plastic housings, (2) loose terminals, (3) damaged terminal studs, (4) improper size terminals used on 24 gauge wire, and (5) generally poor quality crimps.

PLANT SITE APPLICABILITY:

TVA-Bellefonte 10 CFR Part 50.55(e): 50-438/439.

ORGANIZATION: BAILEY CONTROLS COMPANY
WICKLIFFE, OHIO

REPORT NO.: 99900224/84-01	INSPECTION RESULTS:	PAGE 2 of 3

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-02): Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 2.0 of BCCO Administrative Procedure No. 1766-03, the safety concern classification was not identified on Preliminary Report of Safety Concerns (PROSC) Nos. 031, 033, 034, 035, and 037; thus, inhibiting the decision making process of the QA Director with respect to notification of the NRC within 48 hours.

   The NRC inspector reviewed a revised PROSC form that included a new classification for potential deviations for which the above PROSC numbers would have been included. The revised procedure that implemented the modified PROSC form and a recent PROSC were reviewed to assure implementation.

2. (Closed) Nonconformance (83-02): Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 2.0 of BCCO Instruction No. 1766-03-02, (a) a PROSC form was not prepared for PROSC File No. 032, (b) Section 6 of the closed out PROSC No. 034 was not filled out, and (c) an obsolete form was used for PROSC No. 036.

   The NRC inspector reviewed documentation that verified all PROSC files were properly evaluated and identified to the customers. The NRC inspector reviewed a revised procedure which included provisions to prevent recurrence.

ORGANIZATION: BAILEY CONTROLS COMPANY
WICKLIFFE, OHIO

REPORT NO.: 99900224/84-01	INSPECTION RESULTS:	PAGE 3 of 3

E. OTHER FINDINGS AND COMMENTS:

1. 10 CFR Part 50.55(e) Report:

a. Introduction: TVA reported to the NRC on August 15, 1982, that electronic equipment supplied by Bailey in the Reactor Protection System (RPS) and the Engineering Safety Features Actuation System (ESFAS) at Bellefonte Nuclear Plant, Units 1 and 2, contained some of the following defects: (1) built-in indicators with crazed plastic housings, (2) loose terminals, (3) damaged terminal studs, (4) improper size terminals used on 24 gauge wire, and (5) generally poor quality crimps.

An NRC inspection was conducted at the Bailey, Wickliffe, Ohio, facility in September 1983, the results of which are documented in NRC Inspection Report No. 99900224/83-02 and at the Bailey, Williamsport, Pennsylvania, facility in February 1984, the results of which are documented in NRC Inspection Report No. 99900851/84-01. It was determined that to evaluate preventive measures imposed on equipment purchased by TVA, an additional inspection at the Bailey facilities in Wickliffe, Ohio, would be necessary.

b. Findings: To verify that adequate actions had been taken to correct the conditions which caused the deficiency, the NRC inspector examined QA instructions concerning TVA-Bellefonte equipment, inspection requirements and repair and inspection records for 13 products which included inspections for those defects reported by the TVA-Bellefonte. Nonconformances were not identified during this portion of the inspection.

2. Control of Nonconformances and Corrective Action: The NRC inspector reviewed the Bailey procedures applicable to controlling nonconformances and verified corrective action was determined and the prescribed actions were completed for five discrepancies.

3. Implementation of 10 CFR Part 21: The NRC inspector verified Bailey had procedures for evaluation and reporting of defects. Posting requirements were verified by direct inspection in three areas of the facility. One report was reviewed to evaluate Bailey compliance.

ORGANIZATION: BAILEY CONTROLS COMPANY
WILLIAMSPORT, PENNSYLVANIA

REPORT NO.: 99900851/84-01	INSPECTION DATE(S): 2/14-17/84	INSPECTION ON-SITE HOURS: 24

CORRESPONDENCE ADDRESS: Bailey Controls Company
ATTN: Mr. J. Blankenship
Quality Control Manager
2300 Reach Road
Williamsport, Pennsylvania 17701

ORGANIZATIONAL CONTACT: Mr. J. Blankenship, Quality Control Manager
TELEPHONE NUMBER: (717) 323-8501

PRINCIPAL PRODUCT: Process control instrumentation and computer systems.

NUCLEAR INDUSTRY ACTIVITY: Approximately 5 percent at both Bailey Controls (BCC) facilities. Major purchase order agreements are with Bechtel Corporation for Hope Creek Nuclear Generating Plant and Babcock and Wilcox for Bellefonte. These orders presently extend through the first quarter of 1986.

ASSIGNED INSPECTOR: J. W. Hamilton — 1 May 84
John W. Hamilton, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S):

APPROVED BY: I. Barnes — 5-1-84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of the 10 CFR Part 50.55(e) report by Tennessee Valley Authority (TVA) concerning electronic equipment containing: (1) built-in indicators with crazed plastic housings, (2) loose terminals, (3) damaged terminal studs, (4) improper size terminals used on 24 gauge wire, and (5) poor quality crimps.

PLANT SITE APPLICABILITY:

TVA-Bellefonte 10 CFR Part 50.55(e): 50-438/439

ORGANIZATION: BAILEY CONTROLS COMPANY
WILLIAMSPORT, PENNSYLVANIA

REPORT NO.: 99900851/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

None

E. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 50.55(e) Report -

a. Introduction: TVA reported to the NRC on August 15, 1982, that electronic equipment supplied by BCC in the Reactor Protection System (RPS) and the Engineering Safety Features Actuation System (ESFAS) at Bellefonte Nuclear Plant, Units 1 and 2, contained the following defects: (1) built-in indicators with crazed plastic housings, (2) loose terminals, (3) damaged terminal studs, (4) improper size terminals used on 24 gauge wire, and (5) poor quality crimps.

An NRC inspection was conducted at BCC's Wickliff, Ohio, facility in September 1983, and the results are documented in NRC Inspection Report No. 99900224/83-02. It was determined that to evaluate the QA and engineering requirements imposed during fabrication and to evaluate the actions taken to correct the reported defects, an inspection at BCC's manufacturing facility in Williamsport, Pennsylvania, would be necessary.

b. Findings: During this NRC inspection, records were examined that revealed BCC had conducted an onsite review and confirmed the accuracy and completeness of the reported defects by TVA with the exception of the poor quality crimps and the loose indicator terminal nuts.

ORGANIZATION: BAILEY CONTROLS COMPANY
WILLIAMSPORT, PENNSYLVANIA

REPORT NO.: 99900851/84-01	INSPECTION RESULTS:	PAGE 3 of 4

The BCC report that was reviewed by the NRC inspector addressed the deficiency causes and concluded the deficiencies were not previously experienced at the BCC facilities, i.e., the defects have only been seen at the TVA-Bellefonte site.

BCC personnel stated that the reported loose indicator terminal nuts were not supported by the TVA-Bellefonte site investigation. BCC personnel discovered that what was being reported as loose terminal nuts were really terminal nuts that could be loosened by grasping with the hand, the wire connector, and applying a force that resulted in a counterclockwise rotation and subsequent loosening of the nut. BCC personnel stated that indicator terminal nuts that were loose, in the normal sense, have not been discovered at the TVA-Bellefonte site.

Additionally, the NRC inspector examined QA instructions that were in place to identify defective crimped terminals, loose terminals, and crazed plastic housings. Records of inspections were examined which identified the disposition of rejected indicators and crimps. The NRC inspector observed BCC personnel performing both manual and machine assisted crimping of terminals. Control of the tools and machines used in these operations was verified by review of BCC's metrology records.

The NRC inspector examined the BCC's evaluation that satisified the 10 CFR Part 21 requirement. This evaluation established that intermittent or open electrical connection of the indicators resulting from any of the reported defects would not fundamentally impair the RPS and ESFAS, and included a review of field service reports of similar equipment without defects at other nuclear power plant sites.

With regard to corrective action of the reported defects, BCC personnel stated that a program is in place at BCC's Wickliff facility to require a complete inspection of all TVA purchased equipment which is being fabricated at both BCC facilities. The NRC inspector examined purchase agreements, material travelers, shipments records, and inspection records that identified customer inspection hold points for TVA equipment and equipment repairs. Initials and dates of the TVA representative were in evidence on the inspection records.

A review of this program will be accomplished during the next inspection at BCC's Wickliff facility.

The NRC inspector reviewed documentation to ascertain the QA and engineering requirements imposed at BCC's Williamsport facility during the fabrication of equipment like that supplied to TVA-Bellefonte. Material inspection instructions for indicators were examined and found to have provisions for a 100% inspection for stud tightness and provisions to either tighten or return to vendor. Inspection records of loose indicator studs were reviewed. A BCC manufacturing procedure for the attachment of wire lugs contained provisions for the rejection of the indicators for stud looseness.

In support of the VPB Inspection Report No. 99900224/83-02 with regard to the reported connector stress cracks and glue repairs, a review of records by the NRC inspector revealed that QA instructions were in place and inspections were performed that would have identified connectors with the reported defects.

No rejects were recorded between November 3, 1976, and the present for cracking similar to those reported by TVA-Bellefonte; i.e., cracks extending to the surface of the connector or connectors with glue repairs. BCC has experienced crazing within the clear plastic connector body and this condition was present in those connectors used in seismic qualification tests.

Based on a review of relevant information and manufacturing activities at BCC concerning the TVA-Bellefonte reported defects, the NRC inspector could not confirm that the defects were caused by BCC.

ORGANIZATION: BECHTEL POWER CORPORATION
ANN ARBOR POWER DIVISION
ANN ARBOR, MICHIGAN

REPORT NO.: 99900501/84-01	INSPECTION DATE(S): 2/13-17/84	INSPECTION ON-SITE HOU[illegible] · 32

CORRESPONDENCE ADDRESS: Bechtel Power Corporation
Ann Arbor Power Division
ATTN: Mr. W. H. Wahl, Vice President & General Mgr.
P. O. Box 1000
Ann Arbor, Michigan 48106

ORGANIZATIONAL CONTACT: Mr. W. D. Greenwell, QA Manager
TELEPHONE NUMBER: (313) 994-7223

PRINCIPAL PRODUCT: Architect engineering services.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities is approximately 75 percent of the 1950 person staff at the Bechtel Ann Arbor Power Division (AAPD). The division currently provides the principal architect engineering services for two domestic units, Midland, Units 1 and 2, and has modification/repair/service contracts on 8 additional reactor units.

ASSIGNED INSPECTOR: D. G. Breaux — 3/23/84
D. G. Breaux, Reactor Systems Section (RSS) — Date

OTHER INSPECTOR(S):

APPROVED BY: C. J. Hale — 3/23/84
C. J. Hale, Acting Chief, RSS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Topical Report No. BQ-TOP-1 and 10 CFR Part 50, Appendix B.

B. SCOPE: Status of previous inspection findings; audit system; 10 CFR Part 50.55(e) report by the licensee (Midland, Units 1 and 2) to the NRC Region III office of unconservative water hammer loads being used in the original design analysis of the reactor building spray system; 10 CFR Part 21 notification from Bechtel Gaithersburg Power Division (GPD) concerning underclassified supports for HVAC ducts and cable trays on
(continued on next page)

PLANT SITE APPLICABILITY:

Dockets: 50-329 and 50-330

ORGANIZATION: BECHTEL POWER CORPORATION
ANN ARBOR POWER DIVISION
ANN ARBOR, MICHIGAN

REPORT NO.: 99900501/84-01	INSPECTION RESULTS:	PAGE 2 of 5

SCOPE: (continued) the SNUPPS plants (Wolf Creek and Callaway); and 10 CFR Part 21 notification from Bechtel Los Angeles Power Division (LAPD) concerning low voltage control circuits for electrical penetrations not sufficiently protected to limit fault current to a level that does not damage penetration conductors on the Palo Verde and Vogtle projects.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance (83-03): Actions taken by Bechtel in their Management Corrective Action Request (MCAR) lacked effectiveness in assuring no implication or effect on other work was involved.

   Bechtel committed to several corrective actions that were not scheduled for completion prior to the 84-01 NRC inspection. The NRC inspector did verify those corrective actions referenced in the December 9, 1983, letter to Region IV that had been completed; i.e., issuance of two engineering and QA department procedures incorporating Bechtel actions to thoroughly define instructions for planning and scoping MCAR investigations and the training classes provided to engineering and QA personnel explaining the issued procedure. The remaining actions will be included in a future inspection.

2. (Closed) Nonconformance (83-01): Documented instructions and procedures and their implementation did not assure implementation of the requirements of Criterion VII of 10 CFR Part 50, Appendix B, "Control of Purchased Material, Equipment, and Services."

   The inspector verified the corrective actions and preventive measures outlined in Bechtel's letter of response dated May 25, 1983. These actions and measures evidenced progress on the Midland Project in resolving problems with Victoreen and Zack procurements.

E. OTHER FINDINGS OR COMMENTS:

1. Midland Project Reactor Building Spray System Water Hammer Analysis - A 10 CFR Part 50.55(e) notification on January 25, 1983, was transmitted to NRC Region III by Consumers Power Company concerning modeling assumptions which resulted in less conservative water hammer loads than those computed in the original reactor building spray system water hammer analysis.

   The original reactor building spray system water hammer analysis was generated to develop pressure time histories of various branches of the spray piping, following initial filling. This analysis was initiated as a result of a Bechtel AAPD MCAR No. 22 issued March 21, 1978, concerning local pipe stresses potentially exceeding ASME Section III Code allowables near the anchor points in the reactor building spray headers. This condition existed because the vendor's (ITT Grinnell) original anchor design did not use a reinforcing pad to distribute the loading into the piping. The original design loading provided to Grinnell by Bechtel was based on worst case seismic loading with additional allowance to assure an adequate design for a water hammer loading combination. The 1976 analysis used by Grinnell in designing these anchors indicated that the original design, without reinforcing pads, was adequate. Bechtel initiated a reanalysis of the piping system in order to define specific loading on each individual anchor (previous loading of these anchors was based on the worst case, which was applied to all anchors). The results of this reanalysis were forwarded to Grinnell for assurance of anchor design adequacy. These results verified that the loads exceeded the previous seismic loadings provided by Bechtel. A Grinnell reanalysis verified that all the anchor designs fall within ASME Code allowables. The Bechtel concern over this anchor design (MCAR 22) was closed April 27, 1979.

   On January 25, 1983, Region III was notified that new concerns over the containment spray system design had caused Bechtel to renew an examination of this similar subject that had been previously addressed in MCAR 22. The concern was over the original results of pressure time histories of the reactor building spray piping following initial filling. Bechtel hydraulics and hydrology group transmitted these results to the pipe stress analysis group in August 1978. These results were preliminary. In February 1982, Bechtel Project Engineering (Midland Plant) requested that Geotechnical Services Group (formerly hydraulics and hydrology) finalize the preliminary results for the total containment spray

system turnover to the client. In this final review the nonconservative modeling assumptions used in the original water hammer analysis became apparent. These nonconservatives resulted in revised water hammer loads exceeding the design allowables for the piping and piping supports. Bechtel opted to redesign the spray header piping to reduce the water hammer load force to bring the system to within allowable loads. A reanalysis has been performed using the ammended redesign load forces and has been accepted by the Midland Project engineers. A summary of the modeling assumptions and their use has been distributed to other Bechtel AAPD design groups performing water hammer analysis for applicability to their work. In this area of the inspection, no nonconformances or unresolved items were identified.

As a result of this review, the NRC inspector identified a need for a thorough inspection of input data generated by off-project engineering service organizations. This will be accomplished during a future inspection.

2. Bechtel MCAR System - As a result of a previous Bechtel AAPD inspection (83-03), the NRC inspector inspected further the MCAR system and its interface with other Bechtel power divisions. The inspector reviewed two reportable items that resulted in the generation of a Bechtel MCAR.

The first item is a 10 CFR Part 21 concern reported to the NRC Region V office on August 24, 1983, by the Bechtel LAPD. This concern dealt with Palo Verde Nuclear Generating Station, Unit 1 containment penetration conductors that can be damaged by power supply cables that do not have sufficient primary and backup breakers and/or fuses. The Bechtel LAPD issued a Problem Investigation Request for investigation by other projects within the LAPD. division. In conjunction with this, information concerning this noncompliance was transmitted to other power divisions for generic review. This item was received by the Ann Arbor office and was distributed to potentially impacted projects within the AAPD. The electrical design discipline for the Midland Project determined there is sufficient protection for all circuits through electrical penetrations so that the circuit resistance limits the fault current to a level that does not damage the penetration.

The second item is a 10 CFR Part 21 concern reported to the NRC office on October 26, 1983, by the Bechtel GPD. This concern dealt with SNUPPS plants (Wolf Creek and Callaway). HVAC and cable tray supports were found to be underclassified. As a result of the underclassification, procurement, installation, and inspection did not meet 10 CFR Part 50, Appendix B QA requirements. Also, the seismic analysis of the supports in the reactor building may be unsatisfactory. Information relative to this possible generic concern was transmitted to the AAPD for their review. The AAPD civil engineering department chief transmitted this information to Midland project engineering for action. Project engineering is still assessing the potential generic concern as of this NRC inspection.

The NRC inspector reviewed all documentation on actions taken by the AAPD on these two potentially generic concerns. The inspector observed that these concerns are being addressed according to commitments. No nonconformances or unresolved items were identified in this area of inspection.

3. Audits - The inspector reviewed the AAPD QA management audit schedules for the years 1983 and 1984. This review reflected that Bechtel assured that all areas of the division that are conducting activities affecting quality are audited against committed operating procedures. Two internal audits were reviewed. All of the audit findings were reviewed by the NRC inspector to assure they were responded to and corrected in a timely manner. QA verification of corrective actions were also reviewed. In this area of the inspection, no nonconformances or unresolved items were identified.

ORGANIZATION: BECHTEL POWER CORPORATION
GAITHERSBURG POWER DIVISION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900519/84-01	INSPECTION DATE(S): 4/23-27/84	INSPECTION ON-SITE HOURS: 60

CORRESPONDENCE ADDRESS: Bechtel Power Corporation
Gaithersburg Power Division
ATTN: Mr. J. M. Komes, Vice President
and General Manager
15740 Shady Grove Road
Gaithersburg, Maryland 20877
ORGANIZATIONAL CONTACT: Mr. D. C. Kansal, QA Manager
TELEPHONE NUMBER: (301) 258-3776

PRINCIPAL PRODUCT: Architect engineering services.

NUCLEAR INDUSTRY ACTIVITY: The Bechtel Gaithersburg Power Division (GPD) has a total of 3,000 employees of which 1,975 are assigned to domestic nuclear projects. Major projects include Callaway, Unit 1; Wolf Creek, Unit 1; and Grand Gulf, Unit 2. There are also modification/repair/service contracts on 13 additional reactor units.

ASSIGNED INSPECTOR: D.G. Breaux/for 5/29/84
R. P. Nguyen, Reactor Systems Section (RSS) Date

OTHER INSPECTOR(S): D. Breaux, RSS

APPROVED BY: C J Hale 5/29/84
C. J. Hale, (Acting) Chief, RSS Date

INSPECTION BASES AND SCOPE:

A. BASES: Bechtel Topical Report BQ-TOP-1.

B. SCOPE: Followup on previous inspection findings and the following deficiency/defect reports: (1) design deficiency in field-run cables to solenoid valves (SNUPPS plant); (2) improper broadening of seismic design floor response spectra (Hatch, Units 1 and 2); (3) classification of supports for cable trays and heating, ventilating, and air conditioning (HVAC) ducts may be incorrect (MCAR report); and (4) followup on six licensee audit findings concerning SNUPPS activities (SNUPPS projects).

PLANT SITE APPLICABILITY:

Docket Nos. 50-481, 50-483, and 50-366.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Section 5 of Bechtel Topical Report BQ-TOP-1, Revision 1A, and Engineering Department Procedure (EDP) EDP-1.10, the issued date was not input to nine approved and distributed Engineering Department Project Instructions (EDPIs).

2. Contrary to Section 3 of Bechtel Topical Report BQ-TOP-1, Revision 1A, and Section 6.3.1 of ANSI N45.2.11, the design review process permitted power cable to be specified that was not suitable for the required application.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

(Closed) Nonconformance (83-03): Eight whip restraints for Hatch, Unit 2, were requested by the mechanical group from the civil group and specified in the FSAR, but were not installed.

The inspector verified that Bechtel had completed the corrective and preventive measures described in their letter of January 25, 1984.

The EDP-5.1, "Communications Control," was revised and issued on February 29, 1984, to indicate that interdiscipline communications of a significant nature that require action or transfer of responsibility will be processed as controlled correspondence and tracked until satisfactory action is taken.

E. OTHER FINDINGS OR COMMENTS:

1. SNUPPS Design Deficiency in Field-Run Cables to Valcor Solenoid Valves - A 10 CFR Part 21 notification on March 19, 1984, was transmitted to NRC Office of Inspection and Enforcement by GPD. This notification concerned field-run cable to solenoid valves that will not withstand internal valve housing operating temperatures.

GPD received a Deficiency Evaluation Report (DER) from the Los Angeles Power Division (LAPD) dated July 15, 1983, concerning Valcor solenoid valve damage during startup activity at the Palo Verde Nuclear Project. These valves experienced damaged O-rings, melted wiring insulation, and indications of excessive heat to terminal blocks as a result of plant hot functional tests. The initial DER by LAPD raised no question as to the qualifying temperature of the field-run power cable to the Valcor valves. Later investigation by LAPD engineering disclosed that the power cable specified was not qualified for the Valcor valve operating temperatures. (These details are documented in NRC Inspection Report No. 99900521/83-03.)

The GPD quality assurance department received the aforementioned DER and transmitted it to GPD procurement supplier quality. Supplier quality was to determine if any GPD projects had procured these solenoid valves, and had there been any previous problems identified. GPD determined that the SNUPPS project (Wolf Creek and Callaway) and Davis Besse project (operating plant) had procured these valves. GPD supplier quality had discussions with SNUPPS project engineering and quality assurance relative to this concern. There had been no previous identification of terminal block or O-ring failures of these valves. These efforts resulted in no action being taken on the SNUPPS project. In a later development resulting from inadvertent constructor damage of conduit leading to a solenoid valve at the Callaway plant following functional testing; power cable insulation deterioration due to an overheat situation was observed. This resulted in the issuance of a Bechtel nonconformance report (NCR).

The NRC inspector looked closely at the status of possible actions taken on the Davis Besse plant due to its operational status and the potential impact of valve failure. From discussions with project engineering and review of design documentation, the NRC inspector verified that the Davis Besse project had procured these solenoid valves. It was also determined that these valves were procured with a prefabricated connector assembly which contained wiring that was qualified for the temperatures generated at solenoid valves that were continuously energized.

The SNUPPS project had initiated a design change package to rewire the solenoid valves with wire that is qualified for the operational temperatures that it will be exposed to.

GPD has initiated a Management Corrective Action Request (MCAR) to address the concern of field-run cable to solenoid valves. The specification of field-run control cable qualified for temperatures not to exceed 90°C is commonly used for these valve applications. This concern may impact all Valcor solenoid valves and other valves procured for similar applications. GPD project engineering has not responded to this MCAR as of the date of this inspection. The results of this response will be examined more closely on a future NRC inspection. Also to be examined in a future inspection is the level to which potential concerns are researched by GPD for impact on their projects, when these concerns are transmitted to them by other divisions. GPD initially determined no action to be taken on the referenced valves because no previous deficiencies had been reported. The original Palo Verde valve concerns arose out of the results of functional testing; i.e., solenoid energizing. Neither of the SNUPPS projects had initiated functional testing of the valves. This correlation should have been made by SNUPPS project engineering.

The failure of engineering to specify power cables that would meet the qualification requirements identified in the Valcor solenoid valve qualification report that was reviewed and approved by Bechtel engineering resulted in the identification of one nonconformance (refer to B.2).

2. Hatch Units 1 and 2 Seismic Floor Reponse Spectra not Broadened as Committed in FSAR - A potential 10 CFR Part 21 notification on January 9, 1984, was transmitted to the NRC Region II office by Georgia Power and Light (GP&L). This notification concerned commitments in the FSAR to broaden the seismic floor response spectra peaks by 15 percent.

The Hatch project is completing their program of replacing recirculation piping in response to the generic BWR pipe crack concern. The NSSS, General Electric (GE) was to assure that the piping replacement would still meet the FSAR design commitments, because it was not an identical replacement. In the process of analyzing the piping, GE requested data from GPD for analysis input. It was at that time GE questioned the seismic floor response spectra curves and its meeting FSAR commitments. The spectra peaks were broadened ±10 percent. Further research by GPD of this concern revealed that in some areas of the SAR there is a commitment of ±15 percent, and in subsequent answering of NRC licensing questions, a factor of ±10 percent is used. Southern Company Services, Inc. (SCS) also had design responsibilities on the Hatch project involving the

intake, control building, and diesel generator structures. GPD and SCS have been required by GP&L to assess the design impact of broadening the seismic response spectra peaks by 15 percent. As of this NRC inspection, this analysis is approximately 50 percent completed and their input should be transmitted to GP&L by August 1, 1984. This input shall be part of the committed response to Region II regarding the potential concern. GP&L has also procured the services of an independent third party, Impel Corporation, to perform an FSAR credibility study. This study is to look at licensing issues and assure that the actual design reflects FSAR commitments. This credibility study was being conducted at the same time as the NRC inspection.

It was also communicated to the NRC inspector that GPD and SCS are in the process of conducting a full review of seismic design requirements committed to in the Hatch project FSAR. This in process review has resulted in some potentially major concerns in the seismic design of the cable tray systems. When project engineering was questioned by the NRC inspector as to the area of these concerns, the following areas were discussed: (a) updated floor response spectra not incorporated into the original design inputs, (b) use of material properties that did not reflect some as-built conditions (e.g., aluminum vs. steel), (c) use of actual loads (no accountability for new cable run in trays), and (d) limiting factors not used.

GPD project engineering has committed to supply GP&L input of the results of this review by August 1, 1984. The results of this review will be addressed in a future NRC inspection of GPD.

In this area of the inspection no nonconformances were identified.

3. Classification of Supports for Cable Trays and HVAC Ducts - On October 27, 1983, GPD informed the Office of Inspection and Enforcement of a design deficiency reportable under 10 CFR Part 21 on SNUPPS involving noncombination supports for class 1E electrical cable trays and HVAC ducts which had been incorrectly classified and issued as "Seismic Classification II/I" rather than safety-related "Classification Q." As a result, the design and procurement of these supports specified less than a full safety-related QA program. It was noted that five of these supports are located in the reactor building and four in the auxiliary building at each of the SNUPPS units (Callaway and Wolf Creek). In addition to the misclassification, GPD also reported that the five supports in the reactor building were

seismically analyzed under the assumptions for support rigidity that were not suitably conservative for this application. On the basis of this deficiency GPD has issued MCARs describing the following steps in the recommended corrective action: (1) reanalyze the five reactor building supports for seismic accelerations; (2) modify supports as required following reanalysis; and (3) review procurement, installation, and inspection records to resolve deficiencies with "Classification Q" requirements.

Subsequently, SNUPPS engineering has evaluated the above deficiency based on the steps set forth in the MCAR. Following is a summary of their evaluation as described in their final report of January 20, 1984:

a. The five HVAC duct supports in the reactor building, which were incorrectly classified as "II/I" rather than "Q" structures, have been analyzed for appropriate seismic accelerations. The analysis is documented in Revision 0 of calculations 02-77.1-F, 02-77.2-F, and 02-77.3-F.

b. The four HVAC supports in the auxiliary building were analyzed to document that these supports satisfy OBE requirements. The related calculation 03-89.24-F was approved on November 11, 1983.

c. Hardware changes for the modified supports in the reactor building are shown on drawing C-517, Revision 8 and C-518, Revision 7, issued on December 13, 1983. No hardware changes are required for the supports in the auxiliary building.

d. Materials, fabrication, and installation of the nine installed HVAC duct supports were performed in accordance with the requirements of specification 10466-M-635.1 and 10466-M-635.2 which satisfy "Q" material requirements.

During this inspection, the NRC inspector reviewed the following documentation to verify that all actions committed to in the Bechtel's final report of January 20, 1984 had been taken: (1) calculations 02-77.1-F, 02-77.2-F, 02-77.3-F, and 03-89.24-F, (2) drawings C-517, Revision 8 and C-518, Revision 7, and (3) specifications 10466-M-635.1, 10466-M-635.2, 10466-M-618.1, and 1-466-M-618.2.

No nonconformances or unresolved items were identified in this area of inspection.

ORGANIZATION: BECHTEL POWER CORPORATION
GAITHERSBURG POWER DIVISION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900519/84-01	INSPECTION RESULTS:	PAGE 7 of 7

4. Followup on Six Licensee Audit Findings Concerning SNUPPS Activities - On November 8, 1982, a self-initiated evaluation by the licensee was conducted by the Institute of Nuclear Power Operations (INPO) at GPD to evaluate the adequacy of their design control on SNUPPS. As a result of this inspection, INPO issued a Design Control Evaluation Report describing their findings and comments on Bechtel design process, design changes, and other design control areas. In a followup on Bechtel corrective action to the INPO Design Control Evaluation, the SNUPPS audit team found that the finding concerning the premature issuance of design drawings was not an isolated case as indicated in the Design Control Evaluation of Bechtel (Report No. SLM 83-06) and further review by the auditors indicated that the same discrepant condition was observed relative to two additional drawings in the Civil-Structural discipline. On the basis of the additional findings by the SNUPPS audit team, GPD has issued MCAR-12 to all other Bechtel nuclear projects to perform a review for applicability in the design control area. The above MCAR described the following steps in corrective action: (1) implement procedural compliance in civil discipline, (2) evaluation of instances of noncompliance identified for technical significance and reportability, and (3) increase engineering surveillance to confirm procedural compliance in all other disciplines.

Since the evaluation of MCAR-12 was not completed, the NRC inspector will examine this item in a future inspection.

In addition, during this inspection the NRC inspector reviewed a number of EDPs and EDPIs in design control areas to verify that these procedures address and are consistent with all applicable codes, standards, and regulatory requirements.

The nonconformance identified in B.1 above relates to this area of the inspection.

No nonconformance or unresolved items were identified in this area of inspection.

ORGANIZATION: BECHTEL POWER CORPORATION
LOS ANGELES POWER DIVISION
NORWALK, CALIFORNIA

REPORT NO.: 99900521/84-01	INSPECTION DATE(S): 3/26-30/84	INSPECTION ON-SITE HOURS: 120

CORRESPONDENCE ADDRESS: Bechtel Power Corporation
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Vice President and General Manager
P. O. Box 60680, Terminal Annex
Los Angeles, California 90060
ORGANIZATIONAL CONTACT: Mr. R. L. Patterson, Quality Assurance Manager
TELEPHONE NUMBER: (213) 807-2381

PRINCIPAL PRODUCT: Architect engineering services.

NUCLEAR INDUSTRY ACTIVITY: The Los Angeles Power Division (LAPD) of the Bechtel Power Corporation is the architect engineer (AE) for seven domestic reactor units. Fifty percent of the total personnel (approximately 7000) are assigned to activities in connection with these units and four modification/repair/service type contracts.

ASSIGNED INSPECTOR: R. P. Nguyen, Reactor Systems Section (RSS) Date 4/20/84

OTHER INSPECTOR(S): D. G. Breaux, RSS
L. B. Parker, Equipment Qualification Section
M. J. Russell, EG&G

APPROVED BY: C. J. Hale, Acting Chief, RSS Date 4/20/84

INSPECTION BASES AND SCOPE:

A. BASES: Bechtel topical report BQ-TOP-1.

B. SCOPE: Followup on previous inspection findings and the following deficiency/defect reports: (1) seismic design adequacy of flexible conduit couplings between Unit 1 auxiliary building and the control building (Palo Verde), (2) auxiliary feedwater pump turbine steam supply (cont. on next page)

PLANT SITE APPLICABILITY:

Docket Nos: 50-321, 50-366, 50-498, 50-499, 50-528, 50-529, and 50-530.

SCOPE: (cont.) valve logic appears inconsistent with requirements (Palo Verde), (3) classification of supports for cable trays and heating, ventilating, and air conditioning (HVAC) ducts may be incorrect (MCAR report), (4) possible improper use of intensification factors in Bechtel pipe support analysis (South Texas), (5) redesign of pipe hanger axial restraints for safety injection system piping (Palo Verde), (6) questionable acceptance criteria for HVAC systems (Palo Verde), and (7) evaluation of equipment qualification program.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Section 5 of Bechtel topical report BQ-TOP-1, Revision 1A, and Engineering Department Procedure EDP-4.64, drawing ZA for pipe support 13-SI-100-H-106, Revision 4, issued for construction on September 14, 1982, was not in conformance to the related design calculation SI-513B.

2. Contrary to Section 5 of Bechtel topical report BQ-TOP-1, Revision 1A and Engineering Department Procedure EDP-4.47, drawing change notices were generated with no evidence of reason for the changes.

3. Contrary to Section 3 of Bechtel topical report BQ-TOP-1, Revision 1A, and Section 6.3.1 of ANSI N45.2.11, an ineffective design review process permitted parts to be specified that were not suitable for the required application.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

(Open) Nonconformance (82-02): Quality activities involved in the upgrade of commercial grade items for safety-related applications are not qualitatively or quantitatively prescribed by documented instructions, procedures, or drawings.

Bechtel's response date for this nonconformance has been extended to June 21, 1984.

E. OTHER FINDINGS OR COMMENTS:

1. Seismic Design Adequacy of Flexible Conduit Couplings Between Unit 1 Auxiliary Building and the Control Building: A potential 10 CFR 50.55(e) condition was communicated to the U.S. NRC Region V office on September 10, 1982, by Arizona Public Service Company concerning the seismic design adequacy of flexible conduit couplings on the Palo Verde nuclear project.

   During field inspection, a Bechtel engineer became concerned over the adequacy of the installed "DX" conduit couplings in the dead space between the Unit 1 auxiliary and control buildings. The vendor specifications for the couplings allowed only 3/4" movement in any direction. The engineer was concerned that in a seismic event, conduit or couplings could become damaged, creating an unsafe reactor condition due to movement at the couplings.

   In prior installations specific "DX" expansion/deflection couplings had not been used for this type application. Previous "DX" applications had been for buried or imbedded conduit. The engineer noted that the latest revision of the design drawings called for "standard flexible fittings" on all conduits that crossed between these two buildings. The engineer determined that the installation of the "DX" couplings was a misinterpretation by field engineering of the requirements on the drawing. The NRC inspector discovered that revision 1 of the design drawing called specifically for the "DX" coupling. The NRC inspector verified that the majority of the couplings installed were "DX." The reference to the installation of "standard flexible fittings" was added in revision 2 of this design drawing. There was no explanation of why the requirement for "DX" couplings was deleted. This change was made in October 1979, yet no assessment of how many "DX" couplings had been installed was raised until August 1982.

   Concerning the seismic capability of the couplings, Bechtel procured the services of Wyle Laboratories to test the integrity of the couplings under all installed conditions. Bechtel determined from the test results that all conduit expansion/deflection couplings between the auxiliary and control buildings will withstand all postulated motion between these buildings during a seismic event without damage to couplings or cable therein. This resulted in Bechtel concluding

that this concern was not a reportable defect on May 5, 1983. A later reassessment of this problem by Bechtel supported their earlier conclusion that there would be no damage to the couplings or cables therein during a seismic event. The Wyle Lab tests demonstrated the structural integrity of the coupling, but did not consider conditions with cables installed in the fittings. Thus these tests did not represent the as-built conditions.

A closer examination of the as-built condition revealed that some "DX" installations connected conduits that had an initial offset of over 3/4". The vendor's specification allowed only 3/4" movement in any direction. The Wyle tests were conducted with no initial offset.

This renewed Bechtel's concern and resulted in an analysis evaluating the effects on the installed cables during a seismic event. The results indicated 15 cases where the cables could sustain significant damage adversely affecting their safety-related function.

The client notified NRC Region V of the reportable construction deficiency under 10 CFR 50.55(e) on February 16, 1984. In their final report Bechtel outlined corrective action to be taken in disposition of this deficiency. The inspector verified that these actions have been or are being taken. The action included an investigation of all installed "DX" fittings in Palo Verde, Units 1 and 2. These investigations established the basis for design change packages for conduit modifications that included conduit support modification and/or "DX" fitting replacement.

Other Bechtel LAPD projects that may be effected by this problem were contacted, and as of the date of this inspection, no other projects had identified similar problems.

Inspection in this area resulted in identification of two nonconformances (see B.2 and B.3). In addition, there are several areas where additional information is needed. For example, (1) Why was the "DX" fitting deleted from the design and no assessment was made of how many of these fittings had been already procured and installed? (2) Why did Bechtel initiate testing of the "DX" fittings and not represent the as-built condition (i.e., offset, cable fill) which would have affected the test results? (3) Why did Bechtel deem the problem not reportable to the NRC when their evaluation had concluded that, "it has been determined that all conduit expansion/deflection couplings between the auxiliary and control

buildings will withstand all postulated relative motion between these buildings during an SSE event without damage to couplings or cable contained therein," when in fact the tests were made with no cable contained therein?

This area will be inspected further during subsequent inspections.

2. Auxiliary Feedwater Pump Turbine (AFPT) Steam Supply Valve Logic: A potential 10 CFR 50.55(e) condition was communicated to the U.S. NRC Region V office on November 1, 1983, by Arizona Public Service Company concerning the logic for the AFPT steam supply valves being contrary to the FSAR reuirements.

A Bechtel review of the logic diagram 13-J-5GL-001 revealed that the FSAR requirement, "Steam admission valve opens from the intact steam generator," is not satisfied.

In the present logic for the AFPT steam supply valves, the logic actuation provides priority to auxiliary feedwater actuation signal (AFAS-1) for steam generator number one (SG-1) over auxiliary feedwater actuation signal (AFAS-2) for steam generator number two (SG-2).

If both signals are simultaneously present or if AFAS-1 already exist upon the initiation of AFAS-2, the AFAS-1 signal takes preference and maintains SG-1 steam supply to the AFPT. In case of a line break in SG-1, the existing logic will not allow AFAS-2 to override AFAS-1, and transfer supply steam from SG-2. The result will prevent the system from automatically performing its safety function by not being able to supply auxiliary feedwater to the intact steam generator.

This close review of the auxiliary feedwater system (AFS) was in response to Combustion Engineering's (CE) larger than expected instrumentation uncertainties on the AFS. This resulted in CE requesting Bechtel to confirm the acceptability of changing the steam generator differential pressure prior to AFS isolation of a failed steam generator. The change in pressure was from 175 PSID to 325 PSID. Bechtel initiated a modification to the actuation logic which would initiate opening both steam supply valves upon an AFAS signal. This removes the existence of the operator having to determine if there is a disruption in the activated steam supply and manually activate the intact steam supply.

Bechtel has initiated an SAR change to identify that the AFPT system admission valves from both steam generators may open on a AFAS signal. They have also generated a problem investigation request (PIR) for all Bechtel-LAPD nuclear projects to review their logic for AFPT steam supply valves to determine if similar logic deficiencies exist. As of the date of this inspection results of this request have not been finalized.

The NRC inspector will review engineering and licensing documentation to assure that the original logic that required manual response meets the original systematic commitments made in the FSAR. This review will be done on a later inspection.

3. Classification of Supports for Cable Trays and HVAC Ducts: On October 27, 1983, Gaithersburg Power Division of Bechtel Power Corporation (GPD) informed the Office of Inspection and Enforcement of a design deficiency reportable under 10 CFR Part 21 on the Standardized Nuclear Unit Power Plant Systems (SNUPPS) involving nine combination supports for class 1E electrical cable trays and HVAC ducts which had been incorrectly classified and issued as "Seismic Classification II/I" rather than safety-related "Classification Q." As a result, the design and procurement of these supports specified less than a full safety-related QA program. It was noted that five of these supports are located in the reactor building and four in the auxiliary building at each of the SNUPPS units (Callaway and Wolf Creek). In addition to the misclassification, GPD also reported that the five supports in the reactor building were seismically analyzed under the assumptions for support rigidity that were not suitably conservative for this application. On the basis of this deficiency, Bechtel has issued Management Corrective Action Reports (MCARs) to other Bechtel nuclear projects to perform a review for applicability.

In response to the aforementioned MCARs, the LAPD has evaluated this design deficiency for all LAPD nuclear projects and concluded that there is no need for issue a PIR since no combination supports had been used at LAPD for nuclear projects.

No nonconformance or unresolved items were identified in this area of inspection.

4. Intensification Factors in Bechtel Pipe Support Analysis: A 10 CFR 50.55(e) report was issued by Houston Light and Power (HL&P) to NRC on December 28, 1983, concerning the improper use of intensification factors in Bechtel pipe stress calculations. This design deficiency was discovered by Stone and Webster Engineering Corporation (SWEC) as they performed a third party design assessment of the Bechtel pipe stress analysis for the residual heat removal and safety injection systems. Following is a number of specific concerns raised by SWEC in their draft report:

   a. Lack of detail and technical guidance provided in design documents.

   b. Questionable adequacy of mechanisms for control of open items and deviations in calculations.

   c. Questionable of multidiscipline input for system design and modes of operation.

   d. Differences in results between Bechtel and SWEC calculations for the same piping system.

   e. Incorrectly applied stress intensification factor (SIF) was used in Bechtel pipe stress calculations.

   According to Bechtel quality assurance personnel, following receipt of the draft SWEC design assessment report, Bechtel is performing a review of the above mentioned concerns identified by SWEC by reviewing a random sample of pipe stress calculations. They plan to submit a detailed report to HL&P following completion of their review of the final SWEC report. Since the documentation regarding this item is not available at LAPD, the NRC inspector will continue this inspection effort at the Houston area office or possibly the South Texas Project site.

5. Pipe Hanger Axial Restraints for Safety Injection System Pipes: On May 31, 1983, Bechtel-LAPD sent to the NRC a final 10 CFR Part 21 report relating to a construction error on two pipe hanger axial restraints for safety injection system pipes on the Palo Verde Nuclear Generating Station (PVNGS).

The above mentioned report indicated that pipe hanger drawings 13-SI-100-H-006 and 13-SI-100-H-007 specify axial restraints for safety injection system pipes SI-100-CCBA-4 and SI-106-CCBA-3, respectively, by indicating 1"x½"x0'-4" long bars attached adjacent to the north and south sides of each pipe dummy stub base plate (two bars per plate) for hangers 1-SI-100-H-006 and 1-SI-100-H-007. However, as described in nonconformance report (NCR) PA-6143, all four bars were installed around the base plate for hanger 1-SI-106-H-007 and none of these four bars were provided for hanger 1-SI-106-H-006. The report went on to state that the subject error was attributed to a misinterpretation of design drawings and Bechtel has taken the following steps in their corrective action:

a. NCR PA-6143 was dispositioned on June 2, 1983, to have supports 1-SI-100-H-006 and 1-SI-100-H-007 repaired per the design drawings.

b. Drawings 13-SI-100-H-006 and 13-SI-100-H-007 were revised to clarify restraint bar locations.

c. In addition 65 support designs having dummy stub plate were reviewed for adequacy.

During this inspection, the NRC inspection team reviewed the following documentation to verify that all actions committed to in the aforementioned final report had been taken.

a. Deficiency evaluation report.

b. Piping stress computer analysis.

c. Piping and pipe support design calculations.

d. Pipe support assembly drawings.

In addition, a detailed review of the piping stress analysis SI-502A and the piping and pipe support design calculation SI-513B revealed the following: (1) a discrepancy in support design loads was found between the piping analysis and pipe support design calculations; (2) the piping load table, as indicated in design calculation SI-513B,

was revised only in areas where loads were increased significantly; (3) some of the individual support loads reviewed were not revised, and (4) conformance of drawings to design calculation for some support designs was not accomplished.

The nonconformance identified in B.1 above relates to this area of inspection.

6. Acceptance Criteria for HVAC Systems: On March 14, 1984, HP&L informed the NRC of a potentially reportable construction deficiency on the Palo Verde project. This deficiency resulted from an investigation by Waldinger, a subcontractor on Palo Verde project. It was discovered that several problems exist in the Bechtel established acceptance criteria for the HVAC systems. These problems could possibly affect the acceptability of the as-built installations. As indicated in the Bechtel deficiency evaluation report (DER) No. 84-13, examples of these above mentioned problems were as follows: (1) maximum size of datum plates not specified on drawing 13-C-00C-011, detail 4; and (2) knee brace angle does not conform to slope as specified on drawing 13-C-00C-011, note 5.

This DER also described a problem resolution plan for the deficiency by accomplishing the following steps: (1) Bechtel engineering will work with Waldinger to determine the causes of this problem as well as its reportability; (2) Bechtel engineering has generated acceptance criteria for the HVAC walkdown which is presently ongoing at the jobsite; and (3) all nonconforming installations will be documented by NCRs and will be reviewed and analyzed on a case-by-case basis. If the installation is not acceptable by calculation or analysis, the installation shall be reworked or modified to an acceptable condition.

Since the complete walkdown, evaluation, and final report for all three units of PVGNS will not be complete until December 14, 1984, the NRC inspector will examine this item in a future inspection.

7. Evaluation of Equipment Qualification Program: Bechtel-LAPD project programs for quality of safety-related plant equipment for Palo Verde and Vogtle plants were reviewed by the NRC inspector. Equipment qualification (EQ) documentation was compiled and controlled by the responsible project engineer (RPE). Any technical evaluations (seismic or environmental) are submitted by the RPE for review by another engineering group. These engineering groups are independent of project management and operate at a staff level evaluating the EQ documentation for technical content. The NRC inspector examined four final safety analysis report sections, two project specifications, and eight sets of EQ document certification packages. These packages typically consist of environmental and seismic checklists, a list of supplier submitted documentation to support qualification evaluation, and other pertinent information to assist in the compilation of data by which qualification is established. No nonconformances were identified.

ORGANIZATION: BONNEY FORGE
ALLENTOWN, PENNSYLVANIA

REPORT NO.: 99900859/84-01	INSPECTION DATE: 3/19-3/22/84	INSPECTION ON-SITE HOURS: 60

CORRESPONDENCE ADDRESS: Bonney Forge
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Quality Assurance Manager
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P. O. Box 359
Allentown, Pennsylvania 18105

ORGANIZATION CONTACT: Mr. P. R. Benavides, Quality Assurance Manager
TELEPHONE NUMBER: (215) 435-9611

PRINCIPAL PRODUCT: Forged Piping Connections

NUCLEAR INDUSTRY ACTIVITY: Commercial nuclear production of Bonney Forge totals less than 2% of the company production.

ASSIGNED INSPECTOR: Elmer S. T. Baker — 6/1/84
E. T. Baker — Date

OTHER INSPECTOR(S): N. Miegel
C. Czajkowski, Consultant

APPROVED BY: [signature] for — 6/1/84
U. Potapovs, Chief, Vendor Program Branch — Date

INSPECTION BASES AND SCOPE:

A. BASES: NCA-3800 and 10 CFR Part 21

B. SCOPE: This inspection was made in order to determine to what extent deficiencies reported in a Significant Deficiency Report (SD 413-414/83-04) submitted by Duke Power (Catawba Nuclear Station, Units 1 and 2) based on an audit of the Bonney Forge Carlinville facility, existed at the Allentown facility.

PLANT SITE APPLICABILITY:

50-272, 50-423, 50-325, 50-440/441, 50-428

ORGANIZATION: BONNEY FORGE
ALLENTOWN, PENNSYLVANIA

REPORT NO. 99900859/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

Contrary to 10 CFR 21 the following purchase orders (PO) for blank forgings or bar stock did not contain Part 21 applicability statements:

1. All purchase orders issued to Bonney Forge-Italia
2. PO #02812 to Ackerman Taylor Forge
3. PO #19626 to Bethlehem Steel

In addition it should be noted that the Bonney Forge(B-F) procedures for Part 21 specifically excluded foreign purchase orders from the requirement to include the Part 21 applicability statement. Since approximately February 1982 practically all forging blanks have been procured from Bonney Forge Italia.

B. NONCONFORMANCES:

1. Contrary to NCA-3866.6(3), Italian supplied weldolet forging blanks for ASME fittings were not individually marked when the forging blanks were cut into individual pieces.

2. Contrary to NCA-3867.3 and paragraphs 5.2, 5.4.1 and 5.4.2 of the QSM,

   a. The procedure for tagging and logging nonconforming material was not followed on at least three instances on Pullman Power Products Purchase Order #8405-1311. The items which were scrapped and should have had a rejection notice written were Item #1 lot #T-067; Item #2 lot #T-662 and Item #5 lot #S-705. In these cases, the inspector scrapped the nonconforming pieces at his work station, returned them to the material bin, noted the rejection on the inspection report, and did not write a rejection notice.

   b. 14 pieces indicated as scrap on Inprocess Material Rejection Notice (IPMRN) 37537 were not tagged, sprayed red, and moved to the scrap area. Instead these pieces were reworked to a lower pressure, higher flow fitting. There was no indication that any of the 14 pieces were ever reinspected and accepted after the rework occurred.

   c. On IPMRNs 37538 and 37535 rework was indicated, but the rework operations were not described. In addition, there was no evidence that the rework was reinspected and accepted nor any reference to an inspection procedure or report.

   d. IMPRNs 37540 and 37538 indicated that items were repaired, but Section 5 of the B-F QA Manual does not have any provisions

covering repairs. In addition the repair process was not described on the IPMRNs and there was no indication that the items had been reinspected.

3. Contrary to NCA-3869.2 and paragraphs 5.5.2 and 6.9 of the QSM,

   a. It was determined during the inspection that an actual "Defective Material File" does not exist; the Monthly Scrap Report, although capable of tracking scrap, does not track rejectable items which are not scrapped.

   b. There were no studies performed on the forging blanks rejected for cracks and tears along the trim line as noted in IPMRN 37540, those rejected for laps as noted in IPMRN 37538, or minimum wall thickness noncomformance as noted in IPMRN 37535.

4. Contrary to paragraph 8.7 of the QSM, wall micrometer, WMI, which is classified as variable measuring equipment was not included in the overcheck program.

5. Contrary to paragraph 8.5 of the QSM, the auditor for the Bethlehem Steel Lackawanna, Buffalo, New York audit dated 11/16/79 stated on the cover sheet that all areas were being audited, then proceeded to mark some areas NA and left blocks 5.1.1, 5.2.1, 5.2.3, 5.2.4, 5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, and 5.3.7 blank.

6. Contrary to paragraph 10.4 of the QSM, the test bar for lot S-665 was not on file at Bonney Forge, Allentown, Pa. Additionally, no test records were available for the overcheck tests on lot S-668 (Note: the test records for S-668 were telecopied to the Allentown facility from a different facility. There was no record of the test bar ever leaving the Allentown facility.)

7. Contrary to section 4.0 of QCP-8 Rev. 0 an inspection record for Guyon P.O. A-59334 (PE&G - Salem Plant) had no signature/date for acceptance of magnetic particle inspection results on eight pieces.

8. Contrary to paragraph 9.4 of the QSM,

   (a) Two audits were performed by Gulf & Western personnel at Taylor Forge (3/3/82 and 4/13/83) and were accepted by Bonney Forge Quality Assurance as qualifying surveys for this vendor without any mechanism in their Quality Assurance program for accepting the surveys performed by personnel not trained and qualified by the Bonney Forge Allentown QC Manager.

(b) The qualification records for Mr. D. L. Shira, who conducted an audit of Taylor Forge on 4/13/83 were not on file at Bonney Forge-Allentown.

(c) Only one of the audits showed any evidence of having been reviewed and accepted by the Quality Assurance Manager of Bonney Forge.

(d) In addition, Paragraph 9.4 of the Quality Systems Manual conflicts with Quality Control Procedure No. 70.24 (2-1-78) which requires that Quality Assurance designate a qualified individual to perform survey audits rather than the Quality Control Manager.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

This was the first inspection conducted at the Bonney Forge-Allentown facility.

E. OTHER FINDINGS OR COMMENTS:

The Significant Deficiency Report (SDR) submitted by Duke Power concerned the upgrading of commerical grade material to ASME grade material acceptable under NCA-3800 at the Bonney Forge-Carlinville facility. Carlinville produces a very low volume of custom forged items for nuclear application. Most of their work is commercial grade. As such, commercial grade in stock material is upgraded for use in nuclear items. The ASME B&PV Code permits upgrading of commercial grade material through the performance of a chemical and physical overcheck analysis. The SDR submitted by Duke Power noted that on certain heats of material the overcheck analysis had not been performed. Bonney Forge-Allentown purchases and controls all of their material to NCA-3800 therefore, an overcheck analysis is not required. Since Bonney Forge-Allentown does not upgrade stock material for nuclear use, the Duke Power SDR was not applicable to the Allentown facility.

The other areas covered by the inspection were procurement document control; control of purchased material, equipment, and services; identification and control of materials, parts, and components; control of measuring and test equipment; nonconforming material, parts, or components; corrective action; and quality assurance records. A description of the extent of the inspection in each area is presented below:

ORGANIZATION: BONNEY FORGE
ALLENTOWN, PENNSYLVANIA

REPORT NO. 99900859/84-01	INSPECTION RESULTS:	PAGE 5 of 6

1. Procurement Document Control

   Ten Bonney Forge purchase orders were reviewed for applicable quality assurance and regulatory requirements. Two of the purchase orders issued to companies within the United States and all of the purchase orders issued to Bonney Forge-Italia were lacking the required Part 21 applicability statement. All of the purchase orders reviewed contained the applicable quality assurance requirements.

2. Control of Purchased Material, Equipment and Services

   Procedures for controlling material were reviewed and an inspection of the receiving area, storage area, and in-process material revealed no discrepancies.

3. Identification and Control of Material, Parts, and Components

   While witnessing final inspection of two weldolets, the inspector noticed that there were no forge markings for either heat number or heat code. The inspector was told that for a period of 14 months, from March 1982 to July 1983, weldolets supplied by Bonney Forge-Italia did not have individual markings for heat number or heat code. The only markings tying the forgings to the CMTRs were those on the packing crate. Additionally, the Allentown facility was not performing any overchecks on material received from the Italian operation. Therefore traceability for material received in that 14 month time frame was lost. The vendor did commit to performing overcheck analyses on a sample of lots received during the 14 month period.

4. Control of Measuring and Test Equipment

   The applicable procedures were reviewed and several pieces of measuring equipment were selected from the shop for review of calibration records. All equipment within the system was calibrated prior to or on its due date. The record review did not reveal any instruments out of calibration, i.e., no corrective action was necessary. One piece of variable measuring equipment, which was used daily was found to be outside the daily overcheck program. However, it was in the overall calibration system and was within its calibration frequency.

5. Nonconforming Material, Parts or Components

   Eleven IPMRNs were reviewed for material disposition and corrective action as well as the procedures covering nonconforming material. On five IPMRNs and one in-process inspection report the procedures for

controlling nonconforming material were violated. In one instance known nonconforming material was placed back into the storage area. In other instances nonconforming material was reworked or repaired but there was no record of it ever having been reinspected and accepted. Since all operations of the Allentown facility are covered by the NCA-3800 program those reworked and repaired items could end up in a nuclear application.

6. Corrective Action

The procedures applicable to Corrective Action were reviewed. The procedures stated that defective forgings would be studied to determine the cause of the defects and the QC Manager would review the "Defective Material File" to track defective forgings and institute corrective action. Both the QA and QC Managers stated that no studies of defective forgings had been performed. It was also determined that a "Defective Material File" did not exist. There was a "Scrap Report" but it did not include defective forgings that were reworked or repaired.

7. QA Records

Procedures for the completion, review, and retention of QA records were reviewed. A list of records reviewed is attached to this report. There were numerous violations of requirements to fully complete QA records including inspection reports and vendor audits.

ORGANIZATION: BRAND-REX COMPANY
ELECTRONIC AND INDUSTRIAL CABLE DIVISION
WILLIMANTIC, CONNECTICUT

REPORT NO.: 99900325/84-01	INSPECTION DATE(S): 3/12-16/84	INSPECTION ON-SITE HOURS: 56

CORRESPONDENCE ADDRESS: Brand-Rex Company
Electronic and Industrial Cable Division
ATTN: Mr. G. Graeber, Vice President and General Mgr.
Main Street
Willimantic, Connecticut 06226

ORGANIZATIONAL CONTACT: Mr. L. B. Roberts, Quality Assurance Manager
TELEPHONE NUMBER: (203) 423-7771

PRINCIPAL PRODUCT: Wire and cable manufacturer.

NUCLEAR INDUSTRY ACTIVITY: Commercial nuclear production of the Brand-Rex Company (BRC) totals 5% of the company's production.

ASSIGNED INSPECTOR: D. T. Hubbard 4/12/84
G. T. Hubbard, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S): J. J. Benson, Sandia National Laboratories

APPROVED BY: for Wedin Bolton 4-12-84
C. J. Hale, Acting Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection consisted of: (1) a review of the 18 criteria of 10 CFR Part 50, Appendix B, described in the BRC Quality Assurance Manual (QAM); (2) verification that the applicable criteria of the quality assurance (QA) program had been implemented in compliance with their QAM; and (3) 10 CFR Part 21 inspection.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: BRAND-REX COMPANY
ELECTRONIC AND INDUSTRIAL CABLE DIVISION
WILLIMANTIC, CONNECTICUT

REPORT NO.: 99900325/84-01	INSPECTION RESULTS:	PAGE 2 of 7

A. VIOLATIONS:

Contrary to Section 21.31 of 10 CFR Part 21, BRC issued subcontract purchase order (PO) change order (CO) No. 25930, dated May 8, 1981, for safety-related testing services and did not specify that the requirements of 10 CFR Part 21 applied.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.2 of the BRC QAM, dated August 1977, BRC issued PO CO No. 25930, dated May 8, 1981, for safety-related testing services and did not specify that the requirements of 10 CFR Part 50, Appendix B applied.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 5.0 of the QAM, Revision 9, dated June 1983, detailed documented procedures were not established for the control of all applicable BRC equipment qualification activities for safety-related cable. Examples where documented procedures were lacking are:

   a. Documented procedures were not established for the indoctrination and training of engineering personnel performing activities that could affect the quality of test and test data evaluation.

   b. Documented procedures were not established to define how engineering design and analysis efforts are performed and controlled to assure that BRC's safety-related cable meets customer qualification specifications.

   c. Documented procedures were not established which clearly described how POs for testing services and their changes are reviewed, issued, and controlled.

   d. Documented procedures were not established which clearly defined how qualification test specifications, procedures, and evaluation reports are issued and/or controlled.

   e. Documented procedures were not established which described how subcontracted testing services are controlled to assure PO requirements are met.

f. Documented procedures were not established which described how qualification records are identified and maintained.

3. Contrary to Criterion XI of Appendix B to 10 CFR Part 50, BRC conducted thermal aging testing of cables in support of subcontractor qualification report F-C4113 and the following discrepancies were identified:

a. BRC's certification to the subcontractor stated that the cables were thermally aged to 121 ± 1°C and 136 ± 1°C when the aging had been performed in ovens that were only calibrated to an accuracy of ± 2°C.

b. There were no records to demonstrate that the ovens had maintained the required temperatures during the 7 days of thermal aging.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance (82-01): The QA manager did not perform a review with respect to material which had been identified as defective by Sacramento Municipal Utility District. The review was required by BRC's procedure QA-822 dated May 1981 titled "Reporting of Defects and Noncompliance."

The NRC inspector took no action on this nonconformance during the inspection.

2. (Open) Nonconformance (82-01): Records did not exist with regard to operator's qualification, requalification, and training required by BRC's armor-brazing qualification procedure QA-823, Revision 0, dated October 1981. Records also did not exist that would indicate quality control examined and tested the qualification braze for bond strength.

The NRC inspector took no action on this nonconformance during the inspection.

3. (Open) Nonconformance (82-01): A brazing procedure had not been generated, approved, or qualified prior to process use in the repair operation for armor cable.

   The NRC inspector took no action on this nonconformance during the inspection.

E. OTHER FINDINGS OR COMMENTS:

1. Equipment Qualification Program: BRC's equipment qualification (EQ) activities are currently limited to engineering evaluations of customer requirements versus their existing generic qualification documentation. If BRC's cables meet the customer's requirements for qualification, then an order is accepted by BRC and appropriate qualification documentation is provided the customer. BRC has performed generic qualification of its cables by subcontracting EQ testing to a qualification test lab. The test lab has performed all qualification tests for BRC with the exception of flame testing and one series of thermal aging tests. These tests were performed inhouse by BRC.

2. QA Manual Review: The BRC QA program is described in a manual which includes the QAM and seven handbooks which provide detailed operating procedures. The QAM and handbooks establish a QA program in accordance with the applicable 18 criteria of 10 CFR Part 50, Appendix B. The NRC inspector's review of the QA program consisted of an examination and evaluation of the QAM relative to the EQ work being performed by BRC. No nonconformances were identified.

3. Supplemental Procedures Review: The NRC inspector reviewed and evaluated 20 supplemental procedures. This review and evaluation determined that detailed documented procedures were not established for all areas of EQ activities. The nonconformance described in paragraph B.2. was identified.

4. QA Program Implementation Review: The NRC inspector verified the implementation of EQ-related QA program procedures by examining representative records and files and conducting interviews with BRC personnel.

   Findings concerning the implementation of the evaluated criteria of 10 CFR Part 50, Appendix B, as described in the QAM and implementing procedures, are as follows:

a. Organization: The NRC inspector evaluated this criterion by examining two organizational charts and three manuals and by interviewing the QA engineer and the utility product manager. The evaluation determined that the QA manager reports directly to the vice president and general manager and is at a staff level that ensures the authority necessary to correct any program deficiencies. No nonconformances were identified.

b. Quality Assurance Program: The NRC inspector evaluated this criterion by verifying that a QA program was established by the QAM and by verifying the implementation of the applicable 18 criteria of 10 CFR Part 50, Appendix B. The inspector reviewed and evaluated the QAM and one training procedure to verify the implementation of this criterion. The nonconformance described in paragraphs B.2.a. and E.3. was identified.

c. Procurement Document Control: Even though detailed procedures had not been established for this criterion (reference nonconformance described in paragraphs B.2.c. and E.3), the NRC inspector evaluated the implementation of QAM requirements to verify that appropriate technical and QA requirements had been included in subcontracts for EQ testing services. The review and evaluation included examination of six POs and three PO COs. The nonconformance described in paragraph B.1. was identified.

d. Control of Special Processes: The NRC inspector determined that this criterion was not applicable to BRC's qualification activities.

e. Control of Measuring and Test Equipment: The NRC inspector reviewed and evaluated the implementation of this criterion by examination of three procedures, two temperature controlled ovens, and the calibration records for these two ovens. No nonconformances were identified.

f. Audits: The NRC inspector reviewed and evaluated the implementation of this criterion by examination of eight audit procedures, four forms, and one internal audit report. No nonconformances were identified.

g. Criteria Not Evaluated: The NRC inspector did not evaluate the following criteria of 10 CFR Part 50, Appendix B, for implementation during the inspection: (1) Design Control;

(2) Instructions, Procedures, and Drawings; (3) Control of Purchased Material, Equipment, and Services; (4) Identification and Control of Materials, Parts and Components; (5) Inspection; (6) Test Control; (7) Handling, Storage and Shipping; (8) Inspection, Test, and Operating Status; (9) Nonconforming Materials, Parts, or Components; (10) Corrective Action; and (11) Quality Assurance Records. These areas will be evaluated for implementation during a future NRC inspection.

5. 10 CFR Part 21: The NRC inspector evaluated BRC's 10 CFR Part 21 procedure, six POs, and three PO COs to verify that BRC was complying with the requirements of 10 CFR Part 21. The violation identified in paragraph A was identified during the inspection.

6. Technical Evaluation of EQ:

   a. Review of Test Plans/Procedures and Supporting Documents: The NRC consultant's review of nine reports for power, instrumentation, and control cable established that while BRC does not write test plans itself, test plans are generated by BRC's test subcontractor. Four of the nine reports evaluated included exposure to thermal aging, radiation aging, and main steam line break (MSLB)/loss-of-coolant accident (LOCA) environments. The cables tested were constructed of cross-linked polyethylene insulation with a flame retardant hypalon jacket.

   Four more of the nine reports and one test procedure evaluated were for vertical tray flame tests. Two of the reports covered tests by BRC per IEEE 383-1974 and Regulatory Guide 1.131. The other two reports were conducted by an independent test laboratory to requirements and test methods different than those described in IEEE 383-1974.

   The ninth test report evaluated concerned testing conducted by BRC's qualification subcontractor and BRC. BRC conducted the thermal aging portion of the qualification tests. Comments on BRC thermal aging efforts are discussed in paragraph E.6.c.(1), below.

   No nonconformances were identified.

   b. Observation of Testing Activities: At this time, the only qualification testing BRC performs is vertical tray flame tests. The NRC consultant observed no flame testing during the inspection.

c. Review of EQ Records/Documentation: The NRC consultant's review was conducted in two phases: (1) a comparison of raw data to final reports, and (2) an evaluation of BRC's approach to thermal aging and the Arrhenius theory.

(1) Comparison of Data: The consultant's review of raw data and the calibration records for the temperature ovens used in support of qualification report F-C4113, dated May 1975, identified that the BRC certification to BRC's qualification subcontractor was in error. The certification stated that 4 lengths of cable were exposed to a temperature of 136 ± 1°C and 2 lengths of cable were exposed to a temperature of 121 ± 1°C. Review of calibration records for the ovens showed that the ovens were only calibrated to an accuracy of ± 2°C.

The consultant's review determined that no temperature recording devices were used with the ovens during the 7-day thermal aging period. There also was no handwritten record to use as objective evidence that the ovens did maintain the required temperatures over the entire period of thermal aging.

The nonconformance described in paragraph 6.3 was identified as a result of the above evaluation.

(2) Accelerated Aging Theory: The NRC consultant reviewed and evaluated three engineering reports which outline the BRC technique in verifying 40-year service life. BRC's "Long Term Thermal Aging - Arrhenius Plot" discussion is supported by two documents which discuss long term thermal analysis of cross-linked polyethylene. The consultant also reviewed raw engineering data to verify the graphs of individual tests conducted at different temperatures and presented in a report dated November 20, 1975.

No nonconformances were identified.

ORGANIZATION: CARDINAL INDUSTRIAL PRODUCTS CORPORATION
LAS VEGAS, NEVADA

REPORT NO.: 99900840/83-01	INSPECTION DATE(S): 10/11-14 & 11/14-18/83	INSPECTION ON-SITE HOURS: 116

CORRESPONDENCE ADDRESS: Cardinal Industrial Products Corporation
ATTN: Mr. M. J. Donovan
President
3827 W. Oquendo
Las Vegas, Nevada 89118

ORGANIZATIONAL CONTACT: Mr. N. Henderson, Director, Quality Assurance
(702) 739-1966

PRINCIPAL PRODUCT: Fasteners

NUCLEAR INDUSTRY ACTIVITY: Approximately 40 percent of Cardinal Industrial Products Corporation (CIPC) sales is made to the commercial nuclear industry.

ASSIGNED INSPECTOR: L. E. Ellershaw, Reactive Inspection Section (RIS) 2-24-84 Date

OTHER INSPECTOR(S): J. T. Conway, RIS
I. Barnes, Chief, RIS

APPROVED BY: I. Barnes, Chief, RIS 2-24-84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and Appendix B to 10 CFR Part 50.

B. SCOPE: This inspection was made as a result of concerns expressed to the Nuclear Regulatory Commission (NRC) pertaining to compliance of furnished fastener materials with the quality assurance provisions contained in Subarticle NCA-3800 of Section III of the ASME Boiler and Pressure Vessel Code. These concerns were evaluated by an inspection of procurement
(cont. on next page)

PLANT SITE APPLICABILITY: NCA-3800 Deficiencies: 50-313/368, 50-528/529/530. 50-282/306, 50-329/330, 50-373/374, 50-454/455, 50-324/325, 50-302.
Note: Multiple plant docket nos. have been included where purchase orders (POs) did not identify specific unit.

10 CFR 2,790 Information Has Been Deleted

SCOPE (cont'd): document control, receiving inspection, and process control (mechanical testing and nondestructive examination). The inspection additionally included a review of 10 CFR Part 21 implementation.

A. VIOLATIONS:

1. Contrary to Section 21.6 of 10 CFR Part 21, CIPC had not posted: (a) a current copy of 10 CFR Part 21, (b) Section 206 of the Energy Reorganization Act of 1974, or (c) procedures adopted pursuant to the regulation.

2. Contrary to Section 21.31 of 10 CFR Part 21, fasteners were furnished to numerous customer POs, for which the applicability of 10 CFR Part 21 was a specific requirement, without similarly specifying its applicability in the CIPC procurement documents for these items.

B. NONCONFORMANCES:

1. Contrary to Criterion IX of Appendix B to 10 CFR Part 50, the CIPC Quality Assurance Manual (QAM) did not establish measures to assure that welding was controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes. CIPC supplied 2 Locking Cup Assemblies to Arkansas Power & Light Co.'s (AP&L) Arkansas Nuclear One, Unit 1, in which fabrication, including welding, was to be in accordance with Subsection NG in Section III of the ASME Code. In addition to the CIPC QAM not establishing the required measures, a welding procedure specification, procedure qualification record, and welder qualifications could not be located during this inspection.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 8 of the CIPC QAM, survey/audit records did not provide objective evidence of, either performance of satisfactory surveys and audits, or that vendor's manuals were the major basis for demonstration of ASME Code compliance as evidenced by the following categories of examples:

a. Acceptance of vendor's Quality Assurance Programs written in

10 CFR 2790 INFORMATION

b. Vendor survey/audits performed by CIPC were not documented in survey/audit checklists -

10 CFR 2790 INFORMATION

c. Vendor survey/audit checklist with all questions checked off as being acceptable, but with no supporting evidence -

10 CFR 2790 INFORMATION

d. Erroneous supporting evidence statement added to a vendor survey/audit checklist -

10 CFR 2790 INFORMATION

Note: Survey Report No. J-1 dated September 22 and 28, 1983, has the following question in Section V, Part B.4: "Are there established measures to show the status and results of any required examination or test for the material at any time." The answer was "Yes," with this note: "Charpy is the only required test per Cardinal PO per material specification." However, all reviewed Certified Material Test Reports (CMTRs) indicated Izod impact tests were performed instead of Charpy V-Notch (CVN) impact tests.

e. Placement of vendors on Approved Vendor List (AVL) without required survey/audit being performed -

10 CFR 2790 INFORMATION

f. Approval of a vendor whose quality program was not in complete compliance as evidenced by the survey/audit checklist -

10 CFR 2790 INFORMATION

g. Survey/audit checklists apparently filled out by vendor (Self-Audit) -

10 CFR 2790 INFORMATION

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 5 of the QAM, a review of CIPC POs and the associated vendor CMTRs for materials which were subsequently sold for ASME Code Section III applications revealed the following conditions:

   a. CIPC did not invoke ASME Code requirements on POs to their vendors.

   b. Numerous POs were not approved by the QA Department.

   c. Certain POs were placed with vendors not on CIPCs AVL.

   d. Numerous CIPC POs did not contain a statement that the material was to be manufactured in accordance with a QA program meeting the requirements of NCA-3800 and approved by CIPC.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Paragraph NCA-3867.4(e) in Section III of the ASME Code, CIPC improperly certified stock materials (i.e., materials procured from manufacturers without specification that the material be produced using a Quality System Program that had been verified by survey to be in accordance with the requirements of Subarticle NCA-3800 in Section III of the ASME Code) as being in compliance with Section III of the ASME Code. Material specification requirements other than those applicable during melting had, however, not been performed on either a piece or heat basis and product analysis was not performed on each piece of stock material.

10 CFR 2.790 INFORMATION HAS BEEN DELETED

Identified customers receiving these materials include: HUB, Inc.; Commonwealth Edison Company; AP&L; Carolina Power & Light Company; Arizona Public Service Company (APS); Northern States Power Company; and Consumers Power Company. It was further identified that Transamerica Delaval, Inc. indirectly received some of these materials from CIPC through POs placed with Sargent Nut & Bolt Company and Liberty Equipment & Supply Co.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and CIPC Standard Practice No. CSP 7.002, a review of approximately 50 CIPC accepted vendor certification/documentation packages revealed that they were not in accordance with invoked codes, standards and/or specifications as evidenced by the following:

   a. The CMTRs for material received from reported Izod impact test results rather than the material specification and ASME Code required CVN impact tests.

   b. CIPC accepted CMTRs from in which the reported stress relief temperatures were as much as 120°F below the allowable minimum temperature.

   c. CIPC accepted a CMTR from dated May 6, 1981, in which the stated proof load value of 245,900 lbs. was less than the material specification required value of 261,000 lbs. Subsequently on November 9, 1982, CIPC altered the CMTR to reflect the correct value, with the notation, "per A corrected CMTR was not obtained from Hamanaka.

   d. CIPC accepted CMTRs from which contained the required QA statement pertaining to the material being manufactured and supplied in accordance with the QA program as approved by CIPC. However, the name identified in the statement as being the manufacturer and supplier was not but

   e. CIPC accepted a CMTR from , in which the reported stress rupture time was 57.1 hours which did not meet the material specification requirement of 100 hours minimum that was imposed in AP&L's Specification APL-M-402 for material used in thermal shield special bolts.

f. CIPC accepted a CMTR from in which only single mechanical test results were reported rather than the results of multiple tests required by the material specification for the quantity ordered. The CMTR additionally did not contain any heat treatment information to show compliance with the minimum tempering temperature requirements of the material specification.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 15 in the QAM and paragraphs NB/NC-2343, NB-2581 and NX-2321 in Section III of the ASME Code, test and examination requirements have not been performed in accordance with customer reuqirements, invoked codes, standards, and specifications as evidenced by the following:

a. CIPC failed to comply with AP&L imposed Combustion Engineering (CE) Specification No. N-POH16(h) for primary manway studs with respect to:

(1) Removal of test coupons after heat treatment of production material.

(2) Testing of both ends of one bar from each heat in each tempering charge.

(3) Performance of CVN impact testing after all heat treatments had been given to the production material.

(4) Removal of CVN impact specimens with mid-length of specimens at least one diameter or thickness from a heat treated end.

(5) Performance of sufficient CVN impact tests to establish upper and lower energy shelves of the CVN transition curve.

b. CIPC failed to comply with AP&L Specification No. APL-M-402 with respect to reporting the cobalt content of the material used for the thermal shield special bolts.

c. CIPC failed to have performed the required number of CVN impact tests on material received which was in excess of the 6000 lbs. heat treatment lot limitation.

d. When CIPC did have CVN impact tests performed, they failed to report the orientation and location of the test specimens on their CMTRs.

e. AP&L imposed CE Specification No. N-POH19(b) in procurement of primary manway stud nuts. This specification required that a tensile test be performed on the material used to manufacture the nuts. CIPC furnished, however, inventory nuts from for which the required starting material tensile test had not either been required or performed.

f. The following was identified with respect to nondestructive examination (NDE):

(1) There were no records to show that required magnetic particle examination (MT) had been performed on 28, 1-1/2 inch bolts supplied to APS on January 11, 1982.

(2) CIPC CMTR No. 34265 attested that MT had been performed on 20, 1-1/2 inch nuts supplied to APS; however, there were no MT reports to substantiate that MT had been performed.

CIPC's Customer Production Record (CPR), a route sheet, listed an MT operation referencing a test report (No. 6708); however, review of test report No. 6708 showed that it was a report of CVN impact results.

(3) CIPC CMTR No. 31690 dated June 16, 1983, did not report the required MT as being performed on a bolt supplied to Northern States Power Co., nor was there an MT report available.

(4) CIPC CMTR No. 30162 dated April 26, 1983, stated that 40, 2-1/2 inch studs supplied to Consumers Power Co. had been ultrasonic examined (UT'd). However, review of the applicable UT reports for this material failed to show that 31 pieces had been UT'd.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 20 in the QAM, the current Level III Examiner in liquid penetrant examination (PT), MT and UT at , an associated company performing mechanical testing and NDE for CIPC, was employed in February 1983 and was certified on March 1, 1983, by examinations which were not in accordance with the 1980 edition of SNT-TC-1A.

   Paragraph 8.3.3 in SNT-TC-1A specifies the following with respect to the types of tests and numbers of questions:

   Basic Examination - 50
   Method Examination - 65 (For each method)
   Specific Examination - 20 (For each method)

   A review of the Level III Examiner's qualification records revealed the following with respect to types of tests and numbers of questions:

   General Test - 30
   Specific - 15 (For each method)
   Practical - 10 (For each method)

   In addition, there were no valid qualification records available for the Level II radiographer who performed radiography on December 20, 1982, of the thermal shield special bolt heads which were subsequently supplied to AP&L.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section III and V of the ASME Code, CIPC has treated required visual examination as an inspection function and not as an NDE discipline. As a result, personnel performing this activity have neither been qualified nor have they been given eye examinations. Further, written procedures did not exist to provide for the performance of visual examination.

9. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph NCA-38674(b) in Section III of the ASME Code, CIPC, when acting as a material supplier, does not transmit all material manufacturer CMTRs to the purchaser. CIPC's practice is to transcribe data from their vendor CMTRs onto their own master certification, which is subsequently provided to the purchaser. With respect to transcription, it was noted during review of vendor CMTRs and CIPC's applicable master certifications that certain conditions existed in which the purchaser may not have received the correct data.

a. Numerous CMTRs from provided the following heat treatment data for A-193 Grade B7 material: Quench 1530° - 1560°F 40-70 minutes, tempering 1080° - 1150°F 2 hours, and stress relieve 930° - 1040°F 4 hours. CIPC optimized this data, without benefit of objective evidence (i.e., temperature recording charts) to produce a master certification which showed: Harden 1560°F 1:10 hours, temper 1150°F 2 hours, and stress relieve 1040°F 4 hours.

b. CMTRs provided to Consumers Power Co. (Nos. 28961 and 28963) showed the tempering temperature to be 1100°F minimum. However, there was no supporting documentation as to the source of this data.

c. CMTR No. 25517 provided to Northern States Power, showed a proof load value of 133,700 lbs., but there was no supporting documentation as to the source of this data.

10. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 2.10 in CIPC Standard Practice No. CSP 7.001 and paragraph NCA-3867.4 in Section III of the ASME Code, a statement reflecting performance of normalizing and hardening heat treatments was not reported on certain of the CIPC CMTRs for ASME Code Section III, Class 1 primary manway studs supplied to AP&L on PO No. 73555.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS AND COMMENTS:

1. Procurement Document Control: The NRC inspectors reviewed Section 5, "Procurement Document Control," Section 7, "Document Control," and Section 8, "Control of Purchased Materials and Services," of the QAM. An examination was also made of 179 customer POs placed with CIPC, 27 POs placed with 12 foreign and 10 domestic vendors for ASME Section III Code materials and an evaluation performed of compliance of the vendor documentation with PO, ASME Code, and CIPC QA program requirements. In addition, 30 survey/audit reports of 7 foreign vendors and 11 survey/audit reports of 5 domestic vendors were reviewed to assess CIPC's compliance relating to frequency of audits and the qualification of vendors. Within this area of the inspection, nonconformances B.2 and B.3 were identified.

The following supporting information was obtained in regard to both the identified nonconformances and additional discrepant conditions:

a. Liberty Equipment & Supply Co. - A review was performed of CIPC and material vendor documentation which was applicable to HH nuts that had been furnished to Transamerica Delaval, Inc. against PO No. N35474TR dated March 24, 1982, from Liberty Equipment & Supply Co. This PO ordered 500 pieces, 3/4 inch, SA 194 grade 2H HH nuts in accordance with the requirements of ASME Section III Code, Class 3, 1980 Edition through the Summer 1981 Addenda. CIPC furnished a Certification of Compliance for this order which attested to compliance with the PO requirements, use of the CIPC QA program, and that 10 CFR Part 21 was an applicable requirement. Review of the CIPC procurement and vendor documentation applicable to the materials furnished for this order showed that the nuts had been procured from with the manufacturer being

The CIPC PO for these items did not denote, however, the applicability of either the ASME Section III Code Subarticle NCA-3800 quality assurance program requirements or 10 CFR Part 21.

b. Sargent Nut & Bolt Co. - A review was performed of CIPC and material vendor documentation which was applicable to fasteners that had been furnished to Transamerica Delaval, Inc. against POs from Sargent Nut & Bolt Co. As a result of this review, the following examples of deficiencies were identified:

(1) Sargent PO NO. 713 - This PO was received on September 9, 1979, and included an order for 1000 pieces, 3/4 inch - 10 x 3-1/4 inch, SA-325 Hex. bolts in accordance with the requirements of Subarticle NCA-3800 and Subsection ND in Section III of the ASME Code. CIPC furnished a CMTR with the delivered bolts which indicated both compliance with the above requirements and use of the CIPC quality program dated February 14, 1979. Review of the CIPC procurement and vendor documentation applicable to the materials furnished for this order showed that the bolts had been procured from after receipt of the Sargent order. The CIPC PO to (i.e., PO No. 6300) ordered the bolts to the requirements of ASTM A-325 and did not denote the applicability of either Subarticle NCA-3800 or Subsection ND in Section III of the ASME Code.

(2) Sargent PO NO. 729 - This PO which was dated October 1, 1979, included an order for 86 pieces, 1 inch - 8 x 4 1-1/2 inch, SA-325 HH bolts in accordance with the requirements of Subarticle NCA-3800 in Section III of the ASME Code. The CMTR furnished by CIPC for these items indicated compliance with the above requirements and use of the CIPC quality program dated February 14, 1979. Review of the CIPC procurement and vendor documentation applicable to these items showed that the bolts had been manufactured from ASTM A-325 1 inch x 6 inch Hex. blanks which had been procured on CIPC PO No. 1525 dated January 21, 1978, from These blanks were procured without denoting the applicability of Subarticle NCA-3800 in Section III of the ASME Code. It was additionally noted CIPC PO No. 1525 contained the following note, "C.I.P. will grind all heads and use only as A 307B's or other low carbon bolts." The condition which instigated this statement or the material origins could not be positively verified during the inspection.

c. AP&L - A review was performed of CIPC and material vendor documentation which was applicable to fasteners that had been furnished to AP&L. As a result of this review, the NRC inspector identified the following examples of deficiencies:

(1) AP&L PO No. 73555 dated August 31, 1982, in addition to other items, included an order for 60 primary manway nuts, 1-1/2 inch - 8 Heavy Hex, SA 194 Grade 7 material, in accordance with Section III, Class 1 of the ASME Code. In addition, the requirements of 10 CFR Part 21 were imposed.

CIPC furnished CMTRs with the delivered nuts which stated both compliance with the above requirements and use of the CIPC QA program dated January 22, 1982. Review of the CIPC procurement and vendor documentation applicable to the nuts furnished for this order showed the following:

CIPC placed PO No. 10402 dated November 30, 1980, with for a number of items, one of which was for 8100 pieces of 1-1/2 inch - 8 ASTM A-194 Grade 7 Heavy Full Nuts. ASME Code requirements and 10 CFR Part 21 were not invoked. Subsequently, CIPC received a total of 9840 Heavy Full Nuts which were inspected and accepted as follows: 2700 on September 14, 1981; 5400 on April 29, 1982; 1350 on May 3, 1982, and 390 on June 30, 1982.

The only available CMTR from the nut manufacturer was dated May 6, 1981, and was for a total of 2700 pieces. This CMTR provided the ladle analysis, heat treatment data, hardness, CVN impact results, and proof load data for Heat No. 08872.

CIPC apparently used this data as a basis for accepting the other 7140 pieces. CIPC subsequently supplied 60 nuts to AP&L; 20 on September 26, 1982, and 40 on November 8, 1982. The CIPC CMTRs provided to AP&L included all of the data supplied by plus a product analysis. However, it could not be determined from what group these 60 nuts came from.

(2) AP&L PO No. 75400 dated October 13, 1982, included an order for 110, 1 inch - 8 UNR-2A High Strength Bolts (thermal shield bolts) of ASME SA-453 Grade 660, Class A material, with fabrication to Section III, Subsection NG of the ASME Code.

CIPC furnished CMTRs with the delivered bolts which stated both compliance with the above requirements and use of the CIPC QA program dated January 22, 1982. Review of the CIPC procurement and vendor documentation applicable to the bolts furnished for this order showed the following:

CIPC purchased the material (72 feet of 2 inch A 453 Grade 660, Class A material), from on PO 18429 dated November 24, 1982, with the notation that the material was "to be of HT # C10535-8."

The existing records pertaining to showed that there was an audit record dated October 12, 1979, and another dated August 26, 1983. The Vendor Record Form showed that received their initial survey on October 12, 1979, with Audit No. 1 being conducted on August 4, 1980, although there was nothing to substantiate that Audit No. 1 had actually been conducted. Further, the August 26, 1983, audit consisted of 1-1/4 pages of handwritten notes. One of the notes stated, "For the present time it will be necessary for Cardinal to upgrade in purchases - IAW (In accordance with) the Cardinal Standard Policy."

had previously purchased the material from as shown by Crucible's CMTR which was dated March 24, 1981, and showed Heat No. C10535-8. The material was described as being "VAR A-286 CG Sol Trt, AMS 5731 E except hardness RB 83/93. Capability of AMS 5737H Hi Shear Spec 140 Capability of AMS 5737H." Someone other than subsequently typed in Grade 660 ASTM A-453 Cond. A. A corrected CMTR was supplied by dated January 19, 1983. This CMTR did not make reference to A-453 Grade 660. The statement, "Material produced in accordance with Quality Assurance Program audited and approved by Cardinal Industries," was on the corrected CMTR.

It was additionally noted that CIPC's CMTR stated that the bolts had been radiographed and visually inspected in accordance with ASME Section III requirements. The CIPC CMTR failed to provide the temperature, time, and quenching medium for the solution treatment phase of the heat treatment requirements.

d. Hub, Inc. - A review was performed of CIPC and material vendor documentation which was applicable to fasteners that had been furnished to Hub.

Hub, Inc. PO No. T-81211-04 dated August 2, 1982, ordered 1 3/4 inch x 18-20 feet random length SA-193 Grade B7 Rounds. The provisions of 10 CFR Part 21 were identified as being applicable and ASME Section III, Class 1 requirements were imposed. The PO further stated that, "...Starting material

utilized on this order shall be manufactured and supplied under a Quality Program that was audited and approved by Cardinal as conforming to ASME NCA-3800. Material shall be manufactured and supplied under the Quality System Program dated October 17, 1980, Revision 3, that was audited and approved by Hub, Inc. on July 13, 1982. Your quality system program revision and date must appear on all documentation along with date Hub, Inc., approved your program."

The following deficient conditions were noted.

Materials furnished in response to the Hub PO were not manufactured in accordance with the Hub and CIPC approved quality programs, in that the materials had been ordered for inventory stock by CIPC, as much as 2 years before they received the PO from Hub, Inc. Further, the supplier of the material was not on CIPC's AVL at that time and CIPC did not upgrade this material as required by the ASME Code.

CIPC improperly certified the materials by placing the following statement, in part, on their CMTRs to Hub: "We hereby certify that the fasteners supplied under the above PO No. are ... Per ASME B&PV Code, Section III, Class 1, Subsection NF, 1977 Edition through Summer 77 Addenda. 10 CFR Part 21 applies. This material was supplied and produced in accordance with CIPC's Quality Assurance Program dated January 22, 1982, Revision 3 which meets the requirements of NCA-3800. Quality Assurance Program approved by Hub, Inc., July 13, 1982. The above product has been supplied per American Society of Mechanical Engineers."

It was additionally noted that CIPC's CMTR provided a tempering temperature of 1100°F minimum. However, the CMTR provided by did not address heat treatment.

e. During the NRC inspectors review of CIPC's survey/audit records, the following conditions were identified:

(1) - The records indicated that this vendor had been surveyed/audited on November 3, 1980; October 17, 1981; and April 7, 1982. Each of these audits

was documented on the CIPC standard audit checklist which addressed the following areas: Organization; Quality System Program; Responsibility; Quality Control Procedures; Document Control; Control of Purchased Materials; Control of Manufacturing Process; Handling, Storage, and Shipping; Identification of Materials; QA Records; Control of Measuring and Test Equipment; Audits, and Corrective Action. Each of these areas had three columns associated with them: Acceptable; Reject, and Not Applicable, with the appropriate column to be checked off by the auditor in response to a specific question within the area. All of the questions within the areas dealt with "have measures been established to..." The questions did not deal with whether or not the established measures had been implemented. All questions in the three audits had been checked off as being "Acceptable." There was no objective evidence to support these results. Further, the QAM was in

(2) - The records indicated that this vendor had been surveyed/audited on April 25, 1979; November 26, 1980; October 26, 1981; and September 29, 1982. The first audit consisted of 15 pages of questions pertaining to the 18 Criteria of Appendix B to 10 CFR Part 50. None of the questions had been checked off. A statement was written on the checklist by the CIPC auditor, which stated, "The QC function is the responsibility of the Metallurgical Department. The procedures are interwoven in the Standard Operating Procedures for each function of the total mill operation. Although companies such as do not make their Standard Operating Procedures available to outsiders, one can determine from a visit, that the total operation is controlled by written procedures spelling out each area of responsibility in detail setting forth the who, what, where, when and how. It is the considered opinion of the undersigned that the requirements set forth in these Survey Questionaires are being following in the daily operation of the plant."

The second audit checklist had all the questions checked off as being acceptable. The CIPC auditor wrote a statement in the remarks area, "Much more cooperative than visit in April of 1979. In process of preparing a Quality Control Manual in English."

The third audit had all questions checked off as being acceptable.

The fourth audit was not filled out; i.e., the questions were not checked off.

(3) - The records indicated that this vendor had been surveyed/audited on November 21, 1980; November 9, 1981; September 22, 1982; and October 6, 1983. All four survey/audits showed that all questions were checked off as being acceptable. However, the QAM is written in

(4) - The records indicated that this vendor was surveyed/audited on June 18, 1981, and August 5, 1982. The first audit checklist revealed that all questions were checked off as being acceptable, except the six questions dealing with internal audits in Section XIV, which were not checked off at all. A notation entered by the CIPC auditor stated, "See QA Manual Section II," which was on file. Review of Section II in the QAM revealed that annual internal audits were to be performed to determine the effectiveness of the QA Program, using written checklists with results to be retained. The NRC inspector asked the CIPC auditor why the questions in Section XIV of the audit checklist had not been checked off, as appropriate. He responded by saying that had not performed internal audits. He had no answer when asked why the questions were not checked off as being rejectable.

(5) - The records indicated that this vendor had been surveyed/audited on November 19, 1980; October 5, 1981; March 29, 1982; and September 22 and 28, 1983. Section V of the last audit checklist addresses examinations, tests, and reports. One of the questions asked, "Are there established measures to show the status and results of any required examinations or test for the material at any time?" The answer was "Yes" with the notation, "Charpy is the only required test per Cardinal Purchase Order per material specification."

A review of numerous CMTRs from revealed that CVN impact tests are not performed, rather Izod impact tests are performed.

(6) - The records indicated that the vendor was surveyed/audited on October 12, 1979, and August 26, 1983. However, the audit report for 1979 consisted of a cover sheet and one page of handwritten comments and the audit report 1983 was less than two pages of handwritten notes. CIPC purchased material from this vendor on November 24, 1982, which was subsequently supplied as thermal shield bolts to AP&L.

(7) - The records indicated that this vendor was surveyed/audited on April 17, 1979; April 16, 1980; October 30, 1980; October 19, 1981; and September 6, 1982. All the applicable items on two different checklists used on the first four audits were checked "Yes" or "Acceptable" with a minimum number of comments or notes.

(8) - The records indicated that this vendor was surveyed/audited on April 24, 1979; April 23, 1980; October 27, 1980; October 21, 1981; September 29, 1982; and October 7, 1983. All the applicable items on two different checklists used on the first four audits were checked "Yes" or "Acceptable" with a minimum number of comments or notes. In addition, based on a difference in the handwriting used on the audit report cover sheet and the checklist, it appears that the vendor checked off the columns; i.e., self-audit.

(9) - This vendor was surveyed/audited on November 6, 1980; October 14, 1981; April 6, 1982; and April 21, 1983. All the applicable statements on the four checklists were checked "Acceptable" with a minimum number of comments or notes. Based on the information contained in the audit report cover sheet, the audit conducted in October 1981 was apparently performed by the vendor.

(10) - This vendor was surveyed/audited on June 5, 1980; June 19, 1981; and August 4, 1982. All the applicable items were checked "Acceptable" with a minimum number of comments or notes.

(11) - This vendor was surveyed/audited on February 1, 1979; February 25, 1980; April 20, 1981; and June 22, 1982. It was noted that the checklist for the 1982 audit was completely blank. In addition, the annual audit for 1983 is overdue by 5 months.

(12) - This vendor was on the AVL for August and December 1982 but there was no documented evidence that CIPC had conducted a survey/audit of this vendor who supplied material in December 1981.

(13) - This vendor was on the AVL for March 1982, but there was no documented evidence that CIPC had conducted a survey/audit of this vendor who was awarded a PO in April 1982.

(14) - This vendor was surveyed/audited on June 1, 1979. The records also contained an audit report in which the cover sheet was filled in but not dated and the checklist was entirely blank. In addition, the vendor evaluation checklist for the audit of April 1, 1983, was only a single page and addressed the calibration of test equipment.

2. Receiving Inspection: The NRC inspectors reviewed Section 8, "Control of Purchased Materials and Services," Section 9, "Identification and Control of Materials, Parts, and Components," and Section 11, "Inspection," of the QAM.

   A review of CIPC POs and vendor documentation pertaining to those POs was performed to assess the receiving inspection and related QA functions in terms of review and acceptance of vendor CMTRs. Within this area of the inspection, nonconformance B.5 was identified.

3. Process Control (Mechanical Testing and Nondestructive Examination (NDE): The NRC inspectors reviewed Section 10, "Special Process," Section 11, "Inspection," and Section 12, "Test Control," of the QAM. A review of customer POs placed with CIPC and the corresponding CIPC CMTRs was conducted, applicable CPRs were examined, and an evaluation of CIPC's compliance with the PO requirements was performed. NDE personnel records and applicable NDE procedures were reviewed to determine compliance with ASME Code requirements. CIPC CMTRs containing mechanical test and NDE results were compared against the applicable test reports. Within this area of the inspection, nonconformances B.1, B.4, B.6, B.7, B.8, B.9, and B.10 were identified.

The following additional information was obtained in regard to certain of the identified nonconformances and other discrepant conditions:

a. AP&L - The NRC inspectors reviewed CIPC documentation (i.e., CPRs, POs, CMTRs) and supporting NDE and mechanical test records for ASME Section III Code, Class 1, 1-1/2 inch diameter primary manway studs which had been ordered by AP&L in PO No. 73555 dated August 31, 1982. Comparison of these records against the requirements of the PO and the invoked CE Specification No. N-POH16(h) identified the following examples of failure to comply with specified criteria:

(1) Testing Requirements and Sample Removal - Paragraph 2.6 in CE Specification No. N-POH16(h) states, "Test material shall be removed and tested after the material has been given all heat treatments to be applied to the production material." Paragraph 2.7 states, in part, "One test shall be made from both ends of one bar of each diameter from each heat of steel that is heat treated as one charge or as one continuous operation not to exceed in weight the following: 1-3/4 " dia and less 1500 lbs..." Review of CPRs for the primary manway studs showed, however, that bars were cut into test coupons and production blanks prior to performance of normalizing, hardening, and tempering heat treatments. No documented provisions were noted in regard to testing both ends of a bar from each heat that was heat treated in one furnace charge. The CMTRs additionally reflected performance of a single test on material from a given heat that was heat treated as one charge. The NRC inspector additionally noted that CVN impact testing of certain of the studs was performed prior to a second tempering operation and was not repeated after the final heat treatment.

(2) CVN Impact Specimens - Paragraph NB-2224(b) in Section III of the ASME Code states, "For bolting material, the coupons shall be taken in conformance with the applicable material specification and with the mid-length of the specimen at least one diameter or thickness from a heat treated end." Review of CPRs for the 1-1/2 inch diameter bar material

showed, however, that 2-1/4 inch length blanks were cut prior to heat treatment for preparation of CVN impact specimens. As a result, the mid-length of the specimen was below one diameter from a heat treated end.

Paragraph NX-2321 in Section III of the ASME Code states, in part, "...The results, orientation and location of all tests performed... shall be reported in the Certified Material Test Report." Paragraph 12.3 in ASME Material Specification No. SA-540 states, "Tension and impact specimens from bolting material with cross sections of 1-1/2 inch (38.1 mm) or less shall be taken so that their longitudinal axis is on a line representing the center of the diameter or thickness. Review of CMTRs and supporting mechanical test records for the primary studs showed, however, that CVN impact specimen orientation and location had not been reported.

(3) CVN Impact Transition Curves - Subparagraph e) of paragraph 2.8 in CE Specification No. N-POH16(h) states, in part, "Sufficient impact tests shall be made to establish a CVN transition curve. The temperature range shall be sufficient to establish both the upper and lower energy shelves except tests need not be run at temperatures lower than -320°F..." Review of the CVN impact specimen data on the CMTRs showed, a sufficient test temperature range had not been used and the upper and lower shelves had not been established.

(4) Certification and Performance of Heat Treatment - Paragraph 2.4 in the CE Specification No. N-POH16(h) states, "All solid stud materials should be water quenched. The minimum tempering temperature for all materials shall be 1000°F." Paragraph NCA-3867.4(a)(2) in Section III of the ASME Code states, in part, with respect to CMTR reporting requirements, "When specific times and temperatures (or temperature ranges) of heat treatments of materials are required by material specifications, they shall be reported. When specific times and temperatures (or temperature ranges) are not required by the material specification, a statement of the type of heat treated condition shall be reported ..." Review of CMTRs showed, however, that certain

issued CMTRs for the primary manway studs indicated only performance of a single tempering heat treatment and did not report that the required prior austenitizing heat treatment and water quench had been accomplished. Review of the relevant available CPRs for these studs also did not indicate any provisions in the listed operations for performance of required material heat treatments. Alternate records (e.g., POs to the CIPC heat treatment vendor, vendor heat treatment certifications, other CPRs) were not located during the inspection which would confirm that the required material heat treatments had been performed.

In addition to the foregoing, the NRC inspectors identified the following anomaly with respect to UT of 20 primary manway studs which were shipped to AP&L on September 26, 1982. The applicable CPR indicated that UT was initiated and completed on September 23, 1982, and showed that PO No. 17486 to was the document which accomplished the UT of the studs. Examination of the test report for PO No. 17486 showed a date of October 7, 1982, for this examination. The circumstances pertaining to this date anomaly were not established during the inspection. Review of CPRs for these studs also showed process control discrepancies of a type which precluded ready confirmation of material identity being controlled during manufacture. Examples noted of such discrepancies were: (a) differences in quantity between parts sent to a subvendor for machining and parts received back from the subvendor, and (b) handwritten changes to CPR Nos. and quantities of issued materials.

b. Sargent Nut & Bolt Co. - During review of Sargent PO No 729 and CIPC documentation in regard to ordered ASME Material Specification No. SA-325 fasteners, the NRC inspector identified that a proof load test, a requirement of the material specification, had not been performed for 1 inch - 8 x 4-1/2 inch HH bolts supplied to this PO. Hex blanks were procured from for manufacture of these fasteners. A proof test is performed on the finished fastener which would require CIPC to make provisions for the testing.

10 CFR 2.790 INFORMATION HAS BEEN DELETED

During review of CIPC documentation for Sargent PO No. 1203 with respect to 72 pieces, 1/2 inch - 13 x 3-7/8 inch double ended B7 studs, the NRC inspector noted the following material identity anomaly. The PO was received on November 15, 1978, and the items shipped on November 22, 1978. CIPC issued a CMTR for the items which showed that the applicable material heat number was 80990. Review of the CPR for these items also showed that heat No. 80990 was used for manufacture and that this material was procured on CIPC PO No. 3328. Examination of this PO confirmed that material of the correct diameter and specification was included in the PO. Review of the vendor CMTR for the received barstock showed, an identified heat No. 8895122. Mechanical test data obtained by CIPC for this latter heat number differed from the values reported on the CIPC CMTR to Sargent. The heat No. 8895122 mechanical test data was also obtained subsequent to shipping of the studs. The reasons for this material identity discrepancy could not be established during the inspection.

During review of CIPC documentation for Sargent PO No. 659 with respect to Item 4 (30 pieces, 1/4 inch - 20 x 1-1/4 inch ASME Material Specification No. SA-449 bolts), the NRC inspector noted that a hardness test, a requirement of the material specification, had not been reported on the CMTR. Examination of the CIPC vendor CMTR for these items showed that CIPC had actually furnished low alloy steel bolting (i.e., ASTM A-193 Grade B7) for the ordered medium carbon steel bolting. Chromium and molybdenum contents were not included in the CIPC CMTR to the customer. Hardness tests are not included as a requirement for Grade B7 in the ASTM A-193 specification.

4. 10 CFR Part 21 Implementation - During review of customer POs placed with CIPC, it was observed that numerous POs included the requirements of 10 CFR Part 21 as being applicable. As a result, an inspection was made to determine whether CIPC was in compliance with posting, procedural, and procurement activities addressed in 10 CFR Part 21. In this area of the inspection, Violations A.1, and A.2 were identified.

ORGANIZATION: CHICAGO BRIDGE & IRON COMPANY
SALT LAKE CITY, UTAH

REPORT NO.: 99900784/84-01	INSPECTION DATE(S): 5/1-4/84	INSPECTION ON-SITE HOURS: 26

CORRESPONDENCE ADDRESS: Chicago Bridge & Iron Company
ATTN: Mr. J. L. Snider
Plant Manager
550 West 17th Street, South
Salt Lake City, Utah 84110

ORGANIZATIONAL CONTACT: Mr. R. A. Bonina, Superintendent, Welding & QA
TELEPHONE NUMBER: (801) 973-2500

PRINCIPAL PRODUCT: Piping restraints and structural assemblies.

NUCLEAR INDUSTRY ACTIVITY: Less than five percent of production devoted to nuclear activity.

ASSIGNED INSPECTOR: Wm D. Kelley 5/29/84
Wm. D. Kelley, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S):

APPROVED BY: M. E. Foster for 5/30/84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of the identification at the Washington Public Power Supply System (WPPSS) Nuclear Project No. 3 of flame cuts in the webs of structural steel beams which had been covered with cosmetic weld seal passes. The inspection additionally included the status of previous inspection findings, control of special processes (welding), and training.

PLANT SITE APPLICABILITY:

Cosmetic weld seal passes of flame cuts in webs of structural steel beams: 50-508.

ORGANIZATION: CHICAGO BRIDGE & IRON COMPANY
SALT LAKE CITY, UTAH

REPORT NO.: 99900784/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Unresolved Item (Report No. 99900784/82-01) - The NRC inspector was unable to establish from review of QA program requirements and inspection of process control documents that the Nuclear Quality Assurance Manual (QAM), Issue 8 for Contract No. 82105, make adequate provisions for assuring performance of required inspection activities associated with repair welding of materials and/or assemblies.

   The NRC inspector verified by the review of process control documentation and training records that extensive training of all shop and quality control personnel had been completed in the correct use of the process control documents and the definition of a minor cosmetic repair permitted without the implementation of a nonconformance report.

2. (Closed) Nonconformance (Report No. 99900784/83-01, Item B.1) - Documentary evidence was not available which would indicate that: (a) flame cutting nonconformities in Assembly Nos. 503YY-A-1, 5033BB-A-1, 503K-A-1, and 503D-B-1 had been reported to the nuclear QA coordinator for control and documentation; and (b) repairs had been made per an approved repair procedure using repair checklists.

   The NRC inspector reviewed the nonconformance control list, reports of radiographic examination, drawings, repair check lists, shop checklists, verified that the assemblies had been returned to Chicago Bridge & Iron Company (CB&I), Salt Lake City, Utah, plant, repaired in accordance with approved procedures, examined by nondestructive examinations, and accepted by QC with the exception of Assembly No. 503YY-A, which was scrapped. The NRC inspector was

informed that a replacement beam was assembled at the WPPSS Nuclear Project No. 3 site by the erector. The NRC inspector also verified by review of training records that extensive training of all shop personnel and quality control personnel had been completed in the correct use of the repair checklist and the reporting of nonconforming conditions.

3. (Closed) Nonconformance (Report No. 99900784/83-01, Item B.2) - Documentary evidence was not available which would indicate the drawing and returning of welding materials used for welding performed on oxygen-acetylene flame cuts in the webs of Assembly Nos. 503YY-A-1, 503BB-A-1, 503K-A-1, and 503D-B-1.

   The NRC inspector reviewed the repair checklists and daily weld materials distribution log and verified that the weld material used in the repair of the assemblies had been controlled in accordance with the requirements of the QA program. The NRC inspector also reviewed interoffice correspondence, training records, and checklists, verified that the corporate director of QA issued a directive to discontinue the use of "pre-entry" repairs on the checklist, and training sessions had been conducted for all welding and QA supervisors in which the elimination of "pre-entry" repairs was emphasized.

4. (Closed) Nonconformance (Report No. 99900784/83-01, Item B.3) - The Training Guide - Nuclear QA Checklist System, which describes additional QA controls for the nuclear QA checklist was not entitled a special instruction and was not written or approved by the shop QA superintendent.

   The NRC inspector verified by review of correspondence and training guides that the training guides are not special instructions in that they describe the implementation of the requirements of the QAM and do not add additional controls. The NRC inspector also verified that the training guides had been approved by the QA superintendent.

E. OTHER FINDINGS OR COMMENTS:

1. CB&I - Salt Lake City plant ASME Certificate of Authorization for the application of the "N" stamp expires in June 1984 and the NRC inspector was informed the certificate will not be renewed.

2. Control of Special Processes (Welding) - The NRC inspector reviewed the welding procedures, welder qualifications, weld logs, shop checklists, and daily weld material logs for the nine pieces of nuclear fabrication in the shop at the time of the inspection, and verified that the procedures and welders had been qualified in accordance with ASME requirements and that the welders had been issued electrodes and monitored by the welding and QA supervisor in accordance with the requirements of the ASME accepted QA program.

   The NRC inspector reviewed WPPSS Contract Change Request No. W-113-1 dated March 25, 1980, to Ebasco Services, Incorporated (ESI), and verified that CB&I was given the option of providing welding procedure and welder qualifications per ASME Section IX and NDE procedure per ASME Section V; however, the NDE acceptance criteria remained per AWS D1.1-80, Section 9.

3. Training - The NRC inspector reviewed the QAM and training records from January 1982 to April 1984, and verified that the training had been intensified after August 1982. The training included the shop personnel and covered the QA program requirements and special instructions.

4. WPPSS Nuclear Project No. 3 - Continued inspection of the reported problem of the identification of oxygen-acetylene flame cuts in the webs of structural steel beams which had been covered by cosmetic welding.

   a. The NRC inspector reviewed CB&I letters to ESI dated May 19, 1983, and March 30, 1984, and verified that CB&I had notified ESI they had examined the reporting requirements of 10 CFR Part 21 and their position was the ". . . Engineer-of Record, and not CBI, has the final and total responsibility for the adequacy and safety of the structure, he is the only individual who has all the information necessary to determine if this problem is safety-related. Therefore, it is the opinion of CBI's Corporate Quality Assurance Director and our Chief Engineer that Ebasco Services, Inc., must evaluate this problem to determine the necessity of advising the Nuclear Regulatory Commission."

   b. The NRC inspector reviewed ESI site nonconformance report (NCR) Nos. 114-2090 and 14764, and CB&I letter to ESI dated March 29, 1984, and verified that CB&I had signed NCR No. 114-2090 confirming completion of the ESI approved disposition on the

flame cuts in the structural steel beam webs. CB&I personnel stated that NCR No. 14764 had been signed by CB&I confirming completion of the ESI approved disposition of the flame cuts in structural beam webs; however, a copy was not available to the NRC inspector. The signing of the report will be confirmed during a subsequent inspection.

c. The NRC inspector reviewed letters, reports, and documentation and verified that CB&I began nondestructive examination of beams at the WPPSS Nuclear Project No. 3 on June 27, 1983. As a result of the examination, 288 copes were identified out of 2511 copes in 1021 beams on ESI Contract No. 3240-113 as having cosmetic weld repairs. Beams on this contract were fabricated at the CB&I Salt Lake City plant. The NRC inspector was informed by CB&I that 51 percent of the cosmetic weld repairs made at the Salt Lake City plant were documented and 49 percent were not documented.

d. On ESI Contract No. 3240-114 the nondestructive examination revealed 64 copes with cosmetic weld repair and 47 repaired copes with unacceptable weld out of 807 copes in 421 beams. Beams on this contract were fabricated at the CB&I Salt Lake City, Utah; Kankakee, Illinois; and Greenville, Pennsylvania, plants and cosmetic weld repairs had been made at all three plants.

The NRC inspector was informed that the report of the document review of the fabrication shipped from the Kankakee plant would be completed and issued in June 1984; however, the Greenville plant which had been closed had shipped all records to the CB&I record center in Houston, Texas, and no document review had been started. The CB&I reports of the Kankakee and Greenville plants documentation review will be audited during a subsequent inspection.

e. The failure of three CB&I plants to report the cuts in the webs of structural beams to QA and the failure of the welding and QA supervisors to identify and report the cosmetic weld repairs and document all weld repairs will be reviewed with corporate management in an inspection at the corporate offices. Also, the generic issue of the use of the beam burner and cosmetic repairs on nuclear orders at other CB&I plants will be reviewed.

ORGANIZATION: COLT INDUSTRIES
FAIRBANKS MORSE ENGINE DIVISION
BELOIT, WISCONSIN

REPORT NO.: 99900300/84-01	INSPECTION DATE(S): 3/26-30/84	INSPECTION ON-SITE HOURS: 32

CORRESPONDENCE ADDRESS: Colt Industries
Fairbanks Morse Engine Division
ATTN: Mr. J. M. Moriarty, Manager, Utility Sales
701 Lawton Avenue
Beloit, Wisconsin 53511

ORGANIZATIONAL CONTACT: Mr. E. L. Fay, Quality Assurance
TELEPHONE NUMBER: (608) 364-4411

PRINCIPAL PRODUCT: Emergency diesel generators.

NUCLEAR INDUSTRY ACTIVITY: Approximately 8 percent of the total sales in 1983.

ASSIGNED INSPECTOR: J. T. Conway — 5-3-84
J. T. Conway, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): D. Osborne, Office of Inspection and Enforcement
J. Higgins (Consultant)

APPROVED BY: I. Barnes — 5-4-84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made to assess the implementation of the QA program particularly in the areas of 10 CFR Part 21 reportability requirements, control of purchased material and services, nonconformances/corrective action, testing, and manufacturing process control.

PLANT SITE APPLICABILITY:

Docket Nos. 50-322, 50-482, and 50-443/444.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 7.0 of Standard Practice (SP) No. 714.00, purchase orders (POs) to suppliers of items for code components on diesel generator unit No. 700001B for Wolf Creek did not impose Part 21 requirements for the following POs placed after January 6, 1978: B 487179-R, B 492353-R, B 487178-R, B 494823-R, B 281296-1, B 487186-R, B 458595-0, and B 478777-R.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 10.3.4.3 and 10.3.5.3 of the Quality Assurance Manual-ASME (QAM-ASME), a review of 15 Operation Sheets for 5 code components revealed that the final inspection operation (No. 2000QC) was not initialed or stamped on the Operations Sheets for part No. 11872300 (starting air tank for Seabrook, No. 206086A) and part No. 11874348 (jacket water expansion tank for Wolf Creek, No. 700001B).

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 9.3.3.1 and 9.3.3.2 of the QAM-ASME, a review of certification records for seven nondestruction examination (NDE) personnel revealed the following:

   a. Records did not exist for an NDE personnel from American Standards who performed liquid penetrant examination (PT) on the jacket water, lube oil, and intercooler heat exchangers (Wolf Creek, unit 70001B) in February 1979; and for an NDE personnel from CI who performed MT on the air receiver (Seabrook, No. 206086A) in February 1979.

   b. Training and examination records did not exist for an NDE personnel from American Standards who performed PT on the jacket water heat exchanger (Shoreham, No. 700021A) in November and December 1981, and PT on the lube oil and jacket water coolers (Seabrook, No. 206086A) in January and October 1978, respectively.

   c. A certification record did not exist for an NDE personnel from CI who performed magnetic particle examination (MT) on the starting air tank (Seabrook, No. 206086A) in April 1979.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 7.2.3.1 and 7.3.2.2 of the QAM-ASME, it was noted that 17 SA-193 bolts for the fuel oil system (Wolf Creek, No. 70001B) were ordered (PO 487186-R) from Commercial Fasteners (CF) on April 18, 1979, which was 24 months after CF was audited by CI in April 1977.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Subsection NCA-4134.7 of the Code, a review of calibration records and vendor audits revealed that calibration services had been provided by the following four companies, but there was no evidence that these companies had undergone a source evaluation or been approved by CI.

   a. Electrical Instrument Service - Calibrated Miller load panel (no. HK220790) in October 1982 and June 1983.

   b. Standards and Calibration - Calibrated tong ammeter sets (Nos. 2873-C-400 and 53666-1) in February 1983.

   c. Ametek/Mansfield & Green Division - Calibrated dead weight tester (No. 1029) in June 1983.

   d. Starrett - Calibrated gage block sets (Nos. 8-3 and 88-3) both in June 1982 and July 1983.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 5.2 of SP No. 714.00, deviations/field failures identified on engine problem report Nos. 205, 243, and 246 at four nuclear power plants were not evaluated per 10 CFR Part 21; and a report concerning the evaluation was not prepared for the following deviation reported to the NRC per 10 CFR Part 21 on July 27, 1981, exhaust valve cage undertorquing (Wolf Creek and Callaway nuclear power plants).

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 5.4.5.1 of t QAM, test No. 10 560 395, "Load Tests," dated March 8, 1984, for Shoreham engine No. 700021A did not contain any test prerequisites or list of instruments to be used.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 5.4.5.1.2 of the QAM, test procedures did not include acceptance limits from applicable engineering documents as follows:

   a. The Shoreham engine "Load Tests," test No. 10 560 395, dated March 8, 1984, did not include the pressure and temperature acceptance limits of drawing No. P12609255.

   b. The Shoreham engine "Air Start Test," test No. 10 560 398, dated March 8, 1984, only verified that the air compressors could recharge the air tanks from 325 psi to 420 psi in 60 minutes instead of the required rate of 175 psi to 430 psi in 60 minutes.

C. UNRESOLVED ITEMS:

1. Nonconformance Disposition - Nonconforming items are identified on various forms and subjected to a review process. If the item is to be accepted as is, the variation must be approved by the Material Review Committee (MRC).

   According to Section 15.4.3.2 of the QAM, items submitted to the MRC for acceptance as variation material must be such that (among other things) CI has design authority for the item(s) being considered. The inspector reviewed selected variations approved by the MRC and noted several for components where Societe d'Etudes de Machines Thermiques (SEMT), the main designer of the Pielstick engine, had design authority. Discussions with the Vice President of Engineering of CI indicated that this practice had been reviewed and concurred in by SEMT for minor design variations. Further, the inspector reviewed a draft revision of the QAM which would address the practice. The inspector noted that further formalization of the practice was needed and stated that the item would be addressed at a future inspection.

2. Operating and Maintenance Manual - The inspector requested the Operating and Maintenance Manual (Manual) for the Shoreham diesel generators for review. CI stated that the Manual was not yet finalized, but that the Hope Creek diesel generators were essentially identical. The inspector reviewed portions of the Hope Creek Manual and noted two discrepancies with the normal operating parameter limits in paragraph H on page 4-11.

a. Engineering drawing No. P12609255, "Pressure & Temperatures PC2 and PC2-3 Diesel Engines," Revision 6, gives the operating parameter limits to which CI tests the engines. The limits in the Manual did not in all cases agree with those on the engineering drawing; e.g., the fuel header pressure band was 22-40 psi versus 25-75 psi, the lube oil header pressure band was 75-90 psi versus 90-110, and the jacket water temperature band from the engine was 169°-180° versus 173°-183°.

b. The Manual did not specify at what load(s) these parameter limits apply. The engineering drawing limits apply only at 100 percent load. Engineering department representatives stated that the Manual limits also should be used only at 100 percent load. Utility service department personnel, responsible for the Manual, stated that the limits apply at any load. The inspector also noted that if the limits given applied only at 100 percent power, the utility was missing important information due to the fact that when operated at a nuclear power plant, diesel generators usually are not run at 100 percent power. These items are unresolved and will be addressed at a future inspection.

3. Load Test - The inspector reviewed the Shoreham diesel generator procedure, "Load Tests," dated March 8, 1984, and noted that it tested the diesel generator at a design load of 100 percent or 4430 KW and a power factor of 1.0. The Shoreham specification for the diesel generator imposes IEEE Standard 387-1977, "IEEE Standard Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations." Paragraph 6.3.1 of IEEE-387 requires load tests to be performed at the engine manufacturer's factory at rated power factor. The Shoreham specification defines rated power factor as 0.8. Testing at a power factor of 0.8 puts a larger load on both the generator and the engine of the diesel generator set. CI stated that they do not have the capability to test at a power factor other than 1.0 and that they have verbally informed Shoreham of this fact. This item is unresolved and will be addressed at a future inspection.

D. OTHER FINDINGS AND COMMENTS:

1. 10 CFR Part 21 - The inspector reviewed CI's 10 CFR Part 21 reporting procedure (SP 714.00), including all revisions; reviewed selected items from the files for the 14 items reported per 10 CFR Part 21; reviewed records for items considered for 10 CFR Part 21 reporting, although the final conclusion was that they were not reportable; and held discussions with the various personnel in engineering, quality assurance, and utility sales responsible for the 10 CFR Part 21 system at CI. The inspector also reviewed the various sytems in place at CI for documenting deficiencies, nonconformances, and failures, both at the factory and in the field.

   The inspector noted that programs and practices were generally in compliance with 10 CFR Part 21 and that CI had evaluated and reported failures in non nuclear sites. This allowed corrective action to be taken on nuclear diesel generators before the failures occurred. Not all field failures at nuclear sites, however, were properly evaluated for 10 CFR Part 21 applicability. Through a review of engine problem reports back through 1980, the inspector identified three reports, discussing failures or deviations at four nuclear sites which did not appear to have received a formal 10 CFR Part 21 evaluation. Additionally, CI's 10 CFR Part 21 procedure did not specifically address the review and possible escalation into the 10 CFR Part 21 evaluation system of either engine problem reports (representing field failures) or of the internal nonconformance reports, Inspection/Rejection/Variation Request Forms and Purchased Material Request Forms. The SP for each of these reports did not mention 10 CFR Part 21 reviews either.

   Generally, over the last few years, CI's 10 CFR Part 21 evaluation system has operated somewhat informally in that evaluations were performed verbally with little in the way of records of the evaluations prior to an item being reported. After an item was reported per 10 CFR Part 21, records were generally good and CI carefully tracked repairs needed and made on any units to which the defect was applicable.

   Nonconformance B.6 was identified in this area of the inspection.

2. Training/Qualifications - The inspector reviewed 1 procedure and the training/qualification records for 5 inspectors, 3 auditors, and 7 NDE personnel to assure that individuals performing and verifying activities affecting quality were trained and qualified. With the exception of 4 NDE personnel, the training, examination, and certification records for the remaining 11 individuals were in accordance with QA program requirements.

   Nonconformance B.3 was identified in this area of the inspection.

3. Calibration of M&TE - The inspector reviewed three procedures, the gage recall list, and records for M&TE calibrated by CI and certifications for reference standards calibrated by outside vendors. An observation of M&TE at various work stations was also performed to assure that M&TE are properly identified, controlled, and calibrated at specified intervals. It was noted that CI received calibration services from four companies, but there was no documented evidence that CI required these suppliers to have a QA program or that a preaward evaluation and postaward audits were conducted on each supplier by CI.

   Nonconformance B.5 was identified in this area of the inspection.

4. Vendor Audits - The inspector reviewed selected audits performed on CI over the last few years by NRC, architect-engineers, utilities, and ASME. The audits appeared thorough and findings were tracked and corrected by CI. No significant recurrent items were identified.

5. Manufacturing Process Controls - The inspector reviewed documentation packages pertaining to three diesel generator units, No. 700021A (Shoreham), No. 700001B (Wolf Creek), and No. 206086A (Seabrook). The documentation packages consisted of code data reports, NDE reports, hydrotest reports, weld work sheets, certified material test reports (CMTRs), and operation sheets. Individual documents were reviewed for several "code components" (i.e., required to meet Section III of the ASME Code) selected from each unit to assure that all required inspection, testing, and NDE activities were satisfactorily completed.

The components selected were as follows:

Shoreham - lube oil pump/jacket water heat exchanger
lube oil and jacket water heaters

Wolf Creek - lube oil system (main piping)/jacket water system
fuel oil system/jacket water, lube oil,
and intercooler heat exchangers

Seabrook - lube oil pump/lube oil cooler/jacket water cooler/
fuel oil day tank/jacket water expansion tank/
starting air tank

In addition, four QC instructions addressing NDE, three welding procedures, six procedure qualification records, and qualification records for four welders who had welded on code components on the Shoreham (jacket water expansion tank) and Wolf Creek (intercooler, lube oil, and jacket water heaters) units were reviewed, and two welding areas were evaluated to assure that special processes were performed by qualified individuals using qualified procedures.

Nonconformance B.2 was identified in this area of the inspection.

6. Nonconforming Material - The inspector reviewed several CI procedures for controlling nonconforming material, both manufactured and purchased. The inspector also reviewed nonconformance records for the Shoreham diesel generators, currently under construction at CI. One unresolved item (C.1) was identified regarding design authority. The inspector also noted a number of variations or nonconformances accepted by the reviewing personnel with a simple "Use as is" statement and questioned the practice. CI stated that the basis for these was engineering judgement and that recent policy is to document the reasons. The quality assurance manager showed the inspector two memos from the fall of 1983 directing that more detail be provided. A check of recent nonconformances confirmed that the practice has indeed changed. The inspector selected two variations, previously approved with only the "Use as is" justification, and requested that CI provide detailed engineering analysis to justify the parts' acceptability. This was done to the inspector's satisfaction during the inspection.

7. Control of Purchased Material and Services - CI entered into a license agreement in July 1968 with SEMT, Paris, France, to manufacture and sell CI Pielstick diesel engines in the USA and Mexico. As part of this agreement, CI purchases engine components from vendors on a recommended suppliers list (RSL) furnished by SEMT. Vendors are placed on the RSL by virtue of their component being successfully tested by SEMT or as a result of satisfactory experience with the component or engines in service. It was noted that there was no documentation at CI of the SEMT tests on engine components, and CI had never performed a survey or audit of SEMT.

The inspector reviewed 6 vendor evaluation listings (VEL) for 14 vendors (11 nonengine components and 3 engine components), 14 vendor audit reports, 30 POs (13 unit No. 700001B, 9 unit No. 206086A, 8 unit No. 700021A) to suppliers of engine components and items (e.g., pipe fittings, fasteners, welding electrodes) which are fabricated into components that meet Section III ASME Code requirements, and 34 CMTRs. This review was undertaken to assure that material was purchased from qualified vendors and that the items met the technical and quality requirements identified in the POs.

With the exception of one vendor, ten vendors who supplied items for code components were ASME Code certificate holders or had been audited and approved by CI. All the CMTRs had been signed by CI's QA department.

Ten of the thirteen POs for crankshafts, connecting rods, pistons, and cylinder liners were placed with foreign suppliers on the RSL, and three POs were placed with the following domestic suppliers:

Vendor	Component	PO No.	Date
U.S. Pipe & Foundry	cylinder liner	B269011-1	2/74
Gould Pump	electrical jacket water pump	B-464483	9/28/77
Walter B. Rom	electrical jacket water pump	450267	10/1/76

The initial issue of the VEL was in December 1976, and both U.S. Pipe and Foundry and Walter B. Rom appeared on this initial list by virtue of filing a self-evaluation form in October 1976. There was no evidence of audits or plant surveys conducted by CI at any of the three vendors. Documented evidence will be obtained from Gould to verify that they held a Certificate of Authorization in September 1977, when the electrical driven jacket water pumps were ordered for unit No. 70001B. This documentation will be verified in a future inspection. PO No. B262637-1, placed with Fried Krupp in January 1975 for connecting rods for unit No. 206086A, could not be located.

It was also noted that the electrical driven jacket water pump procured from Walter B. Rom for unit No. 206086A was classified by United Engineers and Constructors' specification as a noncode item, while the same pump procured from Gould Pump for unit No. 700001B was specified as a code item on the Bechtel specification.

Nonconformances B.1 and B.4 were identified in this area of the inspection.

8. Diesel Generator Testing - The inspector reviewed three test procedures for the Shoreham diesel generators, the test requirements of the QAM, and actual data from tests performed on the Shoreham diesels. The inspector observed one Shoreham diesel generator being tested, reviewed the operating logs, and examined various components and subsystems in operation.

The inspector observed that the test procedures were not particularly well-defined and did not meet all of the requirements for test procedures given in the QAM (unresolved item C.3). The inspector also noted that:

a. None of three tests reviewed listed who was authorized and availabe to stop the test.

b. The "Load Tests" procedure was not sufficiently detailed to define precisely what readings and documentation were required. As an example paragraph H lists data to be resolved. Log sheets were in use that contained more parameters, but not all the data on the log sheets was being recorded. Various personnel questioned gave different answers concerning the data required.

c. No engine limits specifically for the 110 percent load test are given, either in the procedure or on separate engineering documents.

Nonconformances B.7 and B.8 were identified in this area of the inspection.

9. Plant Tour - The inspector toured the CI manufacturing, testing, and training facilities at various times during the inspection both in the company of CI officials and independently. Items witnessed included: component machining, parts assembly, pipe bending, welding, diesel generator operation, plant cleanliness, and personnel qualification.

No nonconformances were identified.

ORGANIZATION: COOPER INDUSTRIES
COOPER ENERGY SERVICES
GROVE CITY, PENNSYLVANIA

REPORT NO.: 99900317/84-01	INSPECTION DATE(S): 3/12-16/84	INSPECTION ON-SITE HOURS: 32

CORRESPONDENCE ADDRESS: Cooper Industries
Cooper Energy Services
ATTN: Mr. F. B. Stolba, Vice President/General Mgr.
150 Lincoln Avenue
Grove City, PA 16127

ORGANIZATIONAL CONTACT: Mr. W. H. A. Lambert, Manager - Quality Control
TELEPHONE NUMBER: (412) 458-8000

PRINCIPAL PRODUCT: Emergency standby diesel generators.

NUCLEAR INDUSTRY ACTIVITY: Approximately 10 percent of total sales.

ASSIGNED INSPECTOR: J. T. Conway — 4-20-84
J. T. Conway, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): D. Osborne, IE, Headquarters
J. Higgins, Consultant

APPROVED BY: J. T. Conway for — 4-20-84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21

B. SCOPE: This inspection was made to assess the implementation of the QA program particularly in the areas of Part 21 reportability requirements, control of purchased material and services, nonconformances/corrective action, and manufacturing process control.

PLANT SITE APPLICABILITY:

Docket Nos.: 50-528/529/530; 50-448/449;50-387/388; 50-382

ORGANIZATION: COOPER INDUSTRIES
COOPER ENERGY SERVICES
GROVE CITY, PENNSYLVANIA

REPORT NO.: 99900317/84-01	INSPECTION RESULTS:	PAGE 2 of 11

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Subsection NCA-3866.2 of the ASME Code, and Section 3 of the Quality Assurance Manual (QAM), during an evaluation of the fabrication areas, it was noted at the heat treat station that procedure No. HT-17N, "H.T. for G-2315-Nuclear," was Revision 3 dated August 31, 1979; and procedure No. HT-18AN, "HT for G5-1310 and G5-410-Nuclear," was dated September 5, 1975; whereas the current procedures in the Standards Manual for Engineering Material Specifications were HT-17N, Revision 6 dated February 17, 1982, and HT-18AN, Revision 1 dated July 28, 1981.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 4.4.2 of QCP-10-1, a review of Quality Control Inspection Plans (QCIP) for 11 components relating to 7 diesel generator units revealed that the inspector had not signed/stamped or dated various inspection activities on QCIPs for the following:

Unit No.	Component	Part No.
7158	Cylinder liner	KSV-3C2
7170	Turbocharger	ET18016V
7170	Fuel injection pump	Z-50F-019-002
7171	Crankshaft	KSV-2-2BH5
7193	Piston	KSV-5-A2
7171	Cylinder liner	KSV-9-3C2
7197	Cylinder liner	KSV-9-3C2

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 2.4.2 of the QAM, and Section 5.6.2 of QCP-10-13, a review of purchase orders (PO) for critical components indicated that POs were missing for 2 critical components (lube oil lines on unit Nos. 7158, 7193, 7170, and 7186; and connecting rod bearing shells on unit No. 7158).

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 6.3.3 of the QAM, and Section 3.2 of QCP-10-12, a review of records for nondestructive examination (NDE) personnel, revealed the following:

   a. Inspector No. 1631 - performed magnetic particle examination (MT) on cylinder liners in April 1976 prior to his qualification in June 1977 to perform MT.

   b. Inspector No. 2309 - performed MT on five occassions from February 1976 to March 1977 prior to his qualification in March 1978 to perform MT.

   c. Inspector No. 2663 - performed MT in February 1979 prior to his qualification in October 1980 to perform MT. The only record of an eye exam was September 1983.

   d. Inspector No. 688 - performed MT but records were not produced to show that he was qualified to conduct MT.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 4.2 of the QAM, Section 13 of QCP-10-15, and Section 2.1 of QC/IP-APV-2, a review of calibration and vendor audit records revealed that calibration services had been performed by the following seven companies, but there was no documented evidence that these companies had been approved by Cooper Energy Services (CES). In addition, E. J. Daibar was not on the Approved Vendors List, Revision 6.

   1. Colt Industries - gage blocks on an annual basis since 1980.
   2. Magnaflux Corporation - magnaflux machines on an annual basis since 1981.
   3. Edmunds Manufacturing - thread measuring wires on an annual basis since 1983.
   4. Dresser Industries - dead weight tester in February 1984.
   5. Leeds & Northrup - recording pyrometer in September 1983.
   6. Honeywell - furnace recording devices in January 1984.
   7. E. J. Daibar - torque tester in October 1983.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 13 of ANSI N45.2, and Section 4.3 of the QAM, an evaluation of the fabrication areas on March 14 and 15, 1984, and a review of measuring and test equipment (M&TE) records revealed the following:

   a. M&TE in use at factory work stations was overdue for calibration as follows:

      Inside Micrometer (Serial No. 179) due May 16, 1983.
      Dial Bore Gage (Serial No. 163) due February 1, 1984.
      Inside Micrometer (Serial No. 1457) due February 1, 1984.

   b. The calibration stickers on the two torque testers did not indicate a due date.

   c. There was no sticker or small label on a caliper (Serial No. 13018) and a depth micrometer (Serial No. 183).

   d. When M&TE is found out of calibration, evaluations are not made to determine the validity of previous results and the acceptability of items previously inspected or tested.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 5.0 of ANSI N45.2, Section 5.2 of the QAM, and Section 5.6.2 of QCP-10-13, a review of POs for critical components revealed that five POs (Nos. N5633, N5436, 3921W1961, 3621N5380, and 3621F3332) were not signed and dated by QA personnel; and nine POs (Nos. 2190084, 3621P4101, 3621P3293, N5633, N5436, N7180, 3921W1961, 3621F3332, and 3621N8962) did not require suppliers to have a QA program.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Section 5.0 of ANSI N45.2, the NRC inspector found no evidence of documented instructions and/or procedures which addressed specific procurement document controls such as assurance that technical, quality, and purchaser's requirements are included or referenced in POs or that changes to a PO are subject to the same controls as the original PO.

9. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 4.2.1 of QCP-10-8, there was no documented evidence that three vendors of "critical" items (Pumps, Inc.-jacket water pumps and National Forge and Kobe Steel-crankshafts) submitted a copy of their QA Manual or a Manual Evaluation Check List.

10. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 17.0 of ANSI N45.2, CES failed to establish measures to preclude the repetition of M&TE calibration nonconformances identified in architect-engineer and utility audits in 1974, 1976, 1978, May and June, 1980; May, September, and October, 1983; and February, 1984.

11. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 4.2.2 of QCP-10-14, the written response/evaluation of the damaged resistance temperature detector wires at South Texas was provided on May 10, 1982, in 48 days instead of the required 30 days.

12. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 4.3 of ANSI N45.2, the design changes contained on request for drafting action (RFDA) Nos. 18189, 18236, 18250, and 18323 were not verified or checked by an individual other than the one who performed the original design.

13. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 2.1.4 and 5.2 of SA-4, the "Order Affected" block was not completed for RFDA Nos. 18114, 18129, 18133, 18134, 18224, and 18309; and implemented RFDA Nos. 18114, 18134, and 18224 were not signed on the approval line.

14. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 4.2.0, 4.2.1, and 4.2.2 of QCP-10-14, all non-conforming items/deviations/failures in equipment shipped to nuclear facilities were not evaluated per Part 21 (e.g., unqualified Agastat relays at Susquehanna in 1980; failed piston pin bolts at Cooper Station in 1980; crankcase explosion at Susquehanna in 1983; and piston, turbocharger, and lube oil pump failures at Waterford in 1983).

15. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 1.3 of QCP-10-14 and Section 6 of ANSI N45.2, procedure QCP-10-14 did not include appropriate criteria for determining that an important activity had been satisfactorily accomplished in that the procedure did not specifically provide for the review and escalation into the Part 21 review system of problems identified on material review requests, corrective action requests, and direct repair orders.

16. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 18 of ANSI N4.2, and Section 21.51 of 10 CFR Part 21, procedures do not require and records were not prepared to assure compliance with the 2-day reporting requirement of 10 CFR 21, Section 21.21(b)(2).

C. UNRESOLVED ITEMS:

Design changes at CES are processed on a RFDA. These design changes may affect only one engine or all past, present, and future engines manufactured Engineering specifies on the RFDA which engines or Machine Orders (MOs) are affected by the design change. Engines which have been delivered to utility sites are considered closed MOs. The inspector reviewed the file of 300 plus RFDAs issued since 1978 for the nuclear line (KSV) of diesel engines and noted that very few RFDAs were marked as affecting closed MOs. The inspector also noted that the RFDA procedure did not specify how utilities with closed MOs would be notified of design changes or RFDAs affecting their engines. The inspector asked how this notification was done. The inspector also selected one RFDA affecting closed MOs (No. 18060) and requested documentation showing that all closed MOs were notified. Since CES was unable to answer these questions, this item is unresolved pending a determination of how utilities with closed MOs are notified of pertinent design changes. This item will be addressed at a future inspection.

D. OTHER FINDINGS OR COMMENTS:

1. QAM - During the past year, CES has implemented a reorganization in the QA department, but the QAM was not updated to reflect the responsibilities of the organizations affected by the change. As a result of the reorganization, monthly reports from the Director of Quality Assurance to the Vice President covering the quality programs effectiveness were not being sent. Other submitted reports do not appear to provide an acceptable substitute.

   The exhibits at the end of each section of the QAM are numbered with a revision sequence different from the main manual and are not listed on the revision status page, thus making it difficult to tell if the correct revisions of the exhibits are included in the QAM.

2. Reporting of Defects - The NRC inspector reviewed the vendor's Part 21 evaluation procedure, Part 21 posting, and all evaluations performed per Part 21, including those that resulted in Part 21 reports to the NRC and those which did not. The evaluations performed and conclusions drawn appeared appropriate. However, the NRC inspector observed that not all failures and deficiencies were evaluated for Part 21 reportability. In one case, the NRC inspector presented a list of failures which had occurred in CES diesels at nuclear power plants and which had been reported to the NRC by the

utilities. In general, CES had not evaluated these per Part 21. This is a concern since CES would generally be the one who could determine and report if the problems were generic to the entire line of diesels. The respon-sibility to evaluate items of this nature is discussed in NUREG-0302, Revision 1, on pages 21.21(a)-7&8, as well as other places in the NUREG.

In a second case, CES procedures did not specifically provide for the review and possible escalation into the Part 21 system of various lower tier problem reports such as material review requests, direct repair orders, and corrective action requests. Discussions with CES personnel responsible for reviewing and signing these reports indicated they were generally not familiar with Part 21, and they did not generally consider Part 21 applicability when reviewing these reports.

Nonconformances B.11, B.14, B.15, and B.16 were identified in this area of the inspection.

3. Training/Qualifications - The inspector reviewed one procedure and the training/qualification records for ten inspectors and eight NDE personnel to assure that individuals performing and verifying activities affecting quality were trained and qualified. It was noted that three NDE personnel had performed MT on cylinder liners prior to being certified in accordance with SNT-TC-1A to perform MT. In addition, four individuals (Nos. 2721, 1312, 1303, and 2428) had performed inspection activities from 1976 through 1979, but there was no documented evidence of eye examinations prior to October 1982. Nonconformance B.4 was identified in this area of the inspection.

4. Design Control - The inspector reviewed the design control methods employed by CES to determine how design changes were made and how these changes were applied or fed back to previously built diesels. Design changes are processed on a RFDA, and the procedural mechanism is in place to determine the diesels to which the design changes apply. CES also has a system of supplying Service News Bulletins to customers. The inspector reviewed those issues which apply to the nuclear (KSV) line of diesels and discussed methods of sending these to customers. The inspector also noted that the RFDA was not always independently verified or approved by the required official.

Nonconformances B.12 and B.13 were identified in this area of the inspection.

5. Audits performed on CES - The inspector reviewed all licensee/architect engineer audits performed on CES from 1974 to 1984. The audits appeared thorough and responses generally appeared to address the identified concerns. However, three areas (instrument calibration, corrective action followup, and subvendor surveys) were identified to have recurring problems on several audits. Accordingly, the inspector selected these areas for further review, as discussed below.

   The inspector reviewed the CES instrument calibration procedure and computer printouts, toured the manufacturing facility, observed instruments in use and present at various work stations, and visited the instrument recalibration shop. Through the use of CES's own overdue instrument calibration computer printout, the inspector identified three instruments in use which were overdue for calibration. The inspector also noted evaluations are not performed as required when instruments are found to be out of calibration.

   Since nonconformances of these types had been previously identified on numerous audits of CES, the inspector concluded that corrective action measures to preclude repetition of the nonconformances had not been taken.

   The inspector also reviewed corrective action request (CAR) procedure No. QCP-10-4 and file. CAR form No. QCP-10-4A has recently been improved by the addition of a final QC Verification Block, but there is no description of its use in the procedure.

   Nonconformance B.6a, B.6d, and B.10 were identified in this area of the inspection.

6. Calibration of M&TE - The inspector reviewed one procedure and records for M&TE calibrated by CES and records for M&TE and reference standards calibrated by outside vendors. An observation of M&TE at various work stations was also performed to assure that M&TE are properly identified, controlled, and calibrated at specified intervals. It was noted that CES received calibration services from seven companies, but there was no documented evidence that CES required these suppliers to have a QA program or that a preaward evaluation and postaward audit was conducted on each supplier by CES.

   Nonconformance B.5, B.6(b), and B.6(c) were identified in this area of the inspection.

7. Critical Part Designation - A critical part is a classification used by CES to distinguish those parts of diesel engines at nuclear installations whose singular failure could prevent the unit from performing its specified function. Critical parts are treated as safety-related and are covered by the QA program requirements.

   The CES fuel injection line tubing has failed on several operating diesel engines (e.g., Cooper, Zion, and Susquehanna). Some failures of fuel injection tubing have resulted in fuel oil leaks, fires, and diesel generator shutdowns. This tubing is designated by CES as a non-critical part and is bought as a commercial quality item. The inspector stated that, based on inplant performance, a reevaluation of the non-critical designation and the quality of tubing actually used appeared appropriate.

8. Manufacturing Process Controls - The inspector reviewed approximately 185 quality control/inspection plans to assure that all required inspection operations were satisfactorily completed on 9 components (crankshaft, jacket water pump, turbocharger, connecting rod bearing shell, fuel injection pump, cylinder, piston, governor, and piston rod pin bolts) of a diesel generator. The 9 components selected were from the following diesel generator units: No. 7158-Susquehanna; Nos. 7170/7177-Waterford; Nos. 7183/7186-Palo Verde; and Nos. 7193/7197-South Texas.

   The inspector reviewed 12 quality control procedures addressing subjects such as material certification and traceability, process control of heat treatment, and control of plating processes. Five NDE procedures and 20 heat treat procedures were also reviewed. The inspection, testing, calibration, heat treatment, and various work stations in the fabrication area were evaluated to assure that activities affecting quality are prescribed by and accomplished in accordance with documented procedures and/or instructions.

   Nonconformances B.1 and B.2 were identified in this area of the inspection.

9. Control of Purchased Material and Services - The inspector reviewed 2 procedures; 4 Approved Vendor Lists (AVL); 15 POs for 4 components (jacket water pump, 5; connecting rod bearing shell, 4; fuel injection pump, 2; and governor, 4); 1 PO for plating service; and 24 certified material test reports for 4 components (lube oil line, 12; piston rod pin bolt, 1; governor, 3; and crankshaft, 8) to assure that material was purchased from qualified vendors.

It was noted that PO 2190084 dated January 1, 1984, to Van der Horst Corporation (vendor has honed and chrome plated cylinder liners from 1976 to the present) did not require the vendor to have a QA program or impose Part 21 requirements, and QA had not approved the PO.

POs for the crankshafts are not retained since the forgings are procurred as commercial items. Test certificates from the vendors were available certifying the material composition of the forging. CES's position is that the crankshaft becomes a critical item after machining the forging at CES.

POs for the fuel injections pumps on the South Texas Project (Unit 7193) were not available because it was classified as a commercial item although pumps purchased in an earlier time frame were classified as "critical."

It should be noted that the bill of material for South Texas (Unit 7193) shows the jacket water pump (electrical driven) as an ASME code item while the bill of material for Susquehanna (Unit 7158) shows the same component as non-code.

Because of the classification adopted by CES (ref. QCP-1-065, Revision 5, "Vendor Qualification Activity Listings") based on a supplier's activity, it was noted that several suppliers (listed below) of "critical" items and services were not required to submit a QA Manual for CES review and approval. It was also noted that CES did not perform an initial survey and/or annual audit, and the supplier was not on the AVL.

Keystone Tubular Service and Tube Sales both supplied stainless steel type 304 tubing in 1975 which was used in lube oil lines.

Van der Horst honed and chrome plated cylinder liners from 1976 to the present.

Joseph T. Ryerson and Peter A. Frasse supplied 4100 series steel bar stock in 1976 and 1978, respectively. This bar stock was machined into piston rod pin bolts.

Woodward Governor supplied governors from 1976 to the present (records indicate that CES performed a QA manual review in September 1983).

Pumps, Inc. supplied jacket water pumps (motor driven) in 1975 and 1977.

In addition, CES did not perform a survey/audit at Bendix (fuel injection pump), Gould (connecting rod bearing shell), and Crane-Demings (jacket water pump-electrical driven), but all three suppliers filled out a self evaluation check list (i.e. desk audit).

Nonconformances B.3, B.7, B.8, and B.9 were identified in this area of the inspection.

ORGANIZATION: CORPORATE CONSULTING & DEVELOPMENT COMPANY, LTD.
RESEARCH TRIANGLE PARK, NORTH CAROLINA

REPORT NO.: 99900511/84-01	INSPECTION DATE(S): 3/26-29/1984	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: Corporate Consulting & Development Company, Ltd.
ATTN: Dr. J. R. Yow
President
P. O. Box 12728
Research Triangle Park, North Carolina 27709
ORGANIZATIONAL CONTACT: Mr. Carson Blanton, Jr. QA Manager
TELEPHONE NUMBER: (919) 362-8800

PRINCIPAL PRODUCT: Engineering, consulting, and testing services.

NUCLEAR INDUSTRY ACTIVITY: Corporate Consulting and Development Company, Ltd. (CCL) provides engineering consulting and testing services to the nuclear industry for seismic analysis, testing, and nuclear environmental qualification of equipment. CCL employs approximately 51 people for these activities.

ASSIGNED INSPECTOR: C J Hale for 4/26/84
J. R. Agee, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S): J. J. Benson, Sandia National Laboratories

APPROVED BY: C J Hale 4/26/84
C. J. Hale, Acting Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: Status of previous inspection findings; implementation of a QA program to meet 10 CFR Part 50, Appendix B criteria; witness equipment qualification (EQ) tests; and review test plans/procedures for EQ test programs.

PLANT SITE APPLICABILITY:

50-424/425, 50-261/324/325/400/401, 50-416/417

ORGANIZATION: CORPORATE CONSULTING & DEVELOPMENT COMPANY, LTD.
RESEARCH TRIANGLE PARK, NORTH CAROLINA

REPORT NO.: 99900511/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. ACTIONS ON PREVIOUS INSPECTION ITEMS:

(Closed) Violation (81-01): CCL had not implemented requirements of 10 CFR Part 21 in that required documents had not been posted, appropriate procedures had not been adopted, and procurement documents did not specify that the provisions of 10 CFR Part 21 applied.

The inspector verified that required documents were posted; appropriate procedures had been adopted; and that procurement documents had been revised, where applicable, to specify that the provisions of 10 CFR Part 21 applied.

E. OTHER FINDINGS OR COMMENTS:

1. Quality Assurance Program - The inspector reviewed the QA manual (QAM), Report No. A-608-83, dated January 31, 1984, and verified that all 18 criteria of 10 CFR Part 50, Appendix B, were addressed and that each criterion was implemented by one or more implementing procedures. In total, CCL had issued 37 implementing procedures. Each procedure had been reviewed and approved by QA and corporate management. No nonconformances were identified.

2. Technical Inspection - The inspector witnessed the preparation and initial thermal aging of electrical components and reviewed documents concerning two equipment qualification tests.

   a. The inspector reviewed the final test Procedure No. 1724-7, Revision 1, dated March 27, 1984, for an "Extreme Conditions Test," for a digital signal isolator system consisting of a 125 VDC power supply, power supply monitor, ground fault monitor, analog isolator rack, analog isolation printed circuit board, and analog isolator input. The inspector witnessed the functional testing of the components which was completed in compliance with the

"Functional Test Procedure" 1724-1-1. The system components had previously been subjected to the "Surge Withstand Capability Test"; to radiation, thermal, and wear aging; and seismic vibrations in compliance with procedures 1724-2/3/4/5/6. The inspector witnessed the installation of the system into the temperature/humidity chamber where the system was operated for approximately 18 hours without failure. No nonconformances were identified.

b. The inspector reviewed documents concerning the "Environmental Qualification Test Program for Seismic Qualification of Fans for the Vogtle Project." This included review of the PACE (customer) purchase order (PO) No. E-37494-37930 for CCL project No. 82-1718, the architect engineer's specification No. X4AJ07, and the CCL final test report A-508-82. The PO and specification requirements of the test facility were that, ". . . you are to observe regulations that are set forth in 10 CFR 50, 10 CFR 21 . . . ," plus IEEE 323-1974 and daughter standards. By review of the final test report, the inspector verified that the test facility had complied with the test criteria of applicable IEEE standards and NRC regulations and that the PACE fans had been qualified for 40 years plus 1-year postdesign basis event. The fans are qualified to withstand, without loss of function, the seismic events postulated for their functions. No nonconformances were identified.

c. The inspector reviewed the CCL nuclear qualification report for hydrogen ignitors, report No. A-516-82, dated November 12, 1982. This activity included the review of POs, test plans, and qualification data sheets to support the qualified status of the hydrogen ignitors. The qualification methology was evaluated and found acceptable relative to IEEE 323-1974. Review of the test documents revealed the following: (1) radiation aging was completed at Ga. Tech, dose rates and total intergrated doses were certified; (2) thermal aging and Arrhenius calculations were verified for accuracy; (3) seismic tests were conducted by Structural Dynamics Research Corp. (SDRC) and described in SDRC Report No. 10874-3; (4) LOCA simulation was performed by Wyle Labs and recorded in Wyle report No. 45880-1; (5) the submergence test was performed by CCL; and (6) the hydrogen burn test was conducted by Wyle Labs and reported in Wyle report No. 57149. No nonconformances were identified.

ORGANIZATION: CORPORATE CONSULTING & DEVELOPMENT COMPANY, LTD.
RESEARCH TRIANGLE PARK, NORTH CAROLINA

REPORT NO.: 99900511/84-01	INSPECTION RESULTS:	PAGE 4 of 4

F. Exit Meeting - The inspector met with management at the conclusion of the inspection on March 29, 1984, at the CCL facility, Apex, North Carolina. The inspector explained that the findings from the previous inspection would be closed by this inspection report and that there were no findings identified in this report. Management acknowledged the statements by the inspector.

ORGANIZATION: DRESSER INDUSTRIES, INC.
ALEXANDRIA, LOUISIANA

REPORT NO.: 99900054/84-01	INSPECTION DATE(S): 3/26-29/84	INSPECTION ON-SITE HOURS: 48

CORRESPONDENCE ADDRESS: Dresser Industries, Inc.
ATTN: Mr. R. L. Schaus, Vice President
Plant Operations
P. O. Box 1430
Alexandria, Louisiana 71301

ORGANIZATIONAL CONTACT: Mr. B. G. Brunson, Quality Assurance Manager
TELEPHONE NUMBER: (318) 640-2250

PRINCIPAL PRODUCT: Nuclear safety and safety relief valves.

NUCLEAR INDUSTRY ACTIVITY: Approximately 1 percent of its total workload.

ASSIGNED INSPECTOR: Wm D Kelley 5/18/84
Wm. D. Kelley, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S): F. Cifuentes (Consultant)

APPROVED BY: M. E. Foote for 5/18/84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made to review the implementation of your quality assurance program including status of previous inspection findings, manufacturing process control, and control of special processes (welding and nondestructive examination). The inspection also included a review of additional data pertaining to the identified failure of main steam valves with forged bodies to meet the required blowdown limit.

PLANT SITE APPLICABILITY:
(1) Undertorqued bolting: 50-373 and 50-374; and (2) valve failure to meet blowdown: 50-320, 50-323, 50-329, 50-330, 50-336, 50-346, 50-348, 50-395, 50-454, 50-455, 50-456, 50-457, 50-460, 50-498, 50-499, 50-513, 50-428 and 50-529.

ORGANIZATION: DRESSER INDUSTRIES, INC.
ALEXANDRIA, LOUISIANA

REPORT NO.: 99900054/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (Report No. 99900054/83-01, Item A): Contrary to paragraphs 21.21(a) and 21.51(a) of 10 CFR Part 21, Procedure III-EN003.00 did not provide for the maintenance of records in regard to informing a licensee or purchaser with respect to causing a deviation to be evaluated.

   The NRC inspector verified that Procedure III-EN003.00 had been revised and required that a record be made of all communications with a customer or licensee. An appendix (QA-0355) had been added which is a traveler and checklist for documenting the evaluation of deviations or nonconformances subject to 10 CFR Part 21 reporting requirements.

2. (Closed) Nonconformance (Report No. 99900054/83-01, Item B.1): Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraphs 5.2 of the ASME accepted Quality Assurance Manual (QAM) and paragraph 3.3 of Procedure QAOP 5-1, the analysis reports supplied by Southwestern Laboratory, Incorporated (SLI) and Spectrum Laboratories (SI) for the standards used with the Kevex Model 6600 analyst did not provide traceability to nationally recognized standards.

   The NRC inspector verified that Dresser Industries (DI) had received: (a) Certificate of Analysis from the National Bureau of Standards (NBS) for the samples they had purchased direct from the NBS; (b) a quality assurance statement from SLI that a standard from a nationally recognized source, such as NBS or BCS, similar in composition to the samples being analyzed, was run with each sample or group of samples as a control; and (c) a statement from SL that the chemical analysis of standards were determined using NBS materials, when available.

In those instances where suitable reference material was unavailable from NBS, reference material was obtained from six identified sources.

3. (Closed) Nonconformance (Report No. 99900054/83-01, Item B.2): Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraphs 4.1 of the QAM and 5(0) of the Instruction for Installation and Maintenance Consolidated Safety Valves, Type 3700, two cover plate stud nuts on a 6-3777QA-X1-RT25-T safety valve (S/N BU-07877) for the Consumers Power Supply, Midland, Unit 1, were not torqued to the specified value due to insufficient clearance between the stud nut and the yoke rod.

   The NRC inspector verified that two special torque wrench adapters had been designed, manufactured, and were in the assembly area for assuring proper torquing of the stud nuts.

4. (Closed) Nonconformance (Report No. 99900054/83-01, Item B.3): Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.6 of the QAM, release of the "Quality Control Manual for ASME Accepted Capacity Testing Laboratory for Safety and Safety Relief Valves Conforming to PTC 25.3-1976" was not authorized by the Manager, Quality Systems, and its distribution and control was not the responsibility of the Quality Assurance Engineer, Systems and Audits.

   The NRC inspector verified that the manual had been revised removing ASME Section III safety valves from the scope of testing, and the National Board had agreed to accept the revision.

E. OTHER FINDINGS OR COMMENTS:

1. Manufacturing Process Control: The NRC inspector reviewed the parts, travelers, and drawing for seven shop orders and verified that specified requirements such as: (a) heat number stamping, (b) nondestructive stamping, (c) authorized nuclear inspector sign off, (d) first piece inspection, (e) final inspection, (f) minimum wall thickness measurements, (g) calibration of gages, and (h) serial numbers assignment had been documented.

   Fifteen rejection disposition orders were reviewed, and it was verified that the material had been dispositioned in accordance with the recommendations of the material review board.

2. Control of Special Processes:

   a. Nondestructive Examination: The NRC inspector reviewed the nondestructive examination program, four nondestructive examination procedures, qualification of nondestructive examination procedures, and qualification records of four nondestructive testing personnel and verified that the procedures were approved and qualified in accordance with the program. The eye test and certification of the technicians were current. The state license for isotopes, calibration strips for densitometers, calibration of gages on magnetic particle examination equipment, and calibration of ultrasonic equipment were reviewed, and it was verified that all were current.

   Nondestructive examination was not performed on ASME Section III Code parts during this inspection.

   b. Welding: The NRC inspector reviewed three welding procedure specifications, two welding procedure qualification records, the 3-month report for renewal of welder qualifications (March 1984 through May 1984), calibration of welding equipment, rod storage oven gages, and procedures for welding and heat treat process control and verified that: (1) the welding procedures were approved and qualified, (2) the welder qualifications were current, and (3) the welding machines and rod storage gages were calibrated, and the calibration was current.

   Only five parts subject to the ASME accepted quality assurance program were welded or hardfaced during this inspection.

3. Continued Inspection of Failure of Main Steam Safety Valves at the Arizona Public Service Company (APSC) Palo Verde Nuclear Generating Station, Unit 1, to Meet Blowdown Limit of 5 Percent:

   a. The NRC inspector identified in Report No. 99900054/83-01 that the failure of the APSC Palo Verde Nuclear Generating Station, Unit 1, main steam safety valves to meet the design specification 5 percent blowdown requirement was due to DI changing the valve body material from a casting to a forging. The continued inspection was made to examine the Wyle Laboratories (WL) safety valve flow test results and to verify that DI had notified all affected utilities of the potential failure of safety valves with forged bodies to meet the blowdown specified in their design specification.

b. The NRC inspector reviewed one WL test procedure, three WL test reports on DI Series 3700 safety valves, and one Combustion Engineering specification and verified that WL had tested the three orifices supplied by DI in the Model 3700 safety valves.

c. DI informed the NRC inspector that all of the WL data had been received and was currently being evaluated for meeting each customer's design specification requirements, and their final report will be issued in May 1984.

d. The NRC inspector reviewed DI Report SV-202-8 which identified all 72 utilities that had received Model 3700 safety valves. The report identified the 11 utilities that had received the Model 3707 RA safety valves with forged bodies that could have a potential blowdown problem. Letters had been sent to the utilities which owned the valves and the original purchaser of the valves advising them of the 7-12 percent blowdown and requested notification of potential impact on the reactor operation so corrective action could be determined and initiated.

ORGANIZATION: EBASCO SERVICES, INCORPORATED
NEW YORK, NEW YORK

REPORT NO.: 99900505/84-01	INSPECTION DATE(S): 2/27-3/1/84	INSPECTION ON-SITE HOURS: 56

CORRESPONDENCE ADDRESS: Ebasco Services, Inc.
ATTN: Mr. B. E. Tenzer
Vice President, Materials
Engineering and QA
Two World Trade Center
New York, New York 10048
ORGANIZATIONAL CONTACT: Mr. B. R. Mazo, Chief, Quality Assurance Engineer
TELEPHONE NUMBER: (212)839-2830

PRINCIPAL PRODUCT: Architect engineering services.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities is approximately 50 percent of a 5,000 person staff. Major projects include Shearon Harris, Units 1 and 2; St. Lucie, Unit 2; Waterford, Unit 3; WNP, Unit 3; South Texas Project, Units 1 and 2; and Comanche Peak, Unit 2. There are also modification/repair/service contracts on 10 additional reactor units.

ASSIGNED INSPECTOR: C J Hale for — 3/30/84
D. G. Breaux, Reactor Systems Section (RSS) — Date

OTHER INSPECTOR(S): R. Nguyen, RSS

APPROVED BY: C J Hale — 3/30/84
C. J. Hale, Acting Chief, RSS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Topical report ETR-1001.

B. SCOPE: Status of previous inspection findings, design process management, design interfaces, procurement document control, and procurement source selection.

PLANT SITE APPLICABILITY:

Waterford, Unit 3 (50-389) and Shearon Harris, Units 1 and 2 (50-400/401).

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-01): Ebasco reviewed and approved vendor submitted drawings that specified flanges that did not conform to the applicable specification or to the applicable code.

   The inspector reviewed and verified that all commitments referenced in Ebasco's response letters dated June 22, 1983, and August 3, 1983, have been performed.

2. (Open) Nonconformance (83-02): Ebasco's vendor quality assurance (QA) representative released Class 1E sequencer panels for shipment prior to engineering review of the applicable seismic report.

   The details outlined in Ebasco's response dated December 15, 1983, were reviewed to assure that the concern was properly addressed. The inspector reviewed Ebasco's department procedures that allow release of equipment from a vendor prior to engineering acceptance of the seismic report. Vendor QA documentation was reviewed to assure that equipment shipped prior to acceptance of the vendor seismic report had been so identified. The inspector reviewed documentation of examples where Ebasco engineering authorization was given to the vendor QA representative to release equipment prior to acceptance of seismic reports. To assure Ebasco QA had controls that this equipment would eventually have engineering review and approved vendor seismic reports, the inspector reviewed verification documentation of this effort. There are two efforts that will indirectly assure engineering review and approval is made. First, when the equipment is shipped, the quality document package is with the equipment. Site QA personnel review contents of data packages and report missing data. Second, in an effort to determine more effectively the qualification status of

equipment for the Shearon Harris Project, engineering has established a status report for equipment qualification report acceptability. This report lists all procurements and the status of engineering approval of environmental and seismic qualification reports.

Ebasco has submitted to the NRC Region IV office for approval a revision to Section 3.8 of QA-II-5 of the Topical Report ETR-1001 to clarify their position. This item will remain open until the NRC Region IV review of this revision is completed.

3. (Open) Nonconformance (83-02): Ebasco failed to incorporate the welding requirements from specification CAR-SH-IN-13 into the QA plan for auxiliary relay cabinets.

In response to this nonconformance, Ebasco stated in the letter to NRC, dated December 15, 1983, that the requirements for submittal of welding procedures and visual acceptance criteria were not incorporated into the QA Section (Section 14) of specification CAR-SH-IN-13 until Revision 5 dated August 19, 1982, and incorporated into the contract by Supplement 16 dated September 29, 1982. Ebasco also mentioned that these requirements, therefore, were not incorporated into the QA Section of specification CAR-SH-IN-13 for implementation, until after shipment of the equipment in question in April 8, 1982. During this inspection, the NRC inspector examined the specification CAR-SH-IN-13, Revision 4, dated April 15, 1980; Revision 5, dated August 19, 1982; Revision 7, dated May 25, 1983; and related QA plans associated with the above specification.

On the basis of this review, it was noted that the welding procedure requirement had been included as early as Revision 4 of specification CAR-SH-IN-13 by the following statement in Section 5.03 of this specification:

> "Welding procedures shall be identified to the purchaser, if nonstandard procedure is in use, Seller shall submit copies to the purchaser for review and approval."

An interview with Ebasco QA personnel during this inspection revealed that in response to this nonconformance, Ebasco only considered the additional QA welding procedure requirements which were added to the Specification CAR-SH-IN-13 in Revision 5, dated August 19, 1982. They did not impose the engineering welding procedure requirement as it existed from Revision 4 of the specification. Ebasco committed to

address this nonconformance in terms of engineering welding requirements and the effect of these requirements on the QA plans in a subsequent response to NRC.

This item remains open pending Ebasco's additional response to this nonconformance.

4. (Open) Nonconformance (83-02): Ebasco authorized System Control Corporation to fabricate the auxiliary relay cabinets prior to review and acceptance of welding procedure.

Ebasco stated in their response letter to NRC dated December 15, 1983, that the subject auxiliary relay cabinets were formally released for fabrication by Supplement 12 of Purchase Order NY 435246 dated April 8, 1982, under Revision 4 of Specification CAR-SH-IN-13. Ebasco also said that the requirement for the seller to submit welding procedures for review and acceptance prior to any fabrication was first added to the specification in Revision 5 and incorporated into the contract by Supplement 16 dated September 29, 1982, and, therefore, the submittal of welding procedures was not a requirement at the time the equipment was released.

The following is a summary of findings which indicates that Ebasco did not fully consider the above nonconformance in its response letter of December 15, 1983, to NRC:

a. The engineering welding requirement was included in Section 5.03 of specification CAR-SH-IN-13, Revision 4 dated April 15, 1980.

b. Additional QA welding requirements were also incorporated into Section 14.03 of Revision 5 dated August 19, 1982, of specification CAR-SH-IN-13.

c. The change in specification CAR-SH-IN-13, as a result of the additional QA welding requirements as indicated in item (b) above, was not shown on each page of the affected specification nor was it shown on the title page of Revisions 5 and 7 of this specification. This was in violation of paragraph 5.15.3 of Ebasco procedure No. E-21 which requires that the revision number shall be shown on each page of the specification.

d. The subject relay cabinets were formally released for fabrication on April 8, 1982.

On the basis of the above discussion, it is apparent that the review and approval of welding procedures, as indicated in Revision 4 of specification CAR-SH-IN-13, dated of April 15, 1980, was a requirement at the time the equipment was released for fabrication, which was April 8, 1982.

This item remains open pending Ebasco's additional response to this nonconformance.

5. (Closed) Nonconformance (83-02): Failure to identify and document the direction of seismic forces supplied by Combustion Engineering (the nuclear steam system supplier) which were used in calculating the design of the seismic supports for the holdup and boric acid makeup tanks.

The inspector verified that all actions committed to in Ebasco's response letter dated December 15, 1984, had been taken. This verification included a review at the Waterford Project Personnel Directory dated November 1, 1983, where certain mechanical - nuclear design personnel were selected for verification of training. The inspector reviewed the training record for the selected engineers to assure that these sessions included Engineering Procedure E-52 titled "Coordination of NSSS Interfaces." This review revealed that all had received the referenced training. Also reviewed was the overall training system for new project personnel and current project personnel who need, or have missed, certain required training.

E. OTHER FINDINGS OR COMMENTS:

1. Procurement Source Selection - The inspector reviewed four procurement contract files for the Shearon Harris project. A review was made of all bid processes and preaward activities concerning potential vendors to assure that the procurement process is being implemented as committed in Ebasco procedures. Ebasco QA vendor evaluation reports pertaining to the referenced contract files were examined to assure that the evaluation was of sufficient level to establish a level of confidence in the vendors activities affecting quality. The inspector assured that all Ebasco concerns relating to a potential vendor's quality program are documented and corrective action is established and followed up. All engineering technical assessments of vendors to be considered for the four Shearon Harris

contracts were reviewed to assure that they meet procedural commitments. The Approved Vendor List and it's system inputs were reviewed to assure that its function meets Ebasco procedural commitments. From the documentation reviewed, all procedural commitments are being implemented properly.

In this area of the inspection, no nonconformances or unresolved items were identified.

2. Procurement Document Control - The inspector reviewed four procurement contract files for the Shearon Harris project. The purchase specification was reviewed for all of the referened procurements to assure that adequate quality requirements were imposed. The purchase order was reviewed to assure that there was proper imposition of these quality requirements. All addenda to these purchase orders were reviewed to assure that changes impacting quality were properly reviewed and approved as required by Ebasco procedural commitments.

   In this area of the inspection, no nonconformances or unresolved items were identified.

3. Design Process Management - Applicable procedures and instructions were reviewed to verify that procedures prescribe a system for design process management controls which are consistent with the commitment of the Nuclear QA Program Manual (Ebasco Topical Report ETR-1001). The objective of this area of inspection was to verify that:

   a. The design process system is defined, implemented, and enforced in accordance with approved procedures and instructions.

   b. Design inputs are properly prescribed and used for translation into specifications and drawings.

   c. Final design can be related to the design input including the steps performed from design input to final design.

   d. Design activities including design changes are documented in sufficient detail to permit design verification and auditing.

   During this inspection, the NRC inspector examined six specifications, six drawings, two design calculation files, five Design Change Notice (DCNs) and five Field Change Request (FCRs). In reviewing the structural design for the emergency service water system main

reservoir intake structure, the NRC inspector noticed that a significant design change in the building foundation, as indicated in the Shearon Harris FCR-C-4456, dated August 31, 1983, was classified as a minor change and was not reviewed by Ebasco Engineering Department who was the design originator for the foundation. It was also noted that this design change was classified as safety-related category "Q" as indicated on the FCR-C-4456. In addition the NRC inspector also reviewed the design change in the structural component penetration and related piping systems for the Shearon Harris emergency service water system. Since the revised stress calculation file was not available to the inspector by the end of the inspection period, the NRC inspector will review this system in a future inspection.

ORGANIZATION: ELECTRO SWITCH CORPORATION
WEYMOUTH, MASSACHUSETTS

REPORT NO.: 99900833/84-01	INSPECTION DATE(S): 2/7-10/84	INSPECTION ON-SITE HOURS: 26

CORRESPONDENCE ADDRESS: Electro Switch Corporation
ATTN: Mr. F. N. Meissner
President
77 King Avenue
Weymouth, Massachusetts 02188

ORGANIZATIONAL CONTACT: Mr. B. S. Jones, Quality Control Manager
TELEPHONE NUMBER: (617) 335-5200

PRINCIPAL PRODUCT: Detent and cam actuated switches; lockout and switch relays.

NUCLEAR INDUSTRY ACTIVITY: Devices are supplied to manufacturers of panel boards. Production effort is approximately 8 percent.

ASSIGNED INSPECTOR: W. E. Foster — 3/14/84
W. E. Foster, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S):

APPROVED BY: W. E. Foster for — 3/14/84
I. Barnes, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Appendix B to 10 CFR Part 50 and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the issuance of a 10 CFR Part 50.55(e) report by Mississippi Power and Light Company and a 10 CFR Part 21 report by Illinois Power Company. The reports pertained to: (1) a switch which exhibited contact reversal (mirror image) at Grand Gulf Nuclear Station, Unit 1; and (2) an overtravel condition that affects contact alignment of numerous switches that had been furnished to Clinton Power Station, Unit 1.

PLANT SITE APPLICABILITY:

Mirror Image, Docket No. 50-416; Contact Alignment, Docket No. 50-461.

ORGANIZATION: ELECTRO SWITCH CORPORATION
WEYMOUTH, MASSACHUSETTS

REPORT NO.: 99900833/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 5 of Section XVIII of the Quality Assurance Manual (QAM), Revision 5, the November 1982 audit of the engineering drawing control system had not been fully performed in accordance with the applicable checklist. This was evidenced by the lack of an entry for characteristic No. 9 of the checklist for Audit Report No. 1020 dated November 18, 1982.

C. UNRESOLVED ITEMS:

During a demonstration of order entry controls as reflected in Engineering Procedure E-1, Revision 2, it was noted that an electronic file, as opposed to a card file, was used to determine the revision level of the filed copy of the customer drawing.

The procedure should be revised to reflect the current practice.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

Previous inspection findings were not evaluated; consequently, the status is unchanged.

E. OTHER FINDINGS OR COMMENTS:

1. Followup on Regional Requests:

   a. Mississippi Power and Light Company filed a final 10 CFR Part 50.55(e) report on July 15, 1981, with the Nuclear Regulatory Commission (NRC), Region II. The report stated that the contact arrangement of Electro Switch No. S3A was such that placing the switch in the "STOP" position would start the residual heat removal pump and vice versa. The switch was purchased by and used in a panel furnished by General Electric Company-Nuclear Energy Business Operations (GE-NEBO) for use at Grand Gulf Nuclear Station, Unit 1. The GE part number for the switch was 272A7689.

During an NRC inspection at GE in May 1983, it was revealed that the contact reversal (mirror image) deficiency also existed on other part numbers (P/N) of switches manufactured by Electro Switch (ES); at least one other, P/N 272A8005, was supplied to GE for Class 1E application. A blanket engineering change notice (ECN) dated December 15, 1976, was initiated to reverse the contacts of six switch P/Ns; P/Ns 272A7689 and 272A8005 were the only ones destined for nuclear safety-related application. While the GE drawing had been revised for P/N 272A8005, the GE drawing had not been revised for P/N 272A7689.

There were no documented directions from GE to reverse the contacts of P/N 272A7689; however, internal documents indicated that verbal directions had been received from GE. An ECN was initiated on September 21, 1977, to again reverse the contacts of P/N 272A7689; thereby correcting the error created by the initial ECN. As a result of GE's Corrective Action Request No. 82T-065, ES: (1) revised their quality assurance manual to include the necessity to assure compliance to customer requirements, and (2) circulated a memorandum that prohibited acceptance of verbal changes to purchase orders.

The NRC inspector was informed that: (1) the suspect switch had not been returned to ES for evaluation; consequently, verification of the deficiency was impossible; (2) no switches had been returned for correction of a mirror image condition; (3) records were not available to determine the number of switches manufactured and delivered between December 14, 1976, and September 21, 1977; and (4) records were not available to identify other customers.

b. Illinois Power Company filed a 10 CFR Part 21 report on April 17, 1983, with the NRC, Region III. The report indicated that deficient Series 20K switches manufactured by ES had been supplied as basic components in various panels furnished by GE-NEBO for use at Clinton Power Station, Unit 1. The report further indicates that movement of the switch handle to either extreme position and releasing, permitting it to snap back to its normal position, "could cause the 'normal after' contacts to misoperate, thereby giving false indication as to actual switch position."

ES determined, overtravel of the contacts experienced by "flicking," the switch handle was inappropriate operation of the switch. Despite that, a design improvement was undertaken to reduce the likelihood of the occurrence of contact overtravel. Basically, the improvement was the addition of a shaft for the slip contacts as opposed to a single shaft for all contacts (primary and slip). Also, the following decisions were made: (1) adherence to the design limit of four slip contacts, and (2) installation of the slip contacts at the last active deck positions of the switch. Purchasers were informed of the improvement and provided an opportunity for conversion of their switches. The NRC inspector was informed that some customers took advantage of the opportunity while others did not because they had experienced no problems with contact overtravel. The NRC inspector noted that a switch without the design improvement did not overtravel when the handle was firmly grasped and moved to the desired position. The NRC inspector reviewed records which pertained to switches which had been returned, modified, and sent back to the purchaser.

c. The NRC inspector was provided a demonstration of the controls that are implemented during the order entry activity. The order selected was non-nuclear; however, the NRC inspector was informed that order entry is identical. The NRC inspector observed that: (1) the practice differed from the documented procedure regarding the customer drawing file, and (2) controls were circumvented regarding processing when there was disagreement between the revision levels of the customer drawing reflected in the file and the purchase order. No citation was issued because: (1) the order was non-nuclear, and (2) immediate corrective actions and preventive measures were taken.

2. Methodology:

In an effort to assess the effectiveness of the corrective actions and preventive measures, the following areas were evaluated: (1) change control; (2) manufacturing process control; and (3) audits. The inspection was accomplished by evaluating the following documents for requirements and/or implementation of requirements: seven drawings, two specifications, five procedures, one quality assurance manual, four purchase orders, four internal memoranda, four ECNs, and numerous documents identified as: return authorizations, shippers, requests for drawing changes, and audit reports and related checklists. This activity resulted in one nonconformance and one unresolved item which are detailed in paragraphs B and C.

ORGANIZATION: EXXON NUCLEAR COMPANY
NUCLEAR FUELS DEPARTMENT
RICHLAND, WASHINGTON

REPORT NO.: 99900081/84-01	INSPECTION DATE(S): 4/3-5/84	INSPECTION ON-SITE HOURS: 72

CORRESPONDENCE ADDRESS: Exxon Nuclear Company
Nuclear Fuels Department
ATTN: Mr. C. J. Volmer, Quality Assurance Manager
2955 George Washington Way
Richland, Washington 99352

ORGANIZATIONAL CONTACT: Mr. C. J. Volmer, Quality Assurance Manager
TELEPHONE NUMBER: (509) 375-8257

PRINCIPAL PRODUCT: Nuclear fuel assemblies.

NUCLEAR INDUSTRY ACTIVITY: Nuclear fuel reload supplier for various designed cores.

ASSIGNED INSPECTOR: R. H. Brickley — 4/24/84
R. H. Brickley, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S): P. Sears, Reactor Systems Section
W. Shier, Bookhaven National Laboratory

APPROVED BY: C. J. Hale — 4/26/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Exxon Topical Report XN-NF-1A, Revision 6.

B. SCOPE: Special inspection requested by DSI/NRR concerning the development and use of computer codes.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: EXXON NUCLEAR COMPANY
NUCLEAR FUELS DEPARTMENT
RICHLAND, WASHINGTON

REPORT NO.: 99900081/84-01	INSPECTION RESULTS:	PAGE 2 of 10

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to criterion V of Appendix B to 10 CFR Part 50 and Section 5 of Topical Report No. XN-NF-1A, Exxon Nuclear Company (ENC) failed to provide adequate definition of the instruction for satisfactory completion of safety-related computer code activities.

2. Contrary to Section 5 of Topical Report No. XN-NF-1A and ENC procedure XN-NF-P00,002, there was no summary, signature, and date of the checker included in backup calculation No. E-TI22-969-1.

3. Contrary to Section 5 of Topical Report No. XN-NF-1A and ENC document XN-NF-608, the Software Development Records (SDRs) for the computer codes REFLEX and TOODEE-2 did not contain all the necessary records.

4. Contrary to criterion XVII of Appendix B to 10 CFR Part 50, ENC failed to provide the documentation of verification and qualification of the REFLEX and TOODEE-2 computer codes.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance (82-01): Component vendor quality assurance program effectiveness was not fully assured in the area of inspection and test plans.

   Not inspected.

2. (Open) Nonconformance (82-01): Nonconforming items were not always controlled in accordance with written procedures.

   Not inspected.

3. (Open) Nonconformance (82-01): Certain managers were not transmitting records to the custodian in accordance with requirements.

   Not inspected.

E. OTHER FINDINGS OR COMMENTS:

1. Software Quality Assurance Program (SQAP): The ENC SQAP was found to be described in two documents. The first, XN-NF-608, identifies the guidelines to be used for control and administration of computer codes used in engineering design calculations. This document assigns four classifications to computer codes: Master, Use, Special, and Developmental. Master codes are those that have been properly tested in accordance with standard requirements, documented, and controlled by a code custodian and a computer code council. Use codes are those approved for product calculations but which "do not meet the requirements of Master or Special codes." Special codes are those not under ENC control for modification. Developmental codes are those that do not meet the requirements of Master, Use, or Special codes and are not authorized for use in product calculations.

   A code custodian is assigned to all Master and Use codes, and is responsible for maintaining the records pertaining to the code in a Software Development Record (SDR). The SDR contains the records of the development of the code; e.g., listings of the various versions, summaries of modifications, verification and qualification records, and records of their independent reviews and approvals made for code use.

   The computer code council consists of a chairman, technical representatives from each engineering department, and a representative from quality assurance. The council is responsible for standardization and approval of Master codes and designation of Special codes. The document provides "guidance" for standarizing and updating Master codes, records to be maintained for Use and Special codes, and reporting of errors and/or code changes to the NRC.

   The second document, ENC Procedure No. XN-NF-P`0,045, "Procedure for Internal and External Interface Control for Fuel Design Parameters," provides instructions and defines responsibility for internal and external interface control for fuel design parameters; e.g., co-resident fuel, reload fuel, fuel management, ECCS analysis, and transient analysis.

   The nonconformance described in paragraph B.1 above was identified in this area of the inspection.

2. SQAP Implementation: The records maintained on computer codes SLOTRAX, PTSPWR2, REFLEX, and TOODEE-2 were reviewed to determine implementation of ENC procedures and guidelines.

a. SLOTRAX: This computer code, developed by ENC, models relatively slow long-term plant transients; e.g., loss of normal feedwater. The code solves mass and energy equations for primary loop components, the pressurizer, and the steam generator primary and secondary sides.

The NRC inspector reviewed the records maintained by the code custodian consisting of the SDR and numerous computer printouts. The SDR was found to contain: the software development run log which listed all runs made since the initial installation (November 3, 1982); user authorizations; plots from computer run output data; and memo No. CEL:010:84, "QA Check of SLOTRAX-ML Code" (SLOTRAX-ML is a generic multiloop version of the code). The author of CEL:010:84 concluded that the results of the check confirmed the adequacy and accuracy of the coding and model. The development run log listed five code runs that were utilized for verification of the basic version of SLOTRAX. The results of these verification runs were contained within the volumes of computer printout binders made available to the inspector; however, their was no analysis of this data or resulting conclusions documented in the SDR. During the inspection, ENC personnel provided the NRC inspector with this documentation. The NRC inspector's review of this document disclosed the following:

(1) Time Step Verification - A time step run was made using a time step of t=1.0 sec. and the results were compared with the data obtained in a previous run (t=0.5 sec.) using the H. B. Robinson-2 plant. The results (eight parameters) were found to be within 0.05 percent of the baseline data.

(2) Steam Generator Safety Valve Operation - A run was made with the safety valve setpoint set at 830 psi and the results compared with the baseline run which used a sétpoint of 1075 psi. It was concluded that the model operation was reasonable and that the system reacted as expected; i.e., quite sensitive to a change in setpoint.

(3) Steam Generator Heat Transfer Sensitivity - In this verification run, the calculated overall steam generator (SG) heat transfer coefficient (HTC) was halved at each time step. From this run it was concluded that radical uncertainties in the SG HTC produce small changes in the calculated pressurizer level (18 percent in level for

50 percent decrease in HTC). The major source of sensitivity for the SG appears to be the safety valve setpoints.

(4) Primary Loop Flow Sensitivity - The objective of this run was to show that uncertainties in primary flow values result in minimal changes in the maximum pressurizer level. The results indicated that a 25 percent uncertainty in primary flow results in less than 10 percent increase in pressurizer volume and 5 percent or less in the maximum volume calculated. It was, therefore, concluded that the code was relatively insensitive to reasonable flow uncertainties.

(5) LOFT Benchmark - Data from the LOFT L6-5 (loss of normal feedwater) experiment was used as a benchmark problem. The SLOTRAX code was modified to reflect the LOFT geometry; e.g., a leaking main steam isolation valve and a naval type of SG (required changes in the downcomer and recirculation model). The analysis of the results disclosed a good comparison between the SLOTRAX and LOFT data. It was therefore concluded that the code was adequate for predicting important parameters during a relatively slow transient.

There were no nonconformances or unresolved items identified in this area of the inspection.

b. PTSPWR2: The PTSPWR2 code is a digital computer program written in FORTRAN language which simulates the behavior of multiloop pressurized water reactors subjected to abnormal operating conditions; such as loss of electrical load, flow coastdown, dropped rod, etc. The model is based on the solution of the basic transient conservation equations for the primary and secondary coolant systems, of the transient conduction equation for the fuel rods, and of the point kinetics for the core neutronics. The program calculates fluid conditions such as flow, pressure, mass inventory and quality, heat flux in the core and reactor power, and reactivity during the transient and provides tabular printout of these parameters. The PTSPWR2 is presently in operation on the CDC Cyber-175 computer. The code is based on a model originally developed and coded for the PNL-1 hybrid computer at Battelle Northwest Laboratories.

The computer code has many versions because each plant has various control systems, component geometries, and characteristics.

The NRC inspector reviewed qualification packages for the following versions of PTSPWR2:

(1) UFEB 84

(2) REGINNAOLDPL

(3) PTSPWR2 (original Master version)

Also reviewed was a calculation for the ability of PTSPWR2 computer code to simulate PWR transients as encountered in the October 2, 1979, tube rupture incident at Prairie Island, Unit 1. That calculation was performed as input to a generic review by NRC, wherein calculated primary and system performance is compared to available data. In this area of the inspection, one nonconformance was identified (see B.2 above).

c. TOODEE-2 and REFLEX Computer Codes: The REFLEX and TOODEE-2 computer codes are an important part of ENC's methods used for loss of coolant accident (LOCA) analysis for PWRs. These methods also include the RODEX2 and RELAP4-EM computer codes, which were not part of this inspection. REFLEX is used to analyze the core reflood rates while TOODEE-2 calculates the fuel element thermal response during the refill portion of the transient. The purpose of this inspection was to review the quality control used by ENC in the development and application of these two codes.

As part of this inspection of quality assurance of the development and use of codes, the TOODEE-2 code, the SDR, code masterization documentation, and topical reports describing code changes and analyses performed were reviewed. The following paragraphs describe the results of this review:

(1) TOODEE-2 was obtained by ENC from NRC in 1975. It was categorized as a Master code in January 1977. The NRC inspector reviewed the documentation supplied with the masterization procedure. In particular, the report

describing the theoretical basis for the models in the code (XN-75-41) was reviewed. The calculation notebook; however, could not be obtained. It was stated that the custodian for the TOODEE-2 code was not available for retrieval of this notebock. The inspector noted that this notebook was required to substantiate the preparation and independent checking of the information presented in XN-75-41.

(2) The code verification program for the masterized version of TOODEE-2 consisted of calculations presented in XN-75-41. This included some comparison with experimental data from separate effects tests; e.g., FLECHT. However, the calculation notbook supporting the analysis was not available.

(3) The SDR for TOODEE-2 contains more than 15 sets of FORTRAN updates to the masterized version of the code. In several cases, the SDR indicated that the updates were checked by a second individual. However, a number of modifications were not checked and in some cases, the individual preparing the original work was not identified.

(4) It was stated that the January 1977 version of TOODEE-2 is the only masterized version. According to the SDR for TOODEE-2, the succeeding versions are classified as Developmental. This includes the latest version documented in the SDR of April 1981. It was stated that a change in nomenclature has occurred and TOODEE-2 is currently considered a Use code.

(5) Each of the code versions described in the SDR contains a microfiche listing of the new code. However, there is no indication of verification of each update set. In addition, the effects of any model changes included in the FORTRAN updates are not explained. Test cases computed with the revised code were not available in the SDR.

(6) The inspector reviewed ENC topical report No. XN-NF-82-20 (P) Revision 1, describing at least three modeling changes made to the TOODEE-2 code since January 1977. These modeling changes have been used in safety-related calculations; e.g., XN-NF-83-38. However, the calculation notebook that was produced to support the code changes and verification was not complete.

(7) The NRC inspector reviewed ENC report XN-NF-83-38 describing a LOCA analysis performed using the methodology described in XN-NF-82-20 (P). This included the use of the TOODEE-2 code. The calculation notebook supporting these analyses included a sign-off sheet indicating that TOODEE-2 was designated a Use code in April 1983. However, the SDR did not contain a record of this code version or its verification.

(8) It was stated that REFLEX has never been categorized as a Master code. The current classification is as a Use code.

(9) Intermountain Technology Inc. (ITI) topical report ITI-C-3, provides a comparative analysis between REFLEX and RELAP4/FLOOD. This was the only verification analysis that the inspector observed for the REFLEX code originally obtained from ITI and does not constitute a complete verification program.

(10) The NRC inspector reviewed the SDR for REFLEX and observed that several FORTRAN update packages had been applied to the original REFLEX code. However, the SDR provides a limited description of the updates and no verification of the coding. In addition, neither the originator nor the individual performing the checking were identified.

(11) Topical report No. XN-NF-82-20 (P) discusses four analytical model updates that have been added to the REFLEX code by ENC. However, a review of the SDR by the inspector showed no record of these updates.

(12) The inspector requested the calculational notebook supporting the modeling modifications described in XN-NF-82-20 (P). However, this could not be provided due to the unavailability of the code custodian for the REFLEX code.

(13) The inspector reviewed the calculation notebook for ENC topical report No. XN-NF-83-38 and found that a version of REFLEX designated as REFLEX/USEPT82 was used in the analysis. However, there was no record of this version of the code in the SDR. The last recorded REFLEX version was REFLEX/DAPR79.

Further findings that relate to the SDR for the REFLEX and TOODEE-2 codes are:

(1) XN-NF-608 requires all approvals for use of a code in product calculations be kept in the SDR. No approvals were found in the SDRs for TOODEE-2 and REFLEX although these codes are part of the LOCA analysis methodology.

(2) XN-NF-608 also requires records of the independent review of the verification and qualification of a code be kept in the SDR. In addition, review of the SDR by the manager of the code custodian should be documented. None of these records were found in the SDRs for TOODEE-2 and REFLEX.

(3) The NRC inspector reviewed both SDRs and found very little information regarding code verification and qualification. Any verification or qualification documentation that was observed was found in topical reports describing product calculations.

(4) Independent checking of FORTRAN coding updates has been recorded in only a few cases in the two SDRs that the inspector reviewed. In addition, the originator of the updates was not always identified.

(5) The inspector observed that, for at least four computer codes, the code custodian and the manager of the code custodian were the same individual. Thus, the review of some required documentation (e.g., SDR) is completed by the preparer. This does not appear to meet the intent of XN-NF-608.

The nonconformances listed in B.3 and B.4 were identified during this inspection of code development and use.

e. ENC Analyses with Mixed Fuel Loadings: The NRC inspector reviewed the guidelines used by ENC in performing analyses supporting reloads of PWRs. A topical report (XN-74-b(P)) provides a list of the required calculations with additional guidance from referenced standard review plans. The NRC inspector asked about the methodology used when ENC performs a reload for a plant previously fueled by another vendor creating a fuel loading situation that is only part Exxon fuel. Analyses of this type of fuel loadings require data for the fuel systems

provided by the other vendor (or vendors). It was stated that ENC contracts with customers contain a provision requiring this information from the customer. In addition, detailed lists of other plant parameters are requested, including verification of the ENC interpretation of the data supplied. There are several other methods to obtain data required for the calculations, including:

(1) Independent tests by ENC; e.g., hydraulic testing of other vendor fuel systems;

(2) Independent calculations by ENC; e.g., neutronic analyses of all fuel cycles for a particular plant; and

(3) Review of customer plant drawings by ENC.

It was stated that various combinations of these methods have been used for obtaining data for the analysis of mixed fuel cycles.

ORGANIZATION: FARWELL AND HENDRICKS, INCORPORATED
MILFORD, OHIO

REPORT NO.: 99900918/84-01	INSPECTION DATE(S): 4/23-27/84	INSPECTION ON-SITE HOURS: 38

CORRESPONDENCE ADDRESS: Farwell and Hendricks, Incorporated
ATTN: Dr. C. R. Farwell
Chairman
1000 Ford Circle
P.O. Box 209
Milford, Ohio 45150
ORGANIZATIONAL CONTACT: Mr. R. A. Woeste, Quality Assurance Manager
TELEPHONE NUMBER: (513) 831-9390

PRINCIPAL PRODUCT: Environmental qualification testing.

NUCLEAR INDUSTRY ACTIVITY: Farwell and Hendricks, Inc. (F&H) provides consulting, engineering, and testing services for commercial nuclear, military, and domestic equipment and systems. The facility has thermal aging, high energy line break simulation, and service testing facilities. Approximately 95 percent of its business is dedicated to environmental qualification testing for the commercial nuclear industry.

ASSIGNED INSPECTOR: C J Hale/for 5/29/84
L. B. Parker, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S):

APPROVED BY: C J Hale 5/29/84
C. J. Hale, (Acting) Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Review the status of previous inspection findings and to witness the performance of an equipment qualification test simulating an accidental high energy line break (HELB) on an Eaton/Cutler Hammer (E/CH) type Class 1E 480 VAC motor control center (MCC) for use in Public Service Gas and Electric Company's Hope Creek Generating Station (HCGS), Unit 1.

PLANT SITE APPLICABILITY:

50-354

ORGANIZATION: FARWELL AND HENDRICKS, INCORPORATED
MILFORD, OHIO

REPORT NO.: 99900918/84-01	INSPECTION RESULTS:	PAGE 2 of 3

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance A (83-01): Procurement document files did not contain evidence that Appendix B to 10 CFR Part 21 requirements were imposed on suppliers.

   The NRC inspector verified that each supplier to whom purchase orders (POs) had been submitted had received F&H supplemental document (QA-001) with each PO which imposed 10 CFR Part 50, Appendix B criteria and 10 CFR Part 21 regulations. The inspector verified that the QA manual and QA technical procedures had been revised to require that the QA-001 document be attached to each PO issued and copies of the PO in the document control files. Document control, QA, and procurement personnel had been apprised of the document revisions to preclude recurrences.

2. (Closed) Nonconformance B (83-01): The QA manager had audited areas for which the QA manager was responsible.

   The inspector verified that the QA manual and related implementing procedures had been revised to state that the F&H president will audit areas for which the QA manager is responsible.

D. UNRESOLVED ITEMS:

None

E. OTHER FINDINGS OR COMMENTS:

1. Test Status of CVI Inc. Compressor and Valve - In paragraph E.2.b of the previous F&H inspection 99900918/83-02 the inspector had stated that in a subsequent inspection the final seismic test data would be examined. The inspector examined this final seismic data. Revision 4 to test procedure P20001 had been submitted for approval of changes in the extreme conditions test. The final report had not been prepared.

   No nonconformances were identified.

ORGANIZATION: FARWELL AND HENDRICKS, INCORPORATED
MILFORD, OHIO

REPORT NO.: 99900918/84-01	INSPECTION RESULTS:	PAGE 3 of 3

2. MCC Tests - The inspector observed the preparation for and the performance of test procedure PEI-TR-833504-2, Revision B, "Test Procedure for Accident (HELB) Qualification of Class 1E 480 VAC Motor Control Centers for use in Public Service Gas and Electric Company's Hope Creek Generating Station, Unit 1." The purpose of this test is to subject a typical type Class 1E 480 VAC MCC to postulated HELB conditions for HCGS.

The test subject was an E/CH five-section MCC containing aged (and some unaged) devices in typical starter or feeder circuit configurations, standard production model F24S. No modifications were made other than the substututions of selected new components with aged components and wiring changes made to facilitate testing.

This HELB type testing was performed after: (a) component thermal and operational aging (by E/CH), (b) seismic simulation (by F&H), and (c) functional testing (by F&H).

The inspector witnessed testing under HELB conditions as specified in Bechtel Power Corporation Specification 10855-E-118(Q), Revision 6, "Technical Specifications for Motor Control Centers for Hope Creek Generating Station Nos. 1 and 2 Units, Public Service Electric and Gas Company, Newark, New Jersey."

During the testing seven anomalies were recorded, three were concerned with test conditions: (a) chamber temperature deviated above and below specification limits; (b) chamber internal pressure could not be achieved; and (c) chamber humidity levels between 100 percent and 95 percent were indeterminate. The other four anomalies concerned electrical switching and load requirements. The components tested all operated in accordance with the test procedure. Physical inspection of the test subject after the test revealed standing water on the horizontal surface of many of the components.

Later in a telephone conversation with the E/CH representative, it was established that the test will be rerun and an attempt made to meet the specifications which were missed by anomalies (a), (b), and (c). The results of this testing will be reviewed in a future inspection.

No nonconformances were identified.

ORGANIZATION: FLORIDA POWER & LIGHT COMPANY
CASE NUCLEAR SECTION
MIAMI, FLORIDA

REPORT NO.: 99900660/84-01	INSPECTION DATE(S): 3/5-6/84 3/8-9/84	INSPECTION ON-SITE HOURS: 30

CORRESPONDENCE ADDRESS: Florida Power & Light Company
CASE Nuclear Section
ATTN: Mr. R. N. Marsh
Chairperson, Operations Committee
P. O. Box 529100
Miami, Florida 33152
ORGANIZATIONAL CONTACT: Mr. R. N. Marsh, Chairperson, Operations Committee
TELEPHONE NUMBER: (305) 552-4730

PRINCIPAL PRODUCT: Third party inspections/coordinating agency for supplier evaluations (CASE).

NUCLEAR INDUSTRY ACTIVITY: There are 48 sustaining members and 50 associate members of the CASE Nuclear Section. All of the members are engaged in nuclear power industry activities.

ASSIGNED INSPECTOR: J. R. Costello — 3/30/84
J. R. Costello, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S):

APPROVED BY: C. J. Hale — 3/30/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Topical Report CASE-TR2.

B. SCOPE: Initial QA program inspection.

PLANT SITE APPLICABILITY:

All plant sites

ORGANIZATION: FLORIDA POWER & LIGHT COMPANY
CASE NUCLEAR SECTION
MIAMI, FLORIDA

REPORT NO.: 99900660/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

The objective of this initial QA program inspection was to determine that the QA program described in CASE Topical Report CASE-TR2 was being properly implemented. The commitments and requirements relative to CASE's scope of activities are detailed in Topical Report CASE-TR2 and the procedures to implement these commitments and requirements are detailed in the CASE Operating Plan.

The basic objective of the CASE Nuclear Section is to eliminate the proliferation of redundant evaluation audits or surveys. This is accomplished by reducing or eliminating redundant source evaluation surveys of suppliers of nuclear safety-related material, equipment and services. CASE provides a cooperative system which assists purchasers in meeting the source evaluation requirements of 10 CFR Part 50, Appendix B, Criterion VII, Control of Purchased Material, Equipment, and Services.

The CASE Nuclear Section is presently capable of evaluating the following quality systems:

NQA-1
RDT-F2-2
ANSI N45.2-1977
10 CFR Part 50, Appendix B
MIL-Q-9858A
RDT F2-4T
MIL-I-45208A
ASQC-STD-C-1
ASME Sec III NCA 3800 (Supplier)
ASME Sec III NCA 3800 (Manufacturer)

ORGANIZATION: FLORIDA POWER & LIGHT COMPANY
CASE NUCLEAR SECTION
MIAMI, FLORIDA

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CASE Aerospace Section has capabilities in excess of the CASE Nuclear Section in regard to the ability for evaluating special processes and systems which call out reliability as well as quality assurance requirements.

The present CASE Nuclear Section Register covers suppliers of special design items for safety-related applications (basic components) and does not include suppliers of commercial grade items used for safety related applications. This is an area where an important contribution can be made in assuring satisfactory commercial items for use as basic components.

In the CASE system the acceptance of supplier evaluations performed by others rests largely on: (1) confidence in the integrity and credibility of the individuals performing the work, (2) baseline standard of qualifications of auditors, (3) standardized methods of performing a survey, and (4) standardized CASE Supplier Evaluation Checklists.

In the event unsatisfactory conditions indicate lack of credibility of data submitted to or published in the CASE Register, a CASE Alert Bulletin is sent to all register subscribers as soon as practicable explaining the areas of concern. Unsatisfactory conditions can be uncovered by any CASE member doing business with a supplier and is usually the result of a change in management, a change in the work force or financial difficulties.

In the CASE system the purchaser is not relieved of the responsibilities for determining the capability of the supplier to meet technical requirements. The use of supplier evaluations performed by others must be tailored to the requirements of the particular purchase order or contract. Also, the purchaser is not relieved of the responsibility for providing required inprocess or final inspection.

In this inspection the NRC inspector reviewed procedures, internal audits, supplier audits, the CASE Register Nuclear, list of qualified lead auditors and their qualifications, standardized method of conducting a survey, and standardized supplier evaluation checklists to establish that all procedural requirements were being implemented. The documents were examined at the Arizona Public Service Company facilities in Phoenix, Arizona, and the CASE Date Center, Aerojet Tech Systems Company, Sacramento, California.

Relative to the documents examined, no violations, nonconformances, or unresolved items were identified. However, as a result of this inspection two areas of concern were identified which require action: (1) procedure N.A1-2 "Surveys-Supplier Evaluation," Revision 6, November 1, 1983, was

ORGANIZATION: FLORIDA POWER & LIGHT COMPANY
CASE NUCLEAR SECTION
MIAMI, FLORIDA

REPORT NO.: 99900660/84-01	INSPECTION RESULTS:	PAGE 4 of 4

missing from the CASE Nuclear Section Operating Plan controlled copy at the Arizona Public Service Company facilities in Phoenix Arizona; (2) the controlled copy of the CASE Nuclear Section Operating Plan was not identified with the respective Sustaining Member's CASE code number at either the Phoenix, Arizona, or Sacramento, California, facilities.

ORGANIZATION: GA TECHNOLOGIES, INC.
SAN DIEGO, CALIFORNIA

REPORT NO.: 99900402/84-01	INSPECTION DATE(S): 4/2-6/84	INSPECTION ON-SITE HOURS: 58

CORRESPONDENCE ADDRESS: GA Technologies, Inc.
ATTN: H. C. House, Vice President,
Finance and Administration
P. O. Box 85608
San Diego, California 92138

ORGANIZATIONAL CONTACT: T. R. Colandrea, QA Manager
TELEPHONE NUMBER: (619) 455-4570

PRINCIPAL PRODUCT: Engineering services.

NUCLEAR INDUSTRY ACTIVITY: The Torrey Pines Technology Division (TPT) of GA Technologies, Inc. (GA) provides engineering services to the nuclear industry in many areas, such as independent reviews, probabilistic risk assessment, piping stress analysis, equipment qualification, QA training, etc. There are approximately 1800 persons employed by GA of which 250 are assigned to safety-related activities for licensees.

ASSIGNED INSPECTOR: G. T. Hubbard 5/9/84
G. T. Hubbard, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S): J. J. Benson, Sandia National Laboratories

APPROVED BY: C. J. Hale 5/9/84
C. J. Hale, (Acting) Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and topical report GA-A13010A.

B. SCOPE: This inspection consisted of: (1) a review of the 18 criteria of 10 CFR Part 50, Appendix B, described in the GA topical report (TR) No. GA-A13010A and the GA Quality Assurance Manual (QAM); (2) verification that the applicable criteria of the quality assurance (QA) program had been implemented in compliance with the TR and QAM; and (3) verification of implementation of corrective action (CA) on nonconformances identified in NRC Inspection Report No. 99900402/83-01.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: GA TECHNOLOGIES, INC.
SAN DIEGO, CALIFORNIA

REPORT NO.: 99900402/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, TR No. GA-A13010A, Amendment 7, dated October 1982, and paragraph 4.6.4 of Quality Procedure (QP) No. 18, Revision L, dated January 20, 1983, GA did not meet the scheduled CA completion date for the nonconformance identified in paragraph B.2 of NRC Inspection Report No. 99900402/83-01 nor did they notify the NRC and provide a new scheduled completion date.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, TR No. GA-A13010A, Amendment 7, dated October 1982, and paragraph 3.0 of Quality Division Instruction (QDI) No. 16-5, Revision A, dated December 13, 1982, the initiator of corrective action requests (CARs) Nos. 102 through 107 did not sign the CARs in the appropriate space nor date them as required.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-01): Ten of the audits completed or scheduled to be completed in 1983 will have greater than a 12 month lapse since the last audit.

   The NRC inspector reviewed and evaluated the 1983 and 1984 audit schedule, five lead auditor initial certifications, one lead auditor recertification, two monthly status reports of the audit program, two audit reports, and three audit package review checklists to verify that GA had implemented CA for this nonconformance.

2. (Closed) Nonconformance (83-01): Procedures do not provide for the review and modification of the design process and verification procedure when a significant design change is necessary because of incorrect design.

The NRC inspector reviewed and evaluated QA Manual Change Request (Log No. 528) and Amendment 1 (which had not been distributed) to QP No. 3, Revision 5, to verify that GA had implemented CA for this nonconformance. The nonconformance described in paragraph B.1 was identified.

3. (Closed) Nonconformance (83-01): Three different groups of calculations contained in Review Evaluation Report (RER) quality record package No. 2448-RER-09 did not have the required entries; e.g., identification, author, independent reviewer, principal reviewer, etc.

   The NRC inspector reviewed and evaluated RER package No. 2448-RER-09 and Appendix II for word document preparation to verify that GA had implemented CA for this nonconformance.

E. OTHER FINDINGS OR COMMENTS:

1. Equipment Qualification Program: GA's equipment qualification (EQ) activities have been limited in recent years to the performance of engineering evaluations for licensee clients to determine if safety-related equipment meets qualification requirements. These engineering efforts have included evaluations of plant operating requirements, EQ test reports, EQ engineering analysis reports, and other related documentation, as well as the performance of plant walkdown inspections to determine if installed equipment is the same as the equipment for which EQ documentation is on file. If EQ deficiencies are identified then GA makes recommendations to the licensee for correction of the deficiencies.

2. QA Manual Review: The GA QA program is described in the TR and the QAM. The TR and QAM establish a QA program in accordance with the applicable 18 criteria of 10 CFR Part 50, Appendix B. The NRC inspector's review of the QA program consisted of an examination and evaluation of the TR and QAM relative to the EQ work being performed by GA. No nonconformances were identified.

3. Supplemental Procedures Review: The NRC inspector reviewed and evaluated 14 supplemental procedures that related to GA's EQ activities. This review and evaluation determined that formal documented procedures for the control of EQ activities were established. No nonconformances were identified.

4. QA Program Implementation Review: The NRC inspector verified the implementation of EQ-related QA program procedures by examining representative records and files and conducting interviews with personnel.

Findings relative to EQ activities, concerning the implementation of the applicable 18 criteria of 10 CFR Part 50, Appendix B, as described in the TR, QAM, and implementing procedures, are as follows:

a. Organization: The NRC inspector evaluated GA's organizational structure including functional responsibilities and authorities by discussing them with the Manager, Quality Systems and personnel from EQ project No. 2400, and reviewing four organizational charts, the QAM, and one QA program document. The inspector determined that the Manager, QA and his organization have the responsibility and authority to identify quality problems, obtain solutions to the problems, and stop work, if necessary, in order to obtain solutions to the problems. No nonconformances were identified.

b. QA Program: The NRC inspector evaluated this criterion by verifying that a QA program was established by the QAM and by verifying the implementation of the applicable 18 criteria of 10 CFR Part 50, Appendix B. The inspector reviewed and evaluated three procedures, five position descriptions, two files, two training records, and one notebook to verify that training requirements of the QA program were being accomplished. No nonconformances were identified.

c. Design Control: The NRC inspector and consultant's review and evaluation established that GA controls their EQ activities on a program basis. GA issues a QA program document which describes the program organization, authorities, responsibilities, and controls. The inspector and consultant verified the implementation of this criterion by review and evaluation of the QAM, QA Program Document No. QAPD-2387, ten procedures, and two program notebooks. No nonconformances were identified.

d. Instructions, Procedures, and Drawings: The NRC inspector evaluated the implementation of GA procedures, as they relate to this criterion, by review and examination of the QAM, 1 QA program document, 14 procedures, 7 reports, 3 notebooks, 2 files, 3 checklists, and 7 CARs. No nonconformances were identified.

e. Document Control: The NRC inspector evaluated the implementation of this criterion by review and examination of the QAM, 1 QA program document, and 14 procedures. Documents reviewed showed that they were approved and released by appropriate authorities. No nonconformances were identified.

f. Nonconforming Materials, Parts, or Components: The NRC inspector evaluated the implementation of this criterion by review and examination of the QAM, one QA program document, and three program independent review files. No nonconformances were identified.

g. Corrective Action: The NRC inspector evaluated the implementation of this criterion by review and examination of the QAM, one QA program document, one procedure, and seven CARs. The nonconformance described in paragraph B.2 was identified.

h. Quality Assurance Records: The NRC inspector evaluated the implementation of this criterion by review and examination of the QAM, one QA program document, and two notebooks, as well as observation of the records storage area. No nonconformances were identified.

i. Audits: The NRC inspector verified the implementation of this criterion by review and examination of the QAM, one QA program document, three audit reports, one notebook, and five auditor certifications. No nonconformances were identified.

j. Areas Considered Not Applicable: The NRC inspector determined that the following criteria were not applicable for program No. 2400, which was evaluated for EQ implementation during this inspection: (1) procurement document control; (2) control of purchased material, equipment, and services; (3) identification and control of materials, parts, and components; (4) control of special processes; (5) inspection; (6) test control; (7) control of measuring and test equipment; (8) handling, storage, and shipping; and (9) inspection, test, and operating status.

5. Technical Evaluation of EQ:

   a. Review of Test Plans/Procedures: The NRC consultant did not review or evaluate any test plans/procedures during the inspection.

   b. Observation of Testing Activities: The NRC consultant did not observe any test activities.

   c. Review of EQ Records/Documentation: The NRC consultant conducted a technical evaluation of GA EQ program No. 2400. The consultant evaluated two qualification notebooks used to establish the acceptable qualification status of a pressure switch and a solenoid pilot valve, item Nos. 11 and 69, respectively, on the EQ equipment list. The consultant's review and evalution included examination of accelerated thermal aging and radiation analyses performed by GA personnel. No nonconformances were identified.

ORGANIZATION: G. H. BETTIS COMPANY
WALLER, TEXAS

REPORT NO.: 99900715/84-01	INSPECTION DATE(S): 3/26-30/84	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: G. H. Bettis Company
ATTN: Mr. A. T. Locascio
Quality Assurance Manager
18703 GH Circle, P. O. Box 508
Waller, Texas 77484

ORGANIZATIONAL CONTACT: Mr. A. T. Locascio, QA Manager
TELEPHONE NUMBER: (713) 463-5100

PRINCIPAL PRODUCT: Actuators and controls.

NUCLEAR INDUSTRY ACTIVITY: G. H. Bettis (Bettis) has two orders for nuclear actuators.

ASSIGNED INSPECTOR: R. E. Oller — 4-18-84
R. E. Oller, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S): E. L. Burns, Brookhaven National Laboratory

APPROVED BY: C. J. Hale — 4/18/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of a 10 CFR Part 21 report dated November 18, 1983, by Bettis concerning the swelling of actuator seals of ethylene propylene when in contact with the lubricant Mobilgrease-28. Concurrently, design control, procurement control, and 10 CFR Part 21 requirements were inspected.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: G. H. BETTIS COMPANY
WALLER, TEXAS

REPORT NO.: 99900715/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

Contrary to paragraph 21.6 of 10 CFR Part 21, a copy of Section 206 of the Energy Reorganization Act of 1974 was not posted.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 2.4 of Bettis QA Manual (QAM) section No. 3.0; paragraph 2.3 of QAM section No. 5.0, and paragraph 2.3 of QAM section 11.0, a documented procedural program, including parameters, for conducting the test of Molykote-44 as a suitable replacement lubricant for Mobilgrease-28 did not exist.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and paragraph 3.1.3 of Bettis QAM section 3.0, Engineering Standard No. 2 (ESL-2) for use of Mobilgrease-28 was not marked obsolete even though superceding Engineering Standard No. 6 (ESL-6) for use of Molykote-44 was in approved form.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Bettis Actuators' Operability Affected By Swelling of Ethylene Propylene Seals In Contact With Mobilgrease-28 Lubricant:

a. Introduction: Bettis reported to the U.S. NRC on November 18, 1983, and February 13 and 29, 1984, that disassembly of two actuators returned to Bettis verified that the ethylene propylene seals in contact with the lubricant Mobilgrease-28 were swollen. This condition may potentially affect the actuators' operability. Analysis of the problem, in-house testing by Bettis, and review of literature supplied by other organizations resulted in Bettis changing the lubricant to Molykote-44 manufactured by Dow Corning for all replacement nuclear seal kits and new nuclear actuators.

b. Findings: By review of records and interviews with Bettis personnel, the NRC inspector verified that information supplied in the November 1983 and February 1984 10 CFR Part 21 reports was accurate and complete in regard to the identified deficiency. Laboratory testing conducted by Bettis determined that use of Mobilgrease-28 lubricant in contact with ethylene propylene seals resulted in swelling and, therefore, increased friction to be overcome during actuator stroke.

The NRC inspector also verified the adequacy of customer notifications of affected items by a review of the documentation used by Bettis to evaluate the deficiency and by a review of notification letters.

Following a review of laboratory test documentation it was ascertained that Bettis has initiated a change in lubrication specifications for use of Molykote-44 in place of Mobilgrease-28 in order to eliminate the occurrence of seal swelling.

The following conditions were identified as significant but not as nonconforming since discussions with Bettis management and also documentation review indicated that resolutions, as described below, are pending. These items will be followed up during the next NRC inspection:

1. Dow Corning Corporation and Bearings, Inc., the manufacturer and local supplier of Molykote-44 respectively, will be telephone surveyed and/or audited prior to being added to the Approved Vendor List (AVL) since neither firm has a previous procurement history with Bettis.

2. Bettis will revise Nuclear Qualification Test Report No. 37274 for the use of Molykote-44 in place of Mobilgrease-28.

3. The 10 CFR Part 21 report will be amended by Bettis to indicate acceptance of the Molykote-44 radiation capabilities as provided by Dow Corning Corporation.

Inspection of this area was accomplished through discussion, observation, and review of: (1) notification letters and advisory notifications to affected customers; (2) internal memoranda; (3) engineering standards and specifications; (4) test reports; (5) purchase order and sales order documents; (6) engineering change request and change notice; and (7) a subcontractor's test procedure.

Within this area, it was determined that Bettis failed to develop a suitable written test procedure for conducting of tests of Molykote-44 lubricant as a suitable replacement for Mobilgrease-28. This item is identified as a nonconformance (see paragraph B.1).

2. Related QA Program Areas: The areas of design control and procurement document control were inspected concurrently with the actuator seal problem. This inspection was achieved through discussions and review of: (a) the Bettis QA Manual; (b) purchase orders; (c) inventory item master list; (d) AVL; (e) sales order and related documents; (f) two actuator testing procedures; and (g) engineering standards (specifications).

   Within this area, it was found that Bettis failed to mark obsolete ESL-2 for use of Mobilgrease-28, even though superceding ESL-6 for use of Molykote-44 was in approved form. This item is a nonconformance (see paragraph B.2).

3. 10 CFR Part 21 Requirements: The inspectors observed the status of posted documents as required by paragraph 21.6 of 10 CFR Part 21, and reviewed the Bettis procedure required by paragraph 21.21.

   Within this area, it was found that Bettis failed to post Section 206 of the Energy Reorganization Act of 1974. This item is identified as a violation (see paragraph A). The corrective action was taken by posting the above document prior to the end of the inspection.

ORGANIZATION: GNB BATTERIES, INCORPORATED
INDUSTRIAL BATTERY DIVISION
LANGHORNE, PENNSLYVANIA

REPORT NO.: 99900841/84-01	INSPECTION DATE(S): 1/30-2/3/84, 2/27-3/1/84	INSPECTION ON-SITE HOURS: 104

CORRESPONDENCE ADDRESS: GNB Batteries, Incorporated
Industrial Battery Division
ATTN: Mr. A. C. Richards, President,
General Manager
2010 Cabot Boulevard West
Langhorne, Pennsylvania 19047
ORGANIZATIONAL CONTACT: Mr. Larry J. Smith, Director, Quality Assurance
TELEPHONE NUMBER: (215)752-0555

PRINCIPAL PRODUCT: Lead-acid batteries.

NUCLEAR INDUSTRY ACTIVITY: Commercial nuclear sales of the Langhorne, Pennsylvania, office represents approximately 1% of their total sales.

ASSIGNED INSPECTOR: Wm D Kelley 4/13/84
W. D. Kelley, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S): G. Hubbard, Equipment Qualification Section
B. E. Bader, Sandia National Laboratories

APPROVED BY: J. T. Conway for 4-17-84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of: (1) the issuance of a 10 CFR Part 50.55(e) report by Public Service of New Hampshire (PSNH) concerning failure during seismic test of open cell spacer material in Class 1E batteries of a design that had been furnished to the Seabrook Nuclear Station Units 1 and 2; and (2) the issuance of a
(continued on next page)

PLANT SITE APPLICABILITY:

Failure of open cell spacer material, 50-443/444, 50-454/455, 50-456/457, 50-482, 50-483, 50-312; cracks in cells of Class 1E batteries, 50-456.

ORGANIZATION: GNB BATTERIES, INCORPORATED
INDUSTRIAL BATTERY DIVISION
LANGHORNE, PENNSLYVANIA

REPORT NO.: 99900841/84-01	INSPECTION RESULTS:	PAGE 2 of 7

SCOPE: (Cont'd). 10 CFR Part 50.55(e) report by Commonwealth Edison Company (CEC) concerning cracks in cells of Class 1E batteries that had been furnished to Braidwood Station, Unit 1.

A. VIOLATIONS:

1. Contrary to Section 21.21(a) of 10 CFR Part 21 dated August 31, 1983, GNB Batteries, Incorporated (GNB) had not adopted appropriate procedures to provide for the evaluation of deviations or inform the licensee or purchaser in order that the license or purchaser may cause the deviation to be evaluated or assure that the responsible officer is informed if a basic component fails to comply with the Atomic Energy Act of 1954 or contains a defect.

2. Contrary to Section 21.2(b) of 10 CFR Part 21, dated August 31, 1983, the GNB letter of December 19, 1983, did not include the nature of the failure to comply and the safety hazard, the number and location of all such components in use at, supplied for, or being supplied, or the corrective action which has been taken or will be taken.

3. Contrary to Section 21.31 of 10 CFR Part 21 dated August 31, 1983, GNB issued purchase order (PO) No. 12-81469 dated June 29, 1979, for safety-related testing services and did not specify that the requirements of 10 CFR Part 21 applied.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.2.(6) of the Quality Assurance Manual (QAM), there were no records to indicate the change made to closed cell spacer material. Specifically, a Request for Deviation was not used to identify the nonconforming open cell spacer material and the subsequent change to closed cell spacer material.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.6 of the QAM document control was not maintained as evidenced by the failure to have an implementing procedure which specified document review and provided for and identified the personnel authorized and responsible for approval.

3. Contrary to Criterion II of Appendix B to 10 CFR Part 50 and customer specification, "Quality Assurance Administrative and System Requirements for Safety-Related Electrical Equipment," No. 9763-QAS-3, Revision 5, dated March 3, 1977, even though GNB had established and

implemented a quality assurance (QA) program for the production of batteries, they had not established or implemented a formal documented QA program for the control of qualification testing activities for safety-related batteries.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 50.55(e) Report By PSNH:

a. Problem reported by PSNH was the failure during seismic test of the open cell spacer material in Class 1E batteries supplied to Seabrook Nuclear Station, Units 1 and 2. The failure related to open cell type spacer material being permanently deformed when compressed during seismic test.

b. The NRC inspector reviewed United Engineers and Constructors, Incorporated (UE&C) PO and specification and could not verify that Appendix B of 10 CFR Part 50 had been invoked on GNB; however, UE&C specification 9763-QAS-3, Revision 5, did require GNB to have a procedure for the identification and notification of significant deficiencies as defined in 10 CFR Part 50.55(e).

The NRC inspector reviewed the QAM, Revision 7, and verified that the introduction stated that the program fulfilled the requirements of Appendix B to 10 CFR Part 50.

c. GNB did not have a procedure pursuant to 10 CFR Part 21. This was identified as a violation (see paragraph A.1).

d. The NRC inspector verified by review of two specifications, letters, a nuclear environmental qualification program report by Wyle Laboratories, Huntsville, Alabama, and Environmental Qualification for Sacramento Municipal Utility District (SMUD) that: (1) GNB was required to design and qualify the batteries to meet a safe shutdown earthquake gravity constant of 0.5 horizontal and 0.55 vertical; (2) GNB notified UE&C that the batteries would be shipped before the seismic test was performed; (3) UE&C accepted the batteries on site during 1979; (4) the environmental qualification tests were completed in late 1981; and (5) GNB elected to test their batteries at 10.0g horizontal and 6.5g vertical which exceeded the specification requirements;

and (6) the original open cell urethane spacer material was replaced by closed cell polyethylene and the seismic qualification rerun at 6.0g horizontal and 4.7g vertical with no failure.

A Request for Deviation was not used to request a review of the nonconforming open cell spacer material. This was identified as a nonconformance (see paragraph B.1).

e. The NRC inspector reviewed one procedure and correspondence to customer and utilities and verified that: (1) a GNB procedure had been developed and approved for the replacement of the urethane cell spacer material; and (2) the urethane cell material was replaced by GNB field service at Seabrook; and (3) the Commonwealth Edison Company Braidwood and Byron Stations, Standardized Nuclear Unit Power Plant System, and SMUD Rancho Seco Nuclear Generating Station, Unit 1, were notified that the acceptable cell spacer was foamed closed cell polyethyene.

f. The NRC inspector reviewed the GNB letter to NRC-Headquarters reporting that the open cell polyurethane should be replaced with closed cell etha-foam material. The letter did not meet the reporting requirements of 10 CFR Part 21. This was identified as a violation (see paragraph A.2.).

2. 10 CFR Part 50.55(e) Report by CEC:

a. Problem reported by CEC was cracks in three cells on the Class 1E batteries supplied to the Braidwood Station, Unit 1.

b. The NRC inspector reviewed the Sargent and Lundy Engineering (S&L) Specifications, the CEC PO, and GNB shop order for the batteries supplied to the Braidwood Station and verified that 10 CFR Part 21 had been invoked.

c. The NRC inspector reviewed correspondence, internal memoranda and notes and verified that 20 NCX-1500 cells in one non-Class 1E battery and three NCX-1200 cells in one Class 1E battery in Unit 1 were reported as having cracked containers. No cracked containers were identified in Unit 2 batteries.

Three NCX-1500 cell containers (numbers 17, 20, and 50) and one NCX-1200 cell container (Number 18) had been returned to the GNB

Langhorne, Pennsylvania, engineering facilities for evaluation and analysis of the cracks. The NRC inspector reviewed the four cell containers and verified that they contained cracks.

d. GNB had received the four cracked cell containers and was in the process of evaluating the nature of the cracks and the method to be used for verifying the cause of the cracks. GNB's evaluation and corrective action will be reviewed during a subsequent inspection.

3. Design and Document Control:

a. The NRC inspector was informed that the batteries supplied by GNB to the nuclear industry are assemblied from their standard line of cells which are arranged in accordance with the customer specification. A battery rack seismic analysis, if required by the customer PO or design specification is performed by a consultant.

b. A design qualification test program has been initiated (see section E).

4. Quality Assurance Program:

a. All GNB Langhorne, Pennsylvania, activities which include administrative, sales, engineering, and development have been moved into one building. All manufacturing of batteries for nuclear plants is performed at facilities in Fort Smith, Arkansas.

b. The NRC inspector reviewed the QAM and its implementing procedures and noted that it had not been updated to address the changes made as a result of the move. The Director of QA had begun the revision of the manual and procedures. This area will be reaudited during a subsequent inspection.

c. The NRC inspector identified that there was no implementing procedure for paragraph 3.6 of the QAM which addressed document review and approval. This was identified as a nonconformance (see paragraph B.2).

E. EQUIPMENT QUALIFICATION PROGRAM:

1. QAM: The QA program is described in the QAM, "Quality Assurance and Inspection Program, Stationary Battery," Revision 7, dated July 1, 1982; however, the QA program established in accordance with the applicable 18 criteria of 10 CFR Part 50, Appendix B, is established only for the production of nuclear batteries. The NRC inspector's discussions with the Director of QA identified that GNB had not established or implemented a formal documented QA program for the control of qualification testing activities for safety-related batteries. For example, the NRC inspector reviewed an outgoing PO for equipment qualification (EQ) testing services and determined that no requirements were imposed on the subcontractor to require a QA program or a 10 CFR Part 21 reporting system. The inspector's review did identify that while GNB's customer did not directly impose the requirements of 10 CFR Part 50, Appendix B, on GNB, the QA requirements that were imposed were identical to the requirements of Appendix B to the extent that the requirements of Appendix B were essentially imposed on GNB. The violation and nonconformance described in paragraphs A.3 and B.3, respectively, were identified.

2. Supplemental Procedures Review: The NRC inspector did not review this area since no documented QA program had been established or implemented for EQ testing activities.

3. QA Program Implementation Review: The NRC inspector did not review this area since no documented QA program had been implemented for EQ testing activities.

4. Technical Evaluation of Equipment Qualification:

   a. Review of Test Plans/Procedures: The NRC inspector and Sandia consultant reviewed the original and various revisions to the document entitled "Test Procedures for General Qualification of Class 1E Lead-Acid Storage Batteries; Plant and Calcium Types for Nuclear Power Generating Stations." The original procedure required artificially aging of groups of cells prior to seismic testing. The revisions reflected changes to the test plan as the testing progressed.

   b. Observation of Testing Activities: GNB performs no EQ testing, but has testing performed by outside testing labs. Therefore, testing was not observed.

c. Review of Equipment Qualification Records and Documentation: The NRC inspector and Sandia consultant reviewed two reports supporting EQ of Class 1E lead-acid storage batteries for customer POs Nos. 8546 and 9763-006-137-1. The documents were complete with design and test criteria specified. The test program supporting these EQ reports was conducted in accordance with the test procedures as revised. The test report supporting the qualification reports was conducted under GNB PO No. 12-81469 which did not reference 10 CFR Part 50, Appendix B, or 10 CFR Part 21 requirements. The test report completely documented the test program, including notices of anomalies, data records, and calibration information. A problem was identified during the test program concerning the compression set of foam spacers between battery cells. The permanent compression during testing of the spacers allowed some cell jar movement which resulted in cracking of some cell jars. A different foam material with improved compression set characteristics was selected as a replacement spacer and it performed acceptably during the remainder of the test program. GNB has developed a "Cell Spacer Replacement Procedure," No. GNB-P-0001, for replacement of the old foam spacers.

No nonconformances were identified.

ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900403/84-01	INSPECTION DATE(S): 3/12-16/84	INSPECTION ON-SITE HOURS: 56

CORRESPONDENCE ADDRESS: General Electric Company
Nuclear Energy Business Operations
ATTN: W. H. Bruggeman, Vice President & General Manager
175 Curtner Avenue
San Jose, California 95125

ORGANIZATIONAL CONTACT: Mr. J. J. Fox, Senior Program Manager
TELEPHONE NUMBER: (403) 925-6538

PRINCIPAL PRODUCT: Nuclear steam system supplier.

NUCLEAR INDUSTRY ACTIVITY: General Electric Company (GE), Nuclear Energy Business Operations (NEBO), has a work force of aproximately 1,000 people with approximately 98 percent of that force devoted to domestic nuclear activity. NEBO currently has 26 reactor units under construction and 2 units under contract. NEBO has approximately 125 service contracts with various clients.

ASSIGNED INSPECTOR: P. Sears — 4/16/84
P. Sears, Reactor Systems Section (RSS) — Date

OTHER INSPECTOR(S): D. G. Breaux, RSS
Server Sadik, EG&G, Idaho

APPROVED BY: C. J. Hale — 4/19/84
C. J. Hale, Acting Chief, RSS — Date

INSPECTION BASES AND SCOPE:

A. BASES: GE topical report No. NEDO-11209-04A and 10 CFR Part 21.

B. SCOPE: Status of previous inspection findings, review preloaded pipe clamp applications, and review of QA requirements/implementation in relation to certain piping supplied to Hatch, Units 1 and 2.

PLANT SITE APPLICABILITY:

Hatch, Units 1 and 2 (50-321 and 50-366), Limerick, Units 1 and 2 (50-352 and 50-353), Nine Mile, Unit 2 (50-410)

ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900403/84-01	INSPECTION RESULTS:	PAGE 2 of 7

A. VIOLATIONS:

None

B. NONCONFORMANCES:

Contrary to Section 9 of GE Topical Report NEDO-11209-04A, Revision 4, GE did not assure that pipe bending done at a vendor's facility was accomplished by qualified personnel nor did GE assure that the pipe bending was accomplished using a qualified procedure for the pipe bend rate, heating, and annealing.

C. UNRESOLVED ITEMS:

1. GE's remedial actions concerning crack/indications in replacement recirculation piping shipped to the Hatch nuclear power plant were reviewed. GE reported that fourteen 12" risers were penetrant tested at Hatch by GE personnel after receipt and were determined to have indications. These risers had been tested using a die penetrant examination and were passed at a GE subcontractor's facility. GE's remedial actions on this item have not been completed and those actions will be reviewed during a future inspection.

2. Representative samples of preloaded (stiff) pipe clamp applications were selected for analysis as to their effects on piping. That analysis will be done by an NRC consultant. The stresses induced in the pipe by the clamp will be calculated. Those stresses will include thermal, preload, and dynamic stresses in areas in the pipe under or near the clamps. The object of the analysis is to determine if the total stresses are within ASME code allowables. The results of this analysis will be included in a future inspection report.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-03): Control rod drive (CRD) clamps supplied by GE on all BWR-6 plants were classified as nonessential components.

   As noted in GE design specifications for hydraulic lines (21 A 8845), GE does not have design responsibility for the CRD hydraulic lines. A part of the lines is manufactured by GE and shipped to the site. Clamps are provided by GE to support the lines during shipment and subsequent construction. GE has advised all Architect Engineers (AEs) and customers that any postulated failure of the clamps must be evaluated by the owner/AE. GE also advised the owners/AEs that in their opinion the clamps could provide support up to the limits specified on the interface control drawings.

2. (Closed) Nonconformance (83-03): GE did not communicate needed design information to Stone & Webster (S&W) that CRD clamps were nonessential components.

   When GE became aware that certain owners/AEs had interpreted that the CRD clamps were essential, they notified all customers/AEs that the clamps were noncode and nonessential.

3. (Closed) Nonconformance (83-03): Design verifications of Nuclear Control and Instrumentation Division design documents are being deferred without controlling procedural requirements being implemented.

   GE has initiated an action plan to review all documents listed in the Engineering Information System (EIS) to assure that current verification status is correct. The inspector also reviewed customer notification of design documents currently in deferred verification status as required by Engineering Operating Procedure (EOP) 42-600. GE Quality Assurance and Reliability Operation (QA&RO) conducted an internal audit of the implementation and effectiveness of the deferred verification control systems. This audit resulted in two corrective action reports (CARs). As of this inspection, one CAR is still open.

4. (Closed) Nonconformance (83-03): Receiving accepted purchased equipment that did not conform to the procurement document.

   The inspector reviewed EOP 6.10 "Supplier Charge Request," Revision 1, dated December 16, 1982. This allows the supplier to formally submit exceptions to purchase order requirements. QA conducted an audit of purchases similar to the Rosemount 1152 transmitter to assure that the supplier complied with the IEEE qualification requirements specified in the purchase orders. The audit resulted in no further examples of receiving and accepting purchased equipment that did not conform to the procurement document.

5. (Closed) Nonconformance (83-03): Desing Record File (DRF) indexes or equivalent were not established and/or maintained for DRF Nos. ADO-1160 and A1002.

   The NRC inspector verified that all committed corrective actions had been taken.

6. (Closed) Nonconformance (83-03): Mathematical analyses were not prepared and documented so that a technically qualified person could review and evaluate their accuracy without recourse to the originator.

   The inspector verified that additional information was added to the analyses as committed by GE. A letter was also sent to all responsible engineers to remind them of procedural requirements pertaining to generation of analyses.

7. (Closed) Nonconformance (83-03): Functional specifications were not controlled in accordance with procedures.

   The inspector verified that committed corrective action had been done. The inspector reviewed the revision to EOP 40-3.00, "Engineering Computer Programs" (ECPs). The revision includes more specific controls for ECP specifications.

8. (Closed) Nonconformance (83-04): Design change documentation was not initiated for approved Field Deviation Disposition Request (FDDR) HH1-1467.

   The inspector verified that all committed actions in response to this nonconformance had been taken. The design change documentation has been initiated as part of a larger design change package. The change is scheduled for completion by June 8, 1984.

9. (Closed) Nonconformance (84-04): Engineering services failed to process an FDDR into the EIS data base to reflect field implemented design changes.

   QA&RO conducted an internal audit of the adequacy of the FDDR system. Audit findings relating to this area have not been finalized as of this inspection. The current EIS data base reflects the field implemented design changes authorized by the referenced FDDR in the nonconformance. The NRC inspector reviewed the revision to procedures which will aid in preventing this type of nonconformance from occurring.

E. OTHER FINDINGS OR COMMENTS:

1. Replacement of Recirculation Piping Risers

   On or about March 3, 1984, the Hatch plant received 14 12" piping risers. It was reported by GE that these risers were then inspected by first being surface smoothed by flapper sanding and then penetrant inspected. All showed some indications (microfissures). Their manufacture was described by GE as follows:

   a. Plate, fabricated by ARMCO in its Florida facility, was rolled into tube forms and welded. The ARMCO facility has a code certification and was audited by GE in April 1983 and put on the approved vendor list.

   b. The pipe was shipped to the Johnson Controls, Clearfield, Utah, facility for bending by a special machine designed and made in Holland. The process involved induction heating and bending of the pipe. Preliminary inspection (die penetrant) was performed on the risers. It was reported by GE that the bending of some of the risers was observed by GE metallurgists and QA personnel and a representative from Hatch. (The Clearfield facility is not code certified.)

   c. The risers were then shipped to Johnson Controls' Compton facility, which has a code certification to be inspected and NPT stamped. The inspection consisted of die penetrant examination.

Review of purchase documents and specification referenced therein show the following: (1) no specific qualifications for the personnel operating the bending machine were required by GE, and (2) no specific bending, heating, or annealing rates were required by GE.

The nonconformance in B. above was identified in this area of the inspection. Further inspection in this area is necessary. Information yet to be obtained includes:

a. Are the heating, bending, and annealing processes being accomplished at the Clearfield facility considered by GE to be a special process in the context of 10 CFR Part 50, Appendix B;

b. Are the exemptions to NB 4213 provided by the ASME Code for Austenitic stainless steels applicable;

c. The basis or criteria used by GE in classifying "cracks," "indications," and "microfissures" and the significance of the latter; and

d. A review of the revised process to be implemented at the Clearfield facility.

2. Specialized "Stiff" Pipe Clamps

As noted in IE Information Notice No. 83-80, it has become apparent that certain loadings induced by specialized "stiff" pipe clamps can result in significant localized stresses in the piping that should be considered in the piping design. In developing these stiff pipe clamps, clamp vendors have incorporated several innovative design concepts that can detract from the piping integrity when they are not properly considered by piping designers.

GE has specified in several of its designs, stiff clamps. These clamps require, during installation, a preloading of the clamp bolts to achieve the desired stiffness properties and to prevent the clamp from lifting off the piping during design load application. The bolt preload value is determined analytically by the clamp vendors and its magnitude is extremely large. The clamp vendors have qualified the clamp stresses only and no evaluation of the effect on the piping stresses has been made by clamp vendors or by GE.

Representative samples of stiff pipe clamp applications were selected for analysis of their effects on piping. That analysis will be done by an NRC consultant. The stresses induced by the pipe clamp will be calculated. Those stresses will include thermal, preload, and dynamic stresses in areas in the pipe under or near the clamps. The object of the analysis is to determine if the total stresses are within ASME code allowables. The results of this analysis and the effect on GE designs will be included in the scope of a future inspection.

ORGANIZATION: GENERAL ELECTRIC COMPANY
DISTRIBUTION EQUIPMENT ENGINEERING MANUFACTURING OPERATION
PLAINVILLE, CONNECTICUT

REPORT NO.: 99900786/84-01	INSPECTION DATE(S): 2/14-17/84	INSPECTION ON-SITE HOURS: 100

CORRESPONDENCE ADDRESS: General Electric Company
Distribution Equipment Engineering Manufacturing Operation
ATTN: Mr. E. N. DeVault, General Manager
41 Woodford Avenue
Plainville, Connecticut 06062
ORGANIZATIONAL CONTACT: Mr. D. J. Dixon, Quality Assurance Manager
TELEPHONE NUMBER: (203) 747-7466

PRINCIPAL PRODUCT: Low-voltage power circuit breakers, panels, and switchboards.

NUCLEAR INDUSTRY ACTIVITY: Safety-related equipment has been supplied to numerous nuclear power generating stations. Included are: Callaway, Hope Creek, Maine Yankee, Palo Verde, San Onofre, Waterford, and Wolf Creek.

ASSIGNED INSPECTOR: W. M. McNeill, Special Projects Section (SPS) — Date: 5/25/84

OTHER INSPECTOR(S): D. A. Weber, EG&G
W. Mills, Nuclear Energy Consultants
I. Villalva, Events Analysis Branch

APPROVED BY: C. J. Hale, Chief, SPS — Date: 5/29/84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was conducted as a result of the identification by General Electric Company (GE) and various licensees of manufacturing design deficiencies associated with AK2 and AKR-30/-50 low power circuit breakers.

PLANT SITE APPLICABILITY: Relay bell alarm switch mounting screws, 50-382; camshaft bearing retaining ring; camshaft bearing retaining ring, 50-382; closing mechanism "C"-clips, 50-382; wiring error, 50-382; charging spring crank screws, 50-482 and 50-382; closing spring interlock, 50-483 and 50-482; teflon bearing sleeves, 50-483, 528, 529, 530, and 482; and overcurrent trip device, 50-029, 50-417, 50-423, 50-354, 50-355, 50-528, 50-529, and 50-530.

ORGANIZATION: GENERAL ELECTRIC COMPANY
DISTRIBUTION EQUIPMENT ENGINEERING MANUFACTURING OPERATION
PLAINVILLE, CONNECTICUT

REPORT NO.: 99900786/84-01	INSPECTION RESULTS:	PAGE 2 of 21

A. VIOLATIONS:

Contrary to Section 21.21(b)(3) of 10 CFR Part 21, the Distribution Equipment Engineering and Manufacturing Operation's (DEEMO) April 21, 1983, defect report on overcurrent trip device failures in AK-25, AKR-30, and AKR-50 breakers, fails to identify the nature of the defects and safety hazard which is created, the date on which the information was obtained, the number and location of all such components, and the individual or organization responsible for corrective action. DEEMO's November 4, 1983, defect report on bearing mounting failures in AKR-30 and AKR-50 breakers fails to identify the date on which the information was obtained, the individual or organization responsible for corrective actions, and any advice related to the defect given to licenses.

B. NONCONFORMANCES:

1. Contrary to the DEEMO 10 CFR part 21 report dated June 15, 1983, and supplemented August 24, 1983, the DEEMO records of rework at the Waterford site of breakers showed that 84 Class 1E breakers were reworked on the subject 10 CFR Part 21 report.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Section 17 of ANSI N45.2, measures were not documented which assured that conditions adverse to quality, such as failures reported from the field, are identified and corrected by use of the Service Advices issued by DEEMO. In addition to the lack of procedures, the NRC inspectors noted that failures experienced at Main Yankee, which related to preventive maintenance, service life and actions that should be taken when service life is reached, have not been identified to the customers involved.

3. Contrary to Criterion XVI of Appendix B to 10 CFR Part 50, measures did not assure that the corrective action was taken and documented to preclude repetition in the case of field reported failures. This was evidenced by the lack of records which would show that rework was satisfactorily completed on DEEMO Service Advices 9.7 and 9.6 for nuclear sites such as Waterford and Palo Verde.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Section 7 of ANIS N45.2, measures were not established and documented to control the issuance of procedures used and issued by Installation and Service Engineering (I&SE), presently known as Apparatus and Engineering Service Operations (A&ESO), which were used to accomplish field inspection, rework, and repair of breakers to Service Advices.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS (D.A. Weber):

1. (Closed) Violation (Item A, 83-01): Current copies of 10 CFR Part 21 and Section 206 of the Energy Reorganization Act of 1974, or a notice had not been posted at the facility located at 7 Johnson Avenue, Plainville, Connecticut. The posted notices at the Woodford Avenue facility identified the location where the full text of 10 CFR Part 21 was available for examination; however, the available copy of 10 CFR Part 21 was not current; it reflected "Federal Register . . . June 6, 1977."

   DEEMO's response to the above in their letter of August 11, 1983, was to post a notice of 10 CFR Part 21 applicability in their office on 7 Johnson Avenue and add an item to their audit operating components checklist to verify that the posting requirements are being adhered to. These actions were verified. In addition the notice stated that "a copy of the full text of Regulation 10 CFR Part 21, and of the Procedure to be followed is available by any employee in the office of Position Title Quality System Specialist," in that facility. It was also verified that the quality system specialist had a current copy of 10 CFR Part 21.

   It was also verified that DEEMO had placed a current copy of 10 CFR Part 21 in their file at the Woodford Avenue facility and that the quality systems engineer ensure, at least quarterly, that the copy of 10 CFR Part 21 on file is current. It was verified that the Woodford facility has notices of 10 CFR Part 21 applicability posted in the panelboard and switchboard areas and in the engineering hallway that refers to the "Manager - Quality Control," for copies of the full text of 10 CFR Part 21. Further, it was verified that the manager of equipment quality control had a current copy of 10 CFR Part 21 in his file.

2. (Closed) Violation (Item B, 83-01): The notification of reportable defects letter dated June 15, 1982, filed with the Nuclear Regulatory Commission, Washington, D.C. was deficient in that:

   a. The date on which the information of such defect or failure to comply was obtained had not been included in the report.

b. The number and location of all defective components in use at, supplied for, or being supplied for one or more facilities subject to 10 CFR Part 21 had not been included in the report.

c. Advice that has been, is being, or will be given to purchasers related to the defective AKR-30 and AKR-50 circuit breakers was not included in a 10 CFR Part 21 report.

DEEMO's response to these items is noted in their letter of August 24, 1982, which identifies: (1) the date on which the information of such defect or failure to comply was obtained (June 15, 1982); (2) the number and location of all defective components (letter shows plants, locations, and quantities); and (3) Service Advices 9.11 and 9.12 and procedures 82-1 and 82-2.

DEEMO preventive action was to revise instruction 3.01 to require the submittal of supplementary reports to provide additional information required by 10 CFR Part 21 which is not available at the time of the original submission.

It was verified that instruction 3.01 issued October 19, 1983, contains a note on page 8 that states, "if all of the information required by the 10 CFR Part 21 Regulation is not available at the time of the initial report to the NRC, follow-up reports will be provided until all the report requirements are met."

3. (Closed) Nonconformance (Item A, 83-01): Records associated with the rework of the spring prop and switch deficiencies of the AKR-30 and AKR-50 circuit breakers for Hope Creek Nuclear Station were not sufficient and adequate to provide evidence that work was completed, controlled, inspected, and tested. This was evidenced by the lack of records to indicate: (1) the hardware was nonconforming, (2) control of disassembly and reassembly tasks, and (3) results of reinspection and retest.

To assure adequate records on future rework, the DEEMO corrective action is to: (1) prepare a quality control procedure; and (2) add on item to the checklist used for the annual management audit of quality assurance to assure sufficient and adequate records are maintained. DEEMO did not prepare a new quality control procedure, but revised an existing procedure, "Material Review Board for Disposition of Nonconforming Finished Goods - Warehouse Operations," procedure 1601.1, Revision 3, dated August 16, 1983. This procedure has been revised in several areas to assure documentation of rework on finished goods stored or returned to the warehouse. The DEEMO letter of August 11, 1982, stated that the action to prevent recurrence was to add on an

item, to the checklist used for the annual management audit of quality assurance to assure sufficient and adequate records are maintained. This item had not been added when the NRC inspection team arrived at the DEEMO facility on February 14, 1984, but was completed by the time the team departed on February 17, 1984.

4. (Closed) Nonconformance (Item B, 83-01): There was no list of attendees for the 10 CFR Part 21 compliance meeting conducted January 20, 1981, at the Plainville plant. Further, there was no list to indicate that the manager of quality assurance had conducted a 10 CFR Part 21 meeting with cognizant headquarters personnel. Customers affected by the spring prop and switch deficiencies, associated with the AKR-30/-50 circuit breaker, had not been notified by telegram.

   The DEEMO corrective action to the nonconformance, as stated in the letter of August 11, 1983, was to delete the QAM8-13 and revise the Engineering Department Instruction 3.01. This revised procedure appears to comply with the requirements of 10 CFR Part 21.

   The DEEMO action to prevent recurrence was to add an item to the management audit of QA to verify compliance to 3.01. This item had not been added when the NRC inspection team arrived at the DEEMO facility on February 14, 1984, but was completed by the time the team departed.

5. (Closed) Nonconformance (Item C, 83-01): Procedures and instructions for rework and inspection had not been reviewed and approved.

   DEEMO responded to the nonconformance in their letter of August 11, 1983, by preparation of a quality control procedure 16 U1.1 to assure proper documentation for completed items that are reworked, repaired, and reinspected if the completed items are in the warehouse or returned by the customer to the warehouse. The action taken to prevent recurrence was to add an item to the annual management audit of QA to assure sufficient and adequate records are maintained.

6. (Closed) Unresolved Item (83-01): Service Advice 9.12 dated November 3, 1983, indicates that a latent manufacturing defect in the silicon controlled rectifier (SCR) is the cause of deficient ground break relays. However, a review of other records suggest that the cause is misapplication of the SCR.

The DEEMO letter of September 12, 1983, to the NRC explains the source of misapplication was the result of a review of meeting notes between GE DEEMO and GE Semiconductor Products Department regarding deterioration in the DC blocking ability of the DEEMO SCRs. The issue has been resolved through the purchase of SCRs from Raytheon. Raytheon provided DEEMO with a letter dated August 30, 1983, stating, in part, that long term stability tests have shown that there is no deterioration in the blocking ability of planar devices at maximum rated blocking voltage and maximum rated junction temperatures.

Review of the DEEMO drawing 192A7698P2, Revision 1, for the Raytheon SCR; Service Advice 9.12 (November 3, 1982), regarding replacement of the ground break relay; PO 187-029189-60A (November 16, 1982), for procurement of replacement items per the Service Advice 9.12; and DEEMO letter to Bechtel dated November 16, 1982, regarding replacement of ground break relays indicates that: (1) the ground break relay failures were due to manufacturing problems with the SCR, (2) the Raytheon replacement corrects the problem, and (3) corrective action (replacement of the ground break relays) has been implemented.

E. OTHER FINDINGS OR COMMENTS (by W.M. McNeill):

1. Manufacturing/Design Deficiencies: A number of deficiencies identified to the NRC by DEEMO in 10 CFR Part 21 reports, by licensees in 10 CFR Part 50.55(e), and Licensee Event Reports (LERs) were reviewed in light of QA program controls; and to evaluate the safety significance, the generic scope, and that action was taken to correct the items and prevent recurrence. This was accomplished by review of correspondence, drawings, reports, evaluations, and other records.

   a. Relay Bell Alarm Switch Mounting Screws: Louisiana Power & Light (LP&L) issued a 10 CFR Part 50.55(e) dated August 2, 1982, stating that on November 25, 1981, some relay bell alarm switches on AKR-50 breakers were found to be loose or missing at the Waterford Steam Electric Station, Unit 3. In some cases the switches were broken as a result. The frequency of this problem, location of breakers in question, number of breakers, and how this problem was identified was not addressed. The relay bell alarm is used to give a remote (control room) indication of the trip status. The alarm switch is wired in series with the closing circuit. If the switch fails in an open position, the breaker is prevented from closing and the safety-related circuits would remain deenergized, thereby disabling safety equipment.

A November 20, 1982, memo by I&SE was found which suggested the use of RTV (silicone sealant) over the heads of screws after tightening to prevent loosening. I&SE is a GE organization independent of DEEMO which provides field service for DEEMO manufactured products. An August 10, 1983, memo by I&SE stated that the problem was identified to DEEMO engineering in 1981, and a September 19, 1982, memo by engineering states that the design is satisfactory. QA reported that the cause of this problem may have been the omission of a thread locking compound by manufacturing personnel. The engineering memo added that the only problem with these screws is switch breakage due to overtorquing. A review of field service reports and summaries for the past 12 months issued to DEEMO by I&SE found no additional reports of this problem.

There appeared to be no evidence that this problem has occurred elsewhere, and therefore, is not generic. The corrective action is satisfactory to engineering, although the documentation of its evaluation was performed much later after the problem was identified. The DEEMO position is not clearly documented, but appears to be that this problem is not reportable under 10 CFR Part 21 as a manufacturing or design problem.

b. Camshaft Bearing Retaining Ring: LP&L issued a 10 CFR Part 50.55(e) report dated January 3, 1984, which stated that during routine operation, breakers failed to close because a bearing on the closing spring camshaft slid out of the breaker sideframe and caused shaft misalignment at the Waterford Steam Electric Station, Unit 3. The frequency of this problem, location of breakers in question, number of breakers, and when this problem was identified was not addressed. A misaligned shaft can place the closing spring in a position which prevents it from pulling the breaker closed and could prevent the operation of safety-related equipment required for safe shutdown.

DEEMO had a phone report of this problem in September 1983, and sent a team of engineering and quality personnel to the Waterford site. One breaker was returned to DEEMO for evaluation on September 30, 1983. An October 12, 1983, memo to EBASCO Services, Inc. at Waterford identified the results of the evaluation. The evaluation established that the bearing was loose because its side frame mounting hole was larger than specified and that the bearing was not fully pressed into the

side frame at the time of assembly. Service Advices are used by DEEMO QA to communicate to I&SE latent manufacturing and design defects and the inspection, rework, and repair necessary to correct such problems. In general, the Service Advices made the notification of nuclear sites and modification the responsibility of I&SE, as well as the reportability of the completion of such activities to DEEMO.

Service Advice 9.17 was issued on October 12, 1983, which addressed the installation of a retainer plate as corrective action for this problem. This Service Advice was issued only to the Waterford site. A November 4, 1983, memo of QC engineering identified that the side frame in question was fabricated at DEEMO Plainville in the seventeenth week of 1978 from the date code on the mechanism. Sometime in late 1978 or early 1979, side frame fabrication was transferred to Power Breakers, Inc. in Puerto Rico. It has been concluded that the problem was associated with side frames fabricated between mid-1976 to late 1978 at Plainville. Earlier main frame assembly was done at Plainville where the bearing was mounted into the side frame by reaming to size. During the time in question Plainville was to be using a gage to size the mounting hole.

On November 4, 1983, DEEMO identified this problem to the NRC as a reportable defect on AKR-30 and AKR-50 breakers manufactured between mid-1976 and December 1978. This report stated that DEEMO was reviewing their files to determine which nuclear facilities have the subject breakers. The NRC verified the review is underway. A review of the Service Advice work sheets for Waterford found that 84 breakers had been reworked under Service Advice 9.17, the only site to have been issued the Service Advice to date. These work sheets identified by the serial number of the breakers in question were styled AKO without an N style which means they were fabricated prior to January 1978 when DEEMO implemented such serial number styling for 10 CFR Part 21 reporting purposes.

A review of files indicate that other equipment manufacturers such as Golden Gate and Powel may have been supplied suspect breakers as well as DEEMO's Plainville and Salisbury, North Carolina, plants.

During the review of the above work sheets, it was noted that work sheets were also on file for rework of a defective switch in the closing circuit and an improperly heat treated closing spring prop. This had been reported under 10 CFR Part 21 by DEEMO to the NRC on June 15, 1982, and supplemented August 24, 1983. The work sheets state that 84 Class 1E breakers have been reworked under Service Advice 9.11 although the August 24, 1983, memo states 66 are at the Waterford site. The final 10 CFR Part 50.55(e) report from LP&L states that 85 breakers have been repaired. This was identified as a nonconformance (see B.1 above).

The evaluation of the generic impact of this problem is still underway. The corrective action to date has been limited to the Waterford site although these maybe a question as to how many Class 1E breakers are involved. Engineering review and approval of the corrective action is not documented. This problem was reported under 10 CFR Part 21 and further evaluation was found to be under way. The failure to report who was responsible for corrective action, the Service Advice 9.17, and when this problem was found was identified as a violation (see A above). The lack of established procedures addressing the use of Service Advices was identified as a nonconformance (see B.2 above).

c. Closing Mechanism "C"-Clips: LP&L issued a 10 CFR Part 50.55(e) report dated December 7, 1983, which identified that during startup testing, a breaker feeding the shield building vent fan did not close because a "C"-Clip, which retains a pin in the closing mechanism, had fallen off at the Waterford Steam Electric Station, Unit 3. An inspection of 88 breakers, both 1E and non-1E, identified four with missing clips and five with loose clips. Breaker closure is required for the safe operations and shutdown of the plant. The final LP&L report identified the clips more accurately than the interim report such that DEEMO determined that the clip in question was on a pin in the closing solenoid arm which connects the arm to the closing linkage. A review of the drawings and parts lists established a design change had been made December 1979, which replaced the clip in question with a cotter pin. This design change had been reviewed and approved by engineering and quality. It was noted that the review of a design change in regard to its impact on IEEE equipment qualification was not specifically addressed in procedures only very generally addressed by the Quality Assurance Manual; e.g., "review will verify the adequcy of the design

change to comply with the product performance." Also, the quality assurance signoff related only to the effect on inspection planning and tooling.

DEEMO reports that they were not aware of this problem at Waterford or other nuclear sites. The Waterford report stated that "G.E. was contacted to determine if the installation of the "C"-clips required more specific installation instructions . . . . In response G.E. supplied predrilled closure pins with cotter pin retainers as replacements . . . ."

Additional inspection is warranted of this problem. It appears to be generic.

d. Wiring Error: LP&L issued a 10 CFR Part 50.55(e) report dated December 6, 1983, which identified that on some AKR-50 breakers a jumper wire was installed by the vendor and was found at the Waterford Steam Electric Station, Unit 3. The frequency of this problem, location of breakers in question, number of breakers, and how and when this problem was identified was not addressed.

This jumper wire is to improve the antipump characteristics of the closing circuit when closing under low closing voltage conditions. There is no effect on the safety performance of the breaker.

On September 15, 1983, an Ebasco telex was received by DEEMO which identified this problem and attributed breaker failures to this jumper wire. An October 3, 1983, memo to Ebasco states that the DEEMO evaluation of this problem was that the failures were the result of LP&L's failure to implement Service Advice 9.11 on a defective closing control switch, the subject of DEEMO's June 15, 1982, 10 CFR Part 21 report. The Salisbury, North Carilina, equipment drawing was in error in that it failed to show the jumper wire in question and that it was to be revised. The Waterford report notes that the jumper wire has been removed.

The DEEMO evaluation established that there is no problem in this area. However, it appears that further inspection is warranted at Salisbury, North Carolina, on their drawing review and controls to establish if there is a problem in design interface between breaker design and switchgear design. In addition, it was noted that LP&L breakers presently are not wired as required by drawings.

e. Charging Spring Crank Screws: Kansas Gas and Electric (KG&E) issued a final 10 CFR Part 50.55(e) report dated October 15, 1981, which identified that in July 1981 one charging spring crank screw on AKR type breakers was found loose at the Wolf Creek Generating Station, Unit 1. The frequency of this problem, location of breakers in question, and how this problem was identified was not addressed. LP&L issued a 10 CFR Part 50.55(e) report dated August 11, 1982, which stated that DEEMO had advised them of this same problem at the Waterford Steam Electric Station Unit 3. On inspection of 78 breakers three screws were found "backed out" and one broken off. The screw in question could interfere with the charging of the breaker's closing spring and, thereby, prevent the breaker from closing, thus degrading the safety of the plant.

The July 1981 event at Wolf Creek was the first identification of this problem. On July 23, 1981, DEEMO identified this problem as a manufacturing error in the omission of a thread locking compound to the screw in question. A DEEMO Service Advice 9.7 was issued on August 21, 1981, on this problem for AKR type breakers. A September 11, 1981, memo was issued to Waterford identifying some 55 breakers to be reworked as required by Service Advice 9.7.

The KG&E 50.55(e) report identified two GE rework procedures (WC-19 and WC-21); however, evidence of DEEMO engineering and QA review of these I&SE procedures was not on file. It was also noted that Service Advice 9.7 stated either of two types of thread locking compound could be used; however, the manufacturing information, drawings, and parts list identified only one to be used. There was no evidence of engineering approval for the use of the alternate type. The types in question differ in their strength and viscosity. There were no records which showed notification to sites or the rework of breakers to Service Advice 9.7 that would close the loop on this problem.

The problem in question has been identified as a reportable defect and a generic problem, and a Service Advice has been issued. The lack of identification of breakers in question, sites affected, and followup on the rework to verify that the problem has been corrected was identified as a nonconformance (see B.3 above). The DEEMO practice of issuance of Service Advices without evidence of DEEMO engineering's review and

approval is the subject of concern. The Service Advices has procedures associated with them for which there was no evidence of DEEMO engineering's review and approval and had a revision date after the Service Advice issuance date. This was identified as a nonconformance (See B.4 above).

f. Closing Spring Interlock: Union Electric Company (UEC) issued a final 10 CFR Part 50.55(e)/Part 21 report on November 19, 1982, which identified a lever of the closing spring interlock overtraveling the armature linkage pin, jamming, then bending the lever at the Callaway Plant, Unit 1. The frequency of this problem, location of breakers in question, number of breakers, and how this problem was identified was not addressed. On December 9, 1982, KG&E issued a final 10 CFR Part 50.55(e)/Part 21 report which identified the same problem and was discovered on November 8, 1982, at the Wolf Creek Generating Station. Likewise, the number of breakers and how this problem was identified was not addressed. Given sufficient bending of this lever, the breaker would fail which could adversely effect the safe operation of the plant.

In January of 1980 DEEMO had made a design change because of product abuse. Undue force on the racking handle was found to be producing this problem. The design change added an "ear" to the closing spring interlock lever to preclude overtravel. This design change was reviewed by engineering and QA like noted previously on the clip design change. Memos by I&SE to Bechtel the AE for both sites concluded that the problem was not a warranty problem but the result of product abuse and rework would be at the site's expense. The evaluation of this problem as product abuse precludes the question of reportable under Part 21 and the generic scope of the problem. The corrective action is to upgrade to the new design. Preventive action has been taken by revision of the instruction manuals to caution users about possible abuse.

g. Teflon Bearing Sleeves: UEC issued a final 10 CFR Part 50.55(e) report dated May 1, 1981, which stated that DEEMO, by Service Advice 9.6 identified a reportable defect, that breakers may fail to close upon command because of deformation of a teflon sleeve serving as a bearing at the Callaway Plant, Unit 1. On July 10, 1981, Arizona Public Service Company (PSC) issued a similar report for 21 breakers at the Palo Verde Nuclear Generating Station, Units 1, 2, and 3; and on May 17, 1982, LP&L issued a similar report for 86 breakers at the Waterford

Steam Electric Station, Unit 3. If the breakers were left in a charged position for several hours the deformation could occur and resultant failure to close could inhibit safety-related equipment from operating and thus compromise the safe shutdown of the plant.

A 10 CFR Part 21 report was issued by DEEMO on January 13, 1981, which identified this problem as a reportable defect. Commercial experience was the basis for this report and Service Advice 9.6 was issued on January 18, 1981. A design change was implemented which replaced the teflon with an all steel bearing on March 4, 1981, with the type of engineering and QA review as noted earlier. Process control sheets, generated by I&SE, identified that 77 breakers were reworked at the Waterford site. A debit memo was found on file for four replacement bearings shipped to the Palo Verde site.

This problem was deemed reportable by DEEMO and its generic scope addressed by issuance of Service Advice 9.6. The corrective and preventive actiosn were replacement and redesign. However, there is some concern on the rework to Service Advice 9.6 in that the DEEMO records do not agree with the 50.55(e) reports issued by LP&L and PSC. This was identified as a nonconformance (see B.3 above).

h. Overcurrent Trip Device: A memo of September 7, 1983, identified that Yankee Nuclear Power Station had been notified by DEEMO of a reportable defect. The defect may cause breakers to fail to trip close.

DEEMO was made aware of this problem by a phone call on February 24, 1983, from its I&SE personnel at the Millstone Unit 3 site. On April 21, 1983, DEEMO reported this problem to the NRC. The report simply identifies that AK-25, AKR-30, and AKR-50 breakers may contain improperly manufactured assemblies. Discussion with engineering and QA established that the assemblies in question are overcurrent trip devices (EC-1 and EC-2). The manufacturing problems were a short paddle and the improper seating of a tang. Two DEEMO memos were found identifying this problem to I&SE (now known as A&ESO). A list of plant sites effected was found on file dated April 25, 1983. The corrective action identified is to return the devices for repair/rework. No Service Advice is planned on this problem.

Time did not allow a full inspection of DEEMO's records on this problem. Additional inspection is necessary to assess the generic potential of this problem and preventive action. It was noted that the DEEMO report failed to identify the sites, the date of discovery, responsibility for corrective action, and the nature of the defects. This was identified as a violation (see A above).

2. Procurement Control (D.A. Weber): DEEMO manufactures their own current transformers (CT) and solid state trip (SST) units for use on the AKR-30 and AKR-50 circuit breakers. Some of these circuit breakers will untimately be classified as Class 1E. An attempt was made to determine the applicability of 10 CFR Part 21 and 10 CFR Part 50, Appendix B, to the purchasing of material used in the assembly of these breaker subcomponents. However, it was discovered that material for these subcomponents is purchased as commercial items and, therefore, the requirements of 10 CFR Part 21 and Appendix B are not imposed.

A completed Class 1E order for a switchboard supplied by DEEMO to its equipment shop in Salisbury, North Carolina, was reviewed for conformance to 10 CFR Part 21 and Appendix B (order No. 182-48573-051 dated March 3, 1982). Since this order contained procurement from many subsuppliers, an order to Burndy Lugs (cable termination) was arbitrarily selected for review. The cover sheet on the purchase order for the material contained a stamp which stated that the material should conform to DEEMO documents QC-178 and paragraphs 1.0-6.0, 7.1.2, 7.1.3, and 8.0-11 of QC-179. A review of QC-178 and QC-179 showed that QC-178 covers "IEEE-323 Qualification Requirements" and QC-179 covers "Vendor Quality Assurance Requirements." QC-179 contains paragraphs that refer to 10 CFR Part 21 (paragraph 7.3) and 10 CFR Part 50, Appendix B (paragraph 2.0). These paragraphs, however, were not part of this particular purchase order because the material is purchased as a commercial item. A review of other documents verified that Burndy Lugs did conform to QC-178 (IEEE-323 requirements). One of the documents reviewed was a letter from Burndy to DEEMO (dated August 2, 1982) providing life qualification test results per IEEE-323 1974.

From the above, it appears that DEEMO does have at least one document to control outside purchases of Class 1E equipment/material when 10 CFR Part 21 and Appendix B are applicable. This document is the QC-179, "Vendor Quality Assurance Requirements." A review of other Class 1E purchase orders will be considered during a future inspection.

3. Receiving Inspection Control (D.A. Weber): The primary document used by receiving inspection is Quality Control Procedure (QCP) 1681.4, "Control of Supplier Nonconforming Material" (Rev. 0. September 14, 1983). A randomly selected receiving inspection department "history file" was reviewed and compared with QCP 1681.4. The file contained: (a) a "history card" for a non-Class 1E lever arm showing suppliers, quantity received, accept/reject quantities, disposition document numbers (for rejected items), and the inspectors' initials and dates; and (b) inspection reports (IRs) for rejected items (reviewed IR 15063 dated January 26, 1984). Also, the drawing for part 5698210, Revision 11 dated August 1, 1983, was made available and compared with some of the recent IRs where there were rejected items. There were no apparent nonconformances noted for this particular item.

   It should be noted that QCP 1681.4 does not specifically address the control of suppliers of Class 1E nonconforming material. A review of other "history files" and the receiving inspection control of Class 1E material will be considered during a future inspection.

4. Equipment and Services Provided by DEEMO (L.W. Mills and I. Villalva): The objectives were to identify the scope of equipment and services provided by DEEMO related to AK type breakers used in nuclear power plants. Also, the objectives were to identify whether DEEMO properly classified breakers for Class 1E applications.

   The methodology was to identify DEEMO customers who have obtained the AK type breakers for use in nuclear power plants (both original equipment and replacement equipment). A review of several purchase packages was performed that determined which customers have obtained the AK breakers for safety-related (Class IE applications). This review also determined how DEEMO classified the customer's orders for Class 1E equipment.

   The scope of equipment provided by DEEMO related to AK type breakers used in nuclear power plants included the AK2, AKR, and AKF (switch) breakers. The AK2 breakers were previously the standard product line and were originally produced by GE Philadelphia, DEEMO's former headquarters. Now the AKR type breakers have replaced the AK2 breakers as the standard product line. DEEMO Plainville provides AK2

breakers and parts only as replacement for the original AK2 breakers. DEEMO Plainville currently has the overall engineering, manufacturing, and QA responsibility for the AK2 and AKR breakers. The replacement AK2 parts and breakers are assembled and provided by Plainville. The AKR breakers are assembled in Puerto Rico by Power Breakers, Inc. For Class 1E applications, the finished AKR breakers are shipped to DEEMO, Farmington Plant, for final testing and inspection prior to delivery to the customer. The NRC inspectors were informed by DEEMO that up to about 1 year ago, only the AKR breakers (not the AK2 breakers) were knowingly sold as Class 1E by DEEMO.

Prior to that time, DEEMO had provided the AK2 breakers as commercial grade. DEEMO considered that the application and qualification was under the control and responsibility of the customer. The NRC inspectors were informed that, if a utility requested purchase of AK2 breakers for use in a nuclear power plant, DEEMO would not provide the equipment directly. DEEMO would require that the purchase be made by another oganization which would then be responsible for designation and qualification of the breaker if used in a nuclear power plant. The NRC inspectors verified the above DEEMO policy during the inspection. The NRC inspectors requested that DEEMO identify its customers who purchased AK2 breakers (both original and replacement parts). A list of DEEMO customers for AK2 and AKR breakers was obtained. The NRC inspectors also requested and reviewed several purchase packages for AK2 and AKR breakers in detail to determine what DEEMO provided, and whether it was classified as commercial grade or nuclear grade. This review shows that the original AK2 breakers were provided as commercial grade by DEEMO.

5. Quality Assurance Program (W. Mills and I. Villalva): The objectives were to identify and assess DEEMO's programs to control the quality of DEEMO AK2 breakers used in safety-related (Class 1E) applications in nuclear power plants.

The methodology was to identify and review the DEEMO's QA organization and program and selected QA procedures provided by DEEMO for AK2 breakers. A review of the DEEMO QA program was performed to determine if it provided for information flow and customer interface to resolve the concerns presented in NUREG 1000.

A copy of the DEEMO organization and QA manual was obtained and used during this inspection. The organization is such that the QA manager reports to the engineering department's general manager and the QC managers report to the plant managers responsible for production. Maximum QA and QC independence and authority cannot be realized with this organizational structure.

Further, it was found that DEEMO has no formal program, procedures, or customer interfaces established to provide for the routine collection of operating experience data and failure data on GE AK2 breakers. For example, it was observed that DEEMO did not obtain operating data on their breakers from sources such as LERs, INPO, NPRDS, and NRC reports.

6. Customer Interface and Involvement (W. Mills and I. Villalva): The objectives were to identify measures taken by DEEMO's customers to ensure that the AK2 breakers are qualified for their intended Class 1E application and assess the actions taken by DEEMO's customers to provide for an exchange of information with DEEMO on operating experience and technical matters relating to breaker performance.

   The methodology was to identify audits performed by DEEMO's customers and review audit findings and resolution of these findings. Review of DEEMO procedures and practices governing the flow of information on matters related directly to breaker performance was performed to determine if this flow of information satisfied the concerns presented in NUREG 1000.

   The NRC inspectors were informed that DEEMO has been audited by Bechtel, Stone & Webster, and Yankee Atomic. Combustion Engineering has done surveillance of selected areas. Audit packages were selected and reviewed for audits performed by Yankee Atomic and Bechtel.

   The NRC inspectors inquired about involvement in the flow of information relating to breaker field experience data and information relating to breaker quality. The NRC inspectors questioned whether customers had approached DEEMO on the vendor interface issues discussed in NUREG 1000. The NRC inspectors were informed that no DEEMO customer had approached them on this matter.

7. Quality Assurance Implementation (W. Mills and I. Villalva): The objectives were to assess DEEMO's implementation of QA for the production of AK2 breakers and replacement.

The methodology was to select and review several purchase order packages, determine if the customer specified Class 1E applications, and to review DEEMO's QA implementation and practices for Class 1E applications.

Numerous purchase packages were reviewed. During the review it was noted that the files at the QA office were not complete or up to date. For example, Equipment Order Requisition No. 187N929131, information such as the extent of final testing and qualities of breakers shipped, was needed to determine how DEEMO fulfilled the customer's order. The routing sheet for this order was missing the concurrence of the engineering manager, which should have been provided since the order was an original procurement. For Equipment Order Requisition No. 420N80505 the order stated no teflon unless approved by the customer. Nothing in the QA package indicated compliance with this customer specification; however, discussion with DEEMO engineering personnel provided the necessary information.

It was also noted that the QA review and sign off is routinely limited to the customer purchase order only. There is no routine review, audit, and sign off by QA to show that the breaker and the testing meets customer specifications. Complete copies of customer specifications were not on file at the QA office. DEEMO QA does perform an annual audit, but this appears to be programmatic and document related.

This area will be reviewed further in subsequent inspections.

8. Current Equipment Problems (W. Mills and I. Villalva): The objectives were to identify DEEMO actions to resolve AK2 breaker malfunctions at Main Yankee and reported AKF (switch) breaker problems.

The methodology was to identify current problems with AK2 breakers at Maine Yankee; discuss with DEEMO engineering personnel; and determine if DEEMO is taking action to identify, evaluate, and resolve these current problems. Also addressed was if DEEMO is informing its customers of current major problems and their impact on breaker operability, the need for additional or more frequent preventative maintenance or testing, and the need to replace parts which have exceeded service life, if sooner than expected.

DEEMO representatives, with extensive knowledge of breaker design and operation, have been on site and are directly involved with resolution of current problems at Maine Yankee. Information was requested and obtained in several areas as follows:

a. Grease Hardening: A suspected major cause of delayed AK2-25 breaker tripping at Maine Yankee is hardening of the lubricant in the roller bearing in the trip latch mechanism. This lubricant is a petroleum-based grease which can dry and thicken or harden with age. This increases the friction in the roller bearing in the trip latch mechanism and increases the torque required to trip the breaker. The required trip torque can increase beyond that reliably produced by the under voltage trip device (UVTD), thereby, resulting in delayed trip or failure to trip.

The NRC inspectors were informed that DEEMO had performed qualification testing for the AKR breakers which evidenced the failure mode. As part of the qualification testing, the AKR breaker received accelerated thermal aging at elevated temperatures for an extended time period. After this aging the breaker could not be tripped by the UTVD but could be tripped by the shunt trip device which produces a higher trip torque. During elevation of this failure mechanism DEEMO determined that the breaker was excessively thermally aged with respect to the lubricant in the qualification testing. This aging exceeded that associated with expected actual breaker service conditions, and that the observed failures were not considered representative of expected performance. To resolve the problem of lubricant drying or thickening, DEEMO is currently investigating alternative lubricants that can be used which will not dry with time. Until an improved lubricant is commercially available or the lubricant problems otherwise resolved, interim action and preventive maintenance can be taken to minimize this problem. One alternative is to "revitalize" the lubricant periodically by using a solvent such as WD 40 or CRC 5-56 which dissolves and thins the lubricant. Another alternative is to replace the entire front-end mechanism which includes the trip latch mechanism roller bearing.

b. Preventive Maintenance and Service Life: DEEMO has previously publiched Service Advice letters which address preventive maintenance for the AK2 breakers. For example, Service Advice 9.3 mentions that hardened grease can cause the torque required to trip the breaker to exceed the limit of 1.5-inch pounds. It also states that the grease should be replaced or revitalized with a solvent or the bearing must be replaced to correct the problem. However, the Service Advice does not provide specific detailed information that can be used in the field to perform this work correctly or at the right frequency. For example, at Main Yankee the solvent was eventually applied using a hypodermic needle because of the difficulty of getting the solvent inside the roller bearing. Also, the Main Yankee experience may indicate that the effective service life of the breaker is 5-8 years in the application as a reactor trip breaker. If this is the case, the frequency and scheduling of preventive maintenance and testing is important for applications approaching this age. This information is not provided in the Service Advice currently issued by DEEMO. The service life has been typically specified by DEEMO in terms of the number of cycles of operation rather than the number of years of operation.

c. Trip Time Testing: Operating experience and testing of the AK2-25 breakers has shown apparent sluggish breaker trip response as well as trip times which vary significantly from one test to the next and from one breaker to another. While there are reasons for this actually being the case, DEEMO informed the NRC inspectors that inadequate test methods may result in unacceptable response times in excess of the 50 milliseconds, the nominal limit at some plants. For example, the testing method may involve a switching mechanism which removes the voltage applied to the UVTD. The switch operation and rate of voltage decay is critical to the dropout of the UVTD and the measured trip response time. Thus, if the switch does not remove the applied voltage relatively fast, then an excessive trip time would be measured. Also, variations in the switching time would show up as variations in the measured breaker trip response time.

d. Equipment Specifications and Verification Testing: DEEMO has typically provided the AK2 breaker and UVTD as commercial grade equipment with equipment specifications listed in the commercial catalogs. These equipment specifications do not include values or warranty on breaker trip response time or required trip torque. DEEMO has provided this type of information to customers in response to specific requests and has provided values in certain Service Advices.

e. Undervoltage Trip Device: DEEMO has provided the UVTD to its customers as a commercial grade product, except possibly for some recent orders for replacement parts. DEEMO considers that their customers have the responsibility to qualify the UVTD if used in a Class 1E application. DEEMO currently has efforts underway to aid in developing an improved UVTD on other equipment to perform this function. The result of these efforts or expected completion time was not available at the time of the inspection.

f. AKF (Switch) Breaker: The NRC inspectors questioned DEEMO about AKF breaker (actually a switch) problems reported by Monticello and Pilgrim. These plants use the AKF breakers to trip the reactor recirculation pumps to provide protection against anticipated transients without scram events. The NRC inspectors were informed that DEEMO does not consider the AKF breaker reliable for safety-related applications and GE San Jose has been notified. Furthermore, this breaker is not in production, is considered obsolete, and spare parts and rework are not available. This item will be followed by other NRC activities for resolving operating reactor experience.

In summary, the NRC inspectors were concerned that a Service Advice or other correspondence which addresses recommended routine preventive maintenance, service life in terms of the number of years of operation, and the actions that should be taken when service life is reached has yet to be issued. This should include how to lubricate the breaker and when and how to replace aged parts. This was identified as a nonconformance (see B.2 above).

ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900911/84-01	INSPECTION DATE(S): 1/17-20/84 2/6-10/84	INSPECTION ON-SITE HOURS: 70

CORRESPONDENCE ADDRESS: General Electric Company
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175 Curtner Avenue
San Jose, CA 95125
ORGANIZATIONAL CONTACT: Mr. N. G. Shirley, Senior Licensing Engineer
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PRINCIPAL PRODUCT: Nuclear steam system supplier.

NUCLEAR INDUSTRY ACTIVITY: The General Electric Company (GE), Nuclear Energy Business Operations (NEBO), has a work force of approximately 7650 people with approximately 98 percent of that work force devoted to domestic nuclear activity. Approximately 100 of the 7650 personnel are assigned to the environmental qualification (EQ) test program.

ASSIGNED INSPECTOR: C J Hale for 3/9/84
J. R. Agee, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S): E. H. Richards, Sandia National Laboratories

APPROVED BY: C J Hale for 3/29/84
H. S. Phillips, Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: NEDO-11209-04A, NEBO topical QA program and 10 CFR Part 21.

B. SCOPE: The inspection was conducted to: (1) evaluate the qualification of components tested in a GE sponsored test at Wyle Labs, Norco, California; and (2) inspect GE documentation of the test, test failures, and reporting requirements under 10 CFR Part 21 requirements.

PLANT SITE APPLICABILITY:

50-416/417, 50-298, 50-321/366, 50-331, 50-271

ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900911/84-01	INSPECTION RESULTS:	PAGE 2 of 9

A. VIOLATIONS:

Contrary to Section 21.21 of 10 CFR Part 21, GE did not evaluate the deviations from GE Product Performance Qualification Specification (23A1213, Revision 3, dated November 11, 1983) which states the EQ requirements for testing the Pressure Controls Inc. (PCI) pressure switches, Model Nos. 219B4684; 147D8668P001; and 14D8668P003 with (1) Brand-Rex lead wire attached to PCI Model No. 147D8668, and (2) Bostrad 19 lead wire attached to PCI Model No. 219B4684. The deviations which were not evaluated were the failures of both type lead wires during EQ testing to IEEE 323-1974 and IEEE 383-1974 test requirements and criteria. Generic models of the subject switches were furnished to Georgia Power Co. (Hatch, Units 1 and 2).

B. NONCONFORMANCES:

1. Contrary to Section 1, paragraph 1.1 of NEDO-11209-04A, procedure No. 70-42 does not give persons performing quality related activities sufficient authority and organizational freedom to: identify quality problems; initiate, recommend, or provide solutions to quality problems; verify implementation of the solutions; or prevent further processing, delivery, installation or utilization of nonconforming items until proper dispositioning has occurred. This procedure sets up an organizational reporting mechanism which impedes potentially reportable conditions (PRC) from reaching the manager (Safety and Licensing) who evaluates the PRC for reportability by: (1) inserting at least two levels of management review before the PRC reaches the manager responsible for evaluating a deviation, and (2) raising the threshold too high for a deviation that is to be evaluated as a potentially reportable item, causing the originator to use an appeal route which requires "going over management's head" in writing to assure that the PRC is evaluated by the responsible manager.

2. Contrary to Section of NEDO 11209-04A, procedure No. 70-42 does not describe how deviations identified during the implementation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and Criterion XV, "Nonconforming Materials, Parts, or Components," will be considered for 10 CFR Part 21 reportability. The procedure does not assure that deviations identified during design reviews or other phases such as purchasing, manufacturing and construction are considered for reportability, such as a decision block on design deviation or nonconformance reports indicating that 10 CFR Part 21 reportability has been considered.

3. Contrary to Section 5 of NEBO 11209 and procedure No. 70-42:

   a. The GE initiator of a report proposing that a GE PRC be considered did not include all of the information required by Appendix B of the procedure. That is Nuclear Services Engineering Operation memo (SRL-83-9) Subject: Tailpipe Pressure Switches Problems, dated April 18, 1983, did not include: (1) the date which the information of such defect or failure to comply was obtained; (2) the corrective action which has been taken is being, or will be taken; (3) the name of the individual or organization responsible for the action; and (4) the length of time that has been or will be taken to complete the action.

   b. The immediate manager did not respond in writing to describe the disposition of the pressure switch problems which were characterized as potentially reportable conditions.

4. Contrary to NEDO-11209-04A, Section 3, "Design Control," Subsection 3.7, and IEEE 323-1974, Section 6.3.4, "Radiation," the responsible engineer did not assure that the system design specifications which incorporate the general functional, environmental, material and test requirements were met. Design verification did not assure that the IEEE requirement was addressed in the product performance qualification specification (PPQS) for the resistance temperature detectors (RTDs) and pressure switches 23A1212 and 23A1213. As a result, GE Purchase Order No. 205-YE-310 issued for Wyle Laboratories testing did not include the requirement of IEEE 323-1974 and those components were exposed to an excessive radiation dose rate.

5. Contrary to NEDO 11209-04A, Section 11, "Test Control," and IEEE 323-1974, the Environmental Qualification Report (EQR) qualifying GE pressure switch 24A1206CA fails to demonstrate that the pressure switch will meet or exceed the values specified in PPQS GE #23A1213 nor does the EQR provide adequate justification for the substitution of different brands of wire in the qualification test.

6. Contrary to NEDO 11209-04A, Section 11, "Test Control," the product test results were not adequately reviewed, evaluated, and documented to assure that test requirements were satisfied, for example, the EQR for pressure switches (24A1206CA Rev. 1) contained inconsistencies with the Wyle test report (NEDC-30039-11, page 3-4). The dose rates in Table 8.2 were incorrectly listed as 10^6 rd/hr. Actually 6 of the dose rates were 3.15×10^6 rd/hr and 3 were 4.03×10^6 rd/hr. Also,

the total test dose for three of the samples was incorrect. The appropriate test engineer was notified and has initiated action to correct the qualification report by issuing Revision 2.

C. UNRESOLVED ITEMS:

The NRC inspector and NRC consultant performed a preliminary evaluation of Franklin Research Center (FRC) Report F-C5120-1 and determined: (1) the subject report does not contain page 5-2 which describes cable failures that occurred during testing; and (2) the aging parameters in the report do not relate to or describe the service condition and may not support a qualified life of 40 years plus the harsh environment. This item will be considered during future inspections.

D. ACTION ON PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance Item 1 (83-03). *See note below.

2. (Open) Nonconformance Item 2 (83-03). *See note below.

E. OTHER FINDINGS OR COMMENTS:

1. General - The NRC inspector inspected the GE EQ facility where testing of a main steam isolation valve (MSIV) actuator will be conducted during the first quarter of 1984. During this inspection test fixtures for functional operation and thermal aging of the MSIV actuator were being constructed. The EQ procedures for the test were obtained by the inspector for review. The test procedures had been approved by GE engineering management. The test facility organization was awaiting issuance of the engineering work authorization so that the baseline functional testing of the actuator could begin. A portion of the test will be witnessed in a subsequent inspection.

2. Inspection of 10 CFR Part 21 Reporting System - During this inspection the NRC inspectors evaluated specific deviations from technical specifications. As a result of the violation and nonconformances identified during this inspection, the inspectors evaluated the GE system for 10 CFR Part 21 reporting. In discussing the violations in A above with GE management personnel by telephone on February 3, 1984,

*NOTE: These nonconformances were identified at the GE facility in Valley Forge, Pennsylvania, and were not addressed in this inspection at San Jose, California. Responses to these findings will be inspected at the Valley Forge facility in a subsequent inspection.

they stated that their failure to evaluate was caused by problems within the administrative system but stated that they did not make 10 CFR Part 21 notification because the test failure was considered not reportable.

Procedure No. 70-42, "Reporting of Defects and Noncompliance Under 10 CFR Part 21 or Part 50.55(e)," dated March 27, 1981, was reviewed. The subject procedure makes the GE reporting system inadequate by: (1) setting up a system that only evaluates recognized or identified defects for 10 CFR Part 21 reportability; (2) setting up a reporting chain that impedes effective reporting; and (3) failing to directly incorporate or factor design and manufacturing deviation reports into the subject procedure. Nonconformances B.1 and B.2 were identified.

During this inspection an example was identified where an engineer in Control Systems Engineering described lead wire test failures for tailpipe pressure switch 21984684 for the Hatch plant, which could result in loss of certain safety functions at the Cooper, Duane Arnold, Monticello, Vermont Yankee, and Grand Gulf nuclear plants where these switches were presumed to be supplied. Also an additional problem relating to a mechanical problem was discovered during testing; however, the engineer did not provide all the information required by Appendix B of procedure No. 70-42. This information was documented in a Nuclear Services Engineering Operations memo by the engineer who asked for an evaluation of these deviations in accordance with 10 CFR Part 21 to determine if these were defects. GE provided no records or other documentation of such an evaluation during this inspection, nor did management respond to the engineer's memo (see nonconformance B.3 above).

3. Technical Inspection - The inspector reviewed and evaluated engineering documentation concerning a GE sponsored EQ test in which PCI pressure switches; Weed Inc., resistance temperature devices (RTDs); and two 10-foot lengths of insulated lead wires manufactured by the Rockbestos and Boston Insulated Wires (BIW) companies were tested. The test was conducted at Wyle Laboratories, Norco, California, during the fourth quarter of 1982 in compliance with GE purchase order (PO) 205-YE-310. Failures occurred during the test. A summary of the findings identified by the inspector while examining documents concerning the test is presented in the following paragraphs.

   a. GE engineering and test documents reviewed included the following:

(1) Pressure Switch, PPQS 23A1213, Rev. 3, November 11, 1983.

(2) Pressure Switch, Product Analysis Report (PAR) 23A1221, Rev. 0, August 18, 1982.

(3) RTD, PPQS 23A1212, Rev. 1, November 11, 1983.

(4) RTD, PAR 23A1229, Rev. 1, November 10, 1983.

The documents identified above contained inconsistencies, for example: item (4) states that the radiation dose rate should be $1x10^6$ rad per hour; while item (3) specified that the radiation dose rate should be $1x10^6$ rads per hour, minimum. The pressure switch, PPQS, item (1) and the PAR, item (2), do not specify a radiation dose rate. GE PO 205-YE-310 states that the dose rate for radiation aging of the pressure switches and the RTDs should be the same (see nonconformance B.4).

b. The RTDs and pressure switches for this test contained insulated lead wires. IEEE 383-1974 states that conditioned specimen should be subjected to gamma radiation from a source, such as Cobalt 60, at a rate not greater than $1x10^6$ rad per hour. The Wyle Test Report (NEDO-30039-11, Project No. 58789, pages 3-3, 3-4) identified applied dose rates of $1.90x10^6$ rads per hour for the RTDs and $3.15x10^6$ and $4.03x10^6$ rads per hour for the pressure switches. When questioned about the excessive exposure rate used in this test and the possible adverse effects on the wire insulation materials due to oxygen diffusion (see IEEE 323-1974, Section 6.3.4) the cognizant GE engineer contended that the total test doses, and therefore aging times and dose rates were conservative for the plant specific (Hatch) applications. Engineering personnel were unable to provide engineering justification or data to support the generic qualification of these components and materials when exposed to excessive radiation dose rate conditions (see nonconformances B.6).

c. The GE EQR (Pressure Switches, 24A1206 CA, Rev. 1, Table 8.2) identified radiation dose rates and total doses that are different from those identified in the Wyle Test Report, NEDO-30039-11, page 3-4, which were considered accurate (see nonconformance B.6).

NOTE: The cognizant GE engineer initiated corrective action and did revise the EQR to Revision 2; however, the EQR had not been reviewed and approved by appropriate personnel during this inspection.

ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900911/84-01	INSPECTION RESULTS:	PAGE 7 of 9

d. The inspector reviewed Wyle Test Report NEDO-30039-11 and the GE EQR No. 24A1206CA and confirmed that several PCI pressure switches and two 10-foot lengths of insulated lead wires manufactured by the BIW and the Rockbestos companies were included in the GE sponsored EQ test.

The BIW wire (Bostrad 19) failed the qualification test since it did not pass the 500V electrical test specified by the GE PPQS 23A1213; however, the Rockbestos specimen met the acceptance/failure criteria of the qualification test. Since the PCI pressure switch Model No. 219B4684 test specimens contained Bostrad 19 lead wires, the pressure switch was considered not qualified (see nonconformance B.5).

The pressure switch Model No. 147D8668 test specimen contained Brand Rex (BR 1625) lead wires. Following the test, photographs were made of the test specimen. Pages 4-3 and 4-20 of the Wyle test report showed that the insulation of the Brand Rex wire on test specimen #030 and #121 cracked to the extent that the bare conductor (wire) could be readily seen. This was reported to GE by Wyle, page 4-16 of the Wyle test report. One of these specimen survived the qualification test conditions and GE declared the specimen to be qualified even though the lead wire was severely cracked, as stated above. GE qualified this specimen by stating that since the Brand Rex and the Rockbestos insulation materials are both cross-linked polyethylene, the cracked Brand-Rex wire met the requirments by similarity analysis and, thus, the PCI, pressure switch (test item #121), Model No. 147D8668, was qualified because of the similarity of materials. Furthermore, GE's stated position was that the Brand Rex insulation material was cracked due to manual handling; i.e., by coiling and uncoiling the lead wire during the tests; yet GE did not provide engineering data or analyses to support this position.

The NRC inspector stated that the qualification (reference IEEE 324-1974, Section 6.8) by similarily of material was not logical because: (1) the Brand Rex material failed, (2) Rockbestos cable in the chamber was not carrying a load, (3) the 360° crack around the cable was uniform which suggested the crack resulted from material failure versus a crack longer on one side characteristic of a crack caused by a bending stress; (4) Brand-Rex and Rockbestos insulation materials are cross-linked by both chemical and radiation processes, but there was no record to show which type was used; and (5) Rockbestos uses different manufacturing processes.

During the inspection, GE was unable to produce records or other documents to demonstrate that the deviations (failure of pressure switch assemblies including lead wires) had been evaluated in accordance with 10 CFR Part 21, Section 21.21 (see violation A).

e. During the inspection, several GE internal documents and memoranda were examined. These indicated that during the period of the test, damaged test specimens (pressure switches) were removed from the test program and returned to PCI for modification. Other similar switches were removed from GE stock and shipped to PCI for modification then shipped to the Hatch Nuclear Plant.

GE letter SRL-82-52, dated December 27, 1982, states in part that "Pressure switch 219B4684 is not considered acceptable since its lead wire (Bostrad 19) failed the voltage withstand test." GE internal letter, SRL-83-2, dated January 27, 1983, requested that the pressure switch 219B4684 be replaced with pressure switch 188C7602 for the following affected nuclear plants: Cooper, Duana Arnold, Montecello, Hatch, Vermont Yankee and Grand Gulf. The inspector requested records of any evaluation and notification in accordance with 10 CFR Part 21, but no documentation was found in the GE files to demonstrate that GE had evaluated and reported defects of this type to their clients with recommendations that the clients replace the "unqualified" switches or that the clients evaluate the uses of this type switch to preclude potentially hazardous conditions. The GE Manager, Electrical Systems Engineering, stated there was no documentation because no 10 CFR Part 21 notification had been made to their clients or to the NRC regarding the failed components.

4. Evaluation of Franklin Research Center (FRC) Qualification Report F-C5120-1 - On January 27, 1984, GE management submitted FRC Report F-C5120-1 which stated they supported qualification of the Brand-Rex lead wire used in the pressure switch assemblies regardless of the documented failure of this lead wire. This report was used to evaluate and as the basis for accepting the subject failures after the NRC inspection team identified the violation in A above.

The NRC inspector and NRC consultant performed a preliminary evaluation of this report and determined: (1) the subject report does not contain page 5-2 which describes cable failures that occurred during testing, and (2) the aging parameters in the report do not

relate to or describe the service conditions and, thus, may not support a qualified life of 40 years plus the harsh environment. This item is unresolved (see paragraph C).

5. Exit Meeting - On January 20, 1984, the NRC inspector met with members of management at the conclusion of the inspection at the San Jose, California, facility. The inspector described the violation and nonconformances that were identified and had been discussed in detail with cognizant engineers and management personnel during the inspection. GE stated that they might find additonal information in their files and would like to submit such information if it could show that the violation and the nonconformances did not exist. The NRC inspector stated additional information could be submitted if such documentation was found after the exit meeting.

   Subsequently, GE management contacted the NRC inspector and stated that they had additional information concerning the findings identified during the inspection and requested a meeting in the NRC Region IV office.

   On January 27, 1984, a meeting was conducted between NRC and GE management. GE submitted additional information which included an evaluation of the switch failures that was performed after the inspection have ended. An FRC test report (F-C5120-1) was submitted for evaluation and to support their contentions that Brand-Rex cables were qualified even though the Brand-Rex cable failed during testing (see paragraph E.3 and E.4 above). GE also provided their 10 CFR Part 21 procedure and this was reviewed (see paragraph E.2 above).

ORGANIZATION: GILBERT/COMMONWEALTH
READING, PENNSYLVANIA

REPORT NO.: 99900525/84-01	INSPECTION DATE(S): 2/28-3/2/84	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: Gilbert/Commonwealth
ATTN: Mr. H. Lorenz
Executive Vice President
P. O. Box 1498
Reading, Pennsylvania 19603

ORGANIZATIONAL CONTACT: W. F. Sailer, General Manager, QA Division
TELEPHONE NUMBER: (215) 775-2600

PRINCIPAL PRODUCT: Architect engineering and consulting services.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities at the Reading facility is approximately 900 people. Major projects include Perry, Units 1 and 2; Three Mile Island, Unit 1 restart; continuing services for V. C. Summer, Unit 1; Crystal River, Unit 3; Ginna Station; Virginia Electric and Power Company; and the Tennessee Valley Authority.

ASSIGNED INSPECTOR: A. R. Johnson — 3/30/84
A. R. Johnson, Equipment Qualification Section (EQS) — Date

OTHER INSPECTOR(S): J. Benson, Sandia National Laboratories

APPROVED BY: C. J. Hale — 4/4/84
C. J. Hale, Chief (Acting), EQS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and Topical Report GAI-TR-106.

B. SCOPE: Evaluation of equipment qualification (EQ) documentation on selected safety-related items used within the containment and harsh environment during and following a loss-of-coolant accident (LOCA) or high energy line break (HELB).

PLANT SITE APPLICABILITY:

Docket Nos. 50-395, 50-390/391.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Violation (83-02): Procurement documents issued after January 1978 for safety-related services subject to 10 CFR Part 21 did not impose the required provisions of 10 CFR Part 21.

   Gilbert/Commonwealth (G/C) responses for corrective actions and preventive measures for this violation have not been fully implemented, therefore, this item will be reviewed during a subsequent NRC inspection.

2. (Open) Nonconformance (83-02): Procurement documents for safety-related services were not reviewed or aporoved by QA, nor were quality program requirements imposed on contractors providing safety-related computer services.

   G/C responses for corrective actions and preventive measures for this nonconformance have not been fully implemented, therefore, this item will be reviewed during a subsequent NRC inspection.

E. OTHER FINDINGS OR COMMENTS:

1. The NRC inspector and Sandia National Laboratory (SNL) consultant (NRC inspection team) evaluated EQ documentation packages to determine whether they met regulatory requirements of NUREG 0588, Revision 1, and the requirements of IEEE 383-1974, and IEEE 323-1974. The NRC inspection team evaluated eight G/C EQ documentation packages of safety-related electrical cable used within the containment/ harsh environment during and following a LOCA/HELB. The NRC inspection team performed a technical evaluation and review of G/C's methodology and engineering analysis as applied to EQ documentation packages in certifying the licensee's safety-related Class 1E power,

control, and instrumentation cable for its intended use. The EQ documentation represented type testing at the manufacturer's test facility for Class 1E cable supplied to the Perry Nuclear Power Plant (PNPP), Units 1 and 2 and the V. C. Summer Nuclear Power Plant (SNPP), Unit 1. The manufacturers were: (a) Rockbestos, (b) Anaconda, (c) Samuel Moore, (d) Brand-Rex, and (e) Kerite. The NRC inspection team's review included examination of G/C specifications, G/C bill of materials, G/C NUREG 0588 engineering checklists, G/C EQ environmental summaries, manufacturer's EQ test reports, manufacturer's supporting documents, G/C work change requests, G/C engineering design control procedures, G/C engineering instructions and operating procedures, and the PNPP EQ Program Manual.

The EQ documentation packages were examined for the following:

a. The test equipment included a description of all materials, parts, and subcomponents.

b. Equipment interfaces were described.

c. The same equipment was used for all phases of testing and represented a standard production item.

d. Evidence that tests were performed in accordance with a written test procedure.

e. Test acceptance criteria were established as described in the applicable codes, standards, and G/C specifications.

f. All prerequisites for the given test, as outlined in G/C specifications, letters, and contracts with the licensee have been met.

g. Environmental conditions were established and described; e.g., . . . pressure and temperature profiles, radiation, and thermal accelerated aging factors.

h. Test equipment and instrumentation were described for recording test data.

i. Test results were adequately documented and reviewed/evaluated by G/C to assure that test requirements had been satisfied.

No nonconformances were identified.

2. The NRC inspection team determined that the cable manufacturer's EQ documentation packages for generic cable, already previously qualified to a specific envelope (e.g., EQ generic testing at the manufacturer's test facility was completed with a documented qualification test report), are accepted by G/C on the basis of their qualification test report review. The G/C position is that qualification test reports contain all information/intent of the test plan including anomalies, deviations, and nonconformances. G/C assures that qualification test reports are reviewed for all aspects of the test program requirements in accordance with IEEE 383-1974 and IEEE 323-1974.

   No nonconformances were identified.

3. The NRC inspection team reviewed the G/C procurement QA activities which assure control of the licensee's procured services through supplier inspections, surveys, and source audits. The NRC reviewed G/C's contract with Cleveland Electric and Illuminating Company (e.g., QA Program Plan dated January 1, 1975, for PNPP suppliers). G/C's contract with the licensee did not place emphasis in the area of EQ. The G/C manufacturer's audit checklists only identified five items which address the EQ qualification requirements of IEEE 323-1974 and IEEE 383-1974.

   The NRC inspection team determined that G/C's contract for licensee procured services (to perform supplier inspections, surveys, surveillance, and source audits) did not include the EQ requirements of IEEE 383-1974 and IEEE 323-1974 for meeting NUREG 0588. The NRC inspection team's review included examination of G/C's QA program plan for PNPP, engineering purchase schedules, manufacturer's surveillance plans, manufacturer's audit checklists, nonconformances, inspection action requests, corrective action requests, QA manufacturing audit reports, acceptance transmittals/waivers, and certificates of inspection.

   No nonconformances were identified.

ORGANIZATION: HUDSON PRODUCTS CORPORATION
BEASLEY, TEXAS

REPORT NO.: 99900982/84-01	INSPECTION DATE(S): 3/5-9/84	INSPECTION ON-SITE HOURS: 30

CORRESPONDENCE ADDRESS: Hudson Products Corporation
ATTN: Mr. J. Pittman, Vice President
and General Manager
6855 Harwin
Houston, Texas 77036

ORGANIZATIONAL CONTACT: Mr. J. Blair, Manager QA/QC
TELEPHONE NUMBER: (713) 342-4628

PRINCIPAL PRODUCT: Heat exchangers.

NUCLEAR INDUSTRY ACTIVITY: Hudson Products is not presently involved in the domestic nuclear industry.

ASSIGNED INSPECTOR: I. Barnes for D. E. Norman, Reactive Inspection Section (RIS) 5-1-84 Date

OTHER INSPECTOR(S):

APPROVED BY: I. Barnes I. Barnes, Chief, RIS 5-1-84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the receipt of an allegation by Revion IV of the Nuclear Regulatory Commission pertaining to air cooled heat exchangers that had been furnished to the Waterford Generating Station, Unit 3. Subjects of the allegation were a claimed
(continued on next page)

PLANT SITE APPLICABILITY:

Docket No. 50-382.

SCOPE: (cont.) lack of independence of the quality assurance function, inadequate procurement controls, and possible improprieties in the welder qualification program.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.1.1 in Section 4 of Edition III of the QA Manual, purchase orders (POs) were issued to vendors which had not been placed on the Approved Vendors List (AVL).

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.3.6.1 in Section 4 of Edition III of the QA Manual, POs reviewed by the NRC inspector had not been signed nor stamped by the QA manager and there were no other records which indicated that the QA manager had reviewed POs prior to issue.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 10.1.4 in Section 10 of Edition III of the QA Manual, one Level II liquid penetrant (LP) and magnetic particle (MT) examiner did not have eye examinations performed between 1976 and 1980, and there were no certification records for an examiner who had performed radiographic (RT) examination of welds.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Allegation Concerning Lack of QA Independence - The statement of policy which was signed by Hudson Products president and chief executive officer assigns final decisions on QA matters to the QA manager. The QA manual also states that the QA manager reports directly to the president concerning all functional and technical operations of the QA department and to the manufacturing manager for scheduling and coordination of QA activities with manufacturing activities. No personnel records were reviewed. However, it was stated to the NRC inspector that the QA department also reported administratively to the manufacturing manager on matters such as personnel performance appraisals and pay increases.

In the NRC inspector's judgement the administrative reporting of QA to the manufacturing manager may not provide the desired independence from cost and schedule versus safety considerations as required in 10 CFR Part 50, Appendix B, substantiating the allegation. However, Hudson is not presently performing or pursuing domestic nuclear work and no nonconformances or unresolved items were identified in this area. In the event nuclear work is resumed, a reinspection of this area will be made by NRC.

2. Allegation Concerning Inadequate Procurement Controls - Records of 30 vendors included on the AVL were reviewed. Vendors which held valid ASME certificates were placed on the AVL based on the ASME certification, while the remainder were audited by Hudson QA. Reports of six of the vendors audited by Hudson pointed out deficiencies ranging from unqualified personnel performing quality functions to inadequate QA programs. In each instance, the vendor was placed on the AVL, and there were no records available to show that corrective actions for the cited deficiencies were ever taken.

   A comparison of eight vendor POs against the AVL showed that POs were placed with vendors from 6 weeks to 6 months prior to the vendor's placement on the AVL. In addition, records did not reflect a review of the POs by QA prior to being placed.

   Within this area of inspection, the allegations were substantiated and nonconformances B.1 and B.2 were identified.

3. Allegation Concerning Possible Improprieties in the Welder Qualification Program - Qualification records were reviewed for five welders that were identified by manufacturing records to have welded on ASME Code equipment. The records showed the welders to be qualified in accordance with ASME Code requirements. Test coupons were tested and certified to Code requirements by an independent testing laboratory. The allegation that coupons may have been welded by personnel other than the welder shown on the record could neither be substantiated nor disproved. Similarly, the allegation that welder identities may have been stenciled on production welds by a person other than the welder was neither substantiated nor disproved.

   Within this area of inspection, no nonconformances or unresolved items were identified.

4. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs) - WPSs and PQRs for procedures NIM (manual shielded metal arc), WIM (gas tungsten arc and manual shielded metal arc), and NIA (machine submerged arc), which were used in fabrication of the component cooling water system (CCWS) heat exchangers and towers were reviewed by the NRC inspector. Each was found to conform to ASME Code requirements. Testing of PQR coupons was performed by an independent testing laboratory who certified results to ASME Code requirements.

   Within this area of inspection, no nonconformances or unresolved items were identified.

5. Qualifications of NDE Examiners - Qualification records for three NDE examiners who had performed examinations of the CCWS equipment were reviewed. Records for another examiner who was employed by an independent testing laboratory that had performed RT examinations of welds were not available for review. One of the examiners had no record of eye examinations being performed from 1976, when first certified, to 1980.

   Within this area of inspection, nonconformance B.3 was identified.

6. Hardware Data Packages - Hudson Products received a contract from Ebasco for two complete CCWS units for the Waterford Generating Station, Unit 3 site. According to the plant general manager and the QA manager, this was Hudson's only nuclear contract. They are not soliciting nuclear work and did not choose to renew their ASME nuclear certificate at the November 1982 expiration.

   Requirements for the CCWS dry cooling towers were included in Ebasco inquiry LOU-1675 dated April 13, 1973. Contract award date could not be determined from the available records; however, it was prior to April 1974. All pressure retaining portions of the towers; i.e., piping, headers, and tubes were required to be designed and fabricated in accordance with ASME Section III Code, Class 3, 1974 Edition through the summer 1974 addenda. Welding on the remaining equipment was required to be performed in accordance with AWS D1.1, 1972 Edition. The tower units were to be considered as seismic Class 1 and 10 CFR Part 50, Appendix B, was invoked. Two complete tower units were required to be fabricated for the Waterford Generating Station, Unit 3.

Data packages were reviewed with respect to material certification and fabrication records for one heat exchanger which was released for shipment on March 22, 1978; and one structure and component unit which was released for shipment on February 3, 1978.

a. Certified Material Test Reports (CMTRs) and Certificates of Compliance (COCs) - Because of the discrepancies described in D.2 of this report, the NRC inspector reviewed CMTRs and COCs and verified the following items: (1) traceability by heat or other valid number; (2) certification to proper material specification and QA program; (3) proper mechanical and chemical tests performed; and (4) proper signatures and dates.

b. Fabrication Records - The NRC inspector reviewed fabrication records and verified the following: (1) traceability of material used in production to CMTRs or COCs; (2) use of qualified fabrication and inspection procedures; (3) operations and examinations performed by certified personnel; and (4) entries on fabrication records properly completed and signed.

No other nonconformances were identified.

ORGANIZATION: ICO DE PUERTO RICO, INC.
CABO ROJO, PUERTO RICO

REPORT NO.: 99900831/84-01	INSPECTION DATE(S): 2/27-3/2/84	INSPECTION ON-SITE HOURS: 108

CORRESPONDENCE ADDRESS: ICO de Puerto Rico, Inc.
ATTN: Mr. B. Pleunik
Plant Manager
P. O. Box 949
Cabo Rojo, Puerto Rico 00623

ORGANIZATIONAL CONTACT: Mr. M. Rodriguez, QC Manager
TELEPHONE NUMBER: (809) 851-2015

PRINCIPAL PRODUCT: Circuit breakers.

NUCLEAR INDUSTRY ACTIVITY: Less than one percent of the total work is nuclear safety-related equipment.

ASSIGNED INSPECTOR: Wm McNeill 6/4/84
William McNeill, Special Projects Section (SPS) Date

OTHER INSPECTOR(S): D. A. Weber, EG&G
I. Villalva, Event Analysis Branch

APPROVED BY: C S Hale 6/5/84
C. S. Hale, Chief, SPS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Programatic evaluation of the entire QA program and status of previous inspection findings.

PLANT SITE APPLICABILITY:

Not determined.

ORGANIZATION: ICO DE PUERTO RICO, INC.
CABO ROJO, PUERTO RICO

REPORT NO.: 99900831/84-01	INSPECTION RESULTS:	PAGE 2 of 19

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Part II of Quality Control Instruction (QCI) No. PR-8, patrol inspections were not documented to be performed as required by the procedure and records did not give evidence that the procedure was fully implemented, for example:

   a. A review of the patrol inspection records for the last 3 months showed that not all stations were checked at least monthly. In February 1984, a total of 18 stations were checked of the 23 possible. In January 1984, a total of 19, and in December 1983 a total of 20 stations were checked. Stations such as A, D, K, L, and shipping were not addressed in February 1984.

   b. A review of the patrol inspection reports for February 1984 found that only one type of subassembly, stationary contacts, at work station U had been addressed and not the moving contact assembly although the QCI identified both types.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 7.0.3.1 of the Westinghouse Switchgear Division Quality Assurance Manual ICO Plant: (a) detailed work station QCIs have not been prepared for patrol inspection of work station Q; (b) detailed work station QCIs have not been prepared which address the use of an inspection document "Breaker Check List," an ICO form with a revision date of January 22, 1981; (c) case hardening (carbonitriding process) of motor crank assemblies was procured from a heat treatment vendor (Caribe Metallurgical, Inc.) for which no documentation existed that would verify that the material was being heat treated to the depth specified in the applicable drawings (e.g., PS83011JD, Revision 2); and (d) a detailed QCI has not been prepared for testing the hardness of assemblies that have been case hardened.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 6.1.1.2 of the Westinghouse Switchgear Division Quality Manual, of the six drawings checked at work station E, two (8296A68 and 8296A69) were found to be out of date revisions when compared to the ICO office file (aperture cards). In addition, one drawing (8296A1Z) was found to be out-of-date when compared to the Westinghouse Switchgear Division drawing file.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QCI No. PR-59, the springs which were used to calibrate the Chatillon Universal Test Stand did not have a permanent identification number. Records were not available to demonstrate that the Certificate of Guaranteed Calibration from John Chatillon and Sons, dated October 13, 1983, were indeed for the springs used to calibrate.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QCI No. PR-12, the inspection and review of crimping tool records showed that crimping tools serial Nos. (S/N) 17 and 53 were last calibrated on July 21, 1983, and were due to be calibrated in January 1984.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QCI Nos. PR-34 and PR-40, during a review of the instrument calibration data, the following was noted regarding the calibration on February 5, 1984, of the 0 to 600 volt scale on AC voltmeter No. 3, at Test Table No. 1:

   a. Voltage readings between +4 percent and +5.4 percent for the 200 through 600 volt test points.

   b. There was no evidence that the voltmeter was taken out of service, red tagged, repaired/replaced, or that the QC Manager had determined disposition.

7. Contrary to Criterion XVII of Appendix B to 10 CFR Part 50, there were no results or test data available of calibration of volt-ohm meters (VOMs), power supplies, oven controls, and the Chatillon Universal Test Stand which would show that the appropriate quantitative or qualitative acceptance criteria were used. The equipment in question only had a calibration tag showing date calibrated and date due for next calibration.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50, there were no documented instructions in QCI No. PR-34 or other procedures to be used for the calibration of Simpson VOMs, power supplies, and oven controls or instrumentations.

C. UNRESOLVED ITEMS

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (83-01): The copy of 10 CFR Part 21 that was posted was not the current issue dated December 30, 1982.

   A current copy of 10 CFR Part 21 was found posted. It was a standard Westinghouse form Revision 6, dated September 12, 1983. This cross-referenced a procedure NQD-239-I, Revision 1. This procedure was found on file and it defined an evaluation committee composed of the QC Manager and the General Manager. When questioned about defects in support bracket weld that have been found at Comanche Peak it was reported that this problem is under evaluation in regard to Part 21 by Westinghouse Switchgear Division at East Pittsburgh and not ICO.

2. (Open) Nonconformance (83-01, Item A): The established and documented quality assurance program (Switchgear Division Quality Assurance Manual) did not fully identify or describe the designated functions of the ICO de Puerto Rico (ICO) organization as evidenced by the following examples:

   a. There was no description of the ICO QC Manager's duties and responsibilities nor was the function of the quality organization at ICO clearly delineated in writing.

   b. There was no description of the indoctrination and training of personnel in the program requirements.

   ICO has issued a supplement to the Westinghouse Switchgear Division QA Manual (QAM). The supplement is dated February 27, 1984. This supplement identified that it replaced Section Nos. 1, 7, and 8 of the Switchgear Division QAM. This supplement addressed organization, procedures, process control, testing, identification of materials, inspection control of nonconformances, calibration, packing, and

shipment. A review of this supplement by the NRC inspector identified that at least two areas were not addressed that should have been addressed. ICO has some procurement activities such as heat treatment, plating, and calibration services. However, the procurement activities do not conform to the Westinghouse Switchgear Division QAM. For example there is not an Approved Vendor List. The identification of how ICO purchase orders are reviewed and approved, how procurement documents are controlled (issuance), and how procurement documents and purchase order changes are controlled all are not addressed in the supplement nor are the activities as described in the Westinghouse Switchgear QAM.

In regard to QCIs, the issuance, change control, review, and approval is not addressed. This nonconformance remains open because the supplement does not fully address all of the ICO QA program.

3. (Closed) Nonconformance (83-01, Item B): The QA program did not provide measures to assure that applicable requirements are included in documents for procurement of services such as heat treatment, plating, and calibration.

The NRC inspector verified that the QA program now provides measures that assure applicable requirements have been included in procurement documents for heat treating and calibration services.

All the purchase orders in the file for heat treating were reviewed and found to contain proper releases. All of the releases contained reference to the master purchase order, the part number, parts list, heat treating specification, revision status, and all were reviewed by the QC supervisor.

The calibration services file was found to contain the latest service agreement, calibration, test records, and data with a certification that the equipment used to calibrate the ICO instruments is traceable to the National Bureau of Standards.

The file for plating service was not available for review. Considering the completeness of the heat treatment file it seems likely that this file is also complete.

It was also verified that the QAM supplement addressed the above subjects.

Several receiving inspection reports from the suppliers of heat treating and platings service were reviewed. There was no detailed instructions available to describe completion of the top part of the receiving inspection forms. This has resulted in incomplete and inconsistent information regarding the inspection of the received material. Examples of this were inconsistent group number identification or style number, absence of revision status, and absence of the recording of tolerances used. The appropriate QCI should be amended to include specific instructions on filling out the receiving inspection report form, especially the top portion. This area will be inspected further during subsequent inspections.

4. (Closed) Nonconformance (83-01, Item C): The QA program did not include measures which would assure that welding is controlled and accomplished using procedures and personnel that have been appropriately qualified; e.g., the QAM did not address use of welding procedure specifications that have been qualified in accordance with an applicable code or standard and criteria for qualification of welders were not established.

The inspector reviewed the following documents addressing the control of welding, including procedures and welder qualification:

a. ICO's Supplement QAM dated February 24, 1984;

b. QCI No. PR-24, "Welder Identification," Revision 0, dated January 18, 1978; and

c. QCI No. PR-25, "Inspection of Welds," Revision 0, dated January 13, 1978.

ICO's supplement replaces Sections 1.0, 7.0, and 8.0 of the basic Westinghouse Switchgear Division QAM for processes that are applicable to ICO only. Subsection 7.0.4.2.2 of the Supplement QAM provides guidance to assure that ICO welders are trained by qualified instructors, and that appropriate instructions have been issued to ICO inspectors regarding the acceptability of welds. QCI No. PR-24 provides acceptable controls for documenting the qualification of welders, controlling the issuance of identification stencils to qualified welders, and for the procurement, replacement, and disposition of identification stencils as well as the necessary records regarding the location of said stencils. In this regard, the inspector examined the qualification records of two of three ICO welders. QCI No. PR-25 provides acceptable guidance for the

inspection of welds made by the Heli-Arc, Westing-Arc, and consumable electrode welding processes used at ICO. Suitable illustrations of acceptable welds and defective welds, including their principal causes, are contained in QCI No. PR-25.

Based on the information contained in the above documents, and on the results of inspections of randomly selected welded components, it is concluded that this nonconformance has been acceptably resolved by ICO and that this issue may be considered closed.

5. (Open) Nonconformance (83-01, Item D): The following examples were noted of both failure to accomplish activities in accordance with QCIs, and the failure of instructions to include appropriate acceptance criteria:

   a. QCI No. PR-16 described first piece inspection of sensors and reporting of daily yields which was not performed.

   b. QCI No. PR-17 failed to include a conversion factor necessary to verify the sensor testing program.

   c. QCI No. PR-8 failed to include verifications of lift points identification, spring charging handle rebound, front panel labels, and such inspections performed by personnel at final inspection.

   d. QCI No. PR-40 identified voltage values which were not possible to accurately measure with the test fixture provided.

   The QCI Nos. PR-16, 17, and 8 have been revised. The first piece inspection and daily reporting of yields have been deleted from QCI No. PR-16. The necessity of the conversion factor to verify the testing program has been removed from QCI No. PR-17. The final inspection checks in question have been cross-referenced or identified in the QCI No. PR-8. The cross-reference was to the Inspection Tag. In regard to the last item, some testing of the accuracy of the test tables has been performed. A review of this data by the NRC inspector indicated that although differences between operators were less than one volt, the accuracy of the test system (error from target values) was indeed much greater. The NRC inspector's analysis found the average difference from the target values to have a range of 1.1 volts or an estimated sigma (standard

deviation) of 2.2 volts at the 95 percent confidence level. This means that total error in the system precision plus accuracy would be about 2.6 volts at the 95 percent confidence (root mean square) which indeed confirms the instrument manufacturers use of 5 volt increments. This item will remain open. ICO will obtain from the test procedure author some statement on the accuracy required when setting test voltages, e.g., if 127 volts is to be the test voltage, what is the acceptable tolerance around that voltage.

ICO has established a program to review all QCIs to assure personnel understand QCI requirements and identify any inadequacies in the QCIs and thereby revise such accordingly. It was verified that this review process is under way and the first three QCIs have been reviewed.

6. (Closed) Nonconformance (83-01, Item E): Checks or inspections were neither required by instructions nor performed with respect to the dimensions identified on Drawing No. 449D556 for assembled main disconnecting contacts.

   ICO has a fixture to verify the dimensions in question, 449D556TXD, Sub 6. It was found that on a random basis breakers are checked and the checked breakers stamped with a letter "J" on the side. The acceptance status of breakers is then documented on the Inspection Tag.

7. (Closed) Nonconformance (83-01, Item F): The order information issued for an inprocess Class 1E nuclear DS-416 circuit breaker (024N186) did not identify the applicable drawing revisions to be used. A review of a sample of 12 drawings applicable to this order further revealed that two drawings at ICO were of earlier revisions than those reported as current.

   The corrective action was for Westinghouse Switchgear Division East Pittsburgh to supply Shop Orders with drawing revisions. This was verified on the last nuclear Shop Order No. 024N202 for under voltage trip devices. The use of the applicable drawing revisions of critical parts was verified by review of the inspection records and the drawing file. It was also verified that the customer has approved the drawings and their revision levels. Of the drawings in question, ten were defined by NQD-379, Revision 0.

In regard to drawing control, ICO and Westinghouse Switchgear Division had established a process of issuance of drawing revision notices and then an aperture card is issued to ICO. As noted above, the drawing file (aperture cards) were found to have the applicable revisions.

8. (Closed) Nonconformance (83-01, Item G): RTV sealant found at work stations during the inspection was not marked with an expiration date although the stockroom supply was appropriately marked. It was additionally noted that the manufacturer's label on the product identified a shelf life of 1 year and not the 2 years permitted by the QCI.

   The NRC inspector reviewed QCI No. PR-55, "Control of Material of Limited Shelf Life," Revision 1, and inspected the manner by which material of limited shelf life such as RTV is being handled at ICO in order to resolve this item.

   QCI No. PR-55 was recently revised to assure that material having limited shelf life would not be used subsequent to the expiration dates stipulated by the manufacturers. Although ICO had been stamping material for use with expiration dates exceeding those stipulated by manufacturers, the NRC inspector determined that this nonconformance did not jeopardize the quality of the finished product, per se. This determination is based on the fact that ICO maintains a very limited inventory of raw material such that all raw materials, including materials having a limited shelf life, are consumed within a maximum period of 6 months.

   Based on the information contained in QCI No. PR-55, and on the results of the inspections of the handling of materials having limited shelf life, it is concluded that this nonconformance has been acceptably resolved by ICO and that this item may be considered closed.

9. (Closed) Nonconformance (83-01, Item H) Case hardening (carbonitriding process) of motor crank assemblies was procured from a heat treatment vendor (Caribe Metallurgical, Inc.) for which no documentation existed that would establish that either the applicable specification (PS 83011JD, Revision 2) had been invoked or that hardness testing was being performed on a sampling basis.

The following documents were reviewed by the NRC inspector to assure conformance with Criterion V of Appendix B to 10 CFR Part 50 with regard to procuring case hardening (carbonitriding process) services from a heat treatment vendor (Caribe Metallurgical, Inc.) and the hardness testing of said process on a sampling basis:

a. Section 7.0.4.2.3, "Heat Treating," of ICO's Supplement QAM dated Februaty 27, 1984;

b. Memorandum from G. B. Patterson, Manager, Quality Control, Westinghouse Switchgear Division, to M. Rodriguez, Quality Assurance Manager, ICO, et. al., dated April 29, 1983.

The above documents were reviewed and found to provide acceptable assurance that applicable drawings and process specifications are being invoked for heat treating services being procured from Caribe Metallurgical, Inc. These documents also verify that sample testing of heat treated components is being conducted in an acceptable manner by ICO. Sample testing of heat treated components is being conducted at ICO in accordance with MIL STD 105D, Normal Inspection Level II, and AQL of 2.5.

Based on the information contained in the above documents, coupled with reviews of randomly selected inspection reports on heat treated components, it is concluded that this nonconformance has been acceptably resolved by ICO and that this item may be considered closed.

10. (Closed) Nonconformance (83-01, Item I): The NRC inspector observed the following with respect to pole shaft assembly fabrication Drawing No. 567F995:

a. Measurement of fillet welds on one completed pole shaft assembly showed a typical weld size of 3/16" for the top and bottom lever welds and not the required 0.31". Visual examination of other completed pole shaft assemblies indicated a similar dimensional condition existed.

b. Gas metal arc welding (GMAW) of pole shaft assemblies was observed being performed at two welding stations using an amperage range of 120-140 rather than the required range of 155-165.

c. GMAW shielding gas flow rates were observed to be 25 cfh argon/oxygen and 15 cfh carbon dioxide at one welding station, and 18 cfh argon/oxygen and 25 cfh carbon dioxide at a second welding station. The required gas flow rate for both argon/oxygen and carbon dioxide was 20 cfh.

The NRC inspector examined the weldments of several parts for conformance with the applicable drawings (e.g., Center Pole Lever - PN 349A302G01, Levering In Crank Arm - PN 786A588G01, DS 206 and 416 Jackshaft - PN 680C790G01) and examined the records being maintained for control of gas flow rates and amperages being maintained at the welding stations. In addition, the inspector noted that the prescribed gas flow rates and amperages were being maintained at the welding stations while various components were being fabricated.

Based on the results of the above examinations, it is concluded that ICO has taken appropriate measures to assure that welded parts conform to the engineering requirements and that the process variables are being maintained within the prescribed limits. Accordingly, it is concluded that this nonconformance has been acceptably resolved by ICO and that this item may be considered closed.

11. (Closed) Nonconformance (83-01, Item J): Certain calibration activities were not performed in accordance with the QAM as illustrated by the following examples: (a) precision mechanical inspection gages used at ICO were not included in a gage control program operated by either the Switchgear Division Gage Laboratory or ICO, and (b) no records were available for the standards (i.e., springs) used in calibration of the Chatillon Tester which would demonstrate traceability to the National Bureau of Standards.

The NRC inspector verified that ICO has established a procedure for the control of gages. In addition, the gage calibration schedule for 1984 was reviewed and found to contain a recall calibration schedule for the gage block standards, height gages, calipers, and micrometers. The instrument calibration schedule for 1984 contains the calibration schedule for the springs used for calibrating the Chatillon Tester. The certification from John Chatillo and Sons, Inc., dated October 13, 1983, for the springs used to calibrate the Chatillon Universal Test Stand showed that the calibration was traceable to the National Bureau of Standards; however, there is no correlation between this certificate and the springs used to calibrate the Chatillon Tester. This was identified as a nonconformance (see B.4 above).

QCI No. PR-19, Revision 1, titled, "Calibration of Chatillon Universal Test Stand," in part 2, "Calibration Procedure," calls for calibration of deflection, force (tension low and high range; compression low and high range), and conversions (cm to in, lb to kg, and lb to nd). With reference to the force calibration the QCI provides a low and high range table with tolerances. The QCI does not provide a method to document the calibration results. ICO only applied a sticker to the equipment showing the date calibrated and the due date for the next calibration. This was identified as a nonconformance (see B.7 above).

12. (Closed) Nonconformance (83-01, Item K): Checking of crimping tools were not in full compliance with QCI No. PR-12 in that: (a) unassigned crimping tools with both acceptable and unacceptable last crimping check results were stored together; (b) no records existed to demonstrate that a required second test of crimping tools S/N 30 and S/N 2 had been performed after failure of first test; and (c) that the records for tool S/N 2 showed acceptance after a third test rather than returned to East Pittsburgh.

The NRC inspector verified that: (a) the QC storage cabinet contained only tools that were not in use, were all acceptable, no unacceptable tools were found; (b) tool S/N 30 was sent to East Pittsburgh on January 17, 1984, after failure of a retest on the same date; and (c) tool S/N 2 was scrapped.

A review of crimping tool records showed compliance with QCI No. PR-12; however, two tools were found to be overdue for calibration. This was identified as a nonconformance (see B.5 above).

During the exit interview ICO explained the two tools found overdue for calibration had been calibrated but the entry on the calibration form was omitted. It was also noted that QCI No. PR-12 contains forms that are no longer in use.

During review of the electrical instrument test data records it was noted that some of the records showed a reported test reading the same as the test value for each of the selected data points. For example, if the test values were 50 V, 100 V, 200 V, 300 V, 400 V, and 500 V, then readings recorded from the standard were exactly 50 V, 100 V, 200 V, 300 V, 400 V, and 500 V. Many data sheets with an exact correlation between what the tested instrument was set at and what was recorded were observed.

Some of the AC voltmeters on the test bench have a 0 to 60 volt scale. The data sheets showed that the standard used for checking these meters was S/N 20551. Since the lowest scale on this standard is 0 to 150 volts, part of the data points used to check the test bench voltmeter would have been made in the lower third of the standard's scale.

The above two items are a concern with regard to accuracy of the recorded readings. During the next inspection (a) the procedures used in reading/recording test data will be reviewed, (b) the accuracy of the standard will be determined and compared with accuracy of instruments being tested at the upper/lower scales as applicable, and (c) the accuracy ratio of the standard with the instrument being calibrated will be determined to assure that the equipment being calibrated will be within the required tolerance.

E. OTHER FINDINGS OR COMMENTS:

1. Organization and Quality Assurance Program (Wm. McNeill): The ICO QA program was defined by the Westinghouse East Pittsburgh Switchgear Division QAM, the ICO supplement to that QAM, and the QCIs. The responsibility for the establishment and implementation of a program to verify quality was defined by the above documents. Switchgear established general programmatic requirements and inspection instructions (QCIs). ICO implemented the programmatic and inspection instructions or followed practices identified in its supplement to the QAM. The verification of quality was found to be by a quality control group independent of manufacturing. Inspection activities were planned and documented in QCIs. QCIs identified parts, subassemblies and assemblies, and the inspection requirements. The scope of inspection activities in regard to items and requirements involved was defined in the QCIs. QCI stated the acceptance criteria and inspection frequencies to be used for both receiving, inprocess, and final inspection activities. The identification of special training, processes, equipment, controlled conditions, and a like was defined in the QAM and its supplement. Special processes such as welding, plating, etc., were identified and training established. Training in regard to the program was being accomplished as part of the corrective action to a previous finding (see D.5 above). In short, quality activities of ICO which were different from the division practices were described in the ICO supplement to the QAM. However, as noted in D.2 above, the supplement was found to be incomplete. This was identified by a general review of the QAM, its supplement, and QCIs in comparison with the applicable commitments required by Appendix B to 10 CFR Part 50. It was noted that design control, audit, and record functions are not part of ICO activities.

2. Instructions, Procedures, and Drawings; Document Control; Identification and Control of Material, Parts, and Components; Inspection; and Inspection, Test, and Operating Status (Wm. McNeill): The shop quality activities were documented in QCIs, and other documents cross-referenced in QCI such as shop orders, drawings, and operation sequences. Compliance to QCIs was verified by observation and review of QCIs on such activities as wire terminations, inspection tagging and labeling, critical part inspection, auxillary switch inspection, and inprocess inspection. At ICO quality was verified by random inprocess checking and a final inspection of a completed breaker.

Inprocess inspection was found to be not in compliance with its QCI. In short records did not show that all inspection stations were subjected to inprocess checks and not all types of assemblies or subassemblies were subjected to inprocess checks. This was identified as a nonconformance (see B.1 above). The nonconformance was identified by review of inprocess activities at six different work stations such as panel assembly, wiring, etc. The lack of detailed work instructions was also identified as a nonconformance (see B.2.a above).

Assembly, a continuous process, was controlled by manufacturing information (shop order) and material lists which traveled with the assemblies and operation sequence instructions which were issued to each station. With the shop order as the assemblies neared completion final inspection checklists were attached to the assemblies. The checklists with the QCIs controlled the final inspection of breakers. It was found that not all of the three checklists in use were identified by QCI. This was identified as a nonconformance (see B.2.b above).

Acceptance criteria for inprocess and final inspection were identified in QCIs and drawings. A sample of six wiring drawings and ten critical part drawings were reviewed to verify their release and control. It was found that incorrect revisions were issued to the shop. This was identified as a nonconformance (see B.3 above). The review and approval of QCIs and their changes was verified for the sample of six QCIs reviewed.

Traceability of subassemblies is limited in scope to under voltage trip devices (UVTDs). A review of the inspection records found these parts were given unique identification and traceability to inspection records. ICO was found to be initiating a computerized system of

cycle counting of hardware and assemblies. This system will address item or part identification. The NRC inspector had some concerns on the subject of item identification and this area should be addressed in the next inspection.

The documentation of inprocess inspection was found to be recorded in logs and at station work sheets. Final inspection was documented on the checklists referenced above. The status of assemblies was found to be identified with the same checklists.

3. Handling, Storage, and Shipping (I. Villalva): The general requirements for handling, storage, and shipping of circuit breakers and components at ICO are delineated in Section 8.0, "Packing, Shipping, and Storage" of ICO's Supplement, Revision 84-0. The manner by which material of limited shelf life is being handled at ICO is described in QCI No. PR-55, "Control of Material of Limited Shelf Life," Revision 1, dated January 15, 1984. The handling, storage, and shipping of raw stock, components, and circuit breakers are in keeping with standard industrial practices for the types of materials involved. Circuit breakers were being manufactured on a production line basis with minimum inventory being maintained at ICO. Storage of circuit breakers or raw material, therefore, required no special attention. The packaging of the finished product is by a combination of wooden reinforcements within extra heavy corrugated cartons which in turn are steel banded on wooden pallets. Ultimate packaging of breakers being shipped by waterways is by containerization. Based on the NRC inspector's review of the aforementioned documents and inspection of the handling, storage, and shipping methods being used by ICO, it is concluded that ICO meets the relevant requirements.

4. Control of Special Processes (I. Villalva): The welding being performed at ICO only involves the fastening of steel parts having a relatively light metal cross-section. All ICO welds were performed on jig fixtures with most welds done in a flat position and only one weld wire size being used. The welding processes being used at ICO were Heli-Arc, Westing-Arc, and consumable electrode (Tungston inert gas and Metal inert gas). The NRC inspector reviewed the following documents in his evaluation of ICO's handling of the above listed test controls.

   a. Subsection 7.0.4.2.2, "Welding," of ICO's Supplement, Revision 84-0.

   b. Part III of QCI No. PR-8, "Inspection of D.S. Circuit Breakers," Revision 6, dated December 28, 1983.

c. QCI No. PR-24, "Welder Identification," Revision 9, dated January 18, 1978.

d. QCI No. PR-25, "Inspection of Welds," Revision 0, dated January 13, 1978.

Based on the information contained in the above documents and inspection of selected welds and the rather straightforward and simple welds being performed, it is concluded that ICO meets the relevant requirements.

The basic criteria and requirements for welder procedure specifications are delineated in Subsection 7.0.4.2.2 of ICO's Supplement. All welding material control, except gases, is provided by the Westinghouse Switchgear Divison at East Pittsburgh where inspection of all raw material is accomplished. All welds being performed at ICO are accomplished in jig fixtures for bench welding such that joint fitup is assured. Except for a few selected welded components for which heat treatment (carbonitriding process) is procured from a vendor, weld heat treatment per se is not performed at ICO. QCI No. PR-25 provides guidance for visual examination of welds. Section 7.0.4.2.2 of ICO's Supplement provides acceptable guidance for the training and qualifying welders.

Heat treatment services (carbonitriding) are being procured by ICO from a vendor (Caribe Metallurgical, Inc.). Heat treatment services performed by Caribe were qualified on the basis of sample specimens which were tested for hardness and depth by the Westinghouse Switchgear Divison at East Pittsburgh. ICO, in response to nonconformance Item H of Inspection Report 99900831/83-01, has taken the necessary steps to assure that the latest drawings and specifications are being invoked for heat treating services being procured from Caribe Metallurgical, Inc.

Although heat treated components are being hardness tested on a sample basis (i.e., per MIL STD 105D, normal inspection level, 2.5 AQL), no documentation existed at ICO that would verify that the case hardness depth was in conformance with that specified in the applicable drawings. The absence of this documentation resulted in a new nonconformance (see B.2.c above). In addition, ICO has not prepared a detailed QCI for the hardness testing being performed. Accordingly, a nonconformance was also prepared for this matter (see B.2.d above).

The only applicable other special processes being performed by or for ICO in the manufacturing of circuit breakers are electroplating and the dipping and baking of DS sensor coils. As in the case for heat treatment, electroplating services are presently being purchased by ICO and will continue to be purchased of all chromate treated nickel-cadmium plated finish. In the future, pending EPA approval, ICO plans to do limited plating on its own (i.e., special tin plating only). The only vendor providing electroplating services to ICO is Quality Electroplating Corporation. Electroplating services being performed by Quality Electroplating Corporation have been qualified by the Westinghouse Switchgear Division at East Pittsburgh on the basis of sample specimens which were tested for thickness and quality of plating. Each plated component is visually inspected for quality of plating and lots are sample tested per MIL STD 105D, normal inspection level, 2.5 AQL. The dipping and baking of DS sensor coils is being performed by using Process Specification, PS 83333HH for controlling the viscosity of the encapsulating fluid and by assuring that the dipped coils are cured in a temperature controlled oven for 6 hours at a curing temperature of 125-135°C. Curing records for each lot of coils is being maintained at ICO to assure that the prescribed time and temperature is being maintained. Based on the inspectors observations of the dipping process and examination of curing records and plating records, it is concluded that other special processes are being controlled at ICO in accordance with the applicable requirements.

5. Control of Measuring and Test Equipment (D. Weber): The control of gages is defined in ICO's procedure QCI No. PR-59 titled, "Mechanical Measuring Device Control Prgram." For this procedure the gage calibration schedule was reviewed and found to be current, the files for the standards used in calibration were reviewed and the standards were found to be in calibration and contained calibration certificates traceable to the National Bureau of Standards, and a sampling of the gage records cards was reviewed and showed these gages to be in calibration. However, it could not be determined if the certificate for the springs used to calibrate the Chatillon Universal Test Stand actually applied to the springs used in calibrating the test stand. In addition, the procedure QCI No. PR-59 requires a permanent identification number be applied to each item in the gage calibration program. It was found that the springs mentioned above, which are part of the calibration program, did not have permanent identification. This has been identified as a nonconformance (see B.4 above).

QCI No. PR-12 covers the calibration of crimping tools. This procedure and the records of all crimping tools were reviewed. It was noted that two crimping tools, S/N 15 and 53, were overdue for calibration. This has been identified as a nonconformance (see B.5 above).

QCI No. PR-34 covers calibration of electrical instrumentation. This procedure was reviewed along with the calibration procedures and/or test records for Test Tables 1 through 6, three Ductors, the Rockwell Hardness Tester, Simpson VOM, power supplies, oven instrumentation, and the files for the standards used for calibration. In review of these test records it was noted that the voltage error for the calibration of the AC voltmeter No. 3 on Test Table No. 1, on February 5, 1984, was greater than ±2 percent allowed and there was no evidence of corrective action. This has been identified as a nonconformance (see B.6 above).

There was no evidence that instructions or procedures existed for the calibration of the Simpson VOM's, power supplies, and oven instrumentation. This has been identified as a nonconformance (see B.8 above).

Also for the same equipment there was no test data available that would include the appropriate quantitative or qualitative acceptance criteria. The equipment only contained calibration tags showing date calibrated and the due date for the next calibration. This has been identified as a nonconformance (see B.7 above).

6. Document Control and Control of Purchased Material, Equipment, and Services (D. Weber): ICO procures heat treating services from Caribe Metallurgical, Inc. The current file for this firm was reviewed and found to contain a master purchase order 7-2541, dated July 1, 1983, and two sets of drawings, parts lists, and heat treatment specifications. All of the other purchase orders in this file were reviewed and each was found to contain material release forms which referenced the master purchase order and the appropriate drawing, part number, part list, and heat treating specifications.

In addition, Section 7.0.4.2.3, "Heat Treating," of the Supplement was reviewed, as well as material release forms 00268, 00280, and 00309, which directly relate to the heat treating master purchase order issued to Caribe Metallurgical, Inc.

The file for the B&C Calibration Center was reviewed as well as the 1984 gage and electrical instrumentation calibration schedules; a letter from B&C dated June 11, 1983, which contained calibration test records and certification that the equipment used to calibrate the ICO instruments was traceable to the National Bureau of Standards; four QCIs; test reports for 16 gauges; and Section 7.0.8.2.3, "Calibration Procedures," of the Supplement.

The file for the plating services was not available for review; however, 2 plating specifications, 5 related drawings, 12 inspection reports, and applicable part lists were reviewed.

ORGANIZATION: JOHNSON CONTROLS, INC.,UTAH FABRICATING DIVISION
ASSOCIATED PIPING AND ENGINEERING
CLEARFIELD, UTAH

REPORT NO.: 9900291/84-01	INSPECTION DATES: 3/26-28/84	INSPECTION ON-SITE HOURS: 35

CORRESPONDENCE ADDRESS: Johnson Controls, Inc.
Utah Fabricating Division
ATTN: Mr. T. Jones, Vice President
and General Manager
851 Freeport Industrial Parkway
Clearfield, Utah 84015

ORGANIZATIONAL CONTACT: Mr. K. C. Jones, Quality Assurance Manager
TELEPHONE NUMBER: (801) 773-7000

PRINCIPAL PRODUCT: Pipe Fabrication

NUCLEAR INDUSTRY ACTIVITY: Commercial Nuclear Production of the Clearfield, Utah facility totals less than 1% of the facility's production.

ASSIGNED INSPECTOR: E. W. Merschoff, Senior Vendor Program Inspector — 5/9/84 Date

OTHER INSPECTOR(S): S. Reynolds

APPROVED BY: U. Potapovs, Chief, Vendor Program Branch — 5-9-84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made in order to followup on microfissuring problems encountered while hot forming Boiling Water Reactor (BWR) recirculation pipes at the Utah Fabricating Division of Johnson Controls Incorporated, Clearfield, Utah.

PLANT SITE APPLICABILITY: 50-293, 50-324, 50-325, 50-366

ORGANIZATION: JOHNSON CONTROLS, INC., UTAH FABRICATING DIVISION
ASSOCIATED PIPING AND ENGINEERING
CLEARFIELD, UTAH

REPORT NO.: 99900291/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

Contrary to 10 CFR Part 21, the Utah Fabricating Division of Johnson Controls, Inc., did not have procedures in place to implement the requirements of 10 CFR Part 21.

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Background - In order to eliminate the welded elbows on BWR recirculation piping (which is being replaced due to intergranular stress corrosion cracking), General Electric (GE) has redesigned the elbows as 90 degree bends. GE procured the pipe to be bent (316 NG Austenitic Stainless Steel) from ARMCO, Inc., an ASME certificate holder and contracted with Johnson Controls Inc., Compton California (JCI Compton) also an ASME certificate holder, to bend the pipe.

   JCI Compton subcontracted the actual bending operations which consist of hot forming and solution annealing to the Utah Fabricating Division of JCI (JCI-UFD). JCI-UFD is not an ASME Section III certificate holder, does not have an Appendix B quality assurance program, and does not normally do nuclear work. After the hot forming and solution annealing at JCI-UFD is completed, the pipe is shipped to JCI Compton where all code required NDE is performed and the ASME NPT stamp is affixed.

   Originally, orders were placed to bend pipe for Hatch, Unit 2, Pilgrim, Unit 1, and Brunswick, Units 1 and 2. The Hatch pipe was bent and sent to the site in November 1983, and the Pilgrim pipe was bent and sent to the site in December 1983. At this point, questions were raised by GE regarding the possibility of microfissures developing in the outside bend radius as a result of some problems encountered during the fabrication of the Pilgrim pipe. GE notified the affected licensees that pipe supplied to them may be nonconforming, and placed the Brunswick pipe which was still at the JCI Compton facility on hold. GE revised the bending procedure to minimize the probability of microfissures occurring and instituted an ultrasonic testing program (utilizing a gain setpoint well above the ASME Code requirement) to detect the presence of microfissures.

A new batch of pipe has been bent using this revised procedure for both the Hatch and Pilgrim plants. At present, there are no open orders for bending BWR recirculation piping at the JCI-UFD facility.

2. Induction Bending Experience - The JCI-UFD facility has extensive experience in induction bending carbon, low alloy, and austenitic stainless steels. However, a significant difference between the current GE recirculation pipe replacement order and previous experience is the level of strain induced by the dimensional requirements (bend radii). JCI-UFD indicated most of the previous experience was with bend radii of three to five times the pipe diameter (D) whereas the GE pipe requires 2D (or slightly smaller) bends. The bending is accomplished using an induction bending machine (an INKAMAF machine manufactured by Cojafex in Rotterdam, The Netherlands). The machine effects the bend by heating an incremental portion of the pipe and pushing one end while the other is clamped to a pivoted arm. The induction heating coil is water cooled and also acts as a directed (by air blast) water quenching device to quickly cool the pipe from solution annealing temperatures.

3. ASME Certification - The JCI-UFD facility has ASME certificates 11,011 through 11,013 for S, U, and PP stamps (respectively) with expiration dates March 1, 1986. They do not have a Section III certificate nor do they have a Section III QA program.

4. Bending Demonstration - The inspectors witnessed a demonstration of a prototypic hot forming operation. Pipe temperature measurements, operation of the controls, and bending machine sensitivity to changes in control parameters were observed. At the request of the inspectors, the operators jogged the induction heating coil position and made coil power level adjustments, both of which affect pipe temperature. These adjustments were made over a larger range than is normally necessary for the subject bending operation. These experiments indicate that the relationship of the pipe heat sink effects to the normal machine control parameters is such that it is not extremely difficult for a skilled, alert operator to operate within the recommended GE bending parameters.

5. Conformance to NB4213 Hot Forming Requirements - The inspectors discussed the interpretation of the ASME Section III NB4213 requirements for hot formed austenitic stainless steel pipe with representatives of GE, JCI-UFD, JCI Compton, the NRC ASME Section III Main Committee representative, and the Chairman of the ASME Section III Subcommittee on Fabrication and Examination. The Subcommittee chairman stated that in his opinion (not an ASME consensus interpretation) NB4213 was written to address carbon and low alloy steel notch toughness maintenance

for materials that could suffer loss of toughness due to irradiation; e.g., reactor vessels. It was his opinion that it was not the intent of this paragraph to require procedure qualification test requirements for austenitic stainless steels. However, he suggested that a code inquiry be made to allow the subcommittee to consider this question formally.

6. Compliance with 10 CFR Part 21 - A review was conducted to verify compliance with the requirements of 10 CFR Part 21. It was determined that Part 21 had not been imposed on JCI-UFD by JCI Compton, and that, consequently JCI-UFD did not have any portion of a 10 CFR Part 21 program in place. However, since JCI-UFD was aware of the intended ultimate use of the bent pipe, this finding resulted in a violation.

7. Compliance with 10 CFR 50 Appendix B - Appendix B had not been imposed on JCI-UFD, by JCI Compton and, consequently, JCI-UFD's quality assurance program was deficient with respect to control of measuring and test equipment, control of special processes, storage and cleaning of austenitic stainless steel, and control of quality assurance records. These findings will be pursued as nonconformances against JCI Compton since 10 CFR Part 50 Appendix B requirements were invoked by GE on JCI Compton but not by JCI Compton on JCI-UFD.

8. Control of Measuring and Test Equipment - The actual bending process requires rigid control of the temperature at the point of bending to prevent dutile tearing or microfissuring. The temperature is measured using an optical pyrometer and controlled by varying the position of, and power to, the induction heating ring. The optical pyrometer is not included in the measuring and test equipment calibration program as defined in the JCI-UFD Quality Assurance Manual and, consequently, is not calibrated to a standard traceable to the National Bureau of Standards.

   The optical pyrometers used by JCI-UFD have an internal calibration mode which allows the user to perform a one point calibration check against an incandescent wire built into the pyrometer. There are no formal requirements for the operator to perform this "self calibration" on the optical pyrometer before use. A review of the Bend Data Sheets for the Hatch bends revealed that only 1 bend out of 14 included a notation that indicated that the optical pyrometer had been calibrated before or during use. One of the bending machine operators was interviewed regarding use of the optical pyrometer and he stated that they almost always calibrated it before a bend and usually verified the calibration after a bend. He also stated that these calibrations were not always noted on the data sheet as there was no requirement to do so.

ORGANIZATION: JOHNSON CONTROLS, INC., UTAH FABRICATING DIVISION
ASSOCIATED PIPING AND ENGINEERING
CLEARFIELD, UTAH

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9. Control of Special Processes - The final quality of the bend is a function of the skill of the operator since operation of the bending machine requires simultaneous control of several parameters, including pipe feed rate, induction coil position, induction coil power, and quench water flow rate. JCI-UFD does not have a formal qualification or certification program to assure that bending machine operators are properly qualified to perform bending operations.

10. Storage and Cleaning - Pipes worked under the Pilgrim purchase order were inspected after bending, during cleaning, and during dye penetrant tests. During this inspection, it was noted that the pipes were being cleaned with methy ethyl ketone which had not been certified as being less than the maximum cloride concentration levels required for austenitic stainless steels by Section V of the ASME Code. Additionally, during the cleaning process several pipes were supported by carbon steel supports without any spacer material to prevent the carbon steel from contacting the austenitic stainless steel.

11. Quality Assurance Records - The Quality Assurance record keeping and retention requirements were reviewed for adequacy. In general, no records other than those required to maintain material traceability were specified in the purchase specifications provided to JCI-UFD. Consequently, there were no requirements to retain records necessary to furnish evidence of satisfactory accomplishment of activities affecting quality, such as Bend Data Sheets which are needed to verify bending and solution annealing temperatures.

12. Process Qualification - The inspectors reviewed JCI-UFD documentation related to the original bending process qualification for the Hatch and Pilgrim pipe bends. The bending procedures met ASME requirements, and samples taken from the qualification bend pieces showed the hot formed mechanical properties to be equal to the prebent properties within the accuracy of the mechanical tests conducted.

    The inspector asked JCI-UFD representatives why the microfissuring problem was not identified during the original procedure qualification. The JCI-UFD position was that the original procedure qualification adequately demonstrated that the procedure was capable of meeting ASME Code requirements. JCI-UFD further stated that qualification of the revised bending procedure developed by GE to resolve the microfissuring problem was the responsibility of GE and not JCI-UFD. This revised bending procedure qualification will be reviewed during a future GE inspection.

ORGANIZATION: JOHNSON CONTROLS, INC., UTAH FABRICATING DIVISION
ASSOCIATED PIPING AND ENGINEERING
CLEARFIELD, UTAH

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13. Metallurgical Laboratory Facilities - The inspector reviewed the JCI-UFD metallurgical laboratory facilities. The facilities are utilized to support production activities, perform research and development work, and to conduct contract laboratory work. The facilities include sensitization determination capabilities, a limited emission spectrograph capability, a 125,000 pound tensile testing machine with extensometer recording capabilities, metallographic specimen preparation, photomicrographic equipment, and subsized charpy testing facilities. Discussions with JCI-UFD representatives indicated that hot formed pipe tension specimens with known microfissures showed no noticeable effect of the microfissures on the character of the failure faces or on the tensile strength of the specimens.

14. Items Requiring Followup with General Electric - Discussions with GE personnel specifically assigned to the JCI-UFD hot bending activity resulted in the following items which will be addressed during a future inspection of GE:

    a. GE was requested to provide a position regarding whether or not the hot forming operation is considered a special process under 10 CFR Part 50 Appendix B, and if so, what is the basis for considering JCI-UFD's quality assurance program as acceptable under Criterion IX of 10 CFR 50 Appendix B.

    b. GE was requested to provide the basis for the assumption that the certified material test report results provided by ARMCO, are unaffected by the hot forming process performed at JCI-UFD.

    c. GE was requested to provide the basis for acceptability of microfissures when the ASME Code does not permit cracks and the NDE methods employed for acceptance do not preclude acceptance of microfissures.

    d. GE was requested to provide the engineering justification for waiving the requirements of ASME Section III NB 4213.

ORGANIZATION: KAMAN INSTRUMENTATION COMPANY
A KAMAN COMPANY
COLORADO SPRINGS, COLORADO

REPORT NO.: 99900802/84-01	INSPECTION DATE(S): 3/12-16/84	INSPECTION ON-SITE HOURS: 43

CORRESPONDENCE ADDRESS: Kaman Instrumentation Company
A Kaman Company
ATTN: Mr. L. Stanley, Vice President
and General Manager
1500 Garden of the Gods Road [P. O. Box 7463]
Colorado Springs, Colorado 80933-7463
ORGANIZATIONAL CONTACT: Mr. M. Gigax, Manager, Quality Assurance
TELEPHONE NUMBER: (303) 599-1500

PRINCIPAL PRODUCT: Digital radiation monitoring products and systems.

NUCLEAR INDUSTRY ACTIVITY: Approximately 60 percent of the total production is devoted to nuclear products and systems.

ASSIGNED INSPECTOR: L. B. Parker, Equipment Qualification Section, (EQS) — 4-19-84 Date

OTHER INSPECTOR(S): P. R. Bennett, Consultant, Sandia National Laboratories

APPROVED BY: C. J. Hale, (Acting) Chief, EQS — 4/20/84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Review the implementation of Kaman Instrumentation Company (KI) actions concerning the previous inspections findings, review typical examples of type testing, and review generic equipment testing completed by KI.

PLANT SITE APPLICABILITY:

Not identified

ORGANIZATION: KAMAN INSTRUMENTATION COMPANY
A KAMAN COMPANY
COLORADO SPRINGS, COLORADO

REPORT NO.: 99900802/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to the requirements of Criterion V of Appendix B to 10 CFR Part 50 and paragraph 2, Section 3, Revision E of the KI Quality Assurance Policy Manual (QAPM), the authority and responsibility for elements of Section 12, "Test Control," of the QAPM had not been documented for the conduct of prototype qualification tests, preoperational tests, and operational tests.

2. Contrary to the requirements of Criterion V of Appendix B to 10 CFR Part 50, paragraph 2, Section 13, Revision A of the KI QAPM, and Section 2.4 of procedure KNP No. 18-91, Revision A, the component aging oven thermometer had not been calibrated.

C. UNRESOLVED ITEMS:

RAYCHEM sleeve composition was not available. Possible dose rate effects may alter dose rate specification found in the KI test plan 57654-1, Revision A.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (83-01): KI failed to specify that the provisions of 10 CFR Part 21 applied to their purchase order (PO) No. 5045 for mineral insulated triax cable, part no. 825284-001.

   The NRC inspector reviewed a change order to PO 5045 imposing 10 CFR Part 21 upon the vendor and an internal memorandum to general management and materials instructing them about the provisions of 10 CFR Part 21. The corrective actions and preventive measures were found acceptable.

2. (Closed) Nonconformance (83-01, B.1): Measures established by engineering did not assure incorporation of applicable design requirements into equipment modification procedures.

   The NRC inspector reviewed the revision to Field Retrofit Procedure KNP No. 30-1, which added the missing specifications, and an internal memorandum which documented that the personnel involved in the review and generation of engineering documentation had been reinstructed and understood their responsibilities. The corrective actions and preventive measures were found to be acceptable.

3. (Closed) Nonconformance (83-01, B.2): Engineering Operating Procedures (EOP) were incorrectly identified in Exhibit 6.2 of EOP manual.

   The NRC inspector reviewed the revised and corrected EOP manual exhibit, and an internal memorandum which documented that the personnel involved in the review and generation of engineering documentation had been reinstructed and understood their responsibilities. The corrective actions and preventive measures were found to be acceptable.

E. OTHER FINDINGS OR COMMENTS:

1. Equipment Qualification and Test Program Control - KI EOP 5.2 places the responsibility upon the engineering manager to determine if a requirement exists for certifying hardware to special codes and/or standards. If he determines these requirements exist he then has the responsibility for conducting and documenting the testing in accordance with applicable codes and/or standards. The NRC inspection team reviewed equipment qualification test plans, test reports, procurement documentation, nonconformance reporting, and other documentation generated by KI engineering under EOP 5.2. Nonconformance B.1 was identified.

2. Technical Evaluation of Equipment Qualification

   a. Review of Test Plan/Procedures and Supporting Documents - A member of the NRC inspection team reviewed one procedure (KNP No. 18-91, Revision A) and two test plans (57654-1 and 57654-1, Revision A) for compliance with regulatory requirements.

      The Standard Practice Procedure (KNP No. 18-91, Revision A), "In-House On-Going Qualification of Various Normally Energized DRMS Components," defines test methods to be used in the test program for establishing extended qualified life for various digital radiation monitoring system (DRMS) components. This document was briefly reviewed for calibration requirements for test equipment. No nonconformances were identified.

      The test plan, entitled "Test Plan for High Range Ion Detector and Cable Assemblies for Kaman Instruments" (57654-1 and 57654-1, Revision A), deal with qualification of components of the KDI-1000 ion chamber detector, mineral insulated triax cable assembly, and modified amphenol triax and coax connectors.

Test plan 57654-1 was compared to 57654-1, Revision A for total dose, dose rate, and temperature rise time. Only the dose rate changed (from a rate not to exceed 1.0 x 106 rad/hr to 1.0 x 107 rad/hr).

Test plan 57654-1, Revision A was examined for the following technical issues: (1) radiation dose and dose rate, (2) margins, (3) thermal aging calculations, (4) thermocouple readings close to the surface of the equipment, (5) treatment of the RAYCHEM sleeve, (6) testing sequence, and (7) LOCA profile (see unresolved item C).

b. Observation of Testing Activities - A test in progress on extended life qualification of normally energized DRMS components was observed. This program simulates worst case operating conditions to provide a documented operating history. The DRMS components were placed in an oven where the temperature was measured using a thermometer (nonconformance B.2 was identified).

c. Review of Equipment Qualification Records - Supporting documentation for test plan 57654-1, Revision A were reviewed. The "Cable, Mineral Insulated Triax" drawing confirmed that no polymers were used in the cable. The "Palo Verde I Test Report" (EDR 5019) was a summary of the Wyle qualification test report of RAYCHEM sleeves. A dose rate of 0.48 Mrad/hr and a temperature rise time of 5 minutes were stated (see unresolved item C). The "Cable, Qualification Test Program" (KI-GEN-83-008) letter contains KI comments on the test plan 57654-1. This letter specifies a change in dose rate from a dose rate not exceeding 1.0 x 106 rad/hr to a rate not exceeding 1.0 x 107 rad/hr.

The report, "Seismic and Environmental Qualification Summary Report for Kaman Instruments Control Room Air Intake Radiation Monitors" (K-84-2011(R), Volumes I and II), was briefly reviewed. The technical items examined included a sample Arrenhius calculation and a specific calculation for the Deltron power supply with a replacement life of zero years. Both calculations were correct and no nonconformances were identified.

ORGANIZATION: MCC-PACIFIC VALVES
LONG BEACH, CALIFORNIA

REPORT NO.: 99900075/84-01	INSPECTION DATE(S): 4/9-11/84	INSPECTION ON-SITE HOURS: 40

CORRESPONDENCE ADDRESS: MCC-Pacific Valves
ATTN: Mr. R. S. Rankin
President
3201 Walnut Street
Long Beach, CA 90807

ORGANIZATIONAL CONTACT: Mr. W. Dowicki, Quality Assurance Manager
TELEPHONE NUMBER: (213) 426-2531

PRINCIPAL PRODUCT: Nuclear valves.

NUCLEAR INDUSTRY ACTIVITY: Approximately 7.5 percent of its total workload.

ASSIGNED INSPECTOR: W. D. Kelley — 5/24/84
W. D. Kelley, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S): E. T. Baker, IE, Headquarters

APPROVED BY: I. Barnes — 5-29-84
I. Barnes, Chief, RIS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of: (1) the issuance of a 10 CFR Part 50.55(e) report by Duke Power Company (DPC) concerning the failure to seat of a 16 inch, 150 pound check valve that had been furnished to Catawba Nuclear Station, Units 1 and 2; and (2) the issuance of a 10 CFR Part 50.55(e) report by Florida Power and Light Company (FP&L) concerning
(cont. on next page)

PLANT SITE APPLICABILITY:

Failure of check valve to seat: 50-413 and 50-414. Studs exceeded allowable stress: 50-389.

ORGANIZATION: MCC-PACIFIC VALVES
LONG BEACH, CALIFORNIA

REPORT NO.: 99900075/84-01	INSPECTION RESULTS:	PAGE 2 of 4

SCOPE: (cont.) the calculated stress for body to bonnet studs exceeding the allowable stress in 17 valves that had been furnished to St. Lucie Plant, Unit 2. Additional areas inspected included material control, manufacturing process control, and design and document control.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph NCA-8312 and subparagraph NCA-8233.2(b) in Section III of the ASME Code, and the "Statement of Policy and Authority" in the MCC-Pacific Valve (MCC-PV) Quality Assurance Manual (QAM), the QAM did not establish measures for inspection, testing, accepting, or stamping of furnished replacement or spare valve parts and Code Data Report Forms were not being supplied by MCC-PV for such parts.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 50.55(e) Report-Check Valve Disc Hangup: Problem reported by DPC was the hangup of the disc in a 16 inch, 150 pound check valve furnished to Catawba Nuclear Station, Units 1 and 2. The reported cause of the hangup was the disc retainer nut thickness being approximately 9/16 inch less than the required 1 1/8 inch thickness.

   The NRC inspector reviewed the purchase orders (POs) for the nine 16 inch check valves, assembly and parts drawings, bill of materials, certified mill test reports, letters, engineering change request, and marked up drawing, and verified that: (a) the 9/16 inch dimension is the approximate difference in thickness from the 1 1/8 inch heavy hex nut specified on the drawing and bill of materials, and the thickness of a standard 1 1/8 hex nut; (b) one spare disc was ordered by DPC prior to the reported problem; (c) a sketch of a disc with MCC-PV recommended dimensions for field installation of antirotation stops was sent to DPC on October 11, 1983, which further recommended that the stops be installed to prevent future wear and increase service life.

ORGANIZATION: MCC-PACIFIC VALVES
LONG BEACH, CALIFORNIA

REPORT NO.: 99900075/84-01	INSPECTION RESULTS:	PAGE 3 of 4

The NRC inspector was informed by MCC-PV that after the problem was reported to them by DPC, they questioned the assemblers and were informed that, on occasion, the bottom of disc nuts had been ground less than 0.060 of an inch. The reason given was that this grinding was needed to make the top of the nut flush with the disc stud during assembly.

The NRC inspector was informed that the assemblers had been instructed to discontinue the practice. Paragraph 4.5.7 of the QAM does not require documentation of special discussion sessions with plant personnel concerning recurring problems and the corrective action taken.

It was not possible from a review of drawings, bills of material, and document packages for the NRC inspector to ascertain if a standard nut had been installed by the MCC-PV assemblers or by the utility maintenance personnel; however, it is MCC-PV's stated policy that only heavy nuts be installed in valves.

2. 10 CFR Part 50.55(e) Report-Valve Bonnet Stud Stresses: Problem reported by FP&L was the calculated stress for body to bonnet studs exceeding the allowable stress in 17 valves delivered to St. Lucie Plant, Unit 2.

The NRC inspector verified in a previous inspection (see Report No. 99900075/82-01, paragraph D.1.b) that Ebasco Services, Inc. (ESI) specified in their letter of January 3, 1978, that the bolting " . . . material for bonnet studs shall be ASTM A193 GR B8 strain hardened, and material for bonnet stud nuts shall be ASTM A194 GR B8 . . . ." The strain hardened material specified by ESI was not permitted by ASME Code and MCC-PV failed to initially identify this. On discovery by an MCC-PV QA engineer, they submitted a revised set of calculations and drawings in January 1980 which changed the bolting stud material to the higher strength SA 564, Type 630; and ESI reviewed and accepted the revised drawing without comment in March 1980

MCC-PV informed the NRC inspector that they had contacted ESI several times requesting instruction as to where the replacement bolting should be shipped and received no answer; however, there was no documentation of the telephone conversations. Therefore, on May 21, 1982, MCC-PV informed FP&L that they would supply replacement bolting with certifications for the 17 valves.

ORGANIZATION: MCC-PACIFIC VALVES
LONG BEACH, CALIFORNIA

REPORT NO.: 99900075/84-01	INSPECTION RESULTS:	PAGE 4 of 4

The NRC inspector reviewed the data packages for the 17 valves and correspondence and verified that the replacement bolting material shipped by MCC-PV to FP&L met ASME Code requirements and had been installed by FP&L.

3. Material Control (Purchasing): The NRC inspector reviewed document packages for three POs for valves and verified that the bolting material supplied met ASME Code requirements. No further incident of nonconforming bolting material was identified and the supplying of nonconforming bolting material for the 17 valves supplied to FP&L St. Lucie Plant, Unit 2 appears to be an isolated incident and not generic.

4. Manufacturing Process Control: The NRC inspector reviewed shop travelers, drawings, weld repair reports, discrepant material notices, welding, and hard facing records on the five orders in the shop, two of which were for spare parts. The orders were for valves and parts for valves less than 4 inches in size. The NRC inspector verified that the material heat numbers were correct, inspection points had not been bypassed, and the inspector had signed and dated the travelers in accordance with the requirements of the QA program.

   In reviewing the QAM, it was noted that it did not contain provisions for inspection, test, acceptance, stamping, or filing the appropriate Code Data Report Form for valve parts supplied as spare or replacement parts. In discussing spare and replacement parts, the inspector was informed by the QA engineer and the QA manager that MCC-PV does not and has not supplied Code Data Reports for such parts. When asked the basis for not completing a Code Data Report for spare and replacement parts, the QA engineer stated that spare and replacement parts were manufactured under the original N stamp and not under the MCC-PV NPT stamps. In addition, the QA engineer claimed that NCA-8414 provided an exemption to the provisions of NCA-8233.2(b) and NCA-8312 (see B. above).

5. Design and Document Control: The NRC inspector reviewed ten valve assembly drawings and noted that these were composite drawings, and changes had been made to the drawings using "white-out." MCC-PV stated that the prints of the composite drawing returned with the customer's acceptance are ones used in manufacturing.

ORGANIZATION: NAMCO CONTROLS, INC.
MAYFIELD HEIGHTS, OHIO

REPORT NO.: 99900378/84-01	INSPECTION DATE(S): 5/7-9/84	INSPECTION ON-SITE HOURS: 28

CORRESPONDENCE ADDRESS: Namco Controls, Inc.
ATTN: Mr. N. E. Swanson
President
7567 Tyler Boulevard
Mentor, Ohio 44060

ORGANIZATIONAL CONTACT: Mr. T. Federov, Director of Engineering
TELEPHONE NUMBER: (216) 473-0300

PRINCIPAL PRODUCT: Manufacturer of electrical limit switches.

NUCLEAR INDUSTRY ACTIVITY: Supplies safety-related limit switches and conducts environmental qualification (EQ) testing of its designated limit switches for the commercial nuclear power industry and the military. All of the EQ testing is for commercial nuclear power. Approximately 10 percent of its manufactured products are for commercial nuclear.

ASSIGNED INSPECTOR: J. R. Agee — 6/4/84
J. R. Agee, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S):

APPROVED BY: C. J. Hale — 6/7/84
C. J. Hale, (Acting) Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: (1) Status of previous inspection findings; (2) review the test report (TP) of the test conducted per Qualification Test Plan (QTP) 207; and (3) review other TPs and procedures.

PLANT SITE APPLICABILITY:

None identified.

ORGANIZATION: NAMCO CONTROLS, INC.
MAYFIELD HEIGHTS, OHIO

REPORT NO.: 99900378/84-01	INSPECTION RESULTS:	PAGE 2 of 3

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. ACTION ON PREVIOUS INSPECTIONS FINDINGS:

1. (Open) Nonconformance (Item A, Report 83-01): The QA program was not supported by written policies, procedures, or instructions. NAMCO had not issued implementing procedures NSP 20-0005, -0006, -0007, -0008, and NSP 60-0007.

   The inspector verified that the material and intent of NSP 20-0005 has been incorporated into other procedures. Procedure NSP 20-0008 has been compiled and implemented. The remaining procedures, NSP 20-0006, -0007 and NSP 60-0007 are in the formative stage and should be implemented by the end of the third quarter 1984. These procedures will be examined in a subsequent inspection.

2. (Closed) Nonconformance (Item B, Report 83-01): NAMCO had not provided procedures to assure that test data accumulated using instruments out of tolerance would be evaluated and that action would be taken to preclude recurrence.

   The inspector verified that procedure NSP 20-0008, "Test Lab Procedure," Sections 11.0 "Test Control"; 12.0 "Control of Instrumentation and Test Equipment"; 15.0 "Nonconforming Instrumentation, Testing Services, or Test Procedures"; and 16.0 "Corrective Action, Test Anomalies"; implement methods to assure that test data accumulated by instruments out of tolerance are evaluated and that steps are taken to preclude recurrence.

E. OTHER FINDINGS AND COMMENTS:

The inspector reviewed documentation and discussed continuing equipment qualification testing activities with the director of engineering and the project engineer. A summary of the inspection includes the following.

ORGANIZATION: NAMCO CONTROLS, INC.
MAYFIELD HEIGHTS, OHIO

REPORT NO.: 99900378/84-01	INSPECTION RESULTS:	PAGE 3 of 3

1. QA Program - Inspection Report No. 99900378/83-01 documents the review of the corporate QA manual. In this inspection the inspector reviewed and verified that the NAMCO procedure NSP 20-0008, "Test Lab Procedure for the Testing of Components for use in Nuclear Power Plants," meets the QA program requirements for Section 3, "QA Program" of the corporate QA manual for the corporate engineering department and controls test lab located in Highland Heights, Ohio. The NSP 20-0008 procedure addresses the 18 Criteria of 10 CFR Part 50, Appendix B, applicable to engineering and equipment qualification testing at the Highland Heights facility. No nonconformances were identified.

2. Test Reports (TR) - The inspector reviewed the QTP for generic qualification of NAMCO limit switches, model numbers EA 180 and EA 740 with electrical receptacle and connector. The test was conducted to meet Westinghouse nuclear equipment requirements in a Westinghouse plant. The test parameters were established to meet the most severe conditions of Westinghouse document WCAP 9688. These conditions meet the criteria of IEEE Standards 323-1974, 344-1975, and 382-1976; Westinghouse document EQDP-HE-3; and NRC document NUREG-0588.

   The test was conducted in compliance with Section 6.0, "Qualification Test Conditions and Procedures." of QTP 213 and reported in Qualification Test Report (QTR) No. 130 dated May 4, 1984. Raw test data recorded in QTR 130 was duplicated from the test logbook. The inspector examined the test specimen (limit switch EA 180-11302, Serial No. 3161, Test No. 261), which survived the EQ test, and found it to be in excellent and sound condition. In earlier EQ tests of the same generic switch moisture leaked through the Cam-lok connectors, the cover plate gaskets became brittle, cracked, and split, and the electrical contacts corroded. In the current tests, the modified (redesigned) Cam-lok receptacle and connector and gaskets of the specimen remained leak tight. The switch contacts remained clean and dry and retained electrical characteristics. All data indicates the generic model of this limit switch, Model No. EA-180-11302 met the EQ test requirements for the Westinghouse WCAP 9688 test criteria.

ORGANIZATION: NATIONAL TECHNICAL SYSTEMS
TESTING DIVISION
SAUGUS, CALIFORNIA

REPORT NO.: 99900907/84-01	INSPECTION DATE(S): 2/27-28/84 3/1/84	INSPECTION ON-SITE HOURS: 34

CORRESPONDENCE ADDRESS: National Technical Systems
Testing Division
ATTN: Mr. A. Frochaux, General Manager
20988 W. Golden Triangle Road
Saugus, California 91350

ORGANIZATIONAL CONTACT: Mr. R. A. Ely, Manager, Quality Assurance
TELEPHONE NUMBER: (805) 259-8184

PRINCIPAL PRODUCT: Equipment testing.

NUCLEAR INDUSTRY ACTIVITY: Approximately 15% of the facility capacity and total man-hours are involved in testing of equipment for the nuclear power industry.

ASSIGNED INSPECTOR: L. B. Parker, Equipment Qualification Section (EQS) — Date: 3/28/84

OTHER INSPECTOR(S): P. R. Bennett, Consultant, Sandia National Laboratories

APPROVED BY: H. E. Phillips, Chief, EQS — Date: 3/28/84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: (1) Review the implementation of National Technical System's (NTS) actions concerning previous inspection findings, (2) review a typical example of a type test, and (3) review of analyses completed by NTS Saugus.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: NATIONAL TECHNICAL SYSTEMS
TESTING DIVISION
SAUGUS, CALIFORNIA

REPORT NO.: 99900907/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

1. In paragraph E.2.d of this report there is outlined a problem with equipment operation cycling time; however, in a telephone call subsequent to the inspection, NTS stated that there was information available in analysis 548-9311 to justify the deviation. This problem will be reviewed in a future inspection.

2. The radiation specifications for syncotemp hydraulic fluid and loctite magnet cement were not available. The content of these specifications may invalidate the radiation aging calculations found in analysis 528-0847.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-01, B.1): Master Job Order (MJO) No. 548-9247 data sheets had not been signed by the test operator.

   The NRC inspector reviewed: (1) 27 data sheets on MJO 548-9247, all had been signed by the test operator and reaudited by NTS QA after the B.1 nonconformance had been written; (2) NTS training program QA-002 "QA/QC-Part 50" viewgraphs, which instructed personnel to sign and date all MJO data sheets; and (3) 9 personnel training records of NTS staff members indicating they had been instructed in QA-002. The records, corrective action, and preventive measures were found to be acceptable.

2. (Closed) Nonconformance (83-01, B.2): No documented objective evidence in the file folders that corrective action had been accomplished relative to audit deficiencies identified during audits conducted at NTS Saugus, California, and NTS Hartwood, Virginia, facilities.

   The NRC inspector reviewed 4 corrective action requests initiated on March 31, 1983, by the QA (Saugus) manager. The Saugus internal audit folder was examined. The records, corrective actions, and

preventive measures were found to be acceptable at Saugus. Hartwood, Virginia, internal audits have now been assigned to that facility by NTS and will be reviewed by the NRC on a future inspection in Hartwood.

3. (Closed) Nonconformance (83-01, B.3): No documented objective evidence that the required annual review of all Standard Operating Procedures (SOP) had been performed.

   The NRC inspector reviewed SOP master indices that indicated SOPs had been reviewed. The records, corrective actions and preventive measures were found to be acceptable.

4. (Closed) Nonconformance (83-01, B.4): No documented objective evidence that: (a) the competency tests for each job classification in specialized areas had been administered; and (b) personnel had been certified to perform in specialized areas even though employees were working in specialized areas.

   An NRC inspection team member examined three training procedures and two sets of personnel training records verifying that a training program had been established and records were being maintained to attest to the competency and certification of personnel performing in specialized areas. The records, corrective actions and preventitive measures were found to be acceptable.

5. (Closed) Nonconformance (83-01, B.5): QA manager was not stamping or initialing job travelers as each test or other operation was properly accomplished.

   The NRC inspector reviewed Section 2, paragraph 2.4.3 of the NTS Quality Procedures Manual (Rev. D.) "Test Program Planning," and the QA manager had been changed to Quality Inspector. The records, corrective actions, and preventive measures were found to be acceptable.

6. (Closed) Nonconformance (83-01, B.6): Receiving inspection reports were not available for the activator and mutiple damper being tested in accordance with Test Procedure No. 548-9247-1.

   Six receiving inspection reports were examined by the NRC inspector. The records, corrective actions, and preventive measures were found to be acceptable.

7. (Closed) Nonconformance (83-01, B.7): Test records of closed projects were being maintained in engineering offices and not in locked storerooms as required.

   The NRC inspector examined four closed project files which contained the test records in the locked storeroom at the Saugus facility. The records, corrective actions, and preventive measures were found to be acceptable.

E. OTHER FINDINGS OR COMMENTS:

1. Review of Test Plan/Procedures and Support Documents - An NRC inspection team member reviewed the "Qualification Testing of MOV Varistor P/N V130PA20B" (Procedure 528-1403 Rev. A) which contained the seismic test procedure. Technical items examined included the requirements for notices of deviation and for monitoring spurious output and signal interruption during seismic exposure. No nonconformances were identified.

2. Review of Equipment Qualification Records - Documentation -

   a. An NRC inspection team member reviewed one test report (Report 528-1403) and two analysis reports (ANALYSIS 528-1403 Rev. A; Analysis 528-0847 Rev. B) concerning qualification activities for a varistor, varistar, and modulating electro-hydraulic operator system.

   b. The seismic test report, "Qualification Testing of NOV Varistor P/N V130PA20B" (Report 528-1403), was compared to the requirements in the seismic test procedure (Procedure 528-1403 Rev. A). No anomalies occurred during testing; therefore, no notices of deivation were needed. Additionally, the monitoring required during seismic exposure was performed. Nonconformances were identified.

   c. For the environmental qualification report, "Nuclear Environmental Qualification of GE Metal Oride Varistor Catalog #V130PA20B" (Analysis 528-1403 Rev A), the following technical items were reviewed: (1) thermal aging calculations, (2) radiation doses and dose rates consistent with customer specifications (8856-8-504 Rev. 2), and (3) the temperature/humidity exposure. No nonconformances were identified.

d. The following technical items were reviewed for the "Nuclear Equipment Analysis Report Modulating Electro-Hydraulic Operator System P/N 85280" (Analysis 528-0847) report: (1) polyvinyl chloride aging or replacement; (2) replacement intervals for capacitors and fans; (3) radiation specifications on syncotemp hydraulic fluid and on loctite magnet cement; (4) activation energies for accelerated aging of motor brushes; (5) qualification for any installed orientation; (6) operational cycle requirements, and (7) radiation dose levels for the servo amplifier module. No findings were identified for items (1), (2), (3), (4), (5), and (7). Item (6) deals with operational cycle requirements. Ten percent of the operational cycles were to be completed during 42 hours of thermal aging at 3 to 4 cycles per minute. The total number of cycles was 250,000; however, 25,000 cycles at 4 cycles per minute takes approximately 104 hours. NTS personnel said that the written report was not corrected due to oversight and that the thermal aging time should be changed according to the time necessary for cycling. See unresolved item C.1. Items (3) and (7) are still unresolved. For item (3) the radiation specifications from the customer (Borg Warner) were not sent to NTS. Therefore, the radition specifications were unavailable for consideration in the radiation aging calculations. See unresolved item C.2. Item (7) involved a low total radiation dose as specified by the customer (Borg Warner) which will be part of a future inspection at Borg Warner.

ORGANIZATION: NATIONAL TECHNICAL SYSTEMS
FULLERTON, CALIFORNIA

REPORT NO.: 99900923/84-01	INSPECTION DATE(S): 2/29/84	INSPECTION ON-SITE HOURS: 16

CORRESPONDENCE ADDRESS: National Technical Systems
ATTN: Mr. G. Matteson
Facility Manager
1536 East Valericia Drive
Fullerton, California 92631

ORGANIZATIONAL CONTACT: Mr. R. J. McKelligott, Manager, Quality Assurance
TELEPHONE NUMBER: (714) 879-6110

PRINCIPAL PRODUCT: Equipment testing.

NUCLEAR INDUSTRY ACTIVITY: Approximately 12% of the facility's capacity and total man-hours are devoted to testing of equipment for the nuclear power industry.

ASSIGNED INSPECTOR: C J Haller for — 3/28/84
L. B. Parker, Equipment Qualification Section (EQS) — Date

OTHER INSPECTOR(S): P. R. Bennett, Consultant, Sandia National Laboratories

APPROVED BY: C J Haller for — 3/28/84
H. S. Phillips, Chief, EQS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Review the implementation of National Technical Systems (NTS) actions concerning the previous inspection findings, review a typical example of a type test, and review of analyses completed by NTS-Fullerton.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: NATIONAL TECHNICAL SYSTEMS
FULLERTON, CALIFORNIA

REPORT NO.: 99900923/84-01	INSPECTION RESULTS:	PAGE 2 of 3

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (83-01, A.1): NTS had not developed or adopted the required procedures for implementation of 10 CFR Part 21.

   The NRC inspector reviewed Section XIX of the NTS Quality Assurance Procedures Manual, which is the internal implementing procedure for 10 CFR Part 21. The records, corrective action, and preventive measures were found to be acceptable.

2. (Closed) Violation (83-01, A.2): NTS had not posted 10 CFR Part 21 and the other required documents.

   The NRC inspector examined the required documents, which had been properly posted in accordance with 10 CFR Part 21. The records, corrective actions, and preventive measures were found to be acceptable.

E. OTHER FINDINGS OR COMMENTS:

Review of Equipment Qualification Records - Documentation - The NRC inspection team member reviewed the "Compression/Deflection Test on Stainless Steel Honeycomb Material" (379-6300 Rev. A) and supporting documentation. The customer (Combustion Engineering) imposed 10 CFR Part 21 on NTS, but did not impose 10 CFR Part 50, Appendix B.

The compression/deflection test was performed, but no data analysis was asked for by the customer. The only deviation from test specifications (Purchase Order 9370105-14273, dated April 6, 1983) concerned crush velocities. Each test consisted of three trials and the crush velocities of each trial were required to be within ±5% of the others. The customer was informed of the deviation per 10 CFR Part 21, section 21.21(a). Tests 4, 5, 6, and 7 had crush velocity deviations greater than the specifications.

ORGANIZATION: NATIONAL TECHNICAL SYSTEMS
FULLERTON, CALIFORNIA

REPORT NO.: 99900923/84-01	INSPECTION RESULTS:	PAGE 3 of 3

The Purchase Order 9370105-14273 (dated April 6, 1983) for honeycomb material testing and several letters dealt with crush velocity deviations. This information documents the appropriate procedure for informing the customer of deviations. No nonconformances were identified.

ORGANIZATION: NUS CORPORATION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900933/84-01	INSPECTION DATE(S): 2/6-7/84	INSPECTION ON-SITE HOURS: 16

CORRESPONDENCE ADDRESS: NUS Corporation
ATTN: Dr. W. J. Gallagher, Senior Vice President
Division Operations
910 Clopper Road
Gaithersburg, Maryland 20878

ORGANIZATIONAL CONTACT: M. R. Booska, Director, Corp. QA-Division Operations
TELEPHONE NUMBER: (301) 258-6000

PRINCIPAL PRODUCT: Engineering consultant activities.

NUCLEAR INDUSTRY ACTIVITY: NUS Corporation has three divisions that are involved in nuclear safety-related projects. The current level and type of activity is approximately as follows: Engineering Division - 18 contracts (piping analysis, fuel storage rack design, control room habitability design, fire protection modifications, equipment evaluation/qualification, system/component performance
(cont. on next page)

ASSIGNED INSPECTOR: J. R. Agee, Equipment Qualification Section (EQS) 3/23/84 Date

OTHER INSPECTOR(S): E. H. Richards, Sandia National Laboratories

APPROVED BY: H. S. Phillips, Chief, EQS 3/23/84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was conducted to: (1) evaluate implementation of the QA program and the equipment qualification program, and (2) evaluate action concerning previous inspection findings.

PLANT SITE APPLICABILITY:

This inspection relates to the following plant dockets: 50-358 and 50-359.

ORGANIZATION: NUS CORPORATION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900933/84-01	INSPECTION RESULTS:	PAGE 2 of 3

NUCLEAR INDUSTRY ACTIVITY: (cont.)
analysis and design, etc.); Consulting Division - 17 contracts (hazards analysis, system/component/compartment analysis, QA support, control room habitability study, independent review of purchase specifications, etc.); and Environmental Division - 14 contracts (environmental studies, licensing support, meteorological services, radiological services, etc.)

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. ACTION ON PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance, item 1 (Report 99900516/82-01): The NRC inspector examined the QA files concerning project 3366 and verified that the failure of the NUS-Gaithersburg office to receive copies of controlled documents was an isolated incident which was corrected immediately. Following the incident, transmittal forms and document receipt logs were implemented for project document control.

2. (Closed) Nonconformance, item 2 (Report 99900516/82-01): The NRC inspector verified that the records index file had been eliminated and the record logs were being maintained in compliance with the revised QA manual, Sections 17.0, "QA Records," paragraph 17.1, "Idenficiation, Transmittal, Storage and Traceability of QA Records," dated September 30, 1982. All records reviewed had been stamped by the QA department in compliance with document control procedures. All project personnel training records had been consolidated and are located in the QA files in the Gaithersburg office. A review of these training records revealed that project personnel had received project training and orientation including training on recent document control changes.

ORGANIZATION: NUS CORPORATION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900933/84-01	INSPECTION RESULTS:	PAGE 3 of 3

E. OTHER FINDINGS OR COMMENTS:

1. General - The NRC inspector reviewed QA files, training records, and correspondence files including 20 letters concerning implementation of document controls for Project 3366 and 14 distribution records for Project 4074. In addition, the NRC inspector reviewed the QA record log for Project 4074 in which all QA records had been signed-off and stamped by the QA department. No nonconformances were identified.

2. Technical Inspection - The NRC inspector reviewed the project plan for an environmental qualification program for an operating licensee. The environmental qualification program contained requirements for demonstrating qualification of specific equipment. Since NUS does not conduct qualification tests, this review effort was limited to review of equipment qualification records and documentation; for example, the inspector reviewed the qualification review package for ASCO Class 1E solenoid operated valves. In conjunction with this review, NUS assembled the appropriate qualification documents (such as the ASCO Test Report, "Qualification Test of Solenoid Valves," ASCO/AQS 21678/TR) and provided appropriate analysis to justify qualification of ASCO solenoid valve models NP 8316 and NP 8300. Technical items, including margins, dose rates, total doses, and thermal aging calculations, were reviewed. All items reviewed were complete, correct, and in conformance with applicable standards. No nonconformances were identified.

F. EXIT MANAGEMENT MEETING:

The NRC inspector met with members of management on February 7, 1984, at the Gaithersburg, Maryland, office and discussed details of the inspection, including the closeout of the previous inspection findings. Management acknowledged the inspection findings.

ORGANIZATION: PACIFIC AIR PRODUCTS COMPANY
SANTA ANA, CALIFORNIA

REPORT NO.: 99900769/84-01	INSPECTION DATE(S): 4/23-26/84	INSPECTION ON-SITE HOURS: 50

CORRESPONDENCE ADDRESS: Pacific Air Products Company
ATTN: Mr. L. R. Hess
President
3133 W. Harvard Blvd.
Santa Ana, California 92704

ORGANIZATIONAL CONTACT: Mr. J. P. Dodson, Director of Quality Assurance
TELEPHONE NUMBER: (714) 557-1710

PRINCIPAL PRODUCT: Air control equipment.

NUCLEAR INDUSTRY ACTIVITY: Approximately 50 percent.

ASSIGNED INSPECTOR: R. E. Oller — 5-29-84
R. E. Oller, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S): E. L. Burns, Brookhaven National Laboratory

APPROVED BY: C. J. Hale — 5/31/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of a potential 10 CFR Part 21 report by Pacific Air Products Company (PAPCO) with regard to excessive wear in the linear converter mechanical device used on PAPCO dampers in conjunction with ITT actuators. The QA program areas of change control, nonconformances and corrective action, and procurement control were inspected as part of the 10 CFR Part 21 report followup.

PLANT SITE APPLICABILITY:

Excess wear in converters - 50-410, 50-280/281, 50-329/330, 50-413/414, 50-440/441, 50-454/455/456, 50-462, and 50-546/547.

ORGANIZATION: PACIFIC AIR PRODUCTS COMPANY
SANTA ANA, CALIFORNIA

REPORT NO.: 99900769/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraphs 2.0, 8.2, and 8.3 of the PAPCO QA Manual Procedure 15.1, the Corrective Action Request (CAR) form was not used to document the linear converter deficiency evaluated for reportability under 10 CFR Part 21 and no entry concerning this problem was made in the CAR log.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 2.1 of QA Manual Procedure 11.0, the linear converter lubrication test procedure No. 7043-A did not include provisions for assuring that calibrated test equipment was available, such as the caliper depth gauge and torque wrench which were used in the test.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 3.2.a and 3.3.c of QAM Procedure 11.0, the linear converter dry and lubricated test data sheets did not, in all cases, have the signature of the QC supervisor or designee and the test data sheets were not traceable to and identified with the product model number/serial number.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 2.1.b of QAM Procedure 4.0, and paragraph 2.1 of QAM Procedure 7.0, the manufacturers and local suppliers for purchased products specified in the field lubrication procedure No. 7043-PI, identified in PAPCO's 10 CFR Part 21 report (Dow Corning and Motion Industries for Molykote G-N Paste, and Exxon and Bob Smith Oil Company for Unirex N-2 Grease) were not listed on the Approved Vendor List nor did these manufacturers and local suppliers have a previous procurement history with PAPCO.

C. UNRESOLVED ITEMS:

None

ORGANIZATION: PACIFIC AIR PRODUCTS COMPANY
SANTA ANA, CALIFORNIA

REPORT NO.: 99900769/84-01	INSPECTION RESULTS:	PAGE 3 of 4

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance A (83-02): PAPCO had failed to recertify an active QC inspector for Level I limited QC examination of subcontractors.

   Review by the NRC inspector during this inspection verified that the PAPCO director of QA recertified the above inspector for the period December 21, 1983, to December 21, 1985. To prevent recurrence this inspector recertification date was matched to the schedule for the other QC inspectors.

2. (Closed) Nonconformance B (83-02): PAPCO failed to initial and date the final documentation inspection operation on production order traveler for PO No. 2072 of Job Order 6009 for shipped SL100 dampers.

   Review by the NRC inspector during this inspection verified that the documentation package for the dampers on PO 2072 was amended and a copy of the corrected traveler was sent to the customer. Review also verified that current shipment documentation packages are being more carefully reviewed, as all signature blocks are now being signed and dated.

3. (Closed) Nonconformance C (83-02): PAPCO failed to reaudit an active supplier of calibration services by November 2, 1983, as required.

   Review during this NRC inspection verified that the subject supplier was reaudited by PAPCO on December 2, 1983. To prevent recurrence the audit schedule for suppliers on the Approved Vendor List is being maintained on a master calendar by the director of QA.

E. OTHER FINDINGS OR COMMENTS:

Excessive Bushing Wear in Linear Converters Used With ITT Actuators on HVAC Dampers: PAPCO notified the NRC on January 16 and 17, 1984, of possible excessive wear in their SL100LC linear converter device which could affect its intended operability. This mechanical device converts the push-pull motion of an ITT electrohydraulic actuator into a rotary motion to operate HVAC dampers. PAPCO has supplied approximately 768 of these converters mounted to ITT actuators since 1978, to nine nuclear power customers, two nonnuclear power customers, and one nuclear fuel facility. PAPCO conducted in-house evaluation testing of the defect and on March 9 and 28, 1984, notified the NRC with their interim and final reports of the results

ORGANIZATION: PACIFIC AIR PRODUCTS COMPANY
SANTA ANA, CALIFORNIA

REPORT NO.: 99900769/84-01	INSPECTION RESULTS:	PAGE 4 of 4

of their evaluation and final conclusions. The initial, interim, and final notifications were also made to all of their affected customers.

By review of records and interview with PAPCO personnel, the NRC inspectors verified that information supplied in the January 17, March 9, and March 28, 1984, 10 CFR Part 21 reports was accurate and complete in regard to the identified deficiency. Laboratory tests conducted by PAPCO determined that the excessive wear in the shaft guides and bearings of the converter was due to cycling many more times than original design had considered to be the life span of the unit. This was due to a converter/system "hunting" condition. PAPCO concluded that no generic defect exists in the converter.

The NRC inspectors verified that PAPCO has taken the following action: (a) provided adequate notification of test results to all customers; (b) provided them with a field lubrication procedure; (c) provided them with maintenance information and alternate lubrication options, and (d) advised them of the actuator/system "hunting" condition that could affect their plant.

During this NRC review, it was verified that the Byron/Braidwood nuclear power stations, major users of the SL100LC converters, has authorized PAPCO to initiate a rebuild of all of their converters using PAPCO recommended and approved lubricant for bronze guides and bearings. This program will require that PAPCO process the change through their engineering change system. Since this action is pending by PAPCO, the results should be followed up during a future NRC inspection.

This inspection/followup of PAPCO's 10 CFR Part 21 report included their QA program areas of change control, nonconformances and corrective action, and procurement control. This inspection was achieved through discussions, observations, and review of: (a) QA manual; (b) PAPCO's notification documents to all affected customers; (c) internal memorandum; (d) customer purchase order change; (e) audit/survey schedule and checklist records; (f) investigative and trip reports; (g) procedures; (h) converter test data sheets; (i) letters; (j) specifications; (k) approved vendor list; (l) calibration and certification records, and (m) a corrective action request log.

Within this area, four nonconformances were identified. These items are identified in paragraph B above.

ORGANIZATION: POWER BREAKERS, INC.
VEGA BAJA, PUERTO RICO

REPORT NO.: 99900832/84-01	INSPECTION DATE(S): 3/5-9/84	INSPECTION ON-SITE HOURS: 120

CORRESPONDENCE ADDRESS: Power Breakers, Inc.
ATTN: Mr. J. Jerse
President and Plant Manager
P. O. Box 4356
Vega Baja, Puerto Rico 00764

ORGANIZATIONAL CONTACT: Mr. Juan Fuentes, QC Manager
TELEPHONE NUMBER: (809) 858-2120

PRINCIPAL PRODUCT: Circuit breakers.

NUCLEAR INDUSTRY ACTIVITY: Less than 1 percent of the total work involves nuclear safety-related equipment.

ASSIGNED INSPECTOR: Wm. McNeill, Special Projects Section (SPS) — Date: 6-4-84

OTHER INSPECTOR(S): D. A. Weber, EG&G
I. Villalva, Event Analysis Branch

APPROVED BY: C. J. Hale, Chief, SPS — Date: 6/4/84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: A programmatic evaluation of the entire QA program and the status of previous inspection findings.

PLANT SITE APPLICABILITY:

Not applicable.

ORGANIZATION: POWER BREAKERS, INC.
VEGA BAJA, PUERTO RICO

REPORT NO.: 99900832/84-01	INSPECTION RESULTS:	PAGE 2 of 21

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Appendix B to 10 CFR Part 50 and Quality Control Procedure (QCP) 20.1, the "Quality Control Program Description" did not define the Distribution Equipment Engineering and Manufacturing Operation (DEEMO) QCPs, division procedures, etc., that are applicable to the Power Breakers, Inc. (PBI) QA program.

2. Contrary to Appendix B to 10 CFR Part 50 and paragraph II.E of Section 2 in the DEEMO Quality Assurance Manual (QAM), documentation was not on file that would demonstrate training of QC and non-QC PBI personnel (e.g., management, purchasing, engineering, etc.) to applicable sections of the QA program as defined by the QAM, applicable PBI and DEEMO QCPs, or other procedures.

3. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.D. of Section 11 in the DEEMO QAM, in the assembly area of the plant there was no documentation which would demonstrate the QC inprocess checks required by planning were indeed performed. In addition, the adequacy of reviews was questionable in that it was noted the lot checks required by planning were not feasible because continuous processing was established in this area.

4. Contrary to Appendix B to 10 CFR Part 50 and paragraph II of Section 4 in the DEEMO QAM, a design change, the addition of washers, was noted marked up on the "Basic AKR Circuit Breaker," Drawing No. 425D369, Revision 6, dated January 25, 1983; however, there was no controlled design change documentation for this design change.

5. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.B of Section 6 in the DEEMO QAM, documentation, namely some QCPs and QC plans, were not clear, concise, and adequate so as to accomplish the particular activity in an effective manner. Examples of this were:

   a. The QC plan for the "Front Frame and Mechanism" (425D406P1) describes an activity, torque verification of item 18, charging crank screws that is not done at that station but performed at the "Basic AKR Circuit Breaker" (425D369) station.

b. The DEEMO QCP 11M44.2 describes steps (e.g., G, M.1, P, Q, R.1, R.2 and S) of inspection activities not performed at that station, but elsewhere.

c. The DEEMO QCP 11M44.2 step 0.1 describes an acceptance criteria of 1/16" which does not agree with the drawing requirement of .020" for a gap dimension.

d. The DEEMO QCP 15K44.3 does not cross reference another applicable QCP 12L92.1.

e. The "AKR 30/50 Circuit Breaker Checklist" identifies an outline test fixture (K2-18E) to be used, not the fixture presently in use and reportedly correct as TL673D0500-1.

f. The DEEMO QCP 11M44.5 on the outline test fixture describes activities not performed; e.g., steps B and G.

g. The DEEMO QC plan for "Front Frame" (568B547P1 (Gp1)) does not address the verification or checking of the programmer's mount plate.

6. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.A of Section 7 in the DEEMO QAM, documents were not controlled sufficiently to assure requirements were communicated to responsible personnel. Examples of this were:

a. Some PBI QCPs were referenced in the PBI QCP index; however, copies were not on file; e.g., QCPs 6.1 and 18.1.

b. Four of the nine sampled DEEMO QCPs found in the shop were not the current revision as reported by DEEMO Plainville; e.g., 15K44.3, 15K44.1, 11J44.1 and 11M44.5. Note that two of these were not even current in the PBI master file; e.g., 15K44.3 and 15K44.1.

c. One of the seven sampled "Manufacturing Operation Sequences" (MOSs) found in use in the shop was not the current revision as compared to the PBI office master file; e.g., 425D406, "Front Frame and Mechanism." In addition, another MOS which was not current was found at the station for "Side Frames," 139C4617G1.

d. One of the 38 sampled parts lists found in the shop was not the current revision as reported by DEEMO; e.g., 425D369, Section J, page 3.

e. Table 2 of DEEMO QCP 15K44.1 was not found in the shop at the work stations.

f. QC plans were found which were revised and not approved; e.g., "Plate," 192A9502PZ was reviewed on December 1, 1983, but last approved on August 1, 1983.

Note that in regard to QCP 11J44.1, the incorrect revision of this procedure being at the work station had resulted in incorrect test parameters for some groups of undervoltage trip devices (UVTDs) (e.g., groups 18 through 20 and 13 through 16) being in place at final electrical testing.

7. Contrary to Appendix B to 10 CFR Part 50 and paragraph 2.IV of PBI QCP 8.1, a review of MOSs in the assembly area found that conforming material was being processed at subsequent steps without the MOS being stamped by the inspector.

8. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.C of Section 19 in the DEEMO QAM, there was no documentation of the PBI internal audits, checklists, schedule or findings that would demonstrate that auditing was performed as required.

9. Contrary to Appendix B to 10 CFR Part 50 and paragraph 5 of DEEMO QCP 13L1.1, the measures taken for control and calibration of electrical test equipment were found to be ineffective in that: (a) the master list format in use was different than required by the procedure; (b) the equipment was not listed sequentially; (c) all items on the master list were overdue for calibration; and (d) history cards for test equipment with property tag Nos. 395, 434, 651, and 751 were available; however, these items were not on the master list.

10. Contrary to Appendix B to 10 CFR Part 50 and paragraph 6 of DEEMO QCP 13L1.1, many of the data sheets were not filled out in accordance with paragraphs 6.1 through 6.5. For example, paragraph 6.5 requires recording of the meter accuracy on the "Calibration History Cards" (CHCs). None of the CHCs reviewed showed the meter accuracy in the space provided. In addition, the reading of the transfer standard and meters being calibrated were not recorded on the CHCs for property tag Nos. 434, 751, 107, and others. The statement in

paragraph 6.6 referring to paragraph 7.2 for the number of scale points to be checked was in error. Paragraph 7.2 was titled, "Storage and Usage of Transfer Standards." Paragraph 8 identifies the points to be calibrated, usually at 20, 40, 60, 80, and 100 percent of full scale. The few history cards that contained recorded calibration points only listed one to four points and the percent of full scale was not listed. One example is the data sheet for property tag No. 528. Most of the CHCs did not include the serial number of the standard used; e.g. Nos. 107, 395, 434, 528, 651 and 751.

11. Contrary to Appendix B to 10 CFR Part 50 and paragraph III of DEEMO QCP 16B1.1, it was found that QCP 16B1.1 had not been fully implemented in that: (a) at least one deviation notice (D/N) No. 84-012 did not have a description; (b) D/Ns 84-003 and -011 through -015 contained weights or quantities in the blanks required to show the estimated time periods the deviation was to be in effect; and (c) D/Ns 84-005, -006, and -007 were not recorded in the D/N log.

12. Contrary to Appendix B to 10 CFR Part 50 and paragraph 4 of PBI QCP 15.5, it was found that the measures established to assure that conditions affecting product quality had been adequately identified, documented, and promptly corrected by the responsible personnel were not fully implemented in that: (a) none of the corrective action notices (CANs) listed in the CAN log showed an "Actual Completion Date" even though there was evidence that at least one of the CANs (PB1-004) had been closed out; (b) there was no evidence that a copy of the CAN log had been sent monthly to the Manager-Quality Assurance; and (c) there was no evidence that CANs PBI-001 and -003 had been reviewed by the Manager-Quality Assurance, even though they were open longer than 3 months.

13. Contrary to Appendix B to 10 CFR Part 50 and PBI QCP 10.1, the "specific gravity" and "titer" checks were only being conducted every 2 weeks. This determination was based on the NRC inspector's examination of test data that indicated such checks were only conducted on a biweekly basis rather than the required semiweekly basis.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (83-01, Item A): PBI had not adopted procedures to provide for: (a) evaluating deviations, (b) causing deviations to be evaluated, or (c) assuring that a director or responsible officer is informed if a basic component fails to comply or contains a defect.

   The DEEMO QCP 2.01 has been applied to PBI. This procedure, the same as used by DEEMO Plainville, provides for evaluation of deviations and reporting of defects to the NRC. To date, PBI has not had the occasion to implement this procedure. A DEEMO audit of November 29 to December 2, 1983, verified implementation of this corrective action.

2. (Closed) Violation (83-01, Item B): PBI had not posted: (a) a copy of 10 CFR Part 21, (b) Section 206 of the Energy Reorganization Act of 1974, (c) procedures adopted pursuant to the regulations, or (d) a notice describing the regulations and procedures.

   A posting of Section 206 of the Energy Reorganization Act of 1974 and a notice which referenced the procedures which describe 10 CFR Part 21 and the individuals to whom reports are to be made was found at various locations within the PBI shop.

3. (Closed) Nonconformance (83-01, Item A): Inspections were not identified on the "Final Breaker Checklist" to verify the adequacy of installation for items mounted after the basic AKR-30/-50 breaker assembly; i.e., no requirement was included for verification of applied torque to fasteners.

   The checklist in question (11K44.1) has been revised. Step 44 has been added which requires accessible lockwashers and screws are to be verified to be properly torqued and secured. The implementation of this inspection was verified on several checklists by noting inspector stamp off of that step.

4. (Closed) Nonconformance (83-01, Item B): Certain assembly operations were not fully controlled in accordance with drawings, bills of material, MOSs, and "Operating Instructions Sequence Sheets" (OISs), as evidenced by the following examples:

   a. Certain OISs which were referenced by MOSs were not available. It was additionally noted that conflicting information was present.

b. An assembler identified that one type of thread locking compound was being used which was different from that specified by the drawings.

The OISs for the most part, have been removed from the MOSs. Only one exception was found and that OIS was found to be on file and that did not contain conflicting information. By removal of the OISs, the source of conflicting information noted in the previous inspection was removed. Inspection of the assembly area found that the thread locking compounds used were those identified on the drawings. As noted above, corrective action was verified by an audit of manufacturing in late 1983. Drawings have been changed to standardize the thread locking compound to be used.

5. (Closed) Nonconformance (83-01, Item C): Documented measures were not established which describe the actions to be taken when items are identified by manufacturing personnel to be defective.

PBI's corrective action to this nonconformance was to add a section to PBI QCP 8.1 to reflect the current practice of hourly manufacturing personnel segregating and identifying suspected defective material and holding at work station for proper QC review. A review of PBI QCP 8.1 confirmed that paragraph VI had been added to page 3 (Revision 1, dated September 26, 1983) to accomplish this action.

During the inspection it was noted that the manufacturing personnel were conforming to the revised QCP.

PBI stated in their action to prevent recurrence, that QC will audit plant practices and ensure compliance with the revised PBI QCP 8.1. PBI QC stated that an audit had been performed but there was no documented evidence of the audit. This was identified as a nonconformance (see B.8 above).

6. (Closed) Nonconformance (83-01, Item D): The following examples were noted of mechanical measuring equipment not being calibrated and maintained to comply with QCP 12.1:

a. Applicable tolerances or ranges to be checked had not been specified in the "Gage Control Record Cards" (GCRCs) for torque wrenches, micrometers, and dial calipers. This was evident in 7 of 13 gages that were reviewed.

b. The GCRCs for thread measuring wires and a special dimensional gage (K2-391B) did not identify the masters to be used for calibration.

c. A force gage (Q5-52) was found in use that was overdue for calibration.

d. Several go-no-go gages and the Magnaglo nondestructive unit (black light, ammeter) were not included in the calibration program.

e. The master torque tester was not properly calibrated.

f. Micrometers were not properly calibrated.

A review of the gage control records has verified that: (1) the applicable tolerances/ranges have been specified on the GCRCs; (2) the cards for thread measuring wires and gage K2-391B identified the master used in calibration as Q1-7 for the thread measuring wires and Q1-6A for gage K2-391B; (3) gage Q5-52 was found calibrated on December 16, 1983, with the next calibration due June 1984; (4) the go-no-go gages and the Magnaglo equipment are now part of the "Gage Control Program;" (5) the master torque tester had been calibrated and the calibration certificate showed traceability to the National Bureau of Standards (NBS); and (6) the micrometers were calibrated against precision gage blocks and the gage blocks had a certificate of calibration traceable to the NBS.

This response also indicated, as action to prevent recurrence, that periodic GCRC audits have been established to monitor compliance with PBI QCP 12.1. At the start of this inspection the QC manager stated that an audit had been performed but could not provide evidence. This was corrected by revising page 5 of PBI QCP 12.1 to include a paragraph which requires the results of PBI QCP 12.1 audits to be recorded on the individual gage card, and a letter dated March 7, 1984, was addressed to the plant manager stating that an audit of PBI QCP 12.1 had been performed and that the PBI QCP 12.1 had been revised as noted above.

7. (Closed) Nonconformance (83-01, Item E): The QAM did not identify nondestructive examination as a special process. In addition, the necessary qualification requirements for welding personnel and procedures were not defined.

The NRC inspector reviewed the PBI response letters and the following documents:

a. QAM-10, "Special Processes," Revision 1, dated November 28, 1983.

b. DEEMO QCP 2S81.2, "Qualification of Arc Welders," Revision 3 dated December 15, 1983.

c. DEEMO QCP 10S81.3, "Process Control of Steel Arc Welding," Revision 1 dated March 15, 1984.

PBI's October 3, 1983, letter to the NRC states, in part, "Power Breakers, Inc. has trained inspectors and operators as welders via a 40 hour course conducted onsite by an outside consultant. Each and every person received classroom and practical training resulting in a certificate of accomplishment." Said letter further states, "The Q.A Manual will be revised to include nondestructive testing as a special process." Toward this end, QAM-10 has been revised to include nondestructive examination as a special process.

PBI's December 13, 1983, letter to the NRC amplifies its previous response to this item by stating, in part, 'Welders will be qualified by evaluation of test samples prepared in the presence of a Quality Control representative. The test samples will be prepared using materials similar to production material and will be initially inspected and approved by PBI Quality Control. If satisfactory, the test samples will then be forwarded to the DEEMO Materials and Processes Lab (M&P) in Plainville. The M&P Lab will examine the weld test samples using bend tests and visual examination to confirm the quality of the weld samples. The results of the M&P Lab welder evauluation will be documented and retained by the PBI Quality Control, and only qualified welders will be allowed to weld production material."

DEEMO QCP 2S81.2 is a quality control procedure aimed at ensuring that metal inert gas (MIG), tungsten inert gas (TIG), and submerged arc welding (SMAW) weld operators are qualified and capable of producing weldments that comply with the applicable engineering requirements. DEEMO QCP 10S81.2 complements DEEMO QCP 2S81.2 by establishing procedures to ensure that the arc welding of steel components conform with the applicable engineering and quality requirements.

Based on the information contained in the above documents, coupled with the inspector's examination of randomly selected weldments, it is concluded that this nonconformance has been acceptably resolved by PBI and that this issue may be considered closed.

8. (Closed) Nonconformance (83-01, Item F): Procurement documentation for services did not contain adequate information to assure compliance with design quality requirements as evidenced by the following examples:

   a. The applicable vacuum carburizing process specificaton (P11HD1E) was not invoked in procurement documentation for heat treatment of closing props. It was established during the inspection that the heat treatment vendor was, in fact, utilizing a carbonitriding process and not the vacuum carburizing process required for the part by Drawing No. 192A9456. In addition, it was noted that provisions were not made to assure performance of the required temper cycle.

   b. The applicable process specification required by engineering drawings for removal of hydrogen from steel parts after plating (P10DHD5A) was not invoked in procurement documentation.

   PBI's corrective action to this nonconformance was to: (1) revise the P11HD1E specification, (2) invoke the applicable specifications on the purchase order, and (3) require the vendor to submit a Certificate of Compliance to assure conformance to the P11HD1E specification.

   For item a. of the nonconformance, it has been verified that: Specification P11HD1E, Revision 6, dated November 21, 1983, now requires the use of the carbonitride heat treating process; and a letter dated February 2, 1984, was sent to the heat treating vendor (Caribe Metallurgical) requiring the use of the new P11HD1E specification and drawings, the destruction of the old documents, and an acknowledgment that this had been done. The letter, returned by the vendor to PBI, acknowledged that the new information was in effect and the old information was destroyed.

   PBI's action taken to prevent recurrence was to perform periodic audits of the vendor to verify compliance. A letter dated June 15, 1983, verified that an audit was performed at the vendor's facilities on June 12, 1983. During the audit it was determined that the vendor would provide PBI with a Certificate of Conformance (see (3) above) to the appropriate specification "when so requested."

For item b. of this nonconformance, PBI stated that they would send letters to all of their plating vendors with copies of the applicable drawings and specification P10HD5A to be incorporated into the PBI procurement documents. It was verified that letters with attachments were sent on February 9, 1984, and acknowledged to Antilles and Dorado Electro Plating, Bayman Electric Plating, General Electric Plating, and Aerospace. This letter requested that the plating vendor acknowledge receipt of the new information and destruction of the old by signing the letter and returning it to PBI. PBI's action to prevent recurrence was the same as above to audit the vendors annually and as noted above, such was verified.

9. (Closed) Nonconformance (83-01, Item G): There was no evidence to indicate that an implemented change from the requirements of controlled documents (i.e., use of a different process specification to that required by engineering drawings and controlled documents for removal of hydrogen after plating) had been reviewed with the engineering department.

PBI's corrective action was to revise the documents used to control the removal of hydrogen embrittlement after plating to reflect current operating practice and engineering design requirements; i.e., use of Process Specification No. P10DHD5. The MOSs for Drawing No. 192A9546 were verified to be revised to contain the correct specification for removal of hydrogen after plating.

PBI's actions to prevent recurrence were: (a) PBI Manufacturing Engineering will reconcile any disparities in the MOS documentation to agree with the engineering drawing; and (b) QA will audit the interface between the MOS and engineering drawing at least annually to ensure compliance.

When asked if PBI had any example to show that PBI Manufacturing Engineering had reconciled any disparities between MOS documentation and engineering drawings they produced two sets of engineering drawings with revised MOSs. The reason for revising the MOSs was the same as above; i.e., the MOSs had the wrong process specification when compared to the drawing. Also reviewed was Drawing No. 658B512, Revision 4, and the related MOSs (two pages), dated October 10, 1983. The process specifications on both sets of MOSs were in agreement with their related engineering drawings.

Regarding the annual QA audit, PBI produced an audit report dated December 7, 1983, showing a QA audit of several QC areas including document control, instrumentation (gages), procurement, and drawings.

E. OTHER FINDINGS OR COMMENTS:

1. Organization and Quality Assurance Program (by Wm. McNeill): The PBI QA program was defined by the DEEMO Components QA Manual and QCPs issued in some cases by DEEMO and others by PBI. The responsibility for the establishment and implementation of a program to verify quality was defined by the above documents to be a joint effort of DEEMO and PBI. DEEMO supplied the programmatic and inspection requirements in procedures. PBI implemented the programmatic and inspection procedures or authored procedures of alternate methods. It was found that it was difficult to establish what DEEMO programmatic and inspection procedures were applicable to PBI. This was identified as a nonconformance (see B.1 above). In addition, a PBI QCP index was found; however, there were no copies of two PBI programmatic procedures on file or available for use. This was identified as a nonconformance (see B.6.a above). These procedures were on maintenance of production documents and finished product audits. Two additional procedures were identified in this index that were not applicable (PBI QCP 7.1 and 10.2). One procedure (PBI QCP 20.1) was found with the same title and issue date as that identified on the index as PBI QCP 1.1.

   The verification of quality was found to be by a QC group independent of manufacturing. Inspection activities were planned and documented by DEEMO QCPs, and quality plans issued for each part of subassembly. The scope of inspection activities in regard to items, organizations, and requirements involved was defined in the QCPs and plans. Quality control plans identified the parts to be inspected, acceptance criteria, sample rates for inprocess inspection, and sample sizes for final inspection for inspection and manufacturing personnel. The identification of special training, processes, equipment, control conditions, and alike was defined in the QAM. Training of personnel was identified for several special processes such as welding, NDE, etc. It was noted there were no records available that would show training of QC and non-QC PBI personnel to applicable parts of the QA program. This was identified as a nonconformance (see B.2 above).

The above was a result of a review of the QA program against the applicable commitments of Appendix B to 10 CFR Part 50. It was noted that design control and records are not part of the PBI acitivities.

2. Instructions, Procedures, and Drawings; Document Control; Identification and Control of Materials, Parts, and Components; Inspection; and Inspection, Test and Operating Status (by Wm. McNeill): The shop quality activities were documented in QCPs, quality control plans, and other documents cross-referenced in such as shop order summaries, drawings, parts lists, and manufacturing operation sequences. Compliance to QCPs was verified by observation and review of QCPs and plans on such activities as mechanical inspection, programmer calibration, outline fixture, UVTD, and electrical operations. In addition, quality activities on six different piece parts fabricated at PBI were inspected, such as posts, side frames, etc. At PBI, inprocess inspection and final inspection of lots is performed on piece parts. Final inspection is performed on completed assemblies and some inprocess inspection was performed of the assembly areas. However, it was found that records did not show that the assembly area inprocess inspection was performed. It was also noted that, in the assembly area, batch or lot processing was not the case but continuous processing. This was identified as a nonconformance (see B.3 above).

In review of the drawings used for inspection activities, it was noted that "marked up" drawings were found to be used by PBI. One "marked up" change was found that had not been subject to appropriate design change or drawing change procedures. This was identified as a nonconformance (see B.4 above). A D/N was initiated during the inspection on this subject change. There was also a Parts List, No. 425D369, "Basic AKR Circuit Breaker," Revision 1, with a "marked up" change dated June 28, 1983, which required only one washer, item 59, to be installed; however, the practice was to install two as was originally required by the parts list.

The QCPs and plans were found to be inadequate in describing the inspection activities. This was identified as a nonconformance (see B.5 above). In general, it was found that the QCPs and plans were in need of review and update to reflect current inspection practices. The control of inspection and manufacturing documents was found to be inadequate in that QCPs, MOSs and parts lists were found in the shop which were not the current issues. This was identified as a nonconformance (see B.6.b, c, and d). In addition, an incomplete

procedure and an unapproved plan were found in the shop which was also identified as a nonconformance (see B.6.e and f). In regard to inadequate document control, it was noted that, because the current revision of 11J44.1 was not in use on the shop floor, the final electrical testing of UVTD's for some groups (e.g., No. 13 to 16 and No. 18 to 20) was not to the correct test parameters; e.g., upper dropout voltage was about 5 percent less than required.

Assembly, a continuous by unit process, was controlled by the MOS and the attached drawing and parts lists, which were the station instructions. As a basic breaker was assembled, a shop order summary was attached to a breaker and traveled with it. It was noted that material status was not identified as required by the procedure. MOSs were not used the same way in the assembly area as in the parts fabrication area. This was identified as a nonconformance (see B.7 above).

ANSI N45.2, a commitment of the DEEMO QAM, Section 18, requires that records correctly identify the "as-built" condition of items. It further adds that records should include procedures and instructions for use in control of configuration. It is not clear how PBI and DEEMO comply with this requirement, particularly in regard to such design changes as the closing solenoid arm C-clip replacement with a cotter pin and the teflon bearing sleeve replacement with an all metal bearing. There appears to be no method to identify breakers with such changes except by approximate manufacturing vintage. This will be addressed during a future inspection.

3. Audits (by Wm McNeill): The QAM established that PBI was to be performing internal audits of procedure processes and activities. There were no records of this auditing and this was identified as a nonconformance (see B.8 above) The planning, performance, documentation, reporting, and followup of audits could not be verified because the lack of records of this activity.

4. Nonconforming Materials, Parts, or Components and Corrective Action (by D. Weber):

   a. Nonconformances: The NRC inspector reviewed DEEMO QAM, Section 16, Revision 1, "Nonconforming Items," 5 PBI and DEEMO QCPs and related log books, 6 inspection reports, 2 assembly D/Ns, and 12 D/Ns. The DEEMO QCP 16B1.1, Revision 2, "Deviation Notice Use" was found not to be fully implemented in that the information on the D/N forms and in the D/N log had not been recorded per the procedure. This has been identified as a nonconformance (see B.11 above).

b. Corrective Actions: The NRC inspector reviewed DEEMO QAM 17, Revision 1, "Corrective Actions," PBI QCP 15.5 regarding CANs, the CAN log, and 5 CANs. It was found that PBI was not in full compliance with the QAM and the related QCP in that the measures established to assure that conditions affecting product quality had not been adequately identified, documented, and promptly corrected by the responsible personnel. This was identified as a nonconformance (see B.12 above).

During the review of the D/N files it was observed that the D/N log was missing information for D/Ns 84-005, 006, and 007. The QC manager explained that these D/Ns were reserved for future use. It was noted that the related procedure, DEEMO QCP 16B1.1, Revision 2, does not refer to using D/Ns or the log in this manner.

During review of PBI QCP 15.2, Revision 0, "Inspection Report - PBI," the inspector noted minor deviations in the use of Inspection Report (IR) loop, and IR distribution. This procedure, PBI QCP 15.2, is in need of being reviewed and updated.

During review of the PBI QCP 15.5 the inspector noted minor deviations in coding CANs and each of the five CANs reviewed had minor deviations from the CAN log. The CANs and the log need further review and revision to conform with PBI QCP 15.5.

5. Control of Measuring and Test Equipment (by D. Weber): For electrical equipment calibration, the NRC inspector reviewed Section 13 of the DEEMO QAM, Revision 1, "Control of Measuring and Test Equipment", five QCPs, several calibration reports and operating manuals.

During the review it was noted that the DEEMO QCP 13L1.1 had not been fully implemented. This is documented in nonconformances (see B.9 and 10 above). Regarding the electrical equipment calibration, the QC manager stated that when he received DEEMO QCP 13L1.1, "Control and Calibration of Electrical and Electronic Quality Information Equipment," he interpreted the use of the procedure as a "guide" rather than a formal procedure to be followed in detail. As a result, this procedure has not been fully implemented which accounts for some of the nonconformances. In addition, the following procedures were recently issued and have not been implemented at PBI:

a. DEEMO QCP 13L1.2, "Control of Measuring and Test Equipment," Revision 0, dated February 10, 1984.

b. DEEMO QCP 13L1.3, "Calibration of Low Resistance Measurement Equipment," Revision 1, dated February 27, 1984.

c. DEEMO QCP 13L1.4, "Verification of Accuracy of Timers," Revision 0, dated March 1, 1984.

d. DEEMO QCP 13L44.1, "Calibration of AK Operator Console-Hampden J-20284, J-20285, and J-20285," Revision 0, dated February 29, 1984.

The use of the above procedures will be verified during the next inspection.

6. Handling, Storage, and Shipping (by I. Villalva): The NRC inspector reviewed the following PBI documents addressing the handling, storage, and shipping of components and breakers by PBI:

a. PBI QCP 14.1, "Packaging, Handling, Shipping and Storage - PBI," Revision 0, dated September 23, 1981.

b. SPI-A-20, "Packaging, Handling, Storage and Shipment of CPDD Products," Revision 0, dated March 10, 1978.

Material handling (packaging, handling, and storage) at PBI is controlled by PBI QCP 14.1 and SPI-A-20, and is in keeping with industrial standards and codes for the material in question.

The information contained in the above documents coupled with the examinations by the inspector of storage facilities and handling of materials by PBI is in conformance with the applicable requirements and codes. It is, therefore, concluded that PBI meets the applicable NRC requirements pertaining to handling, storage, and shipping.

7. Control of Special Processes (by I. Villalva):

a. Welding: The NRC inspector reviewed the PBI documents related to welding procedure specifications, welding material control, joint fitup and welding, weld heat treatment, visual examination of welds, special welding applications, and welder qualification methods being used at PBI. Welding procedure specifications used by PBI in production welding were prepared, qualified, and controlled in accordance with the manufacturer's QC program as delineated in the following PBI documents:

(1) QAM-10, "Special Processes," Revision 1, dated November 28, 1983.

(2) DEEMO QCP 10S81.3, "Process Control of Steel Arc Welding," Revision 1, dated March 15, 1984.

(3) DEEMO QCP 2S81.2, "Qualification of Arc Welders," Revision 2, dated November 23, 1983.

(4) Manufacturing process specification P8GHD100, "Gas Tungsten Arc Welding of Low Carbon Steel," Revision 4, dated January 4, 1984.

Since the only welding performed at PBI is TIG or MIG on relatively light weight low carbon steels for which only three sizes of welding wire are used, no special procedures were imposed for controlling welding material. Likewise, since all weldments being performed at PBI were on jigs, joint fitup and welding was not a concern. In the same context, since weldments were being performed on relatively light weight carbon steels using small welding wire, weld heat treatment was not a concern. In addition, no special welding applications were being performed at PBI.

All weldments performed at PBI were visually inspected several times during the course of fabricating the breakers. Control of welding at PBI was in accordance with DEEMO QCP 10S81.3, which assures that welding of steel components conforms to the applicable engineering and Underwriters Laboratory requirements. The NRC inspector visually examined several completed welds for surface finish and appearance; shape and size of fillet welds; and for the absence of surface defects, laps, lack of penetration, lack of fusion, porosity, slag and under cut exceeding prescribed limits.

In addition to the information contained in DEEMO QCP 2S81.2, the NRC inspector confirmed that PBI welders and inspectors have been trained as welders via a 40-hour course and that three welders have been qualified to perform production welds at PBI. Based on the foregoing, it is concluded that PBI meets the applicable NRC requirements pertaining to welding.

b. Qualification of Personnel Performing Special Processes: The NRC inspector reviewed the following PBI documents addressing special processes and the qualification of personnel performing special processes:

(1) QAM-10, "Special Processes," Revision 1, dated November 28, 1983.

(2) PBI QCP 10.1, "Control of Painting Processes - PBI," Revision 0, dated September 23, 1981.

(3) Manufacturing process specification F50HD57, "Electrostatic Spray Application of Powder Paint at Vega Baja, P.R.," 1st Issue dated December 27, 1982.

(4) Manufacturing process specification P10THD2, "Induction Hardening - Vega Baja," PBI, Revision 0, dated October 20, 1980.

(5) Manufacturing process specification P10THD2, "Inducation Hardening - Vega Baja," PBI, Revision 0, dated October 30, 1980.

The only special processes being performed at PBI are chemical cleaning (i.e., phosphitizing in preparation for powder painting); powder painting; brazing; heat treating (induction hardening); and nondestructive examination (Magnaglo), each of which is listed in QAM-10 as a special process. QAM-10 states that control of special processes are established, documented, and verified to assure that operating results comply with the design requirements. QAM-10 stipulates that only operators who have received appropriate training and are qualified can perform special processes.

The only nondestructive examination performed at PBI is magnetic particle by the "Magnaflux-Magnaglo" process. The NRC inspectors were recently informed that the nondestructive examinations performed at PBI are limited to large cranks which are not used in Class 1E breakers. Based on the foregoing, and coupled with the inspector's examination of these processes, it is concluded that PBI meets the applicable NRC requirements related to qualification of personnel performing special processes.

c. Heat Treatment: The only heat treatment performed at PBI is induction hardening coupled with furnace tempering. This heat treatment process is controlled by specific manufacturing processes as described under the test control for qualification of personnel performing special processes.

Other heat treatment required for PBI products is performed by outside vendors. Documents reviewed indicated that vendors performing heat treatment services have been provided with the latest revisions of related drawings and specifications. In addition, per PBI quality control plans (e.g., QCP AKR 30/50 PROP dated February 3, 1984), all heat treated parts processed by vendors are 100 percent inspected for hardness and five samples of each lot are inspected for case depth to assure conformance with the specified requirements. If any one of the case depth samples does not conform to the drawing and/or specification requirements, the entire lot is rejected. Based on the foregoing, coupled with the NRC inspector's examination of test data recorded for several components, it is concluded that PBI meets the applicable NRC requirements pertaining to heat treatment.

d. Control of Other Special Processes: The NRC inspector reviewed the following PBI documents related to control of other special processes:

(1) QAM 10, "Control of Special Processes," Revision 1, dated November 28, 1983.

(2) PBI QCP 10.1, "Control of Painting Process - PBI," Revision 0, dated September 23, 1981.

(3) DEEMO QCP 11C44.1, "Universal Sampling Plans," Revision 0, dated January 27, 1983.

The above documents were reviewed by the NRC inspector to verify that special processes other than welding, nondestructive testing, and heat treating were controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable requirements. Toward this end, the NRC inspector witnessed the performance of the following processes at PBI: (a) chemical cleaning (i.e., phosphitizing in preparation for powder painting); (b) powder painting; and (c) brazing.

PBI QCP-10.1 defines and describes the controls for the powder painting process and the chemical cleaning process (phosphitizing) in preparation for powder painting. Manufacturing process specification F50HD57 provides specific instructions on the powder painting process, including the phosphate coating, application of powder paint, curing of paint, and quality assurance requirements. In examination of records involving the powder painting process, the NRC inspector determined that the methods being used to check the phosphitizing process were not in conformance with those stipulated in PBI QCP 10.1. Accordingly, a nonconformance was issued for this item (see B.13 above).

DEEMO QCP 10S30.1, "Resistance Brazing Process Control," Revision 0, dated February 13, 1984, establishes control measurements and procedures to ensure that the brazing process meets the engineering and quality requirements stipulated in the applicable drawings and specifications. The only heat treating performed at PBI is induction hardening followed by furnace tempering. Typically, induction hardening and tempering at PBI is performed and controlled by manufacturing process documents especially prepared for small complex parts requiring limited surface hardening, such as latches and pawls used in breakers.

Based on the NRC inspector's review of the above documents, except for the nonconformance, coupled with the NRC inspector's witnessing of the aforementioned processes, it is concluded that PBI meets the applicable NRC requirements related to the control of other special processes.

8. Test Control (by I. Villalva): The NRC inspector reviewed the following PBI documents to verify that functional tests of breakers manufactured at PBI are performed in accordance with approved procedures and that the tests confirm that completed breakers perform in accordance with their design requirements:

a. QAM 12, "Test Control," Revision 1, dated November 28, 1983.

b. DEEMO QCP 11K44.1, "AKR 30/50 Circuit Breaker Checklist," Revision 4, dated October 4, 1983.

c. Form QC 245, "AKR Breaker Test Report - Microversatrip Programmer," Revision 0 (no date).

d. DEEMO QCP 11J44.1, "AKR Undervoltge Device Check," Revision 4, dated January 13, 1983.

e. DEEMO QCP 11M44.2, "AKR 30/50 Mechanical Inspection of Basic Breakers," Revision 5, dated February 11, 1983.

The above listed QA and QC documents were reviewed and tests of completed breaker assemblies were witnessed by the NRC inspector. QAM 12 defines the overall test control requirements and the functional responsibilities for assuring that test procedures are documented and includes provisions for assuring that all the prerequisites for a given test have been met. DEEMO QCP 11K44.1 lists all the check points (e.g., breaker pole resistance and calibration check), gages, and references needed to assure the proper operation of AKR 30/50 circuit breakers. Form QC 245 is a similar checklist for assuring that the "Microversatrip Programmer" used on AKR breakers are acceptably tested and documented. DEEMO QCP 11J44.1 defines the quality requirements for the testing of undervoltage devices for AKR breakers, and DEEMO QCP 11M44.2 defines requirements for the mechanical inspection of AKR 30/50 circuit breakers.

Based on the information contained in the above documents, coupled with the results of tests on completed breakers witnessed by the NRC inspector, it is concluded that PBI meets the applicable NRC requirements related to testing of completed parts.

ORGANIZATION: NATIONAL TECHNICAL SYSTEMS
FULLERTON, CALIFORNIA

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The Purchase Order 9370105-14273 (dated April 6, 1983) for honeycomb material testing and several letters dealt with crush velocity deviations. This information documents the appropriate procedure for informing the customer of deviations. No nonconformances were identified.

ORGANIZATION: NUS CORPORATION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900933/84-01	INSPECTION DATE(S): 2/6-7/84	INSPECTION ON-SITE HOURS: 16

CORRESPONDENCE ADDRESS: NUS Corporation
ATTN: Dr. W. J. Gallagher, Senior Vice President
Division Operations
910 Clopper Road
Gaithersburg, Maryland 20878

ORGANIZATIONAL CONTACT: M. R. Booska, Director, Corp. QA-Division Operations
TELEPHONE NUMBER: (301) 258-6000

PRINCIPAL PRODUCT: Engineering consultant activities.

NUCLEAR INDUSTRY ACTIVITY: NUS Corporation has three divisions that are involved in nuclear safety-related projects. The current level and type of activity is approximately as follows: Engineering Division - 18 contracts (piping analysis, fuel storage rack design, control room habitability design, fire protection modifications, equipment evaluation/qualification, system/component performance
(cont. on next page)

ASSIGNED INSPECTOR: J. R. Agee, Equipment Qualification Section (EQS) 3/23/84 Date

OTHER INSPECTOR(S): E. H. Richards, Sandia National Laboratories

APPROVED BY: C. J. Hale for H. S. Phillips, Chief, EQS 3/23/84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was conducted to: (1) evaluate implementation of the QA program and the equipment qualification program, and (2) evaluate action concerning previous inspection findings.

PLANT SITE APPLICABILITY:

This inspection relates to the following plant dockets: 50-358 and 50-359.

ORGANIZATION: NUS CORPORATION
GAITHERSBURG, MARYLAND

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NUCLEAR INDUSTRY ACTIVITY: (cont.)
analysis and design, etc.); Consulting Division - 17 contracts (hazards analysis, system/component/compartment analysis, QA support, control room habitability study, independent review of purchase specifications, etc.); and Environmental Division - 14 contracts (environmental studies, licensing support, meteorological services, radiological services, etc.)

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. ACTION ON PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance, item 1 (Report 99900516/82-01): The NRC inspector examined the QA files concerning project 3366 and verified that the failure of the NUS-Gaithersburg office to receive copies of controlled documents was an isolated incident which was corrected immediately. Following the incident, transmittal forms and document receipt logs were implemented for project document control.

2. (Closed) Nonconformance, item 2 (Report 99900516/82-01): The NRC inspector verified that the records index file had been eliminated and the record logs were being maintained in compliance with the revised QA manual, Sections 17.0, "QA Records," paragraph 17.1, "Idenficiation, Transmittal, Storage and Traceability of QA Records," dated September 30, 1982. All records reviewed had been stamped by the QA department in compliance with document control procedures. All project personnel training records had been consolidated and are located in the QA files in the Gaithersburg office. A review of these training records revealed that project personnel had received project training and orientation including training on recent document control changes.

ORGANIZATION: NUS CORPORATION
GAITHERSBURG, MARYLAND

REPORT NO.: 99900933/84-01	INSPECTION RESULTS:	PAGE 3 of 3

E. OTHER FINDINGS OR COMMENTS:

1. General - The NRC inspector reviewed QA files, training records, and correspondence files including 20 letters concerning implementation of document controls for Project 3366 and 14 distribution records for Project 4074. In addition, the NRC inspector reviewed the QA record log for Project 4074 in which all QA records had been signed-off and stamped by the QA department. No nonconformances were identified.

2. Technical Inspection - The NRC inspector reviewed the project plan for an environmental qualification program for an operating licensee. The environmental qualification program contained requirements for demonstrating qualification of specific equipment. Since NUS does not conduct qualification tests, this review effort was limited to review of equipment qualification records and documentation; for example, the inspector reviewed the qualification review package for ASCO Class 1E solenoid operated valves. In conjunction with this review, NUS assembled the appropriate qualification documents (such as the ASCO Test Report, "Qualification Test of Solenoid Valves," ASCO/AQS 21678/TR) and provided appropriate analysis to justify qualification of ASCO solenoid valve models NP 8316 and NP 8300. Technical items, including margins, dose rates, total doses, and thermal aging calculations, were reviewed. All items reviewed were complete, correct, and in conformance with applicable standards. No nonconformances were identified.

F. EXIT MANAGEMENT MEETING:

The NRC inspector met with members of management on February 7, 1984, at the Gaithersburg, Maryland, office and discussed details of the inspection, including the closeout of the previous inspection findings. Management acknowledged the inspection findings.

ORGANIZATION: PACIFIC AIR PRODUCTS COMPANY
SANTA ANA, CALIFORNIA

REPORT NO.: 99900769/84-01	INSPECTION DATE(S): 4/23-26/84	INSPECTION ON-SITE HOURS: 50

CORRESPONDENCE ADDRESS: Pacific Air Products Company
ATTN: Mr. L. R. Hess
President
3133 W. Harvard Blvd.
Santa Ana, California 92704

ORGANIZATIONAL CONTACT: Mr. J. P. Dodson, Director of Quality Assurance
TELEPHONE NUMBER: (714) 557-1710

PRINCIPAL PRODUCT: Air control equipment.

NUCLEAR INDUSTRY ACTIVITY: Approximately 50 percent.

ASSIGNED INSPECTOR: R. E. Oller — 5-29-84
R. E. Oller, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S): E. L. Burns, Brookhaven National Laboratory

APPROVED BY: C. J. Hale — 5/31/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of a potential 10 CFR Part 21 report by Pacific Air Products Company (PAPCO) with regard to excessive wear in the linear converter mechanical device used on PAPCO dampers in conjunction with ITT actuators. The QA program areas of change control, nonconformances and corrective action, and procurement control were inspected as part of the 10 CFR Part 21 report followup.

PLANT SITE APPLICABILITY:

Excess wear in converters - 50-410, 50-280/281, 50-329/330, 50-413/414, 50-440/441, 50-454/455/456, 50-462, and 50-546/547.

ORGANIZATION: PACIFIC AIR PRODUCTS COMPANY
SANTA ANA, CALIFORNIA

REPORT NO.: 99900769/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraphs 2.0, 8.2, and 8.3 of the PAPCO QA Manual Procedure 15.1, the Corrective Action Request (CAR) form was not used to document the linear converter deficiency evaluated for reportability under 10 CFR Part 21 and no entry concerning this problem was made in the CAR log.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 2.1 of QA Manual Procedure 11.0, the linear converter lubrication test procedure No. 7043-A did not include provisions for assuring that calibrated test equipment was available, such as the caliper depth gauge and torque wrench which were used in the test.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 3.2.a and 3.3.c of QAM Procedure 11.0, the linear converter dry and lubricated test data sheets did not, in all cases, have the signature of the QC supervisor or designee and the test data sheets were not traceable to and identified with the product model number/serial number.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 2.1.b of QAM Procedure 4.0, and paragraph 2.1 of QAM Procedure 7.0, the manufacturers and local suppliers for purchased products specified in the field lubrication procedure No. 7043-PI, identified in PAPCO's 10 CFR Part 21 report (Dow Corning and Motion Industries for Molykote G-N Paste, and Exxon and Bob Smith Oil Company for Unirex N-2 Grease) were not listed on the Approved Vendor List nor did these manufacturers and local suppliers have a previous procurement history with PAPCO.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance A (83-02): PAPCO had failed to recertify an active QC inspector for Level I limited QC examination of subcontractors.

   Review by the NRC inspector during this inspection verified that the PAPCO director of QA recertified the above inspector for the period December 21, 1983, to December 21, 1985. To prevent recurrence this inspector recertification date was matched to the schedule for the other QC inspectors.

2. (Closed) Nonconformance B (83-02): PAPCO failed to initial and date the final documentation inspection operation on production order traveler for PO No. 2072 of Job Order 6009 for shipped SL100 dampers.

   Review by the NRC inspector during this inspection verified that the documentation package for the dampers on PO 2072 was amended and a copy of the corrected traveler was sent to the customer. Review also verified that current shipment documentation packages are being more carefully reviewed, as all signature blocks are now being signed and dated.

3. (Closed) Nonconformance C (83-02): PAPCO failed to reaudit an active supplier of calibration services by November 2, 1983, as required.

   Review during this NRC inspection verified that the subject supplier was reaudited by PAPCO on December 2, 1983. To prevent recurrence the audit schedule for suppliers on the Approved Vendor List is being maintained on a master calendar by the director of QA.

E. OTHER FINDINGS OR COMMENTS:

Excessive Bushing Wear in Linear Converters Used With ITT Actuators on HVAC Dampers: PAPCO notified the NRC on January 16 and 17, 1984, of possible excessive wear in their SL100LC linear converter device which could affect its intended operability. This mechanical device converts the push-pull motion of an ITT electrohydraulic actuator into a rotary motion to operate HVAC dampers. PAPCO has supplied approximately 768 of these converters mounted to ITT actuators since 1978, to nine nuclear power customers, two nonnuclear power customers, and one nuclear fuel facility. PAPCO conducted in-house evaluation testing of the defect and on March 9 and 28, 1984, notified the NRC with their interim and final reports of the results

of their evaluation and final conclusions. The initial, interim, and final notifications were also made to all of their affected customers.

By review of records and interview with PAPCO personnel, the NRC inspectors verified that information supplied in the January 17, March 9, and March 28, 1984, 10 CFR Part 21 reports was accurate and complete in regard to the identified deficiency. Laboratory tests conducted by PAPCO determined that the excessive wear in the shaft guides and bearings of the converter was due to cycling many more times than original design had considered to be the life span of the unit. This was due to a converter/system "hunting" condition. PAPCO concluded that no generic defect exists in the converter.

The NRC inspectors verified that PAPCO has taken the following action: (a) provided adequate notification of test results to all customers; (b) provided them with a field lubrication procedure; (c) provided them with maintenance information and alternate lubrication options, and (d) advised them of the actuator/system "hunting" condition that could affect their plant.

During this NRC review, it was verified that the Byron/Braidwood nuclear power stations, major users of the SL100LC converters, has authorized PAPCO to initiate a rebuild of all of their converters using PAPCO recommended and approved lubricant for bronze guides and bearings. This program will require that PAPCO process the change through their engineering change system. Since this action is pending by PAPCO, the results should be followed up during a future NRC inspection.

This inspection/followup of PAPCO's 10 CFR Part 21 report included their QA program areas of change control, nonconformances and corrective action, and procurement control. This inspection was achieved through discussions, observations, and review of: (a) QA manual; (b) PAPCO's notification documents to all affected customers; (c) internal memorandum; (d) customer purchase order change; (e) audit/survey schedule and checklist records; (f) investigative and trip reports; (g) procedures; (h) converter test data sheets; (i) letters; (j) specifications; (k) approved vendor list; (l) calibration and certification records, and (m) a corrective action request log.

Within this area, four nonconformances were identified. These items are identified in paragraph B above.

ORGANIZATION: POWER BREAKERS, INC.
VEGA BAJA, PUERTO RICO

REPORT NO.: 99900832/84-01	INSPECTION DATE(S): 3/5-9/84	INSPECTION ON-SITE HOURS: 120

CORRESPONDENCE ADDRESS: Power Breakers, Inc.
ATTN: Mr. J. Jerse
President and Plant Manager
P. O. Box 4356
Vega Baja, Puerto Rico 00764

ORGANIZATIONAL CONTACT: Mr. Juan Fuentes, QC Manager
TELEPHONE NUMBER: (809) 858-2120

PRINCIPAL PRODUCT: Circuit breakers.

NUCLEAR INDUSTRY ACTIVITY: Less than 1 percent of the total work involves nuclear safety-related equipment.

ASSIGNED INSPECTOR: Wm. McNeill — 6-4-84
Wm. McNeill, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S): D. A. Weber, EG&G
I. Villalva, Event Analysis Branch

APPROVED BY: C. J. Hale — 6/4/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: A programmatic evaluation of the entire QA program and the status of previous inspection findings.

PLANT SITE APPLICABILITY:

Not applicable.

ORGANIZATION: POWER BREAKERS, INC.
VEGA BAJA, PUERTO RICO

REPORT NO.: 99900832/84-01	INSPECTION RESULTS:	PAGE 2 of 21

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Appendix B to 10 CFR Part 50 and Quality Control Procedure (QCP) 20.1, the "Quality Control Program Description" did not define the Distribution Equipment Engineering and Manufacturing Operation (DEEMO) QCPs, division procedures, etc., that are applicable to the Power Breakers, Inc. (PBI) QA program.

2. Contrary to Appendix B to 10 CFR Part 50 and paragraph II.E of Section 2 in the DEEMO Quality Assurance Manual (QAM), documentation was not on file that would demonstrate training of QC and non-QC PBI personnel (e.g., management, purchasing, engineering, etc.) to applicable sections of the QA program as defined by the QAM, applicable PBI and DEEMO QCPs, or other procedures.

3. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.D. of Section 11 in the DEEMO QAM, in the assembly area of the plant there was no documentation which would demonstrate the QC inprocess checks required by planning were indeed performed. In addition, the adequacy of reviews was questionable in that it was noted the lot checks required by planning were not feasible because continuous processing was established in this area.

4. Contrary to Appendix B to 10 CFR Part 50 and paragraph II of Section 4 in the DEEMO QAM, a design change, the addition of washers, was noted marked up on the "Basic AKR Circuit Breaker," Drawing No. 425D369, Revision 6, dated January 25, 1983; however, there was no controlled design change documentation for this design change.

5. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.B of Section 6 in the DEEMO QAM, documentation, namely some QCPs and QC plans, were not clear, concise, and adequate so as to accomplish the particular activity in an effective manner. Examples of this were:

   a. The QC plan for the "Front Frame and Mechanism" (425D406P1) describes an activity, torque verification of item 18, charging crank screws that is not done at that station but performed at the "Basic AKR Circuit Breaker" (425D369) station.

b. The DEEMO QCP 11M44.2 describes steps (e.g., G, M.1, P, Q, R.1, R.2 and S) of inspection activities not performed at that station, but elsewhere.

c. The DEEMO QCP 11M44.2 step 0.1 describes an acceptance criteria of 1/16" which does not agree with the drawing requirement of .020" for a gap dimension.

d. The DEEMO QCP 15K44.3 does not cross reference another applicable QCP 12L92.1.

e. The "AKR 30/50 Circuit Breaker Checklist" identifies an outline test fixture (K2-18E) to be used, not the fixture presently in use and reportedly correct as TL673D0500-1.

f. The DEEMO QCP 11M44.5 on the outline test fixture describes activities not performed; e.g., steps B and G.

g. The DEEMO QC plan for "Front Frame" (568B547P1 (Gp1)) does not address the verification or checking of the programmer's mount plate.

6. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.A of Section 7 in the DEEMO QAM, documents were not controlled sufficiently to assure requirements were communicated to responsible personnel. Examples of this were:

a. Some PBI QCPs were referenced in the PBI QCP index; however, copies were not on file; e.g., QCPs 6.1 and 18.1.

b. Four of the nine sampled DEEMO QCPs found in the shop were not the current revision as reported by DEEMO Plainville; e.g., 15K44.3, 15K44.1, 11J44.1 and 11M44.5. Note that two of these were not even current in the PBI master file; e.g., 15K44.3 and 15K44.1.

c. One of the seven sampled "Manufacturing Operation Sequences" (MOSs) found in use in the shop was not the current revision as compared to the PBI office master file; e.g., 425D406, "Front Frame and Mechanism." In addition, another MOS which was not current was found at the station for "Side Frames," 139C4617G1.

d. One of the 38 sampled parts lists found in the shop was not the current revision as reported by DEEMO; e.g., 425D369, Section J, page 3.

e. Table 2 of DEEMO QCP 15K44.1 was not found in the shop at the work stations.

f. QC plans were found which were revised and not approved; e.g., "Plate," 192A9502PZ was reviewed on December 1, 1983, but last approved on August 1, 1983.

Note that in regard to QCP 11J44.1, the incorrect revision of this procedure being at the work station had resulted in incorrect test parameters for some groups of undervoltage trip devices (UVTDs) (e.g., groups 18 through 20 and 13 through 16) being in place at final electrical testing.

7. Contrary to Appendix B to 10 CFR Part 50 and paragraph 2.IV of PBI QCP 8.1, a review of MOSs in the assembly area found that conforming material was being processed at subsequent steps without the MOS being stamped by the inspector.

8. Contrary to Appendix B to 10 CFR Part 50 and paragraph I.C of Section 19 in the DEEMO QAM, there was no documentation of the PBI internal audits, checklists, schedule or findings that would demonstrate that auditing was performed as required.

9. Contrary to Appendix B to 10 CFR Part 50 and paragraph 5 of DEEMO QCP 13L1.1, the measures taken for control and calibration of electrical test equipment were found to be ineffective in that: (a) the master list format in use was different than required by the procedure; (b) the equipment was not listed sequentially; (c) all items on the master list were overdue for calibration; and (d) history cards for test equipment with property tag Nos. 395, 434, 651, and 751 were available; however, these items were not on the master list.

10. Contrary to Appendix B to 10 CFR Part 50 and paragraph 6 of DEEMO QCP 13L1.1, many of the data sheets were not filled out in accordance with paragraphs 6.1 through 6.5. For example, paragraph 6.5 requires recording of the meter accuracy on the "Calibration History Cards" (CHCs). None of the CHCs reviewed showed the meter accuracy in the space provided. In addition, the reading of the transfer standard and meters being calibrated were not recorded on the CHCs for property tag Nos. 434, 751, 107, and others. The statement in

paragraph 6.6 referring to paragraph 7.2 for the number of scale points to be checked was in error. Paragraph 7.2 was titled, "Storage and Usage of Transfer Standards." Paragraph 8 identifies the points to be calibrated, usually at 20, 40, 60, 80, and 100 percent of full scale. The few history cards that contained recorded calibration points only listed one to four points and the percent of full scale was not listed. One example is the data sheet for property tag No. 528. Most of the CHCs did not include the serial number of the standard used; e.g. Nos. 107, 395, 434, 528, 651 and 751.

11. Contrary to Appendix B to 10 CFR Part 50 and paragraph III of DEEMO QCP 16B1.1, it was found that QCP 16B1.1 had not been fully implemented in that: (a) at least one deviation notice (D/N) No. 84-012 did not have a description; (b) D/Ns 84-003 and -011 through -015 contained weights or quantities in the blanks required to show the estimated time periods the deviation was to be in effect; and (c) D/Ns 84-005, -006, and -007 were not recorded in the D/N log.

12. Contrary to Appendix B to 10 CFR Part 50 and paragraph 4 of PBI QCP 15.5, it was found that the measures established to assure that conditions affecting product quality had been adequately identified, documented, and promptly corrected by the responsible personnel were not fully implemented in that: (a) none of the corrective action notices (CANs) listed in the CAN log showed an "Actual Completion Date" even though there was evidence that at least one of the CANs (PBI-004) had been closed out; (b) there was no evidence that a copy of the CAN log had been sent monthly to the Manager-Quality Assurance; and (c) there was no evidence that CANs PBI-001 and -003 had been reviewed by the Manager-Quality Assurance, even though they were open longer than 3 months.

13. Contrary to Appendix B to 10 CFR Part 50 and PBI QCP 10.1, the "specific gravity" and "titer" checks were only being conducted every 2 weeks. This determination was based on the NRC inspector's examination of test data that indicated such checks were only conducted on a biweekly basis rather than the required semiweekly basis.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (83-01, Item A): PBI had not adopted procedures to provide for: (a) evaluating deviations, (b) causing deviations to be evaluated, or (c) assuring that a director or responsible officer is informed if a basic component fails to comply or contains a defect.

   The DEEMO QCP 3.01 has been applied to PBI. This procedure, the same as used by DEEMO Plainville, provides for evaluation of deviations and reporting of defects to the NRC. To date, PBI has not had the occasion to implement this procedure. A DEEMO audit of November 29 to December 2, 1983, verified implementation of this corrective action.

2. (Closed) Violation (83-01, Item B): PBI had not posted: (a) a copy of 10 CFR Part 21, (b) Section 206 of the Energy Reorganization Act of 1974, (c) procedures adopted pursuant to the regulations, or (d) a notice describing the regulations and procedures.

   A posting of Section 206 of the Energy Reorganization Act of 1974 and a notice which referenced the procedures which describe 10 CFR Part 21 and the individuals to whom reports are to be made was found at various locations within the PBI shop.

3. (Closed) Nonconformance (83-01, Item A): Inspections were not identified on the "Final Breaker Checklist" to verify the adequacy of installation for items mounted after the basic AKR-30/-50 breaker assembly; i.e., no requirement was included for verification of applied torque to fasteners.

   The checklist in question (11K44.1) has been revised. Step 44 has been added which requires accessible lockwashers and screws are to be verified to be properly torqued and secured. The implementation of this inspection was verified on several checklists by noting inspector stamp off of that step.

4. (Closed) Nonconformance (83-01, Item B): Certain assembly operations were not fully controlled in accordance with drawings, bills of material, MOSs, and "Operating Instructions Sequence Sheets" (OISs), as evidenced by the following examples:

   a. Certain OISs which were referenced by MOSs were not available. It was additionally noted that conflicting information was present.

project applicability of the nonconformances identified in the 5 audits were not discussed in the periodic QA coordinator's meetings.

S&L subsequently performed a review of the client audits not documented in QA coordination section meeting notes from March 1982 through March 1983. These audit findings were reviewed relative to possible impact on other projects along with action taken or to be taken. Responsibility for investigative action needed on certain reviewed client audit findings was directed to the QA coordination section. Specific investigative responsibility and their subsequent status are coordinated through a computerized mapper system. The NRC inspector reviewed all subsequent project coordination meeting notes and found that all client audit findings during this time frame were discussed and that coordinator investigative responsibilities were assigned. The inspector also verified that an emphasis to all QA coordinators of the need to fully comply with the requirements of Internal Procedure PCIP-11, "Nonconformance Investigation," was documented in QA coordination section meeting notes.

2. (Closed) Nonconformance (83-02): Project file indexes for the Electrical Project Engineering Division and Geotechnical Division on the Zimmer project and the Electrical Analytical Division on the Marble Hill project were not contained in the Quality Assurance (QA) Records Section files.

   Zimmer and Marble Hill design activities have ceased at S&L and this problem does appear to relate to other project activities. All items pertaining to these projects are regarded as closed unless at some future date the projects should be reactivated. At that time these items would be reopened.

3. (Closed) Nonconformance (83-02): There was no evidence that the Project Distribution Lists were updated quarterly or memoranda issued for the Zimmer, Byron/Braidwood, and LaSalle projects.

   The NRC inspector reviewed documentation gathered by S&L addressing this specific finding. It was determined by the inspector that this documentation provided evidence that, for the Byron/Braidwood and LaSalle projects, the requirements of Section 4.0 of GQ-6.01, Revision 5, "Project Distribution List and Project File Indexes," are being met. Since design activities have ceased for the Zimmer project, this item is regarded as closed unless at a future date the project is reactivated. At that time this item would be reopened.

4. (Closed) Nonconformance (83-02): Department standards books, project instruction books, and project procedures were not being maintained with current document issues for various projects/divisions.

   Department standards books, project instruction books, and project procedures pertaining to projects other than Zimmer and Marble Hill were reviewed and found to be current. This item is considered closed for Zimmer and Marble Hill since design activities have ceased for those projects. If at some future date those projects are reactivated, this item will be reopened. The inspector verified that memoranda had been sent to persons responsible for updating the various manuals, instructing them on promptness of update actions.

5. (Closed) Nonconformance (83-02): The Design Support Section on the LaSalle, Unit 2, project did not notify the Head, Quality Assurance Division that a procedural violation had occurred in the processing of calculations and drawings for a number of support drawings issued during August and September 1982.

   The NRC inspector verified that the Head, Quality Assurance Division issued a memorandum to all department managers requesting they make sure personnel report apparent nonconformances in accordance with Procedure GQ-16.01.

6. (Closed) Nonconformance (83-02): Small bore piping support drawings M-1RH41001G, Revision C and M-1RH41002G, Revision C, were not prepared in accordance with the available design input on the Clinton project.

   Beam stiffeners, as required by design calculations, were not included on certain pipe support drawings (Clinton project). A subsequent review by S&L showed that stiffeners are not actually needed and the hardware shown on the drawings is adequate. A followup survey of related calculations and drawings was performed on the various S&L projects and, although some calculation errors were found, no hardware changes were required on any of the drawings.

7. (Closed) Violation (83-03): S&L did not impose 10 CFR Part 21 on the vendor of a proprietary computer program (ANSYS) procured by S&L and used as a design tool for safety-related components and systems.

By letter dated October 12, 1983, S&L stated that the computer program ANSYS had been procured as a commercial grade item which is exempt from the provisions of 10 CFR Part 21. By letter dated November 28, 1983, NRC agreed that this position is possible and that this item would be inspected in more detail for testing, certification, control and error notification. Subsequently, S&L has imposed 10 CFR Part 21 on the computer program vendor. This item is considered closed.

8. (Closed) Nonconformance (83-03): Applicable QA program provisions were not imposed on a proprietary computer program (ANSYS).

   By letter dated October 12, 1983, S&L stated that the program ANSYS is treated as a commercial grade item and, after verification, is dedicated for use in design. By letter dated November 28, 1983, NRC agreed that this is possible and that testing, certification, control, and error notification of this computer program would be subsequently reviewed. The NRC inspector reviewed those items concerning this computer program and found them satisfactory. This item is considered closed.

9. (Open) Nonconformance (83-03): The design input pressure of 2.52 psi was not incorporated into the design of diesel exhaust piping system A (Byron/Braidwood) and the flexibility of the expansion bellows was not considered in the design method (Fermi 2). Review of S&L corrective action revealed the following:

   a. Byron/Braidwood Project: The formal stress report which incorporates the back pressure of 2.52 psi due to tornado missile effect, was not completed on September 9, 1983, as indicated in the S&L response to the NRC Inspection Report No. 83-03. The above report was issued on January 30, 1984, however, S&L did not give it to the NRC inspector until late in the afternoon of February 2, 1984, which was the last day of the active inspection period. This report will be reviewed in a future inspection.

   b. Fermi 2 Project: S&L has reanalyzed the diesel generator exhaust piping system to incorporate the flexibility of the bellows. As a result, S&L found that some hardware changes in the piping support system are required to accommodate the additional force to the system. S&L did not complete the design

of the additional lateral supports as indicated in the corrective action as described in the S&L response letter to NRC dated October 12, 1983.

Within this area of inspection, one nonconformance was identified (see Section B).

10. (Closed) Nonconformance (83-03): Corrective action taken regarding analysis and design of diesel exhaust piping system was not reported to the appropriate level of S&L management, nor was the nonconformance in modeling the flexible bellows reported to the Head, Quality Assurance Division (Clinton project).

    A Region III inspection report dated January 18, 1983, concerning a Clinton site inspection in November 1982 was sent to S&L by the licensee. In response, S&L advised the licensee by letter dated February 4, 1983, of the corrective action taken. Project management at S&L was aware of the above action. Since the finding had already been identified by NRC, project management considered it unnecessary to report it under S&L's QA Procedure GQ-16.01. The design director reviewed other projects for the basic identified nonconformance and found that other projects were adequate.

    The QA Division is now reviewing documentation of reviews as they are submitted to assure that adequate generic action is taken.

11. (Open) Nonconformance (83-03): A temperature value of 745° F was used in the calculation file dated February 28, 1983, for the diesel exhaust system DG-06A; however, the piping line list dated February 2, 1983, which was referenced in the above calculation file, listed a temperature value of 823° F (Clinton project).

    S&L subsequently corrected the piping line list to show that the correct value of temperature for the division 3DG exhaust is 745° F. In addition, S&L also initiated a special generic audit on January 6, 1984, to investigate the control of piping line list for other major projects such as Byron/Braidwood, LaSalle, and Fermi. Since the audit was not completed, the NRC inspector will review the audit in a future inspection.

E. OTHER FINDINGS OR COMMENTS:

1. Branch Piping Analysis Problem With S&L Methodology: As a result of an NRC Region III inspection conducted on February 9-12, 16-19, 23, 24, and March 5, 1982, the Region III inspector expressed concern with the S&L practice of disregarding the areas where piping header to branch moment of inertia ratios are 7 to 1 or more. This could result in, for example:

   a. Equipment nozzle loading increases exceeding the manufacturer's established values; and

   b. Header support and restraint load increases of more than 10 percent requiring evaluation by S&L's design engineering department.

   Certain design calculations were reviewed and S&L committed on March 1, 1982, to perform the following additional analyses:

   a. For branch connections that are near the rotational equipment, such as pumps and turbines, except for branch lines 2" or smaller and where supports or restraints are located at the headings or near the branch connections; and

   b. For five branch connections with close header/branch moment of inertia ratios S&L indicated that they would reanalyze the lines to include the entire piping subsystems.

   On April 30, 1982, S&L completed these analyses and reported that, for those systems analyzed, 80 percent of the restraints had a decrease in loading and 10 percent had an increase in loading with all designs being adequate. This conclusion is also supported in a study by the Office of Nuclear Reactor Regulation (reported in memo dated December 1, 1980, Bosnak to Jordan). It was concluded that the procedure to neglect the effect of branch lines in the analysis of main piping runs when the ratio of moments of inertia is 7 to 1 or greater, is appropriate and widely adopted throughout the industry. This item is considered closed.

2. Main Steam Line Design (Zimmer Project): In NRC Inspection Report No. 99900507/83-03, it was noted that an outstanding item existed regarding the protection of the main steam line from nonseismic structures. Since all design activities relating to Zimmer have ceased, this item is regarded as closed. If at a future date the project is reactivated, this item will be reopened.

3. Calculations: In NRC Inspection Report No. 99900507/83-02 it was stated that S&L had identified the general area of review of drawings and calculations through the nonconformance trending program as an area needing improvement. It was also stated that this area would be monitored during future inspections.

   During these inspections the NRC inspector examined eight design calculations and affected drawings in the area of pipe supports for the LaSalle project. It was found that the above eight calculations were approved prior to the issuance of the associated support drawings. On the basis of this examination, it is concluded that S&L has taken necessary steps for improving the control of design calculations and drawings to assure that calculations be approved prior to the issuance of the affected design drawings, and this item is considered closed.

4. Small Bore Pipe Analyses: Small bore pipe supports/pipe analyses were reviewed by our consultant who concluded that the designs were adequate to meet the requirements of the ASME Code, Section III. Earthquake response spectra peaks were adequately broadened and correct damping values were used. It had been the inspector's concern that neglecting the compliance of the small bore pipe supports would seriously affect the design of small bore piping. It was, however, concluded by our consultant that this did not significantly affect the adequacy of small bore piping and supports. This item is considered closed.

F. EQUIPMENT QUALIFICATION PROGRAM INSPECTION RESULTS:

1. Quality Assurance Program Review: The QA program is described in the "Quality Assurance Manual" (QAM) which includes the "Sargent and Lundy Quality Assurance Program Topical Report" (TR), SL-TR-1A. The QAM and TR established a QA program in accordance with the applicable 18 criteria of 10 CFR Part 50, Appendix B. The NRC inspector's review of the QA program consisted of an examination and evaluation of the QAM relative to the EQ work being performed by S&L. No nonconformances were identified.

2. Supplemental Procedures Review: The NRC inspector reviewed and evaluated 15 procedures that related to S&L's EQ activities. This review and evaluation determined that formal documented procedures for the control of EQ activities were established. No nonconformances were identified.

3. QA Program Implementation Review: The NRC inspector verified the implementation of EQ related QA program procedures by examining representative records and files and conducting interviews with personnel.

Findings relative to EQ activities, concerning the implementation of the applicable 18 criteria of 10 CFR Part 50, Appendix B, as described in the QAM and implementing procedures, are as follows:

a. Organization: The NRC inspector evaluated the Component Qualification Division's (CQD) organizational structure including functional responsibilities and authorities by discussing them with CQD and QA personnel and by reviewing organization charts, staffing charts, and the QAM. The CQD, which is in the Mechanical Engineering Department, performs its EQ functions by providing technical support to each S&L nuclear project office. No nonconformances were identified.

b. QA Program: The NRC inspector evaluated this criterion by verifying that a QA program was established by the QAM and by verifying the implementation of the applicable 18 criteria of 10 CFR Part 50, Appendix B. The inspector reviewed and evaluated two procedures, one file, and three books to verify that EQ training requirements of the QA program were being accomplished. No nonconformances were identified.

c. Design Control: The NRC inspector's review and evaluation established that S&L EQ design activities included CQD input into design specifications, bid package preparations, and proposal evaluations for S&L clients (licensees). S&L also reviews and evaluates all EQ data provided by EQ component vendors for S&L client contracts with vendors. S&L determines, for its clients, if the EQ data provided is adequate and acceptable to show component qualification. The inspector verified the implementation of this criterion by discussion with 6 personnel and by review and evaluation of 12 procedures, 7 internal memos, 1 letter, 2 meeting minutes, 2 contract proposals, 1 specification, and 3 proposal evaluation forms. No nonconformances were identified.

d. Instructions, Procedures, and Drawings: The NRC inspector evaluated the implementation of S&L procedures, as they relate to this criterion, by review and examination of the QAM, 15 procedures, 1 specification, 6 forms, 4 files, and 3 books. No nonconformances were identified.

e. Document Control: The NRC inspector evaluated the implementation of this criterion by review and examination of 15 procedures, 6 forms, 1 specification, and 4 files. Documents reviewed showed that they were approved and released by appropriate authorities. No nonconformances were identified.

f. Areas Considered Not Applicable: The NRC inspector determined that the following criteria were not applicable to S&L's EQ activities.

(1) procurement document control

(2) control of purchased material, equipment, and services

(3) identification and control of materials, parts, and components

(4) control of special processes

(5) inspection

(6) test control

(7) control of measuring and test equipment

(8) handling, storage, and shipping

(9) inspection, test, and operating status

(10) nonconforming materials, parts, or components

g. Areas Not Evaluated: The NRC inspector did not evaluate the criteria of corrective action, QA, and audits relative to S&L's EQ activities; however, previous Vendor Program Branch inspections have evaluated the implementation of these criteria relative to the overall QA program.

4. Technical Evaluation of EQ:

a. Review of Test Plans/Procedures and Supporting Documents: The NRC consultant/inspector reviewed the S&L Mechanical Administrative Standards and Project Instructions which include EQ procedures for S&L. S&L does not conduct tests and no test plans were reviewed by the consultant/inspector.

b. Observation of Testing Activities: No testing activities were observed during the inspection.

c. Review of EQ Records and Documentation: The NRC consultant/inspector reviewed seven S&L generated EQ reports:

(1) CQD-001983 Low Voltage Power and Control Cable

(2) CQD-002211 Instrumentation Cable

(3) CQD-002212 Coaxial and Triaxial Cable

(4) CQD-002376 Solenoid Pilot Valve

(5) CQD-001982 Medium Voltage Power Electrical Penetration

(6) CQD-003586 Valve Operator

(7) CQD-010113 Pressure and Vacuum Switch

These reports included equipment design specifications, test reports, and other supporting documents to verify compliance with the technical procurement specifications prepared by S&L. The NRC consultant/inspector conducted a technical examination of the specifications to ascertain if design requirements were appropriate for the intended usage.

The S&L qualification reports on cables were reviewed in detail for their technical content. Client purchase orders (POs) to the cable suppliers were examined, as was a client PO to a test lab for an independent review of manufacturer's test reports and data. The test lab's independent review of the qualification status of the cables was examined by the NRC consultant/inspector. A technical assessment of the available information indicated that the qualification status asserted by the three S&L

cable qualification reports was acceptable. The same was true for the four equipment types other than cables which were reviewed. No nonconformances were identified.

ORGANIZATION: SORRENTO ELECTRONICS, INC.
SUBSIDIARY OF GA TECHNOLOGIES, INC.
SAN DIEGO, CALIFORNIA

REPORT NO.: 99900387/84-01	INSPECTION DATE(S): 4/23-27/84	INSPECTION ON-SITE HOURS: 64

CORRESPONDENCE ADDRESS: Sorrento Electronics, Inc.
Subsidiary of GA Technologies, Inc.
ATTN: Mr. I. Bijarchi, President and General Manager
P.O. Box 85608
San Diego, California 92138

ORGANIZATIONAL CONTACT: Mr. M. L. Jones, Manager, Quality Assurance
TELEPHONE NUMBER: (619) 457-8833

PRINCIPAL PRODUCT: Nuclear instrumentation including radiation monitors.

NUCLEAR INDUSTRY ACTIVITY: Electronics Systems Division (ESD), [formerly a part of the Products Division of GA Technologies, Inc. (GA), now a part of Sorrento Electronics, Inc. (SEI), a subsidiary of GA] supplies gas or area radiation monitors and liquid or process radiation monitors to approximately 50 reactor sites. Some of the equipment is safety-related.

ASSIGNED INSPECTOR: G. T. Hubbard, Equipment Qualification Section (EQS) — Date: 6/8/84

OTHER INSPECTOR(S): J. J. Benson, Sandia National Laboratories

APPROVED BY: C. J. Hale, (Acting) Chief, EQS — Date: 6/8/84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection consisted of: (1) a review of the 18 criteria of 10 CFR Part 50, Appendix B described in the ESD quality manual (QM); (2) verification that the applicable criteria of the quality assurance (QA) program had been implemented in compliance with their written procedures; (3) verification of the implementation of the corrective action on the nonconformances of NRC Inspection Report No. 99900387/83-01;
(continued on next page)

PLANT SITE APPLICABILITY:
Docket Nos. 50-528, 50-529, 50-530, 50-445, 50-446, 50-483, 50-482, 50-382, 50-438, 50-439, 50-454, 50-455, 50-456, 50-457, 50-546, 50-547, 50-443, 50-444, 50-352, 50-353, 50-400, 50-401, 50-312, 50-335, 50-389, 50-263, 50-286, 50-247, 50-206, 50-361, 50-362, 50-373, 50-374, 50-317, 50-318, 50-213, 50-324, 50-325, 50-329, 50-330, 50-295, and 50-304

ORGANIZATION: SORRENTO ELECTRONICS, INC.
SUBSIDIARY OF GA TECHNOLOGIES, INC.
SAN DIEGO, CALIFORNIA

REPORT NO.: 99900387/84-01	INSPECTION RESULTS:	PAGE 2 of 10

SCOPE: (continued) (4) examination of SEI/ESD's actions relative to a 10 CFR Part 50.55(e) report issued by Arizona Public Service Company (APS) concerning engineered safety feature (ESF) actuation power supplies that did not meet specification; and (5) examination of SEI/ESD's actions relative to a 10 CFR Part 50.55(e) report issued by Florida Power and Light Company (FP&L) concerning RM23 radiation monitoring system (RMS) display channel "lock-up."

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to the GA letter to the NRC dated May 18, 1983, GA did not generate or implement a quality control instruction (QCI) to provide monthly quality evaluation reports for trend analysis nor did they complete, by May 31, 1983, documented training for their personnel concerning the documentation requirements for assigning a subassembly to a top assembly when the subassembly is still open.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, documented procedures or instructions were not developed and implemented for equipment qualification (EQ) activities which assure that all EQ activities are satisfactorily accomplished. Examples where there were inadequate controls or documentation of EQ efforts due to a lack of procedures are as follows:

   a. Discrepancy record sheets were not signed off in all cases for qualification report (QR) E-254-960, Appendix 1, dated May 1, 1981.

   b. Two hours of a loss-of-coolant accident (LOCA) test were deleted during the test reported in QR E-254-960, without any documented evidence of approval of the test deletion.

   c. QR E-254-960, Appendix 8A, lists aging times for various components (relays, transformers, solenoids, etc.); however, aging temperatures were not documented.

   d. IEEE-STD-323/1974 requires that test margins be considered during EQ testing; however, SEI's approach to margin is not clearly defined in their qualification data packages.

3. Contrary to Criterion XI of Appendix B to 10 CFR Part 50, the Shelton Laboratories Model 2040 oven used for accelerated thermal aging of safety-related equipment had no procedures for temperature/time charts that would document evidence of actual temperatures and times the equipment was aged.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-01): Referenced discussions did not assure adherence to stipulated test methods and entries.

   The NRC inspector reviewed and evaluated test procedures for two area monitors, two training records, the test engineering training schedule, one letter of task assignment, and one quality assurance representative (QAR) observation report to verify adequate corrective action (CA) with regard to this nonconformance.

2. (Closed) Nonconformance (83-01): Reassignment of the document issuing function to product quality did not prevent recurrence of the problem as evidenced by the NRC inspector's identification of one traveler in a sample of three containing inappropriate document numbers.

   The NRC inspector reviewed and evaluated one QCI, eight job travelers, two training records, one letter of task assignment, and one QAR observation report to verify adequate CA on this nonconformance.

3. (Closed) Nonconformance (83-01): The series of retraining sessions did not provide clear direction concerning cleanup sheets (CUSs).

   The NRC inspector reviewed and evaluated eight job travelers, four CUSs, five training records, the test engineering training schedule, one letter of task assignment, and one QAR observation report to verify adequate CA on this nonconformance.

4. (Closed) Nonconformance (83-01): There was no documented plan addressing the trend analysis or monthly evaluation of discrepancies.

   No QCI had been generated or implemented as committed, therefore, the nonconformance described in paragraph B.1 was identified by the NRC inspector.

5. (Closed) Nonconformance (83-01): Quality engineering concurrence had not been obtained on CUS No. 9499 for the repair of an offline gamma monitor, 0365-2901-001.

   The NRC inspector reviewed and evaluated four CUSs, three training records, the quality control training schedule, one QAR observation report, and one letter of task assignment to verify adequate CA on this nonconformance.

6. (Closed) Nonconformance (83-01): Testing for subassembly RD-8 was completed and the subassembly installed in a top assembly 0365-4401-001 without the subassembly final testing operation (No. 2100) being signed on its traveler.

   The NRC inspector's review and evaluation of two travelers, one shortage sheet, five training records, four training schedules, one letter of task assignment, and one QAP observation report identified that the training of manufacturing, test engineering, production control, and quality control personnel was not completed by May 31, 1983, as committed, but was completed September 16, 1983. The nonconformance described in paragraph B.1 was identified.

7. (Closed) Nonconformance (83-01): No evidence was made available to the NRC inspector to indicate that a documented investigation had been made in regard to determining the quality status of voltmeters (and, if applicable, products inspected by these voltmeters) which had been calibrated with an unacceptable primary standard.

   The NRC inspector reviewed and evaluated one letter, one training record, two calibration reports, and four instrumentation calibration records to verify adequate CA on this nonconformance.

8. (Closed) Nonconformance (83-01): (a) Audit results were not formally documented for June 11 to July 10, 1982; (b) followup actions were not taken in regard to the findings made during an audit performed in 1982 of Section 1 of the QM; and (c) during 1982, only 6 of the 18 QM sections were audited.

   The NRC inspector reviewed and evaluated three audit reports, one followup audit report, one work assignment letter, three auditor certifications, one lead auditor certification, one file of QA training records, and the 1983 audit schedule and dates of actual audit completions to verify adequate CA on this nonconformance.

E. OTHER FINDINGS OR COMMENTS:

1. Equipment Qualification Program: SEI/ESD's EQ activities involve generic testing of radiation monitors, with plant specific qualification requirements being justified by engineering analysis or additional tests as necessary. SEI/ESD performs operational and functional tests, thermal aging, and radiation aging inhouse. Seismic and LOCA enrivonmental simulation tests are conducted by outside test laboratories with close SEI/ESD supervision.

2. QA Manual Review: The SEI/ESD QA program is described in the QM which is supported by supplemental procedures which provide detailed program instructions. The QM establishes a QA program in accordance with the applicable 18 criteria of 10 CFR Part 50, Appendix B. The NRC inspector's review of the QA program consisted of an examination and evaluation of the QM relative to the EQ work performed by SEI/ESD. No nonconformances were identified.

3. Supplemental Procedures Review: The NRC inspector reviewed and evaluated 24 supplemental procedures. This review and evaluation determined that detailed documented procedures were not established to assure all EQ activities are satisfactorily accomplished. The nonconformance described in paragraph B.2 was identified.

4. QA Program Implementation Review: The NRC inspector verified the implementation of EQ-related QA program procedures by examining representative records and files and conducting interviews with SEI/ESD personnel.

   Findings concerning the implementation of the evaluated criteria of 10 CFR Part 50, Appendix B, as described in the QM and implementing procedures, are as follows:

   a. Organization: The NRC inspector evaluated this criterion by examining five organizational charts and the QM and by interviewing the QA and test manager, two senior QARs, and one QAR. The evaluation determined that the QA and test manager reports directly to the president and general manager and he and his organization have the authority to stop work or suspend operations for lack of compliance with documented quality requirements. No nonconformances were identified.

b. QA Program: The NRC inspector evaluated this criterion by verifying that a QA program was established by the QM and by verifying the implementation of the applicable 18 criteria of 10 CFR Part 50, Appendix B. The inspector reviewed and evaluated the QM, one procedure, seven training records, one file, one letter, four training schedules, and four auditor certification forms to verify the implementation of this criterion. No nonconformances were identified.

c. Design Control: The NRC inspector and NRC consultant evaluated the implementation of this criterion by review and examination of the QM, three test plans, two QRs, seven procedures, and one specification. No nonconformances were identified.

d. Procurement Document Control: The NRC inspector reviewed and evaluated the QM, one procedure, two forms, one purchase requisition, and one incoming purchase order to verify the implementation of this criterion. No nonconformances were identified.

e. Instructions, Procedures, and Drawings: The NRC inspector evaluated the implementation of SEI/ESD procedures as they relate to this criterion by reviewing the QM, 24 procedures, 8 job travelers, 4 CUSs, 5 training records, 3 test plans, and 2 QRSs. No nonconformances were identified.

f. Document Control: The NRC inspector reviewed and evaluated the QM, 24 procedures, 2 field change orders (COs), 2 engineering COs, 1 request for engineering CO, 3 test plans, and 2 QRs to verify the implementation of this criterion. No nonconformances were identified.

g. Control of Purchased Material, Equipment, and Services: The NRC inspector evaluated the implementation of this criterion by review and evaluation of the QM, one procedure, one source inspection instruction form, one purchase requisition, one purchase order "terms and conditions" form, the vendor quality supplier list, and one vendor audit report. No nonconformances were identified.

h. Identification and Control of Materials, Parts, and Components: The NRC inspector evaluated the implementation of this criterion by review and evaluation of the QM and observing two RMSs undergoing functional tests on the plant floor. No nonconformances were identified.

i. Control of Special Processes: The NRC inspector determined that SEI/ESD does have procedures to control special processes and the qualification of personnel; however, evaluation of the implementation of this criterion was not accomplished since this criterion is not applicable to the EQ work performed by SEI/ESD.

j. Inspection: The NRC inspector reviewed and evaluated the QM, eight job travelers, four CUSs, and one procedure to verify the implementation of this criterion. No nonconformances were identified.

k. Test Control: The NRC inspector and NRC consultant evaluated the implementation of this criterion by review and examination of the QM, two procedures, three QRs, two qualification plans, and one specification. No nonconformances were identified.

l. Control of Measuring and Test Equipment: The NRC inspector and NRC consultant evaluated the implementation of this criterion by review and examination of the QM, one letter, three items of instrumentation on the plant floor, four calibration records, and two calibration reports. No nonconformances were identified.

m. Handling, Storage, and Shipping: The NRC inspector's review and evaluation of the QM, one receiving inspection report, and seven shipping travelers verified the implementation of this criterion. No nonconformances were identified.

n. Inspection, Test, and Operating Status: The NRC inspector evaluated the implementation of this criterion by review and examination of the QM, eight job travelers, and two inprocess notebooks for RMSs on the plant floor. No nonconformances were identified.

o. Nonconforming Materials, Parts, or Components: The NRC inspector evaluated the implementation of this criterion by review and examination of the QM, one procedure, two CUSs, and one RMS on the plant floor with an open CUS. No nonconformances were identified.

p. Audits: The NRC inspector's review and evaluation of the QM, one procedure, three audit reports, one followup audit report, three auditor certifications, one lead auditor certification, and one audit schedule verified the implementation of this criterion. No nonconformances were identified.

q. Criteria Not Evaluated: The NRC inspector did not evaluate the following criteria of 10 CFR Part 50, Appendix B, for implementation during the inspection: corrective action and records. These areas will be evaluated for implementation during a future NRC inspection.

5. Technical Evaluation of EQ:

a. Review of Test Plans, Procedures and Supporting Documents: The NRC consultant's technical evalution of the EQ program for one SEI/ESD customer included review and examination of the customer specification, the customer specific QR, and SEI/ESD generic QRs used to demonstrate the qualification status of the RMSs. Accelerated aging methodology was reviewed and thermal aging calculations were checked. Seismic test data was also reviewed.

Two areas of technical concern were identified:

(1) A generic LOCA test was used to support a customer specification (No. 9763-206-172-15, Revision 1, dated October 10, 1979) requirement for a 375°F peak temperature for one hour; however, the generic LOCA only had a peak temperature of 355°F. SEI/ESD stated in qualification summary E-255-1095, Revision 2, dated November 1983, that they had tested the monitor assembly to 95 percent of the 375°F requirements and that this qualified the assembly for the customer's requirement. Temperature margin, as required by IEEE-STD-323/1974, was not addressed in the summary when comparing the test condition to the customer requirement. SEI/ESD stated during the inspection that they had previously subjected the same monitor assembly to two peak temperatures of 400°F although for only 10 minutes instead of 1 hour. They also stated that they documented the actual qualification temperature in the qualification summary to the customer. This item will be followed up with the customer during a future inspection. This item is one of the examples supporting the nonconformance described in paragraph B.2.

(2) The insulation systems of transformers, relays, solenoids, etc., were initially qualification aged for 168 hours at 105°C to simulate 40 years of life; however, subsequent EPRI activation energy data has resulted in the qualification aging of components for a longer time at a higher temperature. While no detrimental effects have been noted with the new aging time and temperature, the NRC inspector recommended that SEI/ESD notify their customers of the original undertesting and the subsequent successful aging tests and data. This will allow the customer to have qualification data that adequately supports 40 years of qualified life at 40°C.

b. Observation of Testing Activities: The NRC consultant reviewed one RMS undergoing functional testing. The review included examination of the inprocess notebook which listed test sequences and requirements. Although no qualification testing was in-process the consultant inspected the "hot cell" radiation facility and the accelerated aging ovens used for qualification. The nonconformance described in paragraph B.3 was identified.

c. Review of EQ Records/Documentation: The NRC consultant reviewed and evaluated three QRs and three qualification procedures that demonstrate the qualification status of the SEI/ESD RMSs. Three examples supporting the nonconformance described in paragraph B.2 were identified.

6. Followup on 10 CFR Part 50.55(e) Report: APS, Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, filed a 10 CFR Part 50.55(e) report with Region V concerning ESF actuation power supplies that did not meet specification.

The NRC inspector reviewed and evaluated SEI/ESD's action concerning the ESF actuation power supplies that did not meet specification. When SEI/ESD was notified by Bechtel (the engineer and constructor for PVNGS) of the out of specification condition, they investigated the problem and determined that the power supply was a 24 vdc instead of the specified 28 vdc power supply. SEI/ESD had supplied the 24 vdc power supply as one component of a SEI/ESD supplied ESF system. SEI/ESD's system design was such that it would operate within all ESF limits with the 24 vdc power supply. Since they had expected the system to be tested as an entire unit, they considered

the 24 vdc power supply adequate; however, the out of specification condition was identified when the power supplies were tested individually. When the problem was identified to SEI/ESD, they changed the system design to include a 28 vdc power supply and issued a field CO to incorporate the higher rated power supply.

The NRC inspector verified the completion of the field CO and that this out of specification condition was not generic to other nuclear plants, but was limited to PVNGS. This followup item is closed.

7. Followup on 10 CFR Part 50.55(e) Report: FP&L, St. Lucie Nuclear Generating Station, Unit 2, filed a 10 CFR Part 50.55(e) report with Region II concerning RM23 RMS display channel "lock-up."

The NRC inspector reviewed and evaluated SEI/ESD's action concerning the RM23 system display "lock-up." SEI/ESD first became aware of the display "lock-up" during RMS startup in December 1982 at St. Lucie, Unit 2. At that time, they thought the problem was related to the installation at St. Lucie; however, testing at St. Lucie and at SEI/ESD determined that "lock-up" was a generic problem. SEI/ESD notified the NRC on January 24, 1983, by a phone call to Region V and also notified their customers for the RM23 system. This notification to their customers prompted the 10 CFR Part 50.55(e) report to Region II by FP&L.

SEI/ESD's investigation into the problem has lead to a RM23 design change which is being included in systems manufactured since the change and the issuance of field COs for those RM23 systems already delivered. Some of the equipment changes have been performed in the field and in some cases the equipment has been returned to SEI/ESD for factory update.

The NRC inspector reviewed and evaluated the design change, verified 10 CFR Part 21 notification of customers and the NRC, and reviewed the status of equipment updates for the design change. The inspector also verified compliance to SEI/ESD and GA procedures for 10 CFR Part 21 reporting of defects. This followup item is closed.

ORGANIZATION: SHEFFIELD STEEL CORPORATION
SAND SPRINGS, OKLAHOMA

REPORT NO.: 99900268/84-01	INSPECTION DATE(S): 1/30-2/3/84	INSPECTION ON-SITE HOURS: 30

CORRESPONDENCE ADDRESS: Sheffield Steel Corporation
ATTN: Mr. W. A. Powell, Manager
Metallurgy and Quality Control
2300 S. Highway 97
Sand Springs, Oklahoma 74063

ORGANIZATIONAL CONTACT: Mr. W. A. Powell, Manager, Metallurgy and Quality Control
TELEPHONE NUMBER: (918) 245-1335

PRINCIPAL PRODUCT: Deformed billet-steel bars for concrete reinforcement.

NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities by Sheffield Steel Corporation (Sheffield) is approximately 3 percent at the Sand Springs Rolling Mill Plant. The only purchase agreement is with Bechtel Corporation for the South Texas Project Nuclear Power Plant (STP). This order will be complete in February 1984.

ASSIGNED INSPECTOR: John W. Hamilton, Reactive Inspection Section (RIS) — March 28, 1984 Date

OTHER INSPECTOR(S):

APPROVED BY: for Hedin Petrone, I. Barnes, Chief, RIS — 3-28-84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the receipt of an allegation regarding the absence of quality control inspectors and lack of material traceability on deformed billet-steel bars for concrete reinforcement shipped to STP.

PLANT SITE APPLICABILITY:

50-498/499

ORGANIZATION: SHEFFIELD STEEL CORPORATION
SAND SPRINGS, OKLAHOMA

REPORT NO.: 99900268/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

Contrary to Criterion V of Appendix B to 10 CFR Part 50; the QA Program Manual (QAPM) Statement of Policy; Section NCA-3864.1(d) of the ASME Boiler and Pressure Vessel Code, Section II, Appendix G of the QAPM; and the Rolling Mill warehouse and shipping procedures:

1. Persons assigned to examine the quality of work in the Rolling Mill warehouse and shipping areas report directly to the Rolling Mill Superintendent who is responsible for the work being performed.

2. QC inspectors identified in Appendix G have reported directly to the Rolling Mill Superintendent since 1982.

3. QC personnel have been terminated or transferred to other disciplines within Sheffield and since 1982, production personnel have been responsible for examining the quality of work

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Allegation - In September 1983, an allegation was made regarding the lack of a QA program for control of Category I steel being supplied to STP since the facility was purchased from Armco, Inc.

   The STP NRC resident inspector conducted an onsite inspection that included a review of the Sheffield QAPM, randomly selected Sheffield supplied test data packages, and the Bechtel Quality Engineering acceptance records. NRC Report No. 50-498/83-21 was issued on November 25, 1983, which determined the allegation to be without merit.

   In January 1984, a phone call was initiated by NRC RIV personnel to the alleger to determine the availability of additional information pertinent to the original allegation. The alleger was aware of the program documentation but was concerned regarding the absence of QC inspectors and lack of material traceability on deformed billet-steel bars for concrete reinforcement shipped to STP.

As a result of information supplied by the alleger, an inspection of the Sheffield Rolling Mill was initiated to review QC inspector records, records of material inspections and tests, and other records relating to the STP. This inspection resulted in the following findings:

a. Inspection Activities - Concerning the allegation that QC inspectors were no longer being used to inspect STP material, the NRC inspector reviewed personnel records of 10 former inspectors and determined that in July 1979, Armco, Inc. began assigning QC inspectors to production positions. Sheffield purchased the steel mill in September 1981, and continued this policy through December 1982, when the last inspectors were assigned to other positions not related to QC.

A review of Sheffield production records revealed that production steadily declined from 1977 to a low point in 1982 including a 16-month period between June 1981 and November 1982 in which deformed billet-steel bars for STP were not produced. The removal of QC line inspectors closely paralleled the decline of STP production.

The NRC inspector observed that verification and record taking operations were being performed by production personnel. This resulted in the nonconformance detailed in paragraph B.

b. Inspection Records - Concerning the allegation that material traceability was not being maintained, the NRC inspector reviewed inspection records of 55 heats of material manufactured by Armco/Sheffield between the years 1980 and 1984 for the STP. The 15 certified material test reports that were randomly selected and compared to the applicable Sand Springs Works Inspection Reports and Heat Analysis Cards were complete and in agreement with respect to chemical and mechanical properties.

The NRC inspector also reviewed a small number of records for nonnuclear, grade 40 deformed billet-steel bars and fence posts and observed only chemical composition with respect to each heat of material was evaluated and recorded.

In summary, the allegation that QC inspectors were no longer being used on the STP material inspections was confirmed and the allegation that traceability for the STP material was not being maintained was not supported by the NRC inspector's findings.

ORGANIZATION: SHEFFIELD STEEL CORPORATION
SAND SPRINGS, OKLAHOMA

REPORT NO.: 99900268/84-01	INSPECTION RESULTS:	PAGE 4 of 4

2. Material Control - The QAPM and eight procedures were examined with respect to activities controlling material traceability. The procedures provided the controls to prevent a mix-up of material heats and provisions were included for the marking, tagging, and disposition of nonconforming material.

Observations were made at each relevant operation for two heats of material being processed during the period of this inspection for the STP to verify that traceability controls were being implemented. Identification of ladles, billets, rail cars, and deformed billet-steel bars by heat number was maintained. Additional observations were made on current nonnuclear production operations of the pouring of one ladle heat, the casting of four billet heats, location of heats within two billet stacks, and the rolling of two heats of deformed billet-steel bars for proper identification in accordance with the QAPM.

Records required by the QAPM for the two STP material heats that were manufactured into deformed billet-steel bars during the period of this inspection were examined and found to be complete. Records for fifteen other material heats supplied to STP were also reviewed and determined to be complete and consistent with the QAP requirements. Six heats of nonnuclear deformed billet-steel bars were reviewed in the storage and shipping area to assure evidence of proper identification. A nonconformance (above) was identified in that inspection operations called for in the applicable Rolling Mill warehouse and shipping procedures to be performed by QC personnel were, in fact, being performed by production personnel.

ORGANIZATION: STONE AND WEBSTER ENGINEERING CORP.
BOSTON, MASSACHUSETTS

REPORT NO.: 99900509/84-01	INSPECTION DATE(S): 2/6-10/84	INSPECTION ON-SITE HOURS: 60

CORRESPONDENCE ADDRESS: Stone and Webster Engineering Corp.
ATTN: Mr. R. B. Kelly
Vice President, Quality Assurance
P. O. Box 2325
Boston, Massachusetts 02107

ORGANIZATIONAL CONTACT: Mr. F. B. Baldwin, Assistant QA Manager
TELEPHONE NUMBER: (617) 589-6566

PRINCIPAL PRODUCT: Architectural engineering services.

NUCLEAR INDUSTRY ACTIVITY: Major active projects include Beaver Valley Unit 2, River Bend Unit 1, Shoreham, Nine Mile Point Unit 2, Millstone Unit 3, and North Anna Unit 3. In addition, there are approximately 50 modification/repair/service contracts. The aforementioned contracts cover work performed in the Boston, Cherry Hill, New York, and Denver offices.

ASSIGNED INSPECTOR: A. R. Johnson — 3/30/84
A. R. Johnson, Equipment Qualification Section (EQS) — Date

OTHER INSPECTOR(S): C. Craft, NRC Consultant (Sandia National Laboratories)

APPROVED BY: C. J. Hale — 4/5/84
C. J. Hale Jr., Chief (Acting), EQS — Date

INSPECTION BASES AND SCOPE:

A. BASES: Stone and Webster Engineering Corporation (SWEC) Topical Report No. SWSQAP 1-74A and 10 CFR Part 50, Appendix B.

B. SCOPE: The purpose of the inspection was a technical evaluation of equipment qualification (EQ) documentation on safety-related items as controlled by SWEC engineering procured services source inspection audits.

PLANT SITE APPLICABILITY:

Docket Nos. 50-322, 50-410, 50-412, 50-423, and 50-458.

ORGANIZATION: STONE AND WEBSTER ENGINEERING CORP.
BOSTON, MASSACHUSETTS

REPORT NO.: 99900509/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Section 16, paragraph 1.0 of SWEC Topical Report No. SWSQAP 1-74A, SWEC failed to require their vendors to take adequate corrective action after audits identified major and recurring conditions adverse to quality. The following are examples of inadequate corrective action:

   a. SWEC Procurement Quality Assurance/Engineering Assurance (PQA/EA) audit at the Rockbestos Company (QA Audit Report No. 46-82 dated April 28, 1982) identified Rockbestos engineering department's failure to develop, review, and approve test plans for type testing of safety-related Class 1E cable. SWEC QA Audit Report No. 77-82 dated September 17, 1982, closed this finding on the basis that Rockbestos had prepared procedures which would require test plans for future qualification testing; however, this corrective action failed to require Rockbestos to evaluate what impact the failure to have test plans had on previous testing.

   b. SWEC QA Audit Report 93-82 of Boston Insulated Wire Company (BIW) on September 1, 1982, identified one corrective action item (CAI) that was directly applicable to the EQ effort at BIW. The audit report identified no documentation available to verify that the measuring and test equipment used in qualification tests had been calibrated against auditable calibration standards. In a BIW response letter to SWEC dated September 10, 1982, BIW responded to this CAI. BIW stated that, at the time the tests were performed (1976), no record of the measuring and test equipment used was kept; however, BIW stated that SWEC should accept BIW's stated assurance that the equipment was qualified. SWEC PQA/EA referred the BIW response to the SWEC Millstone Project Engineering office for review in an Interoffice Correspondence (IOC) on October 7, 1982. The Millstone project responded in an IOC on October 8, 1982, having reviewed and approved BIW's B915 report for 600V cable, that the letter attached gives SWEC confidence that BIW has complied with the 2412.400-255 specification. This audit finding was closed even though SWEC PQA/EA and SWEC Millstone Project Engineering knew required quality assurance documentation never

existed. SWEC neither determined the cause of this documentation deficiency nor required the vendor to determine the cause and evaluate the impact on previous testing.

c. SWEC PQA/EA audit performed at the Rockbestos Company (QA Audit Report 46-82 dated April 28, 1982) identified inconsistencies between raw test data and the final EQ report (No. QR-1811) on single conductor Firewall III Class 1E cables (chemically cross linked insulation). SWEC's recommended corrective action requested Rockbestos to revise the test report and provide technical justification. The test report was corrected to reflect the raw data obtained during the test; however, SWEC closed the finding without requiring Rockbestos to determine the cause of these inconsistencies in order to preclude their recurrence.

d. SWEC QA Qualification Report No. 46-82 dated April 28, 1982, identified inadequate test instrumentation at Rockbestos Company in CAI-2. Rockbestos Qualification Report Nos. QR 1806, QR 1807, QR 1810, QR 1813, QR 1814, QR 2801, QR 2802, and QR 1811 did not include the type and location of all environmental and cable monitoring sensors used in accordance with IEEE Std. 383, Section 1.4. Rockbestos responded by issuing supplements to each qualification report cited. During a subsequent audit (Report No. 77-82) SWEC PQA/EA closed this finding without requiring Rockbestos to determine the cause of this deficient condition or to take appropriate action to preclude repetition. In addition, no SWEC engineering evaluation of the report supplements was made to determine the technical adequacy of the additional information supplied.

2. Contrary to Section 11, paragraph 1.5 of SWEC Topical Report No. SWSQAP 1-74A, and IEEE Std 323-1974, Section 6.3.1.1, SWEC accepted only the test report as evidence of qualification. No test plan was prepared for BIW specification 2412.400-255 and 2412.400-257; therefore, the SWEC evaluation did not include the review of the test plan, the "auditable link" between the specification and the test results.

3. Contrary to Section 11, paragraph 1.5 of SWEC Topical Report No. SWSQAP 1-74A, and IEEE Std 323-1974 Section 6.3.1.1(9), neither a BIW test plan nor Report B915A addressed the performance limits or failure definition (acceptance criteria) where multiple cables of the same type were tested and one or more cables failed. Therefore, it is not apparent that test requirements were met.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

(Open) Nonconformance (83-01): Superseded engineering design criteria were neither destroyed nor marked "Superseded."

This item will be reviewed during our next Cherry Hill office inspection.

E. OTHER FINDINGS OR COMMENTS:

1. Technical Evaluation of EQ Documentation and Review of SWEC PQA/EA Inspections, Source Audits, and Activities: The NRC inspector and Sandia National Laboratory (SNL) consultant (the NRC inspection team) reviewed and evaluated: (1) the SWEC PQA/EA activities which assure control of procured services, through supplier inspections and source audits; and (2) EQ documentation packages on type testing of safety-related control and instrument cable. These EQ documentation packages, together with their respective SWEC source inspections and audits, involved Rockbestos and BIW cable for Shoreham, Beaver Valley Unit 2, Millstone Unit 3, Riverbend Unit 1, and Nine Mile Point Unit 2 projects. The NRC inspection team's review included examination of SWEC QA audit plans, QA audit plan attribute checklists, QA audit infraction notices, QA audit reports, QA corrective action audit reports, QA inspection plans, PQA inspection reports, procurement specifications, engineering and design change requests, BIW certified test reports, Rockbestos certified test reports, SWEC/utility QA audit reports, utility audit reports, and SWEC interoffice memorandums and correspondence (see B.1 and B.3 above).

2. Review of the Calibration of EQ Equipment at Rockbestos: Two specific CAIs at SWEC were found in audits of Rockbestos which address the issue of calibration. The first was CAI-3 in QA Audit Report 80-23 dated April 18, 1980, which addressed temperature and speed indicators used in production equipment. This CAI required an additional finding (CAI-30) in the QA Audit Report 81-28 dated April 29, 1981, to obtain a closeout of the finding. The second finding was CAI-8 in QA Audit Report 46-82 dated April 28, 1982, which addressed the use of two superseded forms by Rockbestos. A review of the audit plan attributes for the 1981, 1982, and 1983 audits indicate that attributes

specifically written to address EQ equipment calibration were not included prior to 1983. In the 1981 and 1982 audit plans, only general, nonspecific attributes addressed the calibration system in place at Rockbestos. Based on the CAI resulting from the 1980 audit, it appears that the same was true for the 1980 audit plan. SWEC added calibrations to the attribute (checklist) elements as a result of the NRC inspections 99900277/82-02 and 82-03 of Rockbestos. The specific calibration attributes in the 1983 audit plan were not inspected and, therefore, in all the 1980 to 1983 audits, the calibration of EQ test equipment was not directly inspected by SWEC. SWEC's source inspections did not specifically address or assure Rockbestos' compliance with IEEE-323-1974, Section 6.3.1.4.

NRC Report 99900277/83-02 identifies that, during a Rockbestos internal audit of May 10, 1983, Rockbestos itself had documented a significant breakdown in the calibration and measurements system for EQ equipment that existed for several years during which EQ testing was conducted. The existence of such a breakdown was not adequately identified by SWEC (see B.1.b above).

3. Generic Items Previously Qualified: The NRC inspection team determined that the cable manufacturers EQ documentation packages for generic items, previously qualified to a specific envelope (e.g., EQ generic testing at the manufacturer's test facility completed with a documented qualification test report), were accepted by SWEC on the basis of the qualification test report review. The SWEC position is that qualification test reports contain all information/intent of the test plan including anomalies, deviations, and nonconformances. SWEC contends that qualification test reports are reviewed for all aspects of the test program requirements. All qualification test reports on previously qualified items are reviewed/evaluated at SWEC during the vendor qualification/documentation review period. This SWEC review/approval is conducted by their EQ coordinator and project discipline engineer responsible for the procurement specification. The SWEC position is stated in their SWEC No. 82-13, "Policies and Procedures for Equipment Qualification," dated July 14, 1983, and was reviewed by the NRC during the inspection of October 17-21, 1983 (Report No. 99900509/83-02).

REPORT NO.: 99900509/84-01	INSPECTION RESULTS:	PAGE 6 of 6

The NRC inspection team questioned the SWEC approach to award contracts to cable manufacturers for generic items previously qualified to specific envelopes without a requirement to review the manufacturer's test plan. Current EQ contracts with testing laboratories do require development of test plans/procedures prior to testing (see B.2 above).

ORGANIZATION: TOBAR, INCORPORATED
TEMPE, ARIZONA

REPORT NO.: 99900837/84-01	INSPECTION DATE(S): 4/9-13/84	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: Tobar, Incorporated
ATTN: Ms. Karen Saylor
Supervisor, Product Integrity
1441 West Alameda Drive
Tempe, Arizona 85282

ORGANIZATIONAL CONTACT: Ms. Karen Saylor, Supervisor, Product Integrity
TELEPHONE NUMBER: (602) 968-3171

PRINCIPAL PRODUCT: Electronic pressure transmitters.

NUCLEAR INDUSTRY ACTIVITY: Approximately 40 percent.

ASSIGNED INSPECTOR: R. E. Oller — 5-2-84
R. E. Oller, Special Projects Section (SPS) — Date

OTHER INSPECTOR(S): S. Karimian, Brookhaven National Laboratory

APPROVED BY: C. J. Hale — 5/2/84
C. J. Hale, Chief, SPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Status of previous inspection findings, manufacturing process control, nonconformances and corrective actions, procurement control, internal audits, and change control.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: TOBAR, INC.
TEMPE, ARIZONA

REPORT NO.: 99900837/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and the Tobar Nuclear Quality Program Procedures (NQPP) manual PI-2, page 5-6; the form "Request for Engineering Action," page 16-2 of procedure "Corrective Action - Internal Failure," was put into use in December 1983 prior to the revised procedure's issue.

2. Contrary t Criterion V of Appendix B to 10 CFR Part 50 and Tobar NQPP manual PI-2, page 18-7, Revision 0, "Internal Audits," the Annual Internal Audit Report dated October 1983, did not identify the General Manager as recipient nor was the report signed by the Product Integrity Manager as sender.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Tobar Nuclear Quality Program (NQP) manual PI-1, Section 18 "Audits," the Tobar employee who performed the October 1983 internal audit of the areas of "Purchased Material Inspection" and "Product Integrity Program" was not properly trained and certified.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance A (83-01): The organizational titles and responsibilities as described in the Tobar Supplement T were not consistent with the manual QM-102A (QCM).

   The NRC inspectors verified that in accordance with the vendor's response letter dated November 10, 1983, Tobar, Inc., has revised QM-102A (QCM) to correct the organization structure and responsibilit es and reissued the manual as Tobar NQP manual PI-1.

2. (Closed) Nonconformance B (83-01): The QA procedures were not being used by the QC personnel. Instead operating instructions designated as PI-2 procedures were being used.

The NRC inspectors verified that in accordance with the vendor's response letter dated November 10, 1983, the operating instructions for inspectors when under the Westinghouse quality program were in individual procedures. Under the current Tobar program, these procedures have been reformatted into a single procedures manual PI-2. This procedures manual by reference in the quality program manual PI-1 is a part of the Tobar quality program and the inspectors are now using the procedures in PI-2.

3. (Closed) Nonconformance C (83-01): Certain thread gages and two dead weight testers were not recalibrated in accordance with their defined frequencies.

   The NRC inspectors verified that in accordance with the vendor's response letter dated November 10, 1983, the above devices have been recalibrated along with the other mechanical and electrical measuring and testing devices. The results have been logged into the computer. This system provides a complete listing of all equipment needing recalibration at the beginning of each month.

4. (Closed) Nonconformance D (83-01): Assembly/test operations were being performed without the applicable assembly/test procedure being used by the operator.

   The NRC inspectors verified that in accordance with the vendor's response letters dated November 10, 1983, and January 13, 1984, the above procedures are now available at the work areas for the operators. The product integrity personnel now perform ongoing quality monitoring and a quarterly audit of assembly and test operations.

5. (Closed) Nonconformance E (83-01): Configuration control documents were not being signed or stamped to provide verification of assembly parts.

   The NRC inspectors verified that in accordance with the vendor's response letters dated November 10, 1983, and January 13, 1984, the above record is now being signed by the Tobar inspectors. The product integrity personnel now perform an ongoing quality monitoring and a quarterly audit of the use and signoffs of the subject document.

E. OTHER COMMENTS OR FINDINGS:

1. Manufacturing Process Control: The NRC inspectors reviewed the vendor's quality program manual to verify that this activity is controlled by the program.

Observations were made in the shop of: manufacturing facilities, transmitter parts and subassemblies issued to assembly operations, assembly work, final calibration/test and inspection, tagging, and packaging.

A review was also made of: 9 nuclear quality program manual procedures, 13 process procedures inspection plan and data cards, configuration control documents, engineering specifications, picklists, and serial number logs for capsules and final assemblies.

Within this area no nonconformances were identified.

2. Nonconformances and Corrective Actions: Review was made of the vendor's quality program manual to verify that these activities are controlled by the program.

   The following documents were examined: seven product integrity procedures, four discrepant material disposition reports, seven error correction tag records, ten requests for engineering action (REA), and the REA log.

   Within this area one nonconformance was identified. This item concerned use of a revised procedural form "Request for Engineering Action," prior to the revised procedure's effectivity/issue date (see paragraph B.1).

3. Procurement Control: Review was made of the vendor's quality program manual to verify that this activity was controlled by the program.

   The following documents were examined: (a) a controlling procedure; (b) purchase order form No. 45408A; (c) a parts drawing; (d) random purchase orders; and (e) the Approved Vendor List.

   Within this area no nonconformances were identified.

4. Change Control: Review was made of the vendor's quality program manual to verify that this activity was controlled by the program.

   The following documents were examined: (a) three controlling procedures; (b) drawings for model 32XX1 and 32XX2 transmitters; and (c) revision notices.

   Within this area no nonconformances were identified.

ORGANIZATION: TOBAR, INC.
TEMPE, ARIZONA

REPORT NO.: 9990083//84-01	INSPECTION RESULTS:	PAGE 5 of 5

5. Internal Audits: Review was made of the vendor's quality program manual to verify that this activity was controlled by the program.

The following documents were examined: (a) 4 controlling procedures; (b) 11 checklist records of the internal 1983 audit; (c) the 1983 annual audit report; and (d) training and certification records for 3 internal audit personnel.

Within this area two nonconformances were identified that concerned the failure to properly submit and sign the annual audit report and the failure to use a properly trained and certified internal auditor (see paragraph B.2 and B.3).

ORGANIZATION: UNITED ENGINEERS & CONSTRUCTOPS, INC.
PHILADELPHIA, PENNSYLVANIA

REPORT NO.: 99900510/84-01	INSPECTION DATE(S): 3/5-9/84	INSPECTION ON-SITE HOURS: 64

CORRESPONDENCE ADDRESS: United Engineers & Constructors, Inc.
ATTN: Mr. H. P. Burress
Vice President, Administration
30 South 17th Street
Philadelphia, Pennsylvania 19101

ORGANIZATIONAL CONTACT: Mr. R. H. Leonard, QA Manager
TELEPHONE NUMBER: (215) 422-3055

PRINCIPAL PRODUCT: Architect engineering services.

NUCLEAR INDUSTRY ACTIVITY: United Engineers & Constructors, Inc. (UE&C) is the architect engineer (A/E) for Seabrook, Units 1 & 2 and Washington Public Power Supply System, Unit 1 (WNP-1). UE&C has active engineering service contracts on nuclear plants for four utility clients including programs for environmental qualification of safety-related equipment.

ASSIGNED INSPECTOR: J. R. Agee, Equipment Qualification Section (EQS) 4/11/84 Dates

OTHER INSPECTOR(S): L. D. Bustard, Consultant, Sandia National Laboratories

APPROVED BY: for C. J. Hale, Acting Chief, EQS 4-11-84 Dates

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Status of previous inspection findings; inspection of previous inspection open items; and evaluation of activities, documentation, and involvement in equipment qualification activities.

PLANT SITE APPLICABILITY:

50-443/444, 50-460, 50-324/325

ORGANIZATION: UNITED ENGINEERS & CONSTRUCTORS, INC.
PHILADELPHIA, PENNSYLVANIA

REPORT NO.: 99900510/84-01	INSPECTION RESULTS:	PAGE 2 of 7

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (83-02): There is no evidence of a procedure which required the design process to be reviewed and modified as necessary when design errors were identified.

   The NRC inspector verified that the UE&C procedure GEDP-0034 to Revision 19 was revised January 10, 1984, to include requirements that all design errors detected and the attendant design process will be reviewed in total, the potential for errors will be reviewed in the same detail, and the total effort will be reviewed and approved by cognizant management.

2. (Closed) Nonconformance (83-02): Home office concurrence and incorporation of Engineering Change Authorizations (ECAs) were not accomplished within the established time limits.

   The NRC inspector verified that the Administrative Procedure (AP)-15, Revision 19, was issued December 9, 1983. Corrective Action Report (CAR) 83-05 was issued to track corrective action. Verification of corrective action was performed by audit NH-749 dated January 16, 1984, but corrective action was not fully implemented at that time. A later audit report, NH-749A, verified that corrective action implementation was complete and the item closed.

3. (Closed) Nonconformance (83-02): AP-15 does not provide appropriate quantitative or qualitative acceptance criteria for assuring that approved changes are promptly included in documents associated with the change nor for assuring that approved revisions and changes to these documents are distributed in a timely manner.

The NRC inspector verified that AP-15, Revision 19, was issued on December 9, 1983. AP-15 now establishes acceptance criteria for assuring that approved changes are promptly added to appropriate documents and that these changes are distributed in a timely manner. Audit Report NH-749 dated January 16, 1984, verified that corrective action was completed.

E. OTHER FINDINGS OR COMMENTS:

1. General - The NRC inspector reviewed quality assurance documents; applicable sections of the Topical Report UEC-TR-001-6A; CARs; training records; and APs. The NRC inspector discussed applicable sections of these documents with cognizant UE&C engineering and QA personnel to verify adequate resolutions of the findings identified in NRC Inspection Report No. 99900510/83-02 described in Section C above. In addition, the NRC inspector reviewed material that UE&C had provided in response to concerns the NRC inspector had identified in Inspection Report No. 99900510/83-02, including the following:

   a. Cable tray and conduit supports -

      Cable Tray - Seismic qualification calculations of drawing 9763-M-300229, "Typical Notes and Details," for general calculations which encompass a typical support have been completed as stated in the October 21, 1983, letter to the NRC.

      Seismic qualifications for those unique supports identified after October 1983 are now being prepared. This will be an ongoing effort as long as additional unique supports are identified by the site.

      Conduit Supports - Seismic qualification calculations of Revision 21 of drawing 9763-M-300228, "Typical Notes and Details," has been completed. Identification of all subsequent work to qualify other support configurations and loading conditions has been identified on Task Authorization Sheets as stated in the October 21, 1983, letter to the NRC. All conduit support actions are complete.

b. Commitment to and verification of completion dates for all responses to NRC inspection items - UE&C had previously submitted a response to the Region IV office, dated October 12, 1983, committing to supply verification dates for completion of corrective actions for the nonconformances. The inspector reviewed written responses to the findings and verified that UE&C had responded to the open items on a timely basis.

c. Engineering evaluation program - This program has been expanded. The NRC inspector verified that since the last NRC inspection, 52 audits have been conducted, related reports have been issued, and five additional audits were in progress. UE&C estimated that a total of 65 to 75 engineering evaluation audits will be completed by the end of 1984.

d. Independence of Design Reviewers - Independence of design reviewers has been established by revised definition of this activity as added to procedure GEDP-0000, Revision 2, dated December 16, 1983. The NRC inspector verified the revised procedure has been issued and contents of the procedure have been incorporated in related and interface procedures.

e. Other concerns identified to UE&C by the NRC inspector during discussions in a previous inspection - UE&C has responded to each of the concerns and had compiled an action item status report dated February 15, 1984. UE&C has addressed each of the concerns. The inspector verified that UE&C was responsive in its efforts to improve the overall QA program. A summary of these items includes the following:

(1) UE&C reorganized the UE&C Seabrook and home office engineering organizations to enhance the review and flow of ECAs.

(2) Revision and formatting of AP-15 (Revision 19) eliminated procedure duplication and separated technical design control and administrative requirements.

(3) Training of the personnel involved in the ECA process was conducted. Training records for over 100 personnel were checked.

(4) The status of the concurrence and incorporation of ECAs along with the backlog is reported in a monthly management report. The backlog is investigated to determine trends and which ECA's could have a significant impact on the project. Recommended corrective action for management is also included.

(5) The input of ECA information, to design documents has been changed to a point prior to issuing of the document so that status is maintained current throughout the life of the document.

(6) UE&C QA has performed audits and surveillance of both the Seabrook site and home office ECA activities.

(7) Engineering has initiated a trending of the technical cause and solution of ECAs to reduce the need to write ECAs on repetitive conditions.

No nonconformances were identified in the items above.

2. Equipment Qualification (EQ) Program - UE&C does not identify a separate organizational structure for equipment qualification programs. UE&C is primarily responsible for balance-of-plant equipment, therefore is concerned with limited categories of safety-related equipment. UE&C involvement in EQ programs is performed on a plant specific basis in which the licensee contractually identifies equipment to be qualification tested. UE&C does not perform qualification testing and does not compile test plans or test procedures for the qualification testing of equipment. UE&C generally relies on the equipment supplier to provide evidence of adequate qualification of their specific equipment. When adequate qualification data is not available from a vendor (supplier), UE&C contracts the specific equipment supplier to perform the required equipment qualification test programs to meet conditions of the UE&C PO and related equipment specifications which identify equipment operating environments and/or parameters. When UE&C contracts EQ test programs, they review and approve test plans and or specifications prior to performance of the EQ test. They rely on the equipment supplier or the testing facility to compile the final test report which must be approved by UE&C.

The NRC inspector did not review any qualification test plans or procedures during this inspection and did not observe any test activities since UE&C does not perform qualification testing. Review of the EQ program for one project included the following documents: UE&C generated purchase orders and supporting specifications; qualfication test reports submitted by manufacturers in response to UE&C purchase orders and specifications; UE&C and it's consultant's review documents concerning qualification acceptability; and UE&C's inspection and audit reports to assure vendor compliance with appropriate UE&C quality specifications.

The NRC inspector confirmed by review of UE&C purchase order (PO) 9763-006-113-18 that qualification testing was required by the PO and that 10 CFR Part 21 and UE&C specification 9763-QAS-3 were applicable. Specification 9763-QAS-3, "Quality Assurance Administrative and System Requirements for Safety-Related Electrical Equipment," is a document that includes all the elements of 10 CFR Part 50, Appendix B. UE&C specification 9763-006-113-18, identified appropriate IEEE standards and NRC Regulatory Guides as applicable standards and guides, but did not list NUREG-0588 as applicable. The inspector did not determine whether UE&C had committed to satisfying the NUREG-0588 interim staff position. The inspector did confirm that the UE&C PO and related specification 9763-006-113-18 did specify the normal and abnormal environmental parameters to which the 300-volt instrument cable must be qualified.

The inspector reviewed two POs and related specifications (1) PO No. 9763-006-113-18 for 300-volt instrument cable and thermocouple extension wire, and (2) PO No. 9763-006-113-5 for specialty cable and coaxial and triaxial cable. During the inspection, UE&C personnel indicated that qualification of the thermocouple extension wire and the coaxial and triaxial cables was no longer required for system safety. The specification for PO No. 9763-006-113-18 identified typical use conditions and relied on IEEE Standard 383-1974 to provide "acceptance criteria" guidance. No nonconformances were identified.

F. EXIT MEETING:

The inspector met with members of management at the conclusion of the inspection at the Philadelphia, Pennsylvania office. The inspector reviewed the purpose of the inspection and described the findings that were identified during the inspection.

ORGANIZATION: UNITED ENGINEERS & CONSTRUCTORS, INC.
PHILADELPHIA, PENNSYLVANIA

REPORT NO.: 99900510/84-01	INSPECTION RESULTS:	PAGE 7 of 7

The inspector stated to management that the previous inspection findings were reviewed and will be closed by this inspection report. The inspector also advised management that approval of the QA topical report was not contingent on the resolution of inspection findings. UE&C management acknowledged comments by the NRC inspector during the exit meeting.

ORGANIZATION: WEED INSTRUMENT COMPANY, INC.
ROUND ROCK, TEXAS

REPORT NO.: 99900837/84-01	INSPECTION DATE(S): 4/9-13/84	INSPECTION ON-SITE HOURS: 32

CORRESPONDENCE ADDRESS: Weed Instrument Company, Incorporated
ATTN: Mr. W. O. Miller
President
707 Jeffrey Way
Round Rock, Texas 78664

ORGANIZATIONAL CONTACT: Mr. R. L. Vernengo, Quality Systems Manager
TELEPHONE NUMBER: (512) 255-7043

PRINCIPAL PRODUCT: Resistance temperature detectors (RTDs), thermocouples, RTD transmitters, thermowells.

NUCLEAR INDUSTRY ACTIVITY: Approximately 33 percent of the facility capacity and total manhours are involved in the manufacture of equipment for the nuclear power industry.

ASSIGNED INSPECTOR: LB Parker 5/16/84
L. B. Parker, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S):

APPROVED BY: CJ Hale 5/16/84
C. J. Hale, (Acting) Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of the 10 CFR Part 21 report by Virginia Electric and Power Company (VEPCO) concerning the reliability of narrow range RTDs provided by Weed Instrument Company, Inc. (Weed) as environmentally qualified replacements for unqualified RTDs at North Anna Power Station (NAPS), Unit 2. Also the inspection covered a review of pertinent portions of the Weed QA program and their implementation of 10 CFR Part 21.

PLANT SITE APPLICABILITY:

Docket No. 50-339.

ORGANIZATION: WEED INSTRUMENT COMPANY, INC.
ROUND ROCK, TEXAS

REPORT NO.: 99900837/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

Contrary to Section 21.6 of 10 CFR Part 21, Weed had not posted Section 206 of the Energy Reorganization Act of 1974.

B. NONCONFORMANCES:

Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 9-3.2 of Section 9 of the Weed Quality Assurance and Control Manual, Weed did not have approved procedures or personnel qualification records for the special process of silver soldering.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Item 10 CFR Part 21 Report: VEPCO attempted to replace environmentally unqualified Rosemount RTDs used in the reactor coolant system as the narrow range temperature sensors with environmentally qualified Weed RTDs. However, because of a 50 percent failure rate during shop testing and heatup operations VEPCO was not confident that the Weed RTDs would function properly during operation. Therefore, VEPCO replaced the suspect Weed RTDs with new Rosemount RTDs (still environmentally unqualified) and resumed operation of NAPS, Unit 2 under the license requirements which allowed this.

   From the documentation available the NRC inspector concluded the above problems could be attributed to several factors: (1) time constraints, to meet outage schedules, (2) improper and rough handling of the RTDs, (3) lack of training, and (4) misinterpretation of test data.

The NRC inspector verified his conclusions by reviewing two trip reports, four change orders, six drawings, three qualification reports, and other documentation. Also this review substantiated that Weed and VEPCO were resolving the problems. Modifications had been made by Weed to solve previously encountered problems. Installation manuals had been modified, provisions are being made to have a Weed engineer available at NAPS during the installation and checkout of the RTDs and VEPCO personnel have been at Weed to observe testing and receive installation training.

Since Weed stated that this particular design of RTD has only been sold to VEPCO for use at NAPS, this appears to be a site specific problem

The records, corrective actions, and measures established to prevent recurrence of this item at Weed were in place and no nonconformances were identified.

2. Equipment Qualification and Test Program: Weed's current equipment qualification (EQ) activities consist of the generation of project specific similarity analyses. These similarity analyses are based on a generic qualification test report, (Report of Nuclear Qualification Testing of Fast Response RTD/RTDT and Thermocouple Assemblies), prepared by National Technical Systems, Saugus, California, for Weed. Weed has also had qualification reports prepared by Analysis and Measurement Services, Knoxville, Tennessee, for: (a) "Time Constant of Weed Single Element Direct Immersion RTD"; and (b) "Response Time Qualification of Weed Model N9000RTD." The NRC inspector reviewed a similarity report and the above reports. No nonconformances were identified.

3. QA Manual Review: The Weed QA program is described in a single quality assurance and control company regulation (QAM) numbered 100-1. The regulation established a QA program in accordance with the applicable 18 criteria of 10 CFR Part 50, Appendix B. The NRC inspector's review of the QA program consisted of an examination of the QA/QC regulation relative to the documentation examined during the evaluation of the item discussed in paragraph D.1. No nonconformances were identified.

4. Quality Assurance Program: The NRC inspector evaluated this criterion by verifying that a QA program was established by the QAM and by verifying the implementation of the applicable criteria of 10 CFR Part 50, Appendix B. The inspector reviewed and evaluated the QAM and two work orders to verify the implementation of this criterion. No nonconformances were identified.

5. Design Control: Section 3 of the QAM established the procedure for this criterion. The NRC inspector reviewed and evaluated the implementation of this criterion by examination of one specification, three drawings, four engineering change orders, and correspondence. No nonconformances were identified.

6. Procurement Document Control: Section 4 of the QAM established the procedure for this criterion. The NRC inspector evaluated the implementation of QAM requirements to verify that appropriate technical and QA requirements had been included in six purchase orders (POs) for EQ testing services and other safety-related equipment and materials. No nonconformances were identified.

7. Instruction Procedures and Drawings: Section 5 of the QAM established the procedures for this criterion. The NRC inspector evaluated the implementation of the QAM requirements by examining four drawings, two work orders, and four engineering change orders. No nonconformances were identified.

8. Control of Special Processes: Section 9 of the QAM established the procedure for control of these processes. The NRC inspector evaluated the implementation of the QAM requirements by examining a procedure for the control of welding and two work orders. The nonconformance in B. was identified.

9. Quality Assurance Records: Section 17 of the QAM established the procedure for this criterion. The NRC inspector evaluated the implementation of the QAM requirements by examining the QA records accummulated concerning the manufacture of the RTDs inspected in D.1 above. No nonconformances were identified.

10. 10 CFR Part 21: The NRC inspector evaluated Weed's instructions concerning the reporting of items under 10 CFR Part 21, six POs, and other correspondence to verify that Weed was complying with the requirements of 10 CFR Part 21. The violation in A. was identified.

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR TECHNOLOGY DIVISION
MONROEVILLE, PENNSYLVANIA

REPORT NO.: 99900404/84-01	INSPECTION DATE(S): 2/27-3/2/84	INSPECTION ON-SITE HOURS: 28

CORRESPONDENCE ADDRESS: Westinghouse Electric Corporation
Nuclear Technology Division
ATTN: Dr. R. J. Slember, General Manager
P. O. Box 355
Pittsburgh, PA 51230

ORGANIZATIONAL CONTACT: Mr. P. T. McManus, Manager, Quality Assurance
TELEPHONE NUMBER: (412) 825-7988

PRINCIPAL PRODUCT: Nuclear steam supply systems.

NUCLEAR INDUSTRY ACTIVITY: The Nuclear Technology Division of Westinghouse Electric Corporation (W-NTD) employs approximately 1,500 people that are assigned to domestic nuclear power plant activities.

ASSIGNED INSPECTOR: for P. M. Sears, Reactor Systems Section (RSS) — Date: 4/12/84

OTHER INSPECTOR(S): W. Shier, Brookhaven National Laboratory

APPROVED BY: for C. J. Hale, Acting Section Chief, RSS — Date: 4/12/84

INSPECTION BASES AND SCOPE:

A. BASES: Topical report No. WCAP-8370 and 10 CFR Part 21.

B. SCOPE: This inspection resulted from an NRC headquarters request to review the development and use of a computer program NOTRUMP.

PLANT SITE APPLICABILITY:

E.1: Docket Nos. 50-498 and 50-499; E.2: Multiple plant potential.

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR TECHNOLOGY DIVISION
MONROEVILLE, PENNSYLVANIA

REPORT NO.: 99900404/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Section 17.1.15 of W-NTD topical report WCAP 8370, error reports for WECAN computer program are sent to WECAN manual holders only; however, there are WECAN users who are not WECAN manual holders, thus there is not assurance that all WECAN users receive such error reports. There is no followup to the error reports to assure that, in fact, the user evaluated the effect of the error on his own application.

2. Contrary to ANSI N45.2.11 (1974) which is endorsed by WCAP 8370, no QA audit has been conducted on the development and use of a computer program in the past 2 years.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. NOTRUMP Computer Code - This item resulted from an Office of Nuclear Reactor Regulation request to inspect the development and use of NOTRUMP computer code.

   NOTRUMP calculates effects of small break loss-of-coolant accidents (LOCAs). The latest version of NOTRUMP is an improvement of an earlier version of NOTRUMP. The code is in the process of being verified. Verification consists of comparison of the results of NOTRUMP code calculations to a number of separate effects and integral test results. The separate effect tests are used for verification of individual code models, and integral tests are used to check the capabilities of the complete code. Verification will be documented by a series of calculation notes that are independently reviewed by a second individual. To summarize the status of this effort, one calculation note is completed, including the review, 20 are being prepared by the author, and 14 are under review. Complete inspection of the code verification cannot be accomplished until all verification calculation notes are complete.

As mentioned above, the latest version of NOTRUMP is being programmed as an extension of an earlier code, also called NOTRUMP. The current NOTRUMP is being produced by a series of FORTRAN code changes. Each change contains a series of comment cards that describe the purpose of the particular update. The approval of the responsible engineer for the code is required before additions or changes are implemented in the code. The verification of each addition to the FORTRAN coding is currently checked by an informal method consisting of hand calculations or test problems. The responsible engineer was not available during this part of the inspection to confirm the methods used. A completed calculation note showing formal verification of the coding of one subroutine was inspected and found to be acceptable. When asked for other calculation notes, W-NTD was unable to show them to the inspector.

Because of the "in progress" status of NOTRUMP, this item will remain open. W-NTD indicated that all verification will be complete in June 1984. At that time another inspection will be conducted on NOTRUMP.

2. WECAN Computer Code - WECAN is a large structural/heat transfer computer code developed and used by W-NTD. It was estimated that there are approximately 2,000 users of WECAN. Error reports on WECAN are transmitted to engineers who have been assigned WECAN user manuals. It is not required by W-NTD that a recipient of an error report give a response of what effect such an error has had on his design or even whether he has received the report. Error reports are also reported in a very abbreviated manner on the printout of new WECAN runs, with those reports staying on line only until the error is fixed.

There are many WECAN users without users manuals. Those users are usually intermittent users and it is quite possible for such users to miss error reports.

WECAN error reports are treated by manual holders in an uncontrolled manner. Some manual holders keep the error reports in a sequential file. Some manual holders read the error reports and then discard them.

No internal QA audit has been conducted in the past 2 years on WECAN or on any other computer program as such. Limited audits concerning computer programs have been conducted as peripheral to certain design activities but no audits of computer programs development and use or the disposition of code errors have been conducted.

A brief survey of the Safety Review Committee (SRV) log showed that no WECAN errors had been reported to the SRV for disposition in the past 2 years. Approximately 20 WECAN errors, which would give wrong answers (as opposed to an error which would cause a run abort), have been reported to the WECAN responsible engineer in the past 2 years.

The inspector identified two nonconformances in this area of the inspection (see B.1 and B.2 above).

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR TECHNOLOGY DIVISION
MONROEVILLE, PENNSYLVANIA

REPORT NO.: 99900404/84-02	INSPECTION DATE(S): 4/30-5/4/84	INSPECTION ON-SITE HOURS: 57

CORRESPONDENCE ADDRESS: Westinghouse Electric Corporation
Nuclear Technology Division
ATTN: Mr. J. L. Gallagher, General Manager
P. O. Box 355
Pittsburgh, PA 51230

ORGANIZATIONAL CONTACT: Mr. P. T. McManus, Manager, Quality Assurance
TELEPHONE NUMBER: (412) 825-7988

PRINCIPAL PRODUCT: Nuclear steam supply systems.

NUCLEAR INDUSTRY ACTIVITY: The Nuclear Technology Division of Westinghouse Electric Corporation (W-NTD) employs approximately 1,500 people that are assigned to domestic nuclear power plant activities.

ASSIGNED INSPECTOR: R. H. Brickley —30→ 6/1/84
R. H. Brickley, Special Projects Section (SPS) Date

OTHER INSPECTOR(S): J. C. Higgins, Brookhaven National Laboratory

APPROVED BY: C. J. Hale 6/4/84
C. J. Hale, Chief, SPS Date

INSPECTION BASES AND SCOPE:

A. BASES: Topical report No. WCAP-8370 and 10 CFR Part 21.

B. SCOPE: This inspection was made as a result of: (1) a request from NRC Region V to review the processing of defective Barton transmitter information and its evaluation under 10 CFR Part 21 and (2) a request from the Office of Inspection and Enforcement to review the program for processing items potentially reportable under 10 CFR Part 21.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR TECHNOLOGY DIVISION
MONROEVILLE, PENNSYLVANIA

REPORT NO.: 99900404/84-02	INSPECTION RESULTS:	PAGE 2 of 9

A. VIOLATIONS:

1. Contrary to the requirements of Section 21.21(b)(3) of 10 CFR Part 21, Westinghouse failed to include in their report to the NRC the number and location of all defective Barton transmitters in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations in this part.

2. Contrary to the requirements of Sections 21.5 and 21.21 of 10 CFR Part 21, procedures did not specify what was to be in the evaluation record or when the record was to be prepared. Consequently, as of May 2, 1984, records were not prepared sufficient to assure compliance with 10 CFR Part 21.21(a)(1) as follows:

   a. The evaluation record for Identified Item (ID) 82-200, concerning Westinghouse Type AR relays, did not support the determination that the item was not reportable to the NRC.

   b. The evaluation record for ID 82-198, concerning steam generator J-tube failures, did not support the determination that the item was not reportable to the NRC subsequent to the 1983 Surry, Unit 2 failures.

   c. The evaluation records for Potential Items (PI) 82-162, concerning non-seismic panels, and PI 82-154, concerning valves not fully qualified, did not support the decision not to refer them the Safety Review Committee or the decision not to report the items to the NRC.

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance (84-01) - Error reports for WECAN computer program are sent to WECAN manual holders only; however, there are WECAN users who are not WECAN manual holders, thus there is not

assurance that all WECAN users receive such error reports. There is no followup to the error reports to assure that, in fact, the user evaluated the effect of the error on his own application.

Not inspected this inspection.

2. (Open) Nonconformance (84-01) - No QA audit has been conducted on the development and use of a computer programs in the past 2 years.

Not inspected this inspection.

E. OTHER FINDINGS OR COMMENTS:

1. Defective Barton Transmitters

a. Scope

This area of the inspection was conducted by request of Region V to review the Westinghouse evaluation of the defective Barton transmitters and determine why it took so long to evaluate and report the results to the NRC. Westinghouse procured Barton transmitters were found to have excessive errors at both abnormal and accident temperature conditions. These errors were caused by Barton's calibration technique for temperature compensation and an electrical leakage path through the wiper arm and shaft of the zero and span calibration potentiometers to the instrument case. The NRC inspector reviewed the records maintained by Westinghouse on this issue (PI 82-180 and ID 83-211) consisting of internal memos, letters, 10 CFR Part 21 reports, checklists, monthly operations reports, and safety review committee meeting minutes.

b. Findings

(1) Barton investigations of reported excessive transmitter errors at abnormal temperature resulted in the initial notification by Barton to the NRC and their customers on October 29, 1982.

(2) Westinghouse became aware of this problem on November 4, 1982, and initiated their potential item process (PI 82-180) on November 29, 1982.

(3) In November 1982, Westinghouse received a copy of a letter from Barton to Duke Power Company that reported results of tests that identified the cause of the error.

(4) In March 1983, Barton identified an additional source of error attributed to their method of temperature compensation. Reportedly, Westinghouse felt that the data was questionable and requested additional testing. The data from the additional tests was received by Westinghouse in June 1983.

(5) Westinghouse spent the period from June 1982 through September 1983 analyzing the effect of the error on 18 applications of this transmitter in approximately 50 plants. On October 5, 1983, the decision was made to report this matter to the Safety Review Committee (SRC) and file ID 83-211 was initiated.

(6) The SRC met on October 11, 1983, to review the results of the investigation of the Barton transmitter errors, i.e., thermal non-repeatability, negative shift, and incorrect compensation. The SRC reached the following conclusions:

- Thermal non-repeatability - reportable under 10 CFR Part 21 for affected operating plants i.e., Indian Point 2, D. C. Cook 1, and Trojan. They also decided to notify all customers of results of their evaluation.

- Negative shift - identified as a result of Barton's 10 CFR Part 21 report; however, Westinghouse did not have sufficient data to complete their evaluation. Their evaluation later determined that this item was not a safety concern.

- Incorrect compensation - determined not to be reportable since the transmitters met their intended function.

(7) On October 13, 1983, Westinghouse filed a verbal and written 10 CFR Part 21 report with the NRC regarding the thermal non-repeatability in which they identified only three plants as being affected (Indian Point 2, D. C. Cook 1, and Trojan).

(8) On November 28, 1983, an additional five plants were notified that they had Barton transmitters containing the same defect. These plants were Comanche Peak 1 and 2, Marble Hill 1 and 2, and Shearon Harris. The failure of Westinghouse to identify these plants in their 10 CFR Part 21 report to the NRC was determined to be a violation of this part. (See paragraph A.1.)

2. Nonconformance Control

a. Scope

The inspector reviewed the various Westinghouse systems for control of nonconformances, including Field Deficiency Reports (FDRs), Deviation Notices (DNs), and Operating Plant Deficiency Reports (OPDRs). The inspector reviewed the control procedures, the indices of identified items, and selected reports of each type. The inspector also discussed the reports and the report systems with Westinghouse (W) personnel at various levels of responsibility. The inspector particularly noted the mechanism available for reviewing these nonconformances for escalation into the Part 21 reporting system for significant safety hazards. With the exception of the below three findings, no discrepancies were identified. Also, no items were identified where W had failed to forward them for further appropriate safety reviews.

b. Findings

(1) Procedure NSD-OPR-210-2, Revision 6, dated July 31, 1979, titled "Field Deficiency Reporting Procedure for Standard Scope NSSS Sites" describes how FDRs are handled by the W Nuclear Services Integration Division. The inspector noted that this procedure was outdated in that the steps and responsibilities of the procedure did not fully correspond to the current W organization or to the FDR form presently in use.

(2) Procedure WRD-OPR-15.1, Revision 3, "FDR Reporting System: Preoperational Plants" and Procedure WRD-OPR-15.3, Revision 3, "OPDR System" describe how the FDR and OPDR reports are processed and dispositioned. Both procedures assign responsibilities for certain reviews to the Cognizant Design Manager, including the review for referral of the items to the SRC for consideration as a potential substantial safety hazard under Part 21; however, neither the FDR nor the OPDR forms, contain a signature block for the Cognizant Design Manager. Discussions with these managers indicated that they were aware of their responsibilities. Reviews of completed FDRs and OPDRs showed that some, but not all had been initialed or signed by the Cognizant Design Manager.

(3) Procedure WRD-OPR-15.2, Revision 3, "Deviation Notices (DNs)" describes how DNs are processed and dispositioned. The inspector noted that an item identified on a DN could possibly be a substantial safety hazard. This procedure, however, does not specifically assign or discuss the responsibility to review each DN for possible referral to the SRC as a potential substantial safety hazard per Part 21.

3. Review of Safety Issues

a. Westinghouse Program

The W program for review of significant safety issues is described in procedure WRD-OPR-19.0, Revision 1, dated December 18, 1980, titled "Identification and Reporting of Substantial Safety Hazards, Significant Deficiencies, and Unreviewed Safety Questions" and consists of multi-leveled reviews by individual W divisions, the secretary of the SRC, assigned Nuclear Safety Groups, the SRC, and finally the Vice President and General Manager of W Water Reactor Divisions. Items may be submitted by W divisions or any individual for review to the secretary of the SRC, whereupon they receive a PI number and a unique file is opened. If determined to be significant, the items are sent to the SRC and are converted to an ID number and file.

The inspector reviewed the procedure WRD-OPR-19.0, a number of selected files of PIs and IDs as described below, and associated analyses and data. The inspector noted that overall, W appeared to have established a positive atmosphere for reporting items to the SRC and appeared to have processed a significant number of items through their system. However, during the review of this area, two violations as described in paragraph A were identified.

b. SRC Items Reviewed

The inspector selected the below items for review, none of which were formally reported to the NRC by W.

ID 82-200: Westinghouse AR Relays - This item involved the use of unqualified magnetic type relays, ARMLA, as replacements for ARLA spring type relays. W issued a technical bulletin to customers in June 1982, and NRC issued Information Notice 82-55 in December 1982, to address the concerns.

ID 82-198: Steam Generator(SG) J-tubes - In the summer of 1982, three plants were identified with corroded/eroded J-tubes in W SGs. Technical Bulletin 82-07 was issued in December 1982, recommending J-tube inspections and replacement of all with less that 50 percent wall thickness remaining. In August 1983, Surry, Unit 2 identified more rapid corrosion rates and fully perforated J-tubes. As a result, Revision 1 to the technical bulletin was issued. Most other plants inspected to date, however, have shown little or no corrosion to their J-tubes.

ID 83-205: F_Q Limit - In May 1983, it was noted that Zion had operated through the first part of the refueling cycle in certain sequences of modes so that fuel burnup was not fully as predicted and as enveloped in the LOCA analyses. As a result, further specific power maneuvers could result in exceeding the full power F_Q LOCA limit. This was reported to the utility as a potential unreviewed safety question, but not to the NRC under Part 21. Additionally, all W plant owners were notified of the need to operate within analyses bounds or to reanalyze to meet the specific burnup conditions.

PI 82-162: Non-Seismic Cabinets - In July 1982, W became aware that some plants were locating non-seismic cabinets immediately next to seismic cabinets, thus compromising their seismic qualification. As a result, modifications to some plants' cabinets were made. Further analyses are still underway.

PI 81-139: Fan Cooler Gasket Material - This item questions the environmental qualification of replacement gasket material for the Indian Point fan coolers located inside containment. A new soft polymer was selected and installed as the gasket material.

PI 82-169: Containment Transmitters - The water filled systems used for containment pressure and containment sump level transmitters were questioned due to flashing under post-accident conditions, which results in output oscillations or perhaps even rupture of the transmitter itself. W determined that an oil filled system would alleviate these problems and notified all plants to change their systems from water to oil. NRC was aware of the issue throughout the resolution.

PI 82-154: Unqualified Solenoid Valves - Solenoid valves and external limit switches associated with the operators of the feedwater control valves (FCV) and the feedwater control bypass valves (FCBV) which are furnished by W were found not to meet the requirments of the equipment specification (G-952847, Revision 3, dated March 2, 1977). Specifically, Section 3.5.3.3.6 requires that the solenoids and their external limit switches be seismically qualified to the requirements of IEEE-323-1974 and IEEE-344-1975; and Section 3.5.3.5 requires that the solenoids be environmentally qualified to the requirements of IEEE-373-1974 and IEEE-382, Appendix E. Additionally, the memo which distributed the specification (MEE-HCE-760 dated March 10, 1978) stated that Revision 3 applied an active valve status to FCV and FCBV. W has identified 31 plants that are affected and has plans to upgrade the solenoids and limit switches.

c. Findings

(1) Programmatic Items

There are a relatively large number of ID and PI issues remaining open at any given time. While individual personnel

are assigned to each one, W has not established adequate management controls for tracking these items to an expeditious completion. For example:

(a) There is no listing or sort of items remaining open, which is periodically updated, statused, and reviewed by management.

(b) There is no program to establish target dates or required response time frames to assure followup on individual items. As a result, several items appear to have required excessive times for resolution (e.g., ID 82-200 open from late 1982 to the present; PI-82-162 open from mid 1982 to the present, and PI 82-166 open from mid 1982 to the present).

(c) There is no clear indication in the system if items are currently open or closed (e.g., ID 82-200, ID 82-198, ID 83-205, PI 81-139, and PI 82-169).

(2) The above items will be considered further during subsequent inspections.

4. Evaluation Records

Westinghouse procedure WRD-OPR-19.0 does not specifically state what is to be included in the evaluation record for reviewed items or when the record is to be completed. NUREG-0302, Revision 1, "Remarks Presented (Questions/Answers Discussed) at Public Regional Meetings to Discuss Regulations (10 CFR Part 21) for Reporting of Defects and Noncompliance" on page 21.21(a)-2 states that the procedure for the evaluation and the record for evaluation should include:

a. Review of information sufficient to describe the evaluation.

b. An analysis of the effect of such a deviation in a basic component if used.

c. A conclusion based on the analysis as to whether the deviation could creat a substantial safety hazard.

As described in the violation in paragraph A.2, evaluation records were not prepared for all items identified as deviations or potential substantial safety hazards.

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR SERVICES INTEGRATION DIVISION
PITTSBURGH, PENNSYLVANIA

REPORT NO.: 99900900/84-01	INSPECTION DATE(S): 4/9-13/84	INSPECTION ON-SITE HOURS: 26

CORRESPONDENCE ADDRESS: Westinghouse Electric Corporation
Nuclear Services Integration Division
ATTN: T. A. Christopher, General Manager
P. O. Box 355
Pittsburgh, Pennsylvania 51230

ORGANIZATIONAL CONTACT: Mr. R. B. Miller, Nuclear Safety Department
TELEPHONE NUMBER: (412) 374-5217

PRINCIPAL PRODUCT: Engineering design analysis and development of methodology for equipment qualification (EQ) testing.

NUCLEAR INDUSTRY ACTIVITY: Westinghouse-Nuclear Services Integration Division (W-NSID) is responsible for the development of EQ test plans currently being used in various Westinghouse test laboratories and jointly responsible with Westinghouse-Nuclear Technology Division (W-NTD) for the development of equipment qualification data packages and equipment qualification test reports.

ASSIGNED INSPECTOR: A. R. Johnson
A. R. Johnson, Equipment Qualification Section (EQS) — Date: 5/31/84

OTHER INSPECTOR(S):

APPROVED BY: C. J. Hale
C. J. Hale, Chief (Acting), EQS — Date: 6/1/84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and topical report WCAP-8370, Revision 9A, Amendment 1.

B. SCOPE: This inspection consisted of: (1) a technical review and evaluation of environmental qualification test plans prepared by W-NSID, and a review of W-NSID engineering analysis of test results which incorporates acceptance; (2) a followup inspection as a result of a report
(cont. on next page)

PLANT SITE APPLICABILITY:
Docket Nos. 50-247, 315, 316, 327, 328, 338, 339, 348, 364, 369, 370, 382, 390, 391, 395, 400, 401, 412, 413, 414, 423, 424, 425, 443, 444, 445, 446, 454, 455, 456, 457, 482, 483, 486, 498, 499, 546, 547.

SCOPE: (cont.)
by Tennessee Valley Authority (TVA) concerning radiation sensitive non-metallic materials in safety-related pumps, control valves, and relief valves for Watts Bar Nuclear Plants, Units 1 and 2; and (3) followup of potential problem with the Westinghouse 7300 process protection system.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Technical Evaluation of Qualification Test Plans: The NRC inspector evaluated seven EQ test specifications to determine whether they met the approved methodology of WCAP 8587, Revision 5, "Methodology for Qualifying Westinghouse WRD Supplied NSSS Safety-Related Electrical Equipment," and the regulatory requirements of NUREG 0588/IEEE 323-1974. The NRC inspector reviewed the EQ process prescribed in each test plan; reviewed test results, including the bases for accelerated thermal aging and radiation; verified calculations; and reviewed assumptions, engineering letters, and documents which define acceptance limits for the equipment tested.

   Each of the six EQ test plans and related engineering documents were examined for the following:

   a. Test equipment included a description of all materials, parts, and subcomponents.

   b. Equipment interfaces were addressed.

c. Same equipment was used for all phases of testing and represented a standard production item.

d. Test acceptance criteria were established as described in the test specification or in the design engineering documents, such as calculations and engineering letters to meet the nuclear regulatory requirements of NUREG 0588/IEEE 323-1974.

e. All prerequisites for the given tests as outlined in the test specification had been met.

f. Environmental conditions were established and described (e.g., pressure and temperature profiles, and thermal aging factors were consistent with those outlined in the test specification and those prescribed in WCAP 8587).

g. Adequate test instrumentation was described and used to meet the requirements of NUREG 0588.

h. Test results were adequately reduced and evaluated against the established acceptance criteria described in the test specification or in W-NSID design engineering documents and these requirements had been met.

No nonconformances were identified.

2. Followup of 10 CFR Part 50.55(e) Reported by TVA; Watts Bar Nuclear Plants, Units 1 and 2; and Environmental Qualification of Mechanical Equipment WBRD-50-390/83-65 and WBRD 50-391/83-60: The subject deficiency was reported to NRC Region II by TVA on November 9, 1983, and identified as potentially reportable under 10 CFR Part 21. Impell Corporation, Norcross, Georgia, in their report to TVA, identified certain nonmetallic materials not qualified for the postulated postaccident temperature and radiation conditions. The materials identified were subcomponents of the Pacific/Dresser centrifugal charging (CC) and safety injection (SI) pumps, Babcock & Wilcox containment spray (CS) pumps; Ingersol Rand residual heat removal (RHR) pumps; Crosby safety relief valves (SRV), used in the reactor coolant system; and five types of Grinnell diaphragm flow control valves (FCV) used in the ice condenser, reactor coolant, waste disposal, and primary makeup water systems. All of the above equipment are supplied to TVA by Westinghouse under the NSSS contract.

The NRC inspector reviewed and evaluated three EQ summary reports provided to TVA by Impell Corporation for four of the above listed mechanical equipment.

The results of this review and evaluation are as follows:

a. Crosby SRVs, Model 6RV88MSB:

(1) The Impell Corporation EQ summary report No. 0060-508-002 conclusion is as follows:

(a) This equipment is required to stand a worst case radiation dose of 1.2×10^8 rads, and a worst case maximum temperature of 170°F. An analysis of the nonmetallic materials contained in this equipment reveals that the manual actuator shaft seal (Viton) is sensitive to the effects of radiation.

(b) All Crosby valves (model 6RV88MSB) are not qualified for the postulated postaccident temperature and radiation conditions. However, the function of the only sensitive material (Viton), is as a static seal, and degradation of its physical properties is not expected to impact the entire valve's safety function.

(2) TVA's conclusion and position (reference, letter to NRC, Ms. E. Adensam, Division of Licensing, Branch No. 4, from TVA, L. M. Mills, dated March 9, 1984), are as follows:

(a) Failure of the Viton O-ring after irradiation will in no way impair the valve from performing its safety function.

(b) Valves described in the Impell EQ summary report are acceptable for use under TVA's qualification program.

No nonconformances were identified.

b. Grinnell Diaphragm FCVs, Models 1DA92R, 2DA62RZ, 3DA92R, 3/4DA92R, and 4DA62RZ:

(1) The Impell EQ summary report No. 0060-508-007 conclusion is as follows:

(a) This equipment is required to stand a worst case radiation dose of 1.2×10^8 rads, and a worst case maximum temperature of 327°F. An analysis of the nonmetallic materials contained in this equipment reveals that some of these materials are sensitive to the effects of radiation or thermal aging. Therefore, valve models 1DA92R, 2DA62RZ, 3DA92R, and 4DA62RZ are not qualified to the postaccident temperature and radiation environment. However:

- Most of the sensitive materials are associated with the valve actuator, which will perform its safety function (to close the valve) typically within 5 minutes postaccident.

- Engineering judgement would indicate that even if the most sensitive component (the diaphragm support plate) were significantly deteriorated, the valve could maintain its safety function.

It is recommended that, as a minimum, the diaphragm support plates (polyurethane) and the air motor diaphragms (nitrile rubber) should be replaced with a more radiation resistant material such as ethylene propylene terpolymer (EPT). Either replacement of these components will be required or a specific environmental qualification test will be required to adequately qualify these valves to the required environment.

(b) Grinnell diaphragm valve model 3/4DA92R is qualified for the postulated postaccident temperature and radiation conditions.

(2) TVA's conclusion and position (reference, letter to NRC Ms. E. Adensam, Division of Licensing, Branch No. 4, from TVA, L. M. Mills, dated March 9, 1984), are as follows:

(a) The nonmetallic parts contained in valve models 2DA62RZ and 4DA62RZ are buna-N, Nordel, and Estane. Radiation is the limiting environmental condition. Failure of the buna-N, Nordel, and Estane parts after irradiation, including the Estane diaphragm support sheet, will in no way impair the valve from performing its safety function.

(b) 1) The nonmetallic parts contained in valve models 1DA92R and 3DA92R are buna-N, Nordel, Estane, and ethylene propylene rubber (cable jacket).

2) Thermal evaluation, through Arrhenius calculations, indicates the materials will have an expected qualified life, including accident, as shown below:

buna-N - 5.00 years
Nordel - 6342.54 years
Estane - 695.92 years

3) Radiation is the limiting environmental condition.

4) Failure of the buna-N, Nordel, and Estane parts after irradiation will in no way impair the valve from performing its safety function.

5) TVA qualified these valve models with Nordel and ethylene propylene components by similarity. Automatic Switch Company valves with Nordel seats were tested at a radiation dose of $2.013X10^8$ rads. After irradiation, the valves passed seat leakage test.

The cables jacketed with ethylene propylene rubber were tested at a radiation dose of $2X10^8$ rads and combined LOCA and MSLB events. Tests concluded that cables were qualified for 40-year life.

Based on these tests we consider these materials to be acceptable for use in the subject environmental area.

No nonconformances were identified.

c. Pacific/Dresser CC and SI Pumps, Models 2½" RL1J and 3" JHF:

(1) The Impell EQ summary report No. 0060-508-1573 conclusion is as follows.

This equipment is required to stand a worst case radiation dose of $1.1x10^7$ rads, and a worst case maximum temperature of 110°F. An analysis of the nonmetallic materials contained in this equipment reveals that the EPT, seal parts, the phenolic (Micarta) worm gears, several nitrile rubber gaskets and seals, and in particular the paper gaskets are sensitive to the specified postaccident environment. However, evidence of functionability of the pump seals after irradiation of the entire pump unit to much higher levels than the damage threshhold for the EPT material is available. This higher qualification level is believed to be due to the shielding of the seal materials by other pump components, the prevention of direct air contact during irradiation, and elimination of the physical damage caused by reinstallation after irradiation. In addition, the pump seal manufacturer advertises that the specific EPT compound which they use for these pump seals is qualified to $1.1x10^8$ rads, which could qualify the seals for the specified postaccident environment.

The Pacific/Dresser pumps identified in this summary are not qualified for the postulated postaccident temperature and radiation conditions. It is recommended that all paper gaskets, nitrile rubber parts, and phenolic parts be

replaced with more radiation resistant materials. Assuming replacement of these parts, interim operation of these pumps is justified based on the pump seal functionability as described in the above paragraph.

(2) TVA's conclusion and position (reference, letter to NRC Ms. E. Adensam, Division of Licensing, Branch No. 4, from TVA, L. M. Mills, dated March 9, 1984) are as follows:

Review indicates sensitive materials as Durez, Micarta, Nordel, and paper. Radiation is the limiting environmental condition. Durez and Micarta used in these pumps are the same material. Radiation damage levels for Micarta (phenol formaldehyde-paper laminate filler) are the most conservative. An evaluation indicates a 50 percent radiation damage level for elongation at a dose of $7.5X10^7$. Based on this, the Durez and Micarta parts are acceptable for use in the subject environments. The Nordel parts are acceptable for use in the subject environments based on direct comparison of radiation damage levels up to 50 percent property change. Failure of the paper parts after irradiation will impair the pumps from performing their safety function.

The pumps described in this summary are not acceptable for use under this qualification program. The paper parts must be replaced with materials that are acceptable for use in the subject environmental area. Replacement parts for this equipment are being processed on TVA nonconformance report Nos. WBNNEB8326 and NEB831102851.

No nonconformances were identified.

3. Followup of 10 CFR 50.55(e)/10 CFR Part 21 Reports by Westinghouse: A potential problem within the Westinghouse 7300 process protection system (PPS) was reported under 10 CFR Part 21 for operating plants and under 10 CFR Part 50.55(e) for plants under construction. These items were inspected during NRC inspection 99900240/83-01, at Westinghouse-Industry Electronics Division (W-IED), and followed up during a subsequent inspection 99900900/83-03 at W-NSID. During this inspection, the NRC inspector further evaluated this item.

Seismic testing of the PPS NTC card replacement "reed" relay was successfully completed at the Westinghouse-Advanced Energy Systems Division test laboratory in December 1983. Design efforts at W-NSID, utilizing this replacement component in the PPS NTC card design identified an unacceptable contact resistance of the "reed" relay within the W-NSID circuit. W-NSID had aborted use of the "reed" relay in the PPS NTC card design, and is currently considering other solutions. W-NSID will work with their manufacturer (W-IED) for any hardware modifications to the PPS NTC card.

W-NSID has issued the following field change notices (FCN) which address NTC card applicability, to temporarily bypass the NTC input test relay in all Westinghouse 7300 series temperature channels. These FCNs are for both operating plants and those under construction. W-NSID will issue FCNs for all other plants within their scope of supply. All FCNs require modifications of the PPS 7300 instrument cabinet rack wiring, and will be implemented in the field.

FCN No.	Date	Nuclear Plant
DCPM10583	3/19/84	Catawba 1 & 2
CGCQ40508	6/27/83	V. G. Summer 1
SCPM10637	12/22/83	Callaway 1
CAEM10756	1/6/84	Byron 1 & 2

W-NSID resolution of the PPS NTC problem will require W-NSID to issue a change control order in accordance with design control manual procedure NTD-DPP-5A dated July 24, 1981. This item is considered open until the change control order is issued.

ORGANIZATION: WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP
HUNTSVILLE, ALABAMA

REPORT NO.: 99900902/84-01	INSPECTION DATE(S): 5/22-25/84	INSPECTION ON-SITE HOURS: 56

CORRESPONDENCE ADDRESS: Wyle Laboratories
Scientific Services and Systems Group
ATTN: W. W. Holbrook, General Manager, Eastern Test and Engineering Operations
7800 Governors Drive
Huntsville, Alabama 35807
ORGANIZATIONAL CONTACT: Mr. E. W. Smith, Director, Contracts and Purchasing
TELEPHONE NUMBER: (205) 837-4411

PRINCIPAL PRODUCT: Research, engineering, and test operations.

NUCLEAR INDUSTRY ACTIVITY: Wyle Laboratories, Huntsville, Alabama, provides a variety of nuclear services to the industry which includes environmental and seismic qualification testing of safety-related equipment, refurbishment and recertification of valves, valve and component flow testing, mechanical and hydraulic snubber testing, decontamination, and repair.

ASSIGNED INSPECTOR: A. R. Johnson, Equipment Qualification Section (EQS) — Date: 6/13/84

OTHER INSPECTOR(S): P. R. Bennett, Sandia National Laboratories (SNL)

APPROVED BY: C. J. Hale, Acting Chief, EQS — Date: 6/13/84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection consisted of a technical evaluation of environmental qualification test plans, investigative test reports, and assessments prepared by Wyle Laboratories.

PLANT SITE APPLICABILITY:

Not identified.

ORGANIZATION: WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP
HUNTSVILLE, ALABAMA

REPORT NO.: 99900902/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

The NRC inspector and SNL consultant (NRC inspection team) evaluated five equipment qualification (EQ) documentation packages, including qualification plans/reports, investigation test reports, and purchase orders to determine whether they met the regulatory requirements of NUREG 0588; 10 CFR Part 50.49; Regulatory Guides 1.63, 1.73, and 1.89; and IEEE 323-1974, IEE 382-1980, and IEEE 317-1976, as applicable. The five EQ documentation packages of safety-related equipment reviewed were used within the containment/harsh environment during and following a LOCA/HELB. The NRC inspection team performed a technical evaluation and review of Wyle's philosophy, methodology, and engineering analysis, as applied to the EQ documentation packages in certifying licensee's safety-related Class 1E equipment for its intended use.

The licensee's electrical equipment represented by the EQ documentation packages during this review included liquid level transmitters, main steam isolation valve pnuematic control manifolds and two-way air valve assemblies spring return matrix actuators (seismic qualification only), electrical cable end assemblies, splice assemblies, electrical sealing kits, cable sleeves, seal fittings, terminal blocks, and electrical penetration assemblies.

The NRC inspection team's review included examination of licensee qualification specifications, contract reports, purchase orders, aging matrices, qualification plans, qualification reports, record of interim procedure/plan revisions, technical inquiry responses, notice of anomalies, and various letters involving type testing of Class 1E equipment.

The EQ documentation packages were examined to verify the following:

a. The test equipment included a description of all materials, parts, and subcomponents.

b. Equipment interfaces were described.

c. The same equipment was used for all phases of testing and represented a standard production item.

d. Evidence that tests were performed in accordance with a written test procedure.

e. Test acceptance criteria were established as described in the applicable codes, standards, and licensee specifications.

f. All prerequisites for the given test, as outlined in licensee specifications, letters, and contracts with the licensee have been met.

g. Environmental conditions were established and described; e.g., pressure and temperature profiles, radiation, and thermal accelerated aging factors.

h. Test equipment and instrumentation were described for recording test data.

i. Test results were adequately documented and evaluated by Wyle to assure that test requirements had been satisfied.

The EQ documentation package for a liquid level transmitter and receiver, manufactured by Gems Sensor Division of Transamerica Delaval, identified a test anomaly during 20 hours into the LOCA test in which a test failure occurred involving BIW Bostrad 7, hypalon jacket, EPR insulated, cable. The notice of anomaly (NOA) was dispositioned by replacement of this cable with a tefzel cable in which the test was allowed to proceed. The cable was not considered part of the equipment being tested for qualification. Wyle test report No. 45700-1 considered the level transmitter qualified to the requirements of Wyle test plan No. 45102-1, provided a qualified interconnecting cable is used to interface this equipment.

Wyle test report Nos. 45700-1 and 45700-2 (including Addendum I) indicate that irradiation was performed prior to accelerated thermal aging. Testing sponsored by the NRC at SNL has reported that this sequence causes some polymers to degrade to a greater extent than when irradiation follows thermal aging (SNL Report No. SAND-80-2149C). SNL's position postulates that radiation-cleaved bonds, in the form of radicals, react with oxygen to give degradation products including peroxides. The peroxides being chemically weak links are then susceptible to thermal cleavage which in turn provides more radicals in the presence of oxygen, leading to increased degradation. Wyle has used the SNL position as their basis in establishing thermal aging after irradiation in preparation of their test plan Nos. WLTP 45102-1 and 45102-2, included in test report Nos. 45700-1 and 45700-2. Wyle maintains this position as the only method in which to account for the strong synergism due to radiation and high temperature found in polymers.

This position differs from that of leading cable manufacturers who have identified failure modes, during their testing of Class 1E cable, where testing employed the thermal aging prior to irradiation sequence. The failure mode was attributed to thermal expansion and extrusion of the dielectric insulation through the metallic braid, and upon cooling down does not contract to its original position producing voids in the insulation (reference NRC Inspection Report No. 99900277/83-01, Section D.3). Leading cable manufacturers maintain that the irradiation prior to accelerated thermal aging sequence hardens the dielectric materials and mitigates the degradation mechanism.

ORGANIZATION: WYLE LABORATORIES
WESTERN OPERATIONS
NORCO, CALIFORNIA

REPORT NO.: 99900905/84-01	INSPECTION DATE(S): 4/23-24/84	INSPECTION ON-SITE HOURS: 7

CORRESPONDENCE ADDRESS: Wyle Laboratories
Western Operations
ATTN: Mr. R. C. Sadlier, General Manager
1841 Hillside Drive
Norco, California 91760

ORGANIZATIONAL CONTACT: Mr. Larry Hou[illegible]teau, QA Manager
TELEPHONE NUMBER: (714) 737-087[illegible]

PRINCIPAL PRODUCT: Equipment testing and engineering services.

NUCLEAR INDUSTRY ACTIVITY: The Wyle Laboratories, Western Operations facility provides engineering and test services to military, utility, and commercial nuclear power organizations. Approximately five percent of the facility's capability is currently committed to environmental qualification testing of safety-related equipment for the commercial nuclear power industry.

ASSIGNED INSPECTOR: C J Hale for 5/10/84
J. R[illegible]Agee, Equipment Qualification Section (EQS) Date

OTHER INSPECTOR(S):

APPROVED BY: C J Hale 5/10/84
C. J[illegible] Hale, (Acting) Chief, EQS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B and 10 CFR Part 21.

B. SCOPE: Status of previous inspection findings, review QA program, and examine selected test programs that are being scheduled.

PLANT SITE APPLICABILITY:

Not identified

ORGANIZATION: WYLE LABORATORIES
WESTERN OPERATIONS
NORCO, CALIFORNIA

REPORT NO.: 99900905/84-01	INSPECTION RESULTS:	PAGE 2 of 3

A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. ACTION ON PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (Item A, 83-02): No document control instructions had been described or implemented for the control, review, approval, and distribution of the engineering manual procedures and the QA standard operating procedures.

   The inspector verified that Section 6 of the Wyle Laboratories QAM 380 was revised to include the control, review, approval, and distribution of the Engineering Procedures Manual and the QA Standard Operating Procedures (SOP) Manual. Control of the distribution of the manuals was implemented November 21, 1983.

   Revision D to the QAM was completed and issued April 15, 1984.

2. (Closed) Nonconformance (Item B, 83-02): Wyle conducted a test before the test procedure No. 4272 was assigned and approved.

   The inspector discussed this situation with the QA department that admitted the condition occurred during an unaccountable lapse in the test program review. In the interim the test documentation has been identified which provides accurate documentation of the test results. The QA department has subsequently increased surveillance over test program reviews to preclude recurrences.

3. (Closed) Nonconformance (Item C, 83-02): A test was conducted using samples other than the ones specified in the test procedure, the samples were not identified appropriately during the test, or in the final test report (58789).

The inspector verified that the samples were subsequently identified through correspondence with tne customer. A copy of the identifications has been added to the test program files. To preclude recurrences the lab has implemented the use of a stainless steel tag maker to provide positive identification and traceability of all samples.

4. (Closed) Nonconformance (Item D, 83-02): The photographs of the test specimen for project 58789 were not properly identified.

   Subsequent to the test the QA department issued a memorandum dated November 8, 1983, which states, in part, "Effective immediately, all photographs now taken for use in test reports will conform to the requirements of SOP 518-6, paragraph 6.0. . . ."

E. OTHER FINDINGS OR COMMENTS:

The inspector reviewed selected portions of the revised QAM and related implementing procedures, records, and procedures to close the previous inspection findings identified in Section D above, and a "request for quote" for a proposed environmental qualification (EQ) test program.

Wyle has just completed the last of its currently scheduled EQ tests and was in the midst of tooling-up for the next iteration of EQ tests to be performed on hydrogen analyzers and MSIV limit switches.

Within this area of the inspection no nonconformances were identified.

F. EXIT MEETING:

The inspector met with the QA manager at the close of the inspection at the Norco, California, facility and discussed details of the inspection concerning the Wyle reduced EQ test activities, the current version of the QAM, and related implementing procedures.

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NRC FORM 335 (2-84) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE

1. REPORT NUMBER (Assigned by TIDC, add Vol. No., if any)

NUREG-0040
Vol. 8, No. 2

2. TITLE AND SUBTITLE

Licensee Contractor and Vendor Inspection Status Report
Quarterly Report - April 1984-June 1984

3. LEAVE BLANK

4. DATE REPORT COMPLETED

MONTH	YEAR
June	1984

5. AUTHOR(S)

6. DATE REPORT ISSUED

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Washington, DC 20555

8. PROJECT/TASK/WORK UNIT NUMBER

9. FIN OR GRANT NUMBER

10. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

Same as 7 above.

11a. TYPE OF REPORT

Quarterly

b. PERIOD COVERED (Inclusive dates)

April 1984 - June 1984

12. SUPPLEMENTARY NOTES

13. ABSTRACT (200 words or less)

This periodical covers the results of inspections performed by the NRC's Vendor Program Branch that have been distributed to the inspected organizations during the period from April 1984 through June 1984. Also included in this issue are the results of certain inspections performed prior to April 1984 that were not included in previous issues of NUREG-0040.

14. DOCUMENT ANALYSIS - a. KEYWORDS/DESCRIPTORS

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