NUREG-0040
Vol. 8, No. 4

LICENSEE CONTRACTOR AND VENDOR INSPECTION STATUS REPORT

QUARTERLY REPORT
OCTOBER 1984 - DECEMBER 1984

UNITED STATES NUCLEAR REGULATORY COMMISSION

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OCTOBER 1984 - DECEMBER 1984

Manuscript Completed: December 1984
Date Published: February 1985

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

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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 information 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)

CONTRACTOR WITH NRC LETTERS CONFIRMING QA PROGRAM IMPLEMENTATION

(See Next Page for Example of Confirming Letters)

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 29, 1983
Westinghouse NTD	WCAP-8370	Revision 10/6A	August 28, 1984
Bechtel - Gaithersburg	BQ-TOP-1	Revision 2A	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.	GIBSAR 17-A	Amendment 6	February 7, 1983
United Engineers & Constructors	UEC-TR-001-3A	Amendment 6	March 31, 1977
General Electric Company	NEDO-11209-04A	N/A	May 24, 1983
Sargent & Lundy Engineers	SL-TR-1A	Revision 5	May 17, 1979
Bechtel - Los Angeles	BQ-TP-1	Revision 3A	December 20, 1982
Gilbert/Commonwealth	GAI-TR-106	Revision 3	May 24, 1984
Bechtel - Ann Arbor	BQ-TP-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: BABCOCK & WILCOX, A MCDERMOTT CO.
UTILITY POWER GENERATION DIVISION
LYNCHBURG, VIRGINIA

REPORT NO.: 99900400/84-03	INSPECTION DATE(S): 8/6-10/84	INSPECTION ON-SITE HOURS: 92

CORRESPONDENCE ADDRESS: Babcock & Wilcox, A McDermott Co.
Utility Power Generation Division
ATTN: Mr. D. E. Guilbert, Vice President
and General Manager
Post Office 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 and nuclear cores.

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

ASSIGNED INSPECTOR: P. M. Sears 9/6/84
P. M. Sears, Vendor Inspection, Section 2 Date

OTHER INSPECTOR(S): W. Bannister (EG&G)
W. Shier (BNL)

APPROVED BY: J. R. Costello 9/6/84
J. R. Costello, Acting Section Chief, Vendor Inspection Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR 50 Appendix B and Topical Report BAW-10096A

B. SCOPE: 1. Ascertain the status of previous inspection findings; 2. Audit the Quality Assurance and Verification of Thermohydraulic Computer Codes; 3. Review redesign activities concerning Core Barrel Bolt Stress Corrosion; 4. Review two internal audits concerning computer activities; and 5. Review electrical items from Potential Safety Concern files.

PLANT SITE APPLICABILITY: All B&W plants.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

1. Contrary to Criterion XVI of Appendix B to 10 CFR 50;

   a. A Potential Safety Concern (PSC) was identified in September 1983 and entered into the Babcock & Wilcox (B&W) PSC file in November 1983. That PSC potentially affected the technical specifications for all the plants with B&W Model 177 fuel assemblies, and possibly those plants with B&W Model 205 fuel assemblies. This PSC, identified as PSC 24-83, was related to an increased potential for fuel damage and possible exceedance of accident acceptance criteria. Although analyses performed to date have indicated possible necessity for technical specification changes for a new Model 177 fuel assembly plant under construction, analyses have not been performed for the Model 177 fuel assembly operating plants.

   b. A PSC (PSC 23-83) was initiated on October 11, 1983. That PSC concerned power supplies used in certain safety related systems. The power supplies in the delivered systems did not conform to approved drawings. The inspector found no further evidence of action taken on this concern over the subsequent ten months since the PSC was initiated, nor were B&W personnel able to produce such evidence when requested.

2. Contrary to Section 3.2 of B&W Topical Report BAW 10096A, Rev. 4, the reviewer indicated on the Certification of Computer Program form (PDS-21177) for three conditionally certified versions of the small break version of the CRAFT2 code was the immediate supervisor of the responsible engineer for the code. The reviewer designated on PDS-21777 is responsible for the review of all modifications and additions to the code version being certified. The circumstances described above that permit review by the immediate supervisor were not justified by documentation in these three cases.

3. Contrary to Section VII.B of B&W Procedure NPG-0402-01, Rev. 17, an uncertified computer code, designated as CORE, was used as part of a loss of coolant licensing analysis (calculation file No. 32-1139690-00). The CORE code was used for input data preparation and does not meet any of the certification exemption criteria stated in B&W QA Procedure NPG-0902-06, "Computer Program Development and Certification."

4. Contrary to Appendix 2, Section B of B&W QA Procedure NPG-0902-06, Rev. 4, two modelling additions to the small break version of CRAFT2 code (i.e., nonequilibrium pressurizer and the primary metal heat structure model) were not evaluated against criteria a., b., or c. described in the above procedure following implementation in the code.

5. Contrary to Appendix 2, Section B.2 of B&W Procedure NPG-0902-06, Rev. 9, the certification file for the small break version of the CRAFT2 code did not include an evaluation of the adequacy of the agreement with experimental data for the test case associated with the steam generator modelling modifications implemented in the code.

6. Contrary to Appendix 1 of B&W QA Procedure NPG-0903-03, Rev. 9, the Program Manual for the small break version of CRAFT2 code did not provide a complete description of the code output or the code limitations. The manual provided information on the code dimensioning without any restrictions on the ranges of physical properties, correlations and other limitations.

7. Contrary to Criterion VII of Appendix B to 10 CFR 50, B&W failed to assure that measures were in place so that certain components (Lambda Power Supplies) were as described in drawings submitted by Bailey Controls Co. (BCCo) for approval. B&W purchase documents required equipment to be delivered to a performance specification with drawings and schematics being submitted by BCCo for B&W approval. The delivered equipment did not conform to the drawings and schematics.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

(Closed) 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. In Inspection Report 99900400/84-01 it was stated that a further review of NUPIPE certification file showed that B&W had done sufficient additional calculations to show that NUPIPE program functions are consistent with the equations and models as described in the program, however B&W neglected to revise the Computer Program Information (CPI) listing to reflect the new certification date of February 29, 1984. The NRC inspector verified that the CPI listing reflects the new certification dated February 29, 1984. This item is considered closed.

(Closed 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. In Inspection Report 99900400/84-01 it was reported that B&W had subsequently performed calculations to establish the sump pH values and had subsequently considered the effect of dead volumes on these values. During this inspection the NRC inspector verified that B&W has reviewed other analyses of the Bellefonte reactor building spray system to confirm that the analyses performed reflect the actual plant design. This item is considered closed.

(Closed) Nonconformance (84-01): The manuals of computer 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. The NRC inspector verified that the manuals of FELCON (version 17/2) and RADAR (version 23/1) have been revised and corrected. Additionally, a complete review has been performed on the manuals of all active computer program manuals and all similar occurrences have been corrected. This item is considered closed.

(Closed) Nonconformance (84-01): The certification file of program R4 ANSYS/OD did not contain the authorization form No. BWNP-20367, and no written notification was provided when the computer code R4 ANSYS/OB was removed from the active program information listing. The NRC inspector verified that the R4 ANSYS/OD certification file was repaired by adding the appropriate form No. BWNP-20367 and that all certification files of active computer programs had been reviewed to verify that form No. BWNP-20367 as contained in those files. The NRC inspector also verified that the wording of procedure NPG-0902-06, Section VII, paragraph M has been revised to prevent unambiguous requirements for maintenance of and revisions to the CPI listing. That revised procedure now requires that all modifications to the CPI listing be by written request of the cognizant manager. This item is considered closed.

E. OTHER FINDINGS OR COMMENTS

1. Internal Computer Code Audits: The NRC inspector reviewed two recent internal audit reports by B&W QA, concerning their computer program activities. Those audits checked for compliance with B&W procedures NPG-0906-06, "Computer Programs Development and Certification" and NPG-0903-03, "Development and Control of Computer Program Manuals." These audits also checked for problems similar to those delineated in NRC Inspection Reports 99900400/83-01 and 83-02. The internal B&W audits identified 26 nonconformances similar to those identified in the aforementioned NRC Inspection Reports. The internal nonconformances identified primarily involved failure to follow procedures. No

violations or nonconformances were identified in this part of the investigation.

2. Upper Core Barrel Bolt Integrity Stress Corrosion Failures: On April 10, 1983, Florida Power Corp. (FPC) performed an ultrasonic examination of approximately 1/2 the reactor vessel upper core barrel bolts at Crystal River 3. Out of 61 bolts examined, 25 exhibited flaw indications. These indications were similar to those found by Sacramento Utilities at Rancho Seco in March 1983. The cracking was at the bolt head/shank juncture. The bolt material was A286.

   B&W examined the consequences should the bolt heads separate from the shanks, and concluded that the heads would be held in place by locking clips. This would preclude the heads from becoming loose parts. The bolt shanks, it was concluded, would remain captured within the core support shield bolt holes. B&W also concluded that both lateral and rotational motion of the upper core barrel and core would be restrained by the bolt shanks and coolable core geometry would be maintained. Guide lugs and guide blocks would provide similar restraint at the bottom of the core.

   On July 6, 1983, NRC transmitted an SER to Arkansas Power & Light, allowing restart of ANO-1 which had a small number of core barrel bolts showing UT indications.

   The bolt problems affect all B&W Model 177 and Model 205 designs and B&W notified all affected utilities through the B&W Owners Group (B&WOG). Original designs of these bolts date back to the early 1970's. Topical reports for the design of B&W reactor internals are dated 1972 and 1970. Those topical reports were accepted by the AEC in 1972 and 1973.

   B&W has not, as yet, finished all actions concerning these bolts and this item will be again reviewed at a future inspection. No violations or nonconformances were identified in this part of the inspection.

3. PSC Files: The PSC log was reviewed for the period of June 1983 thru July 1984, and the following selected reports were examined:

   a. PSC-19-83. This PSC was initiated September 14, 1983 when Bailey Control Company (BCCo) became aware that single grounding arrangements were being used at Bellefonte for power and signal grounds. BCCo specifications (A-162215-4) recommended that power grounds be separated from signal grounds. An evaluation included in the file concluded (June 21, 1984) that this item

was not reportable under 10 CFR 21 or 10 CFR 50.55(e). No documentation was included in PSC-19-83 file to show that a generic search for this problem in other areas had been done. A new PSC-5-84 (see below) has been initiated, however, that PSC expanded the investigation.

b. PSC-5-84. As a result of a BCCo concern (BCCo report SCR-041 dated May 22, 1984) this PSC was initiated on June 19, 1984 delineating three concerns as follows:

1. Power and signal grounds are jumpered together.

2. The grounding of redundant systems sequentially together allows for a potential single failure of redundant systems.

3. In certain electrical cabinets, the signal common bus was reported as not grounded (floating).

The evaluation and resolution of this PSC are being pursued by B&W and this will be reviewed in a future inspection at B&W.

c. PSC-3-84. This PSC was issued on 4/6/84 concurrent with the issuance of a white paper report on "An assessment of BCCo Safety and Safety Related Module Circuit Board Hold-down System as a Probable Safety Concern." This report was written as a result of a test performed on the retaining/hold-down clips. These circuit board retaining clips are in various systems associated with model fuel assemblies.

On March 27, 1984, a seismic retest of the Auxiliary Power Supply was performed and resulted in the failure of the circuit board hold-down clip. Following the test failure, the evaluation concluded that the hold-down clip design is prone to several malfunction modes. The circuit board top retainer also allows horizontal rotation. Malfunction of the hold-down clip together with the circuit card top retainer movement permits the circuit card to be displaced by partial rotation in a horizontal direction as observed during the OBE seismic event. After a broken hold-down clip was found following the test it was concluded that this was not part of the system failure modes, but the result of a random component failure.

This item will be the subject of a future inspection at BCCo.

B&W appears to be actively pursuing the determination of reportability under 10 CFR 21 as well as determining the technical resolution of the problem. This item will also be audited during a future inspection at B&W.

d. PSC-23-83. A site problem report by B&W was issued on October 27, 1983 after communication with BCCo on October 21, 1983 concerning different components being used in Lambda Power Supplies. Those power supplies were used in safety/safety related systems. Two power supplies examined at the Bellefonte site did not contain a CRG, a zener diode ahead of the regulator as required by Lambda schematic drawing E93-523. Three other Lambda Power Supplies which had been returned to the subcontractor for functional problems were re-delivered with an additional capacitor, a C26, not in the other power supply units delivered to the site. B&W purchase documents recuired equipment to be delivered to a performance specification with drawings and schematics being submitted for B&W approval by BCCo. The delivered equipment did not conform to the drawings and schematics. This concern was issued as a Preliminary Report of Safety Concern, PSC-23-83, on November 14, 1983. B&W conducted an audit (118-16) August 23-25, 1983 that verified that BCCo had procedures in place to control supplier performance.

The inspector found no documentation of further action taken on this concern over the subsequent ten months since the PSC-23-83 was initiated nor could B&W personnel produce such documentation when requested. This item will be the subject of a future inspection at BCCo and at B&W.

Two nonconformances (Section B.1.b and B.7 above) resulted from this area of the inspection.

e. PSC-24-83. This concern is related to the calculation of the departure from nucleate boiling ratio (DNBR) of the Technical Specifications for both new and operating plants. (DNBR is a measure of the potential for fuel damage during operational and accident transients). An analysis performed in September 1983 indicated that a revised analytical procedure showed a reduction in the DNBR that could affect the Technical Specifications for new and operating plants with Model 177 fuel assemblies and possibly those with Model 205 fuel assemblies. This was entered in the PSC file in November 1983 and a "Front End" meeting was held in February 1984 to discuss possible solutions to the problem. An analysis was completed for a new Model 177 fuel assembly plant which indicated that new Technical Specifications would be

required based on the results using current analytical techniques. However, analysis has not been performed for the operating plants. It was noted that a Technical Specification change for an operating plant could be reportable under 10 CFR 21 and that the required analysis should have been performed promptly after the identification of the problem. There was one nonconformance (see Section B.1.a above) identified in this part of the inspection.

4. Thermohydraulic Computer Codes: During this inspection, the development and verification of two computer codes that are used in safety-related analysis (CRAFT2, small break version and REFLOD3) was reviewed. As part of this review, the B&W Quality Assurance Topical Report (BAW-10096A, Rev. 4) and several quality assurance procedures (NPG-0402-01, NPG-0902-06, and NPG-0903-03) were utilized extensively. In addition, several internal audit and potential safety concern (PSC) files were compared with the applicable procedures and requirements. The findings and observations of each part of this inspection are summarized in the following sections.

   a. CRAFT2 Computer Code

      The CRAFT2 large break loss of coolant accident analysis computer code is being extensively modified for use in small break analyses. A topical report describing the code modifications has been submitted for NRC staff review. During this inspection, the development and verification of the small break version of CRAFT2 were reviewed and the findings are described below:

      i. The certifications files for versions 18-30 of CRAFT2 were reviewed. With the exceptions of versions 28 and 29, each of these revisions was for the small break version of CRAFT2. The modifications consist of a number of new models being added to the code, including:

         non-equilibrium pressurizer model
         valve models
         ECC injection model
         MIT two phase pump model
         steam generator model improvements
         steam generator tube heat conduction model
         draft flux model
         aspirator model
         primary metal heat structure model

With two exceptions, each modelling improvement included a verification test problem that satisfied the requirements of B&W QA procedure NPG-0902-06. However, the non-equilibrium pressurizer and the primary metal heat structure model were not verified in compliance with the B&W procedure.

ii. Computer code manuals for CRAFT2 are controlled by B&W's Applications Development Section. Revisions to the manuals are sent to all code users who have received the complete manual and receipt of the revisions must be acknowledged. This provides a good means to ensure that code users are aware of modifications, including error corrections.

iii. The Program Manual for CRAFT2 was reviewed and compared with the requirements of NPG-0903-03. It was observed that the manual included a reasonable description of the analytical models included in the code. However, the section describing code limitations was deficient in that only FORTRAN dimensioning limits were discussed. Other, potentially significant code limitations (i.e., physical properties, correlations, etc.) were not included.

iv. Several calculation files describing modifications to the small break version of CRAFT2 were reviewed. It was noted that each included a reasonable description of the analysis, identified the responsible engineer, and were signed by the independent reviewer.

v. As part of the review of the certification files for CRAFT2 versions 18 thru 30, it was noted that the independent review of three certified versions of the code were performed by the supervisor of the responsible engineer. It was also noted that not all code versions between 18 and 30 had been conditionally certified and that a certification of a new version includes all versions since the previous certified version. Independent review by an immediate supervisor is not in compliance with topical report BAW-10096A, Rev. 4. None of the allowed exceptions to the topical report specification were satisfied in this case.

vi. Three calculation files supporting use of the CRAFT2 code in large break loss of coolant accident analyses were reviewed. In each case, a reasonably complete description of the analysis was documented including an independent review. However, in one case an uncertified computer code was used for the preparation of CRAFT2 input. This code, identified as CORE, did not meet any of the certification exemption requirements of NPG-0402-01. It was noted that the code was independently verified in the other two calculation folders reviewed. However, in its present use as a FORTRAN source code, it is subject to uncontrolled changes by the responsible engineers and that certification could provide efficient reliable analytical tool for future analyses.

vii. The certification file for one version of the small break CRAFT2 code included a test problem run as part of the verification of a new steam generator model. The results were compared with experimental data; however, the file did not provide a discussion of the results or an assessment of the adequacy of the agreement with the data.

Five nonconformances (see Section B.2 thru B.6) were identified during this part of the inspection.

5. B&W Reloads with Mixed Fuel Cycles: Several inquiries were made about the methodology used when B&W performs a reload for a plant previously fueled by another vendor creating a fuel loading that is only part B&W fuel. Analysis of this type of fuel loading could require data that may be considered proprietary by the other fuel vendors. It was stated that B&W has supplied fuel for a mixed reload in only one instance and all data required was supplied by the utility. Similar circumstances in future reloads would be handled through contractural arrangements with the customers.

There were no nonconformances identified in this part of the inspection.

ORGANIZATION: BINGHAM-WILLAMETTE COMPANY
PORTLAND, OREGON

REPORT NO.: 99900031/84-01	INSPECTION DATE(S) 10/1-4/84	INSPECTION ON-SITE HOURS: 48

CORRESPONDENCE ADDRESS: Bingham-Willamette Company
ATTN: Ms. Patricia A. Ganonug
Manager, Quality Assurance
2800 N. W. Front Avenue
Portland, Oregon 97210

ORGANIZATIONAL CONTACT: Mr. James A. Odoms. Assistant Quality Assurance Manager
TELEPHONE NUMBER: (503) 226-5455

PRINCIPAL PRODUCT: Nuclear pumps.

NUCLEAR INDUSTRY ACTIVITY: Approximately 2 percent of the 1983 production

ASSIGNED INSPECTOR: J. T. Conway
J. T. Conway, Reactive Inspection Section (RIS) 12-17-84 Date

OTHER INSPECTOR(S): J. Petrosino, RIS
P. Turtzo, consultant

APPROVED BY: E. W. Merschoff
E. W. Merschoff, Chief, RIS 12-21-84 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 result of the issuance of a 10 CFR 50.55(e) report from Arizona Public Service Company (APSC) and a 10 CFR Part 21 report from Bingham-Willamette Company (BWC) concerning defective impeller wear rings in auxiliary feedwater pumps which had been furnished to the Palo Verde nuclear generating station.

PLANT SITE APPLICABILITY: Cracked impeller wear rings: 50-528/529/530

A. VIOLATIONS:

Contrary to Section 21.31 of 10 CFR Part 21, a review of documentation packages for eight reworked shafts on Section III, Class 3 pumps to Palo Verde revealed that fifteen Bingham-Willamette Company (BWC) purchase orders (PO) to material manufacturers and services vendors (71-00208, -221, -223, and -439 to Beaver Heat Treating; -161, -171, -173, -220, -224, and -225 to Gladstone Machine; -181 to Roemer Foundry; -222 to Pacific Northwest Plating; -159 to Technical Casting; -168 to Arrow Machine; and -200 to Coulter Steel) did not specify that 10 CFR Part 21 would apply.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Sections 10.2.3.1 and 10.2.3.3 of the Quality Assurance Manual (QAM) and Section 9.6.1. of SNT-TC-1A, a review of qualification records for one Level III and seven Level II examiners revealed that the records for six Level II examiners (Nos. 185, 186, 186, 190, 191, 197, and 199) did not contain a statement showing completion of training in accordance with BWC's Procedure No. H 29.6 "Certification of Nondestructive Examination Personnel.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Procedure No. E12.7.0 of the Engineering Department Manual, "Engineering Specifications to the Shop," Manual No. 23 assigned to the Manager Quality Assurance contained deleted specifications E-10.36, -20.56, -20.66, and -20.81 which were not in the index dated July 20, 1984 and did not contain current specifications E-10.17, -21.38, -21.39, and -21.40 which were listed in the index.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 3.2 and 4.3 of Procedure No. H30.5, a review of purchase orders (PO) for material and services for the 10 pump shafts which were reworked (ie., wear rings were replaced) for Arizonia Public Service indicated that the QA Engineer did not review and approve PO 71-00223 dated December 13, 1983 to Beaver Heat Treating and PO 71-00159 dated October 7, 1983 to Technical Casting.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Subsection NCA-4134.6 of Section III of the ASME Code, a review of 4 manuals from the QA, Purchasing, Production Control & Manufacturing, and Engineering Departments revealed that measures did not exist to control the preparation, issuance, and disposition of individual specifications and/or procedures contained in the Purchasing, Production Control & Manufacturing, and Engineering Department manuals.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Subsections NCA-4134.5 and -4134.9 of Section III of the ASME Code, a review of POs for material and services relating to the rework of nuclear pump shafts indicated that POs 71-00171 (October 18, 1983) and 71-00161 (November 17, 1983) to Gladstone Machine did not identify or reference a procedure for the chrome plating operation; and POs 71-00208 (November 21, 1983), -221 (December 7, 1983), -223 (December 13, 1983), and -439 (June 21, 1984) to Beaver Heat Treat did not identify or reference a procedure for the heat treat operation.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 1.3.2. and 1.3.5 of the QAM, no records were in the QA department to indicate that an indoctrination session was given for the Quality Assurance Manager (employed March, 1984) and a Quality Assurance Document Control Clerk (transferred October, 1983).

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Procedure No. H31.21.1, a review of POs and Approved Vendor Lists revealed that paragraph 6.0 "Class II Quality Program Requirements" of Procedure No. H31.27 was not specified in the following POs to five "Class II" vendors:

Vendor	PO (date)
Beaver Heat Treat	71-00208 (November 21, 1983) -00221 (December 7, 1983) -00223 (December 13, 1983)
Gladstone Machine	71-00161 (November 17, 1983) -00171 (October 18, 1983) -00220 (December 6, 1983) -00224 (December 13, 1983)
Pacific Northwest Plating	71-00222 (December 12, 1983)
Technical Casting	71-00159 (October 7, 1983)
Arrow Machine	71-00168 (October 17, 1983)

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 4.1 of Procedure No. H 31.27.3, a review of vendor audits and auditor qualifications indicated that audit no. A-81-8 was performed of Beaver Heat Treat on May 8, 1981, but the QA records indicate that the auditor was not certified as a lead auditor until December 1981.

9. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 5.3.2 of Procedure No. A14.0, BWC obtained information about a defective auxiliary feedwater pump wear ring at the Palo Verde Nuclear Generating Station on September 26, 1983, but did not submit the written notification to the NRC until November 8, 1983.

10. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Procedure No. H31.29, Sections 2.4 and 5 of ANSI/ASME N45.2.6., and Section 2.1 of Procedure No. H29.1, a review of qualification records for dimensional inspectors revealed the absence of any certification for the Dimensional Inspection Foreman who had performed periodic overinspections from March 1982 to September 1984 of the work performed by the dimensionally inspectors.

C. Unresolved Items:

Audits of Calibration Service Vendors - BWC was notified of the NRC position (ie., requirements for a preaward evaluation and postaward audits) relating to the QA program requirements for suppliers of calibration services in a Potapovs/Wood letter dated August 24, 1983. It was noted that BWC has begun auditing this category of vendors and are approximately 60 percent complete. Vendors audited to date by BWC include: American Gage, Deltronic, Dresser, IRD Mechanalysis, PCB Piezotronics, Don Richetts, TRW Greenfield and Webber Gage Division. BWC plans to have all their calibration service vendors audited by the end of 1984. The satisfactory completion of this activity will be evaluated during the next NRC inspection.

D. Status of Previous Inspection Findings:

1. (Closed) Nonconformance B.1 (83-01): There was no documented evidence that committed training of pump engineering personnel in the design of heat exchangers had been accomplished.

   The NRC inspector reviewed the June 1983 training records for the Pump Engineering Department concerning ASME Code requirements for heat exchangers and found them acceptable.

2. (Closed) Nonconformance B.2 (83-01): The quality assurance engineer did not complete an inspection report identifying that the rear head of the Ametek-Schutte and Koerting Division Size 8-H-48, Type 1-V-4, heat exchanger was misorientated and, as a result, a noncompliance was not initiated and maintained in the Vendor Noncompliance Log.

The NRC inspector reviewed BWC's equipment instruction manual supplement regarding the proper orientation of the heat exchanger head and determined that it was satisfactory to prevent misorientation during reassembly operations. The manual supplement was transmitted to BWC customers who had purchased the Ametek-Schutte and Koerting Division unit.

3. (Closed) Nonconformance B.3 (83-01): The wear rings on pump serial Nos. 230701, -2 and -3 were removed using torch heating in lieu of heating in an oven.

   The NRC inspector reviewed revised Procedure No. E 21.36 which removed the reference to torch heating and the training record for the pump department, asssembly/disassembly personnel concerning adequate methods of installing and removing pump wear rings and found them acceptable.

E. Other Findings or Comments:

1. Reporting of Defects and Noncompliance - BWC procedures for complying with the requirements of 10 CFR Part 21 along with associated records, files and technical analyses were reviewed. In a May 9, 1980 letter, BWC reported the failure of the seal assemblies on primary coolant pumps for Rancho Seco and Oconee to meet the radiography requirements of Section III of the ASME Code. This was later determined to be acceptable. By letter dated January 21, 1981, BWC reported the cracking of an impeller wear ring on a pump identical to the two shipped to Beaver Valley, Unit 2 for the auxiliary feedwater system. The cause was later determined to be an overhaul practice whereby the rings were removed and reinstalled using heat. BWC no longer permits this method for removing and reinstalling wear rings.

   In a November 8, 1983 letter BWC reported the failure of an impeller wear ring on an auxiliary feedwater pump at the Palo Verde facility. Following extensive testing and analysis, BWC concluded that the AISI 440 A spuncast material for the wear ring is sensitive to undue upset during manufacture, assembly or operation. Consequently, BWC has changed the wear rings to AISI 420 wrought material which has enhanced properties of ductility (i.e., elongation and reduction of area) subsequently reducing sensitivity to upset. Affected nuclear plants were notified by BWC, and all potentially affected utilities have contracted for the upgraded wear rings with the exception of Duke Power who is currently in negotiation with BWC regarding the modification. Engineering actions taken to date appeared appropriate.

   Nonconformance B.9 was identified in this area of the inspection.

2. Training/Certification - The inspector reviewed applicable sections of the QAM, two procedures, QC dimensional inspection department indoctrination and certification records and QA Auditor certifications. The indoctrination portion of the QA records, and the dimensional inspection personnel records were reviewed to ensure BWC programmatic commitments had been achieved. No records were in evidence for the Chief Inspector. The only document in the Dimensional Inspection Foreman's file was an examination signed by the Chief Inspector on April 18, 1983.

   Nonconformances B.6 and B.10 were identified in this area of the inspection.

3. Audits - The inspector reviewed internal audits for the period of January 1982 to June 1984 in conjunction with the QA master schedule which established the date and program section of each audit. The audits appeared thorough and the responses addressed the identified concerns. Corrective action notification, followup and verification appeared satisfactory.

   Vendor surveys/audits conducted from 1976 to the present of suppliers of materials and services, including seven suppliers related to the replacement of impeller wear rings for Palo Verde pumps, were evaluated. All of the surveys/audits reviewed appeared adequate.

   Nonconformance B.8 was identified in this area of the inspection.

4. Pump Testing - BWC performs various types of testing at their facilities. The Performance Test Procedure, Hydraulics Institute Standands, ASME Power Test Code, PTC8.2, and data packages of tests for pumps for the Seabrook Station were reviewed. The test procedure and data were reviewed for test methods, appropriate acceptance criteria, instrumentation requirements, and test results. The following types of testing were included: hydrostatic pressure tests, pump performance curves, flow, pump head, pump power, speed, temperature, vibration and net positive suction head. Personnel interviewed appeared technically knowledgeable and competent.

   It was noted that BWC was still using the 13th edition of the Hydraulics Institute Standard when a 14th edition was issued in 1983. In addition, the data packages for the actual tests performed did not list serial numbers and calibration information for the specific instrumentation used in the test. This information is recorded

in the nuclear industry and is discussed in Criterion XI of Appendix B to 10 CFR Part 50 and in BWC's QAM. Specifically, these documents require that test procedures contain necessary instrumentation requirements, and results will be documented to assure that test requirements, including instrumentation requirements, have been satisfied.

5. Nondestructive Examination (NDE) - Two procedures and the qualification records for seven NDE examiners (one - Level III and seven - Level II) were reviewed to assure that personnel performing and verifiying activities affecting quality were qualified. Records of the physical examinations for all examiners were found to be acceptable. Test records and certifications in both 1980 and 1982 for the Level III examiner in four desciplines meet the requirements of SNT-TC-1A. The test records for the seven Level II examiners were satisfactory, but qualification records for six examiners were incomplete.

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

6. Control of Purchased Material and Services - The inspector reviewed applicable sections of the QAM and the Purchasing Department Manual, Approved Vendor Lists dated July 1983 and April and September 1984 and 14 POs (4 - Gladstone Machine, 4 - Beaver Heat Treating, 2 - Coulter Steel & Forge, 1 - Roemer Foundry, 1 - Technical Castings, 1 - Pacific Northwest Plating, and 1 - Arrow Machine) pertaining to the replacement of impeller wear rings on ten shafts for pumps from the Palo Verde facility. Applicable Certified Material Test Reports and Certificate of Compliances from the suppliers were also reviewed. The review was undertaken to assure that applicable specification and QA program requirements were included or referenced in procurement documents, material and services were purchased from qualified vendors, and items met the technical and quality requirements identified in the POs.

   During the repair process for the Palo Verde pumps and components, Engineering specified that the wear rings and a pump shaft should be ground, chrome-plated, and re-ground. It was noted that this process was initiated without review by the QA organization.

   Violation A.1 and Nonconformances B.3, B.5, and B.7 were identified in this area of the inspection.

7. Document Control - The inspector reviewed manuals from the QA, Purchasing, Production Control & Manufacturing, and Engineering Departments to assure: (a) procedures/instructions, including changes, are reviewed for adequacy and approved for release by authorized personnel and used at the location where the prescribed activity is being performed; and (b) the inadvertent use of obsolete or superseded procedures/instructions.

   Nonconformances B.2 and B.4 were identified in this area of the inspection.

8. Service Center - BWC's manufacturing facilities including the Service Center were toured at various times during the inspection in the company of BWC personnel. The Service Center utilized generic computer-generated work order forms for tracking items under repair or retrofit operations, but there is no documented list of operations to be performed that is approved prior to repair commencing on the item. Currently, when items are received in the Service Center for repair or retrofit, there is no documented receiving inspection to determine and document the as-received condition.

ORGANIZATION: BUFFALO FORGE COMPANY
BUFFALO, NEW YORK

REPORT NO.: 99900882/84-01	INSPECTION DATE(S): 9/24-28/84	INSPECTION ON-SITE HOURS: 34

CORRESPONDENCE ADDRESS: Buffalo Forge Company
ATTN: Mr. Robert Jorgensen
Vice President of Engineering
490 Broadway
Buffalo, New York 14240

ORGANIZATIONAL CONTACT: Mr. John Twentyfive
TELEPHONE NUMBER: (716) 847-5268

PRINCIPAL PRODUCT: Air handling and air conditioning equipment.

NUCLEAR INDUSTRY ACTIVITY: less than 1%.

ASSIGNED INSPECTOR: _____ 11/5/84
FOR N. J. Miegel, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S): E. W. Merschoff, RIS

APPROVED BY: _____ 11/5/84
E. W. Merschoff, Chief, RIS, VPB Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: This inspection was conducted as a result of the NRC's initiation of inspections at material manufacturers and material suppliers to verify compliance with NRC and ASME Code requirements. This inspection was also made to review the action Buffalo Forge has taken regarding the Part 21 report submitted on June 10, 1981, concerning missile penetration analysis.

PLANT SITE APPLICABILITY:

Docket Nos.: 50-440, 50-441, 50-382, 50-461, 50-402, 50-460, 50-397, 50-513.

ORGANIZATION: BUFFALO FORGE COMPANY
BUFFALO, NEW YORK

REPORT NO.: 99900882/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATION:

Contrary to Section 21.31 of 10 CFR Part 21, Buffalo Forge (BF) did not specify 10 CFR Part 21 as an applicable requirement on an order for ASME Code Section III weld wire placed with the Lincoln Electric Company (BF purchase order (PO) #57373, dated 10/19/83). The requirements of 10 CFR Part 21 had been imposed on BF by their customer.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 1.6 of the Quality Assurance Manual (QAM), a review of 18 POs issued by BF revealed four occasions where BF failed to procure items for nuclear orders from suppliers on the approved vendor list (AVL).

   a. BF PO #64660 dated 5/21/84, issued to the Quick Cut Gasket and Rubber Corporation for five items. One item, gasket material, was used to fill a nuclear order.

   b. BF PO #41973 dated 4/29/82, issued to the Erdle Perforating Company for perforated sheets.

   c. BF PO #16119 dated 5/22/80, issued to the Buffalo Welding Supply Company, Inc. for welding wire.

   d. BF PO #35392 dated 10/27/81, issued to the National Steel Corporation for sheets of galvanized steel.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 11.2 of the QAM, standards from Canada, France, and the United Kingdom, not traceable to the National Bureau of Standards, have been used to calibrate the BF Jarrell Ash Spectrometer. This spectrometer is used by BF for ladle analysis of forgings.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 21 - Missile Penetration Analysis - BF submitted a 10 CFR Part 21 report to the NRC in June 1981 concerning missile penetration analysis and certification. BF had supplied axial and centrifugal fans to the nuclear industry. These fans had been certified that in the event a blade or portion thereof broke from the wheel of the fan, the piece would not perforate the fan housing and become a missile. This certification was based on analytical calculations developed for BF by a private engineering firm.

   At the time of the original certifications, BF was not aware of any instance where blades, or fragments, had broken off and penetrated a fan housing. BF was subsequently advised by the private engineering firm of two cases where locomotive fans had oversped, failed the wheel, and the failed blades then perforated the fan housing and became missiles. BF elected to test their calculations for missile penetration analysis on these reported cases. The analysis determined that the fragments should not have penetrated the housings. Since their method proved to be in error, BF elected to revise the calculations to provide a more conservative estimate of the minimum acceptable fan housing thickness to ensure against missile penetration.

   Four utilities (Louisiana Power and Light operating Waterford 3, Cleveland Electric operating Perry 1 and 2, Illinois Power operating Clinton 1 and 2, and WPPSS 1, 2 and 4) had received fans which were certified against missile penetration using the original calculations. BF determined that these fans could be fixed by welding or bolting additional bands of material to the housings to increase the total housing thickness to acceptable levels. BF contacted the four utilities and offered to provide each with drawings of the suggested field modifications.

   Sixteen of the twenty fans sold to Cleveland Electric for the Perry site had not yet been installed when they were contacted by BF. These fans were returned to BF for repair. BF supplied Cleveland Electric with the material necessary to fix the other four fans in the field. Louisiana Power and Light (LP&L) had received eight fans from BF which were affected by the reanalysis. All eight fans had been installed so BF shipped LP&L the material necessary to repair the fans in the field. Both Illinois Power and WPPSS received drawings from BF of the suggested field notification. There were not records available to indicate whether Illinois Power or WPPSS had either received material from BF for field modifications, or had returned the fans.

The NRC inspector reviewed the BF documentation package concerning the Part 21 report, and BF procedures DO-148F-1, and DO-148F-2. The inspector verified that customers had been properly notified and that the corrective action was appropriate.

2. Control of Purchased Material - The inspector reviewed the applicable sections of the BF QAM, and 18 POs issued by BF to 11 vendors. The review was undertaken to ensure that applicable regulatory, technical, and QA program requirements were included or referenced in procurement documents, and that the material was purchased from approved vendors.

   Violation A and Nonconformance B.1 were identified in this area of the inspection.

3. NDE - The inspector reviewed procedures for liquid penetrant, magnetic particle, and ultrasonic testing, and the qualification records for three NDE personnel. These procedures and records were examined to ensure that the requirements of Section III of the ASME Code were met, and that personnel were properly trained and qualified in accordance with SNT-TC-1A. There were no violations or nonconformances identified during this area of the inspection.

4. Internal Audits - Section 17.2 of the QAM, BF procedure QCP-21, and internal audit reports for 1981, 1982, and 1983 were reviewed. Performance of the audits complied with prescribed procedures. Checklists corresponding to each section of the QAM were used, personnel had been adequately trained to audit, and auditors did not have direct responsibility for assigned areas. The QAM is divided into twelve increments and each month a portion of the audit is completed. Records are maintained of the audits and include the completed checklist, handwritten notes taken by the auditor, and any followup action, such as reaudit of deficient areas. In general, the internal audit system was found to be a thorough amd comprehensive check of the BF QA program.

5. Equipment Calibration - Section 11 of the QAM and BF procedure QCP-25 were examined. The chem lab was also inspected to verify that equipment used for chemical and physical analyses, such as balances, tensile testers, and spectrometers, were appropriately maintained and calibrated. Nonconformance B.2 was identified during this area of the inspection.

6. Welding - Section 8.2 of the QAM and BF procedures QCP-7 and DO-110-MF were reviewed, and the nuclear weld rod issue station was inspected. The inspector verified that the station and rods were properly maintained and controlled, and that all thermometers examined were calibrated. Four weld rods (Buffalo Forge Codes N-E7018 3/16-4, N-E7018 5/32-5, N-316-L-5/32-1 and N-316-L-1/8-2) were also inspected to verify traceability. The qualification records for one welder and the Welder Certification Report were reviewed to assure that welders are properly qualified. The Welder Certification Report is a printout updated weekly, which lists each welder, the procedures the welder is qualified to perform, and the date the qualification expires. There were no violations or nonconformances identified during this area of the inspection.

ORGANIZATION: CARDINAL INDUSTRIAL PRODUCTS CORPORATION
LAS VEGAS, NEVADA

REPORT NO.: 99900840/84-01	INSPECTION DATE(S): 5/29-6/1/84	INSPECTION ON-SITE HOURS: 75

CORRESPONDENCE ADDRESS: Cardinal Industrial Products Corporation
ATTN: Mr. D. Fielder
President
3827 W. Oquendo
Las Vegas, NV 89118

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

PRINCIPAL PRODUCT: Fasteners

NUCLEAR INDUSTRY ACTIVITY: Approximately 75 percent of Cardinal Industrial Products Corporation (CIPC) sales are made to the commercial nuclear industry.

ASSIGNED INSPECTOR: _____ 8/20/84
For I. Barnes, Inspector, Region IV Date

OTHER INSPECTOR(S): L. E. Ellershaw, Region IV
E. W. Merschoff, Office of Inspection and Enforcement

APPROVED BY: _____ 8/20/84
E. W. Merschoff, Chief, Reactive Inspection Section 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 complete a review 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
(cont. on next page)

PLANT SITE APPLICABILITY: Material control deficiency, 50-528/529/530; non-performance of required nondestructive examinations, 50-329/330, 50-482; NCA-3800 deficiencies, 50-482. Note: Multiple docket nos. have been included where purchase orders (POs) did not identify a specific unit.

10 CFR 2.790 INFORMATION HAS BEEN DELETED

SCOPE (cont.) Code. These concerns were evaluated by an inspection of procurement source selection and an integrated procurement and process control inspection. The inspection included a review of visual examination criteria and completion of a review of 10 CFR Part 21 implementation.

A. VIOLATIONS:

Contrary to Section 21.21 of 10 CFR Part 21, the CIPC adopted procedure, Cardinal Standard Practice (CSP) No. 17.003, did not provide for informing the licensee or purchaser of an identified deviation that would require their evaluation.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph NCA-3866.6 in Section III of the ASME Code and CIPC CSP Nos. 12.001 and 9.002-A, material control quantity verification activities were observed to be not effectively implemented as evidenced by the following:

   a. The final operation on a Customer Production Record (CPR) for 1-1/2" x 6-1/2" hex head bolts, of which a portion were furnished for Arizona Public Service Purchase Order (PO) No. 10407-F-140441, showed in the final operation that a total of 110 bolt blanks were placed in stock on November 25, 1981.

   b. Records for prior operations on the CPR (i.e., heading, heat treatment, receiving inspection) showed, however, that a total of only 100 bolt blanks had been produced. This quantity discrepancy brings into question whether a loss of traceability occurred.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 15 in the QA Manual and paragraph NB-2581 in Section III of the ASME Code, test and examination requirements have not been performed in accordance with customer requirements, invoked codes, standards and specifications as evidenced by the following:

   a. CIPC failed to perform required ultrasonic examination (UT) of 4, 3½"-8 x 26" studs which were ordered in PO No. 5008-3634-QA (Midland) by Consumers Power Company (CP) to ASME Section III Code Class 1 requirements.

b. Required magnetic particle examination (MT) was not performed on 300, 1¼"-8 nuts which were ordered by Daniels Construction (Wolf Creek) on PO No. 7158-SR-6620 to ASME Section III Code Class 1 requirements.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and CSP No. 7.002, vendor certification/documentation packages were accepted by CIPC which were not in accordance with invoked codes, standards and/or specifications as evidenced by the following:

a. Acceptance of numerous CMTRs from a material vendor which reported Izod impact test results rather than the material specification and ASME Code required Charpy-V notch impact tests.

b. Acceptance of vendor CMTRs which did not contain the required QA statement pertaining to the material being manufactured and supplied in accordance with the QA program as 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.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 11 of the CIPC QA Manual, Material Specification SA-614, paragraph NC-2580 in Section III of the ASME Code and Article 9 in Section V of the ASME Code, written procedures were neither developed nor used for performing visual inspections of ASME Section III Code, Class 2 and Class 3 bolting material.

C. UNRESOLVED ITEMS:

None

10 CFR 2.790 INFORMATION HAS BEEN DELETED

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

Review of previous inspection findings (i.e., Inspection Report No. 99900840/83-01 - Notice of Violation, Items A and B; Notice of Nonconformance, Items A through J) was restricted during this inspection to providing clarifications and additional examples to CIPC. Formal review of implementation of corrective actions will be performed in a future inspection after completion of corrective action correspondence.

E. OTHER FINDINGS AND COMMENTS:

1. General: Records from and pertaining to the following CIPC material and service vendors were utilized to perform this inspection:

a. Vendor 1 10 CFR 2790 INFORMATION

b. Vendor 2 10 CFR 2790 INFORMATION

c. Vendor 3 10 CFR 2790 INFORMATION

d. Vendor 4 10 CFR 2790 INFORMATION

e. Vendor 5 10 CFR 2790 INFORMATION

f. Vendor 6 10 CFR 2790 INFORMATION

g. Vendor 7 10 CFR 2790 INFORMATION

h. Vendor 8 10 CFR 2790 INFORMATION

i. Vendor 9 10 CFR 2790 INFORMATION

j. Vendor 10 10 CFR 2790 INFORMATION

k. Vendor 11 10 CFR 2790 INFORMATION

l. Vendor 12 10 CFR 2790 INFORMATION

m. Vendor 13 10 CFR 2790 INFORMATION

n. Vendor 14 10 CFR 2790 INFORMATION

o. Vendor 15 10 CFR 2790 INFORMATION

p. Vendor 16 10 CFR 2790 INFORMATION

10 CFR 2.790 INFORMATION HAS BEEN DELETED

q. Vendor 17 10 CFR 2790 INFORMATION

r. Vendor 18 10 CFR 2790 INFORMATION

s. Vendor 19 10 CFR 2790 INFORMATION

t. Vendor 20 10 CFR 2790 INFORMATION

u. Vendor 21 10 CFR 2790 INFORMATION

The NRC inspectors utilized the documented QA program which was in effect prior to the November 1983 ASME survey for performance of this inspection. The current ASME accepted QA program was not reviewed because the inspection concentrated on procurement and process control activities that occurred before the ASME survey took place.

2. Procurement Source Selection: The procurement source selection files including survey and audit records were reviewed for Vendors 1 through 10 to determine the adequacy of CIPC's program for evaluating suppliers of ASME Code and safety-related equipment. Each of these ten vendors had been surveyed and audited by CIPC and their QA programs accepted by CIPC as being consistent with the requirements of Subarticle NCA-3800 in Section III of the ASME Code. The results of the NRC review were as follows:

a. Vendor 1 (Nut Manufacturer) - A copy of the vendor's QA manual was available in both the vendor's native language and in English. The English language version did not fully meet the requirements of NCA-3860, "Quality System Identification and Verification Programs." Specifically, adequate provisions were not established to assure control of purchased materials and services (NCA-3866.3) or for controlling and identifying material throughout the manufacturing process (NCA-3866.6).

One day surveys or audits were conducted by CIPC on April 17, 1979 (survey); April 16, 1980 (audit); October 19, 1981 (audit); and September 6, 1982 (survey). The April 16, 1980, audit was incomplete in that the portion of the audit checkoff list dealing with the requirement to maintain personnel records (NCA-3864.3) was left blank. Vendor 1 was maintained on CIPC's Approved Vendor List (AVL) after performance of the April 16, 1980, audit.

10 CFR 2.790 INFORMATION HAS BEEN DELETED

b. Vendor 2 (Steel Mill) - An English language version of the Quality System Program dated November 22, 1982, was available for review.

This document was actually a brief (i.e., 5-1/2 pages, double spaced) overview of the QA program rather than a detailed QA manual and, as such, did not fully address the requirements of NCA-3800 in Section III of the ASME Code. For example, the requirements to control and identify material throughout the manufacturing process (NCA-3866.6) and the requirements for certification of materials (NCA-3867.4) were not adequately addressed.

One day surveys or audits were conducted by CIPC on November 2, 1980 (survey); March 31, 1982 (audit); January 31, 1983 (survey); and February 13, 1984 (survey). The only portion of the February 13, 1984, checklist which was filled out was the section dealing with personnel qualification. All other NCA-3800 criteria were left blank. Vendor 2 is currently listed on CIPC's AVL based on the February 13, 1984, survey.

c. Vendor 3 (Steel Mill) - An English translation of this vendor's QA program was available for review. This document did not fully address the requirements of NCA-3800 in Section III of the ASME Code in that the QA program did not include any form of an identification and verification program to assure traceability of materials.

One day surveys or audits were conducted by CIPC on November 21, 1980 (survey); November 9, 1981 (audit); September 22, 1982 (survey); and October 6, 1983 (survey). The September 22, 1982, survey was incomplete in that the checklist sections dealing with responsibility and QC procedures were left blank.

d. Vendor 4 (Nut Manufacturer) - The only QA manual available for review was not in the English language and, therefore, a determination could not be made in regard to the adequacy of the QA program it described.

One day surveys or audits were conducted by CIPC on April 12, 1979 (survey); April 17, 1980 (audit); October 28, 1980 (audit); October 20, 1981 (not specified); and September 28, 1982 (not specified). The September 28, 1982, checkoff sheet was entirely blank except for the section dealing with organization, yet the vendor was listed on the CIPC AVL based on this report. When asked why a complete survey or audit was not performed, the auditor (CIPC Senior Vice President) indicated that the September 28, 1982, report reflected simply a "visit" and was neither a survey nor an audit. He further stated that placing the vendor on the AVL based on this visit was a mistake. It is currently not known whether CIPC purchased any fastener material from this vendor during the time period it was inadvertently approved as a vendor.

e. Vendor 5 (Product not identified) - A QA manual was not on file for this vendor and, therefore, an independent determination could not be made in regard to QA program adequacy.

One day surveys or audits were conducted on November 6, 1980 (survey); October 14, 1981 (audit); April 6, 1982 (audit); and April 21, 1983 (survey). Only the April 21, 1983, survey checkoff sheet was completely filled out. The portion of the November 6, 1980, survey checkoff list dealing with the requirement to maintain personnel records (NCA-3864.3) was left blank. The portion of the October 14, 1981, audit checklist dealing with the requirement to maintain QA records (NCA-3867.2) was left blank and portions of the April 6, 1982, audit checklist were also left blank with respect to requirements for audits (NCA-3869.1); handling, storage, and shipping (NCA-3866.5); control of purchased materials and services (NCA-3866.3); and QA organization (NCA-3864).

f. Vendor 6 (Steel Mill) - A QA manual was not on file for this vendor and, therefore, an independent determination could not be made in regard to QA program adequacy. The CIPC survey and audit reports for this vendor were not reviewed in their entirety.

g. Vendor 7 (Nut and Bolt Manufacturer) - A QA manual was not on file for this vendor and, therefore, an independent determination could not be made in regard to QA program adequacy. One day surveys or audits were conducted by CIPC on November 3, 1980 (survey); October 17, 1981 (audit); and April 7, 1982 (survey). All portions of these survey and audit checkoff sheets were completed.

h. Vendor 8 (Nut and Bolt Manufacturer) - The only QA manual available for review was not in the English language and, therefore, a determination could not be made in regard to the adequacy of the QA program it described.

One or two day surveys or audits were conducted by CIPC on April 24, 1979 (survey); April 23, 1980 (audit); October 27 and November 13, 1980 (audit); October 21, 1981 (audit); and September 20, 1982 (survey). All survey and audit checkoff sheets were completed except for the April 23, 1980, audit in which the following sections were left blank: quality assurance records; corrective actions; control of nonconformances; control of inspection, test, and operation; and control of handling, storage, and shipping. The vendor was maintained on the CIPC AVL after the April 23, 1980, audit.

i. Vendor 9 (Steel Mill) - An English language version of the vendor's QA program dated February 13, 1978, was available for review. The portions reviewed were found to be consistent with the requirements of NCA-3800 in Section III of the ASME Code.

One day surveys or audits were conducted by CIPC on April 9, 1979 (survey); April 15, 1980 (audit); October 21, 1980 (audit); November 2, 1981 (audit); April 14, 1982 (survey); April 29, 1983 (audit); and April 27, 1984 (survey). The April 29, 1983, audit checklist was not completed in the areas of: corrective action; certification of material; identification of material; and handling, storage, and shipping. The April 27, 1984, survey checklist was not completed in the areas of: identification and marking of material; control of purchased material and services; examinations, tests, and reports;

certification of materials; and internal audits. The CIPC auditor (CIPC Senior Vice President) was asked why, in light of the incomplete April 27, 1984, survey, was the vendor identified on the current CIPC AVL. He replied that he knew the vendor's QA program was consistent with the requirements of NCA-3800 in Section III of the ASME Code based on the notations made in the comments column of the survey checklist, and he then checked off all incomplete sections of the survey as being satisfactory.

j. Vendor 10 (Steel Mill) - A QA manual was not on file for this vendor and, therefore, an independent determination could not be made in regard to QA program adequacy.

One or two day surveys or audits were conducted by CIPC on November 19, 1980 (survey); October 5, 1981 (audit); March 29, 1982 (audit); and September 26 and 28, 1983 (survey). The 1983 survey, which provided the basis for placing the vendor on the CIPC AVL, did not evaluate the vendor with respect to QA organization independence, control and documentation of heat treatment, and corrective action.

k. Summary Comments -

(1) Audit Performance - All surveys and audits reviewed for Vendors 1 through 10 were conducted by the CIPC Senior Vice President. The auditor stated that in all cases he was accompanied by an interpreter who was familiar with the steel industry and who, as part of each survey or audit, verbally translated the vendor's QA manual or changes made to it since the last visit. These verbal translations apparently formed the basis for CIPC acceptance of the QA manual with respect to the requirements of NCA-3800 since, in most cases, no notes or supporting documentation were included in the file. From discussion with the auditor, it was ascertained that the auditor perceived that there was general QA program compliance with the requirements of NCA-3800 by steel mills in the country where vendors 1 through 10 are located. The NRC inspector was also informed that the auditor had never rejected a steel mill in that country based on a survey or audit he had performed.

(2) Objective Evidence of Satisfactory Performance of Audits and Surveys - Of the ten vendor files inspected, four did not contain a QA manual in any language and two had native language versions only without an English language translation. Four had some form of English language translation of the vendor's QA program, of which three were clearly inadequate with respect to the requirements of NCA-3800 in Section III of the ASME Code.

A nonconformance was identified during the previous inspection of CIPC (i.e., Item B, Notice of Nonconformance, NRC Inspection Report No. 99900840/83-01) with respect to survey/audit records not providing objective evidence of either satisfactory performance of surveys and audits or that vendor manuals were a major basis for demonstration of ASME Code compliance. The findings made during this inspection are applicable to and supportive of this nonconformance and will be factored into NRC planned CIPC vendor QA program evaluation activities.

3. Integrated Procurement and Process Control Inspection:

A detailed evaluation was made of CIPC compliance with the requirements of selected CIPC customer POs. The evaluation included: (a) a review of CIPC vendor test and certification data with respect to CIPC PO, material specification, and applicable ASME Code requirements; (b) examination of Customer Production Records (CPRs) for control of processing and specification and performance of required mechanical tests and nondestructive examination (NDE); (c) review of supporting NDE and mechanical test records; (d) control of sub-contracted operations; and (e) review of CIPC Certified Material Test Reports (CMTRs) against supporting data for correctness and compliance with ASME Code requirements. The findings of this inspection with respect to specific customer POs are detailed below:

(a) Arizona Public Service Company (APS) PO No. 10407-F-140441 (Palo Verde) - APS ordered 28 hex head bolts, 1-1/2"x 6-1/2" long, on this PO dated December 14, 1981, in accordance with ASME Material Specification SA-325 and the requirements of Section III, Class 1 of the ASME Code.

The material used to fill this order had been previously purchased by CIPC from Vendor 15 on PO No. 8960 dated May 30, 1980. This PO, in addition to other items, called for 2500' of 1½" AISI 4140 hot rolled bar totalling 1500 lbs. This material was subsequently received by CIPC on September 4, 1981, with final acceptance occurring on September 8, 1981. CIPC commenced to process some of this material (127' of bar) on September 9, 1981. CPR No. 1245209, which was the applicable traveler, shows that the bars were cut to the specified size on September 10, 1981, resulting in 100 pieces and 2-6" test coupons.

The 100 pieces were sent to Vendor 18 for heading, with the vendor invoice (No. 8324 dated September 28, 1981) showing that 100 pieces were headed. The NRC inspector was informed that this figure should be an actual count, in that the heading machine has a counter. The next identified CPR operation was heat treatment. CIPC placed blanket PO No. 12338 dated May 6, 1981, with Vendor 17, in which Line Item 13 showed 100 each, 1-1/2" x 12", 4140 Bolt Blanks and Coupon. This PO also required Vendor 17 to spot check the hardness and certify the heat number, with this information appearing on all certifications. Certified Test Report No. 33513 dated September 28, 1981, from this vendor shows that 100, 1½" x 12", bolt blanks were heat treated, but the certification did not, as required, identify or certify the heat number.

The next operation on the CPR, No. 50, shows that 100 pieces were received back from the heat treat vendor and inspected on September 30, 1981. The last CPR operation, No. 75, states, "Put In Stock." The CPR record shows, however, that 110 pieces were placed in stock on November 25, 1981. The origins of the extra ten pieces could not be determined from available records. As a result of this condition, nonconformance B.1 was identified.

To fill the APS PO, CIPC generated CPR No. 2599801 dated December 14, 1981, which shows that 28 bolt blanks were pulled from stock on December 28, 1981. Processing of the bolts was completed on January 8, 1982. It was noted that both the Internal Order Form and the CPR stated that NDE was not required and that this was to be confirmed with the customer. Apparently, confirmation was not made and ASME Code Section III Class 1 required NDE was not performed. The 28 heavy hex bolts were shipped to APS with a certification dated January 11, 1982, which attested to the bolts meeting ASME Code Section III, Class 1 requirements. Notice of Nonconformance Item F.5, NRC Inspection Report No. 99900840/83-01, was previously written with respect to this inspection finding.

b. CP PO No. 5008-3634-QA (Midland) - CP ordered, in addition to other items, 32 stud bolts, 3-1/2" x 24" long, on this PO dated January 27, 1983, in accordance with ASME Specifications SA-193 Grade B7 and SA-614, and the requirements of ASME Code Section III, Class 1.

The NRC inspector did not identify any problems in regard to 2 shipments totalling 28 stud bolts. The following was identified, however, with respect to four stud bolts that were shipped to the CP Midland Plant on March 16, 1983. CIPC placed PO No. 19958 with Vendor 19 on February 7, 1983, for a total of 60' of 3-1/2" ASTM A-193 Grade B7 rod, hot rolled and heat treated. This material had been previously purchased by Vendor 19 from Vendor 21. The material was received and accepted by CIPC with a Vendor 19 CMTR dated February 9, 1983.

CIPC commenced to process 16' of this material on February 28, 1983, as shown on CPR No. 2879612. A scheduled initial operation was for the performance of UT. This operation was not signed off as having been completed, nor were there any UT reports or other documentation available to show that UT had been performed. Manufacturing of the four bolts continued and was completed on March 15, 1983, with shipment being made on March 16, 1983, with CMTR No. 28969 dated March 16, 1983. The CMTR attested to performance of UT in accordance with the requirements of Section II Specification SA-614 and Section V of the ASME Code and that the results had been found acceptable.

Nonconformance B.2.a has been identified as a result of these inspection findings.

c. Daniel Construction Co. (DC) PO. No. 7158-SR-66208 (Wolf Creek) -

(1) DC ordered 100, ASME SA-194 Grade 7, 2"-8, heavy hex nuts on Release 2 of this blanket PO dated May 25, 1983. This blanket PO invoked the requirements of Section III, Class 1 of the ASME Code (1974 Edition through the Summer 1975 Addenda). Fasteners were required to be examined in accordance with paragraph NB-2580 in Section III of the ASME Code and Charpy-V notch (CVN) impact tests at 30° F maximum were specified for fasteners greater than 1" in diameter.

Review of CIPC and CIPC vendor documentation for the 2"-8 heavy hex nuts showed the following anomalies and deficiencies in regard to QA records and demonstration of compliance with NCA-3800 by the nut supplier. The nuts were procured from Vendor 8 by a now defunct affiliated company of CIPC on their PO. No. 0018661 dated November 24, 1982. Standard certification requirements attached to the PO included a requirement that the fastener vendor report that the product was provided in accordance with their QA program as surveyed and approved by CIPC on the date of the latest survey in 1982. Certification to that effect from Vendor 8 was not contained in the documentation provided to the NRC inspector.

Review of heat treatment certification from a subvendor showed that their customer was another manufacturer and not Vendor 8. It would thus appear that the nuts may have been produced by this other manufacturer and not by the organization receiving the PO. The heat treat subvendor and the other manufacturer were identified on the CIPC AVL in this procurement time frame. It was additionally noted that the mechanical test data required by ASME SA-194 and the PO standard certification requirements had not been furnished by the nut supplier. Required testing was obtained by CIPC from Vendor 16 after receipt of the nuts. A CMTR from the raw material manufacturer, Vendor 11, was present in the documentation package which attested to, as required by the PO standard certification requirements, use of a QA program that had been surveyed and approved by CIPC on September 22, 1982. A survey report for this date was not, however, located for Vendor 11, during this inspection.

(2) Release 6 to DC PO No. 7158-SR-6620 included orders for ASME SA-194 Grade 2H, 1-1/4" -8, nuts; ASME SA-193 Grade B7, 1-1/2" -8 x 1', threaded studs; ASME SA-193 Grade B7, 1 3/4"-8 x 1' studs; ASME SA-193 Grade B7, 2"-8 x 1' threaded studs; and ASME SA-193 Grade B7, 1 3/8"-8 x 1' threaded studs. As stated above in 3.c.(1), the requirements of Section III, Class 1 of the ASME Code were applicable to these orders.

SA-194 Grade 2H, 1-1/4"-8, Nuts - Review of CIPC and CIPC vendor documentation for the ASME SA-194 Grade 2H, 1-1/4"-8, nuts showed that a total of 14,580 pieces was procured from Vendor 8 by handwritten CIPC PO No. 10396 dated November 27, 1980. This PO required that the product be manufactured in accordance with the Vendor 8 QA program which was approved by CIPC in November 1980. The bar steel was also to be obtained from a CIPC approved mill. The standard certification requirements which were referenced by the PO were not attached to the PO copy reviewed by the NRC inspector. An undated certification from the raw material manufacturer, Vendor 3, was present in the documentation package which attested to manufacture of the bar material using the quality program that had been surveyed and approved by CIPC on November 7, 1980. A survey date of November 21, 1980, was indicated, however, on the CIPC 1980 survey report for this manufacturer. The Vendor 8 CMTR dated April 24, 1981, did not indicate use of a CIPC surveyed and approved QA program for manufacture of the nuts. It was additionally noted that the CMTR did not include a statement of heat treated condition as required by paragraph NCA-3867.4 in Section III of the ASME Code. Only the tempering cycle was documented on the CMTR. This type of deficiency was previously identified as a nonconformance; i.e., Item J, Notice of Nonconformance, NRC Inspection Report No. 99900840/83-01.

Review of the CPR for the 1-1/4" -8 nuts showed that required MT (i.e., for ASME Section III Code, Class 1 compliance) had been accomplished by CIPC PO No. 17561-E. Examination of the applicable MT report from Vendor 16 for this PO showed, however, that this report applied to a sample of 50 nuts which had been examined in accordance with MIL-S-1222G. All 50 nuts had been rejected by MT because of linear indications. No records were available to indicate that MT in accordance with ASME Section III Code requirements had been performed on the nuts furnished to Wolf Creek. CIPC CMTR No. 0035174 dated November 15, 1983, attested, however, to MT compliance with the provisions of paragraph NB-2580 in Section III of the ASME Code.

The failure to perform required MT has been identified as nonconformance B.2.b. Acceptance of Vendor 8 certification for the 1-1/4"-8 and 2"-8 (c.(1) above) nuts, which did not provide the required confirmation of use of the CIPC surveyed and approved QA program, has been identified as nonconformance B.3.b.

SA-193 Grade B7, 1-1/2"-8 x 1', Threaded Studs - Review of CIPC and CIPC vendor documentation showed that the material had been supplied by Vendor 10 in response to CIPC PO No. 16805 dated July 14, 1982. Examination of the vendor CMTR identified that Izod impact test values had been reported by Vendor 10 and not the required CVN impact test results. The Izod impact test values were transcribed, however, on the CIPC CMTR as being the results of CVN impact tests.

This finding and the other examples noted later in this report have been identified as nonconformance B.3.a. This nonconformance was previously identified in NRC Inspection Report No. 99900840/83-01 as Item E.1, Notice of Nonconformance.

It was additionally noted that Vendor 10 heat treatment information had been transcribed onto CIPC CMTRs to show only the maximum temperatures of the ranges reported for hardening, tempering, and stress relief. This condition was previously identified in Item I.1, Notice of Nonconformance, NRC Inspection Report No. 99900840/83-01. The use of a stress relief temperature range by this vendor which allowed the minimum temperature to be below that specified by the material specification was similarly documented as Item E.2 in the Notice of Nonconformance of NRC Inspection Report No. 99900840/83-01. No basis was seen in Vendor 10 documentation to support the statement made on the CIPC CMTR with respect to impact specimen location.

SA-193 Grade B7, 1 3/4"-8 x 1', Studs - Review of CIPC and CIPC vendor documentation showed that this material had been supplied by Vendor 10 in response to CIPC PO No. 0013308 dated August 6, 1981. The same conditions, as noted above for the 1¾"-8 studs, were observed with respect to heat treatment information and transcription by CIPC of reported Izod impact values as CVN impact test results.

SA-193 Grade B7, 2"-8 x 1', All Threaded Studs - These items were also furnished by Vendor 10 in response to CIPC PO No. 14101 dated October 20, 1981. The same conditions, as noted above, were observed with respect to transcription of reported Izod impact test values as CVN impact test results on the CIPC CMTR. In this instance, CIPC did not list on their CMTR the stress relief performed by Vendor 10 after cold drawing. It was additionally noted that Vendor 10 had referenced on their CMTR the use of the steelmaker's QA program and not their own. This latter condition was previously identified as Item E.4, Notice of Nonconformance NRC Inspection Report No. 99900840/83-01.

SA-193 Grade B7, 1 3/8"-8 x 1', All Threaded Studs - These items were furnished by Vendor 10 in response to CIPC PO No. 12140 dated April 21, 1981. The same findings were made, as noted previously, with respect to transcription of reported Izod impact test values as CVN values, heat treatment information, and no apparent basis for the impact specimen location statement on the CIPC CMTR.

(3) Release 5 to DC PO No. 7158-SR-6620 included orders for ASME SA-194 Grade B7, 1-1/2"-6, heavy hex nuts; and ASME SA-193 Grade B7, 1-1/2"-6 x 1", all threaded rod.

SA-194 Grade 7, 1-1/2"-6, Heavy Hex Nuts - Review of CIPC documentation showed that a memorandum dated September 30, 1983, had been sent to DC which confirmed the CIPC understanding that the nuts were to be furnished in accordance with Section III, Subsection NF of the ASME Code, with Class 2 being provided since a class had not been specified by DC. No DC documentation was seen confirming this apparent change in PO requirements from Subsection NB of Section III of the ASME Code. Subsequently, the nuts were returned by DC to CIPC for upgrading to Subsection NB requirements. These nuts were manufactured by Vendor 1 in response to CIPC PO No. 10402 dated November 25, 1980. CIPC reported only the vendor tempering information in their CMTR and did not include either the vendor hardening heat treatment information or a statement reflecting performance of a hardening heat treatment. This is contrary to paragraph NCA-3867.4 in Section III of the ASME Code.

On performing required MT examination of returned nuts for upgrading to Subsection NB requirements, a total of 279 were accepted and 31 rejected for cold shuts and cracked flats.

SA-193 Grade B7, 1-1/2"-6 x 1', All Threaded Rod - Review of CIPC and CIPC vendor documentation showed that CIPC had purchased the material from Vendor 12 on CIPC PO No. 7888 dated March 19, 1980. The material was procured as ASTM A-193 Grade B7, with no requirements invoked in regard to either use of a documented surveyed QA program or the applicability of Section III of the ASME Code. The vendor handwritten CMTR similarly attested to furnishing only ASTM A-193 Grade B7

and contained no information with respect to heat treatment, other than tempering, or use of an NCA-3800 QA program. Survey/audit checklists were not present at CIPC for this vendor which was previously identified in Item B.2, Notice of Nonconformance, NRC Inspection Report No. 99900840/83-01. No information was made available to indicate upgrading had been performed in accordance with the provisions of NCA-3867.4(e) in Section III of the ASME Code. The furnishing of apparent stock materials for Class 1 application has been identified as nonconformance B.4. This nonconformance subject was previously identified as Item D, Notice of Nonconformance, NRC Inspection Report No. 99900840/83-01.

Additional rod of this size was provided to DC for Release 5 of the PO using material furnished by Vendor 10 in response to CIPC PO No. 16805 dated July 14, 1982. The same conditions were noted with respect to CIPC transcription of reported Izod impact test values as CVN values and heat treatment information as described previously for other items furnished by this vendor.

4. 10 CFR Part 21 Implementation: To complete the review of CIPC 10 CFR Part 21 implementation initiated in the prior inspection of CIPC (NRC Inspection Report No. 99900840/83-01), a detailed review was performed of the adopted CIPC procedure (i.e., CIPC Standard Practice No. 17.003) for compliance with the procedural requirements of the regulation. In this area of the inspection, the violation identified in paragraph A was identified.

5. Visual Examination Criteria: The NRC inspectors reviewed CIPC's practices for performing NDE on ASME Section III fasteners. Although the ASME Code requires visual inspections to be performed in accordance with written procedures (i.e., Section II, SA-614; Section III, NC-2580; and Section V, Article 9), written procedures were not used when performing the required visual inspections for Class 2 and 3 fasteners. Methods for performing visual inspections, and inspection acceptance criteria based on IFI-105, "Recommended Practice on Surface Discontinuities on Bolts & Screws for Automotive Applications," as well as other Society of Automotive Engineers (SAE) sources are included as part of the inspector training program. However, specific procedures detailing how to perform a visual inspection and what constitutes a rejectable indication have not been developed. Nonconformance B.5 was identified in this area of the inspection.

ORGANIZATION: CHICAGO FLUID POWER CORPORATION
STREAMWOOD, ILLINOIS

REPORT NO.: 99900877/84-01	INSPECTION DATE(S): 8/28-31/84	INSPECTION ON-SITE HOURS: 25

CORRESPONDENCE ADDRESS: Chicago Fluid Power Corporation
ATTN: Mr. Richard Norberg
Plant Manager
411 North Avenue
Streamwood, Illinois 60103

ORGANIZATIONAL CONTACT: Mr. Raul Dominquez, QA Manager
TELEPHONE NUMBER: (312) 830-7400

PRINCIPAL PRODUCT: Fluid Power Actuators

NUCLEAR INDUSTRY ACTIVITY: There are currently no active nuclear orders in the plant.

ASSIGNED INSPECTOR: R. E. Oller — 9-21-84
R. E. Oller, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S):

APPROVED BY: E. W. Merschoff — 9-24-84
E. W. Merschoff, 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 an allegation received by the NRC concerning possible improper certification of O-ring material in hydraulic actuators manufactured by Chicago Fluid Power and furnished to Zion Units 1 and 2. Concurrently, the Quality Assurance program areas of procurement control, inspection/test, and conformance to 10 CFR Part 21 were inspected.

PLANT SITE APPLICABILITY: O-ring material, 50-295/304.

ORGANIZATION: CHICAGO FLUID POWER CORPORATION
STREAMWOOD, ILLINOIS

REPORT NO.: 99900877/84-01	INSPECTION RESULTS:	PAGE 2 of 4

A. VIOLATIONS:

Contrary to Sections 21.6 and 21.21 of 10 CFR Part 21 dated December 30, 1982:

a. A copy of Section 206 of the Energy Reorganization Act of 1974 was not posted in a conspicuous location at the Streamwood, Illinois, plant.

b. Appropriate procedures to provide for evaluation of defects, and informing the licensee or purchaser were not available.

These are Severity Level V violations (Supplement VII).

B. NONCONFORMANCES:

None.

C. UNRESOLVED ITEMS:

None.

D. OTHER FINDINGS OR COMMENTS:

1. Allegation

a. Introduction:

On March 6, 1984, the NRC Region III office received a telephone call which alleged that O-ring seal materials used in hydraulic actuators for nuclear service were improperly certified. The seals were installed in hydraulic actuators manufactured by Chicago Fluid Power Corporation (CFP) for use in the Zion nuclear facilities.

b. Findings:

The NRC inspector performed an independent verification review of conditions related to the allegation. This was accomplished through (1) observations of receipt and storage practices for O-ring seals for nuclear application; (2) observation of an environmental qualification test unit; (3) review of documents specific to CFP's design and manufacture of nuclear actuators for Zion Station; and (4) review of CFP's O-ring seal procurement documents, and certification of the finished product furnished to their customers. This review provided the following information.

CFP designed and manufactured a hydraulic actuator test model and caused it to be qualification tested by American Environmental Company to meet IEEE Standards No. 382-1980, No. 344-1975 and No. 323-1974. The report of the test results was accepted by their customer, Commonwealth Edison Company (CECo). The materials used in the test unit included different types of O-ring and packing materials including the Dupont E60C Viton material. The E60C Viton material was subsequently installed, at the request of CECo, in the eight actuators delivered to the Zion nuclear facility. The CFP procurement documents for this O-ring and bushing material, specified the Dupont E60C Viton and required that all distributors and manufacturers of the seals, furnish Certificates of Conformance (C of C) describing the CFP purchase order number, item material batch, and cure date. Review verified that these requirements were met by the suppliers. CFP in turn was required to furnish a C of C by their customer (CECo). Review of this C of C verified that it contained the information required by CECo.

Specifically, it certified that the equipment (actuators) were manufactured using the same organic materials and components as those that were environmentally qualified in the Test Unit Model EHO-6-3-FC by American Environment Company (AECo) per CFP Test Procedure A0107-23; AECo Test Procedure No. STP-45680-2 and Test Report No. STR-45680-1. The qualification met the requirements of IEEE Standards A382-1980, 344-1975, 323-1974, CECo Purchase Order No. 262819, Project 6165.00, and Sargent and Lundy Specification X-3609L, Revision 1. CFP also certified that the equipment was manufactured in accordance with their QA Manual dated August 24, 1981, Revision 0.

c. Conclusion:

Based on the above review, it was determined that the allegation does not have a valid basis, and there is no safety-related problem concerning the seals in the actuators shipped to the Zion nuclear facilities.

2. Procurement Control

The NRC inspector observed shop activities, conducted discussions, and reviewed applicable documents to verify that procurement of materials and services used in manufacturing of hydraulic actuators for nuclear service was controlled in accordance with Appendix B to 10 CFR Part 50. The following documents were reviewed: (a) applicable

sections of CFP's QA manual; (b) O-ring seal procurement record packages; (c) approved vendor list; (d) purchase orders; (e) vendor qualification records; and (f) procedure to control the qualification of vendors.

Within this area, no nonconformances were identified.

3. Inspection and Tests

The NRC inspector conducted interviews with CFP management personnel and reviewed applicable documents to verify that inspections and final tests of parts and finished actuators for nuclear service are controlled in accordance with Appendix B to 10 CFR Part 50. The following documents were reviewed: (a) applicable sections of CFP's QA manual; (b) procedures controlling receiving inspection, finished parts inspection, and final functional tests; (c) incoming material inspection reports; (d) inprocess inspection checklists, and (e) final test reports.

Within this area, no nonconformances were identified.

4. 10 CFR Part 21

The NRC inspector held discussions with CFP management personnel to verify whether or not they were aware of the 10 CFR Part 21 requirements with regard to evaluation and reporting of defects, posting, procedure adoption and record retention. As a result of this review, two violations were identified. One item concerned the failure of CFP to adopt documented procedures to accommodate the 10 CFR Part 21 requirements, and the second item concerned the failure of CFP to post a copy of Section 206 of the Energy Reorganization Act of 1974 and the posting of a notice in lieu of the required procedures (see paragraph A).

ORGANIZATION: COMBUSTION ENGINEERING, INC.
POWER SYSTEMS GROUP
WINDSOR, CONNECTICUT

REPORT NO.: 99900002/84-01	INSPECTION DATE(S): 10/1-5/84	INSPECTION ON-SITE HOURS: 33

CORRESPONDENCE ADDRESS: Combustion Engineering, Inc.
ATTN: Mr. H. V. Lichtenberger
Vice President-Manufacturing
1000 Prospect Hill Road
Windsor, Connecticut 06095

ORGANIZATIONAL CONTACT: Mr. P. Ferwerda
TELEPHONE NUMBER: (203) 688-1911, ext. 5774

PRINCIPAL PRODUCT: Nuclear fuel assemblies and control rod drives.

NUCLEAR INDUSTRY ACTIVITY: Nuclear fuel assemblies and control rod drives and supplies for Combustion Engineering (CE) designed cores.

ASSIGNED INSPECTOR: J. R. Costello for R. L. Cilimberg 10/29/84
R. L. Cilimberg, Special Projects Inspection Section (SPIS) Date

OTHER INSPECTOR(S):

APPROVED BY: J. R. Costello 10/29/84
J. R. Costello, Acting Chief, SPIS, VPB Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: Manufacturing and special process control including fuel pellet fabrication, fuel rod loading, bundle assembly, and follow-up on previous inspection findings.

PLANT SITE APPLICABILITY:

Docket Nos.: 50-361/362; 50-317/318; 50-528; 50-382; 50-389; 50-309; and 50-336.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

None.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (Item A, 83-02): Supplementary data required by Purchase Order No. 9290132 to certify conformance to the applicable specification did not fully certify conformance in that the halide content was over the specification limit although the certification for lot No. 2772 of burnable poison pellets (BPPs) did not report such a condition. The supplementary data for lot No. 2202 of control element pellets indicated the actual boron loading to be lower than that reported on the certification.

   Based on a review of DCR 9130143-10 dated 9/7/83, data from operating reactors using pellets made by the same process indicates that the reported pellet deviation in halide content will not have a functional effect on the use of the poison rods, therefore the pellets were accepted for use in the reactors to which the pellets were shipped. A closer review of chemistry results has been initiated by CE to prevent a recurrence of this nonconformance.

2. (Closed) Nonconformance (Item B, 83-02): Copies of all analytical reports were not supplied as required by the above purchase order for some recertified lots such as the halide reports for BPP lot Nos. 1781 through 1783. BPP lot Nos. 1707 and 1792 were recertified based on data from a laboratory that was not formally approved by Combustion Engineering, Inc. as required by the purchase order.

   A review of audit reports 1781 through 1783 indicates that the halide contents were within the required limits. A review of audit report TDM-83-277 dated 12/6/83 concludes that the laboratory (Eagle-Picher Industries, Inc.) has been formally approved by CE.

3. Waterford CEA Bowing Problem: During the last inspection covered by NRC Inspection Report No. 83-02, sixteen of 94 control element assemblies shipped to Waterford site had been returned to CE because during preoperational testing, excessive scram and drag test times were found. The problem was caused by a manufacturing error which resulted in the center CEA rod being excessively bowed. The bow had been caused by erroneous rework which actually put bow in a straight rod which appeared to be bowed. This problem has been solved by using a functional straightness gauge (gauge Z2843) to check for straightness as part of the final inspection. The inspector verified this procedure by a review of operations sheet No. 1515 dated 5/29/84. All Waterford CEAs have been reinspected by the approved procedure.

E. OTHER FINDINGS OR COMMENTS:

1. Manufacturing and Special Process Control - The control of the manufacturing of fuel pellets for use in the CE PWR fuel rods was verified. This inspection concentrated on the details of fabrication of pellets and the testing of characteristics. Fabrication and inspection functions are performed in accordance with operations sheets (OS) which detail the functions to ensure that fuel rods meet the specifications referenced in purchase orders. The performance of functions by process operators and inspectors was observed to meet the requirements of the operations sheets for the following operations:

- Receiving, weighing and batch make-up of UO_2 powder
- Press pellets
- Dewaxing
- Carbon analysis
- Sintering
- Grinding pellets
- Measure dimensions and density of pellets
- Chemical analysis
- Roll separation and drying
- Stack pellets, inspect, weigh and sample
- Load pellets in tubes
- Analyze pellet samples for hydrogen
- Welding of end caps and metallographic examination
- Leak testing
- Fluorscopic examination

2. External Audits - Tubing for fuel rods is purchased from Sandvik while metals for other components are procured from various vendors. Audit reports for Sandvik, Western Zirconium, and Teledyne Wah Chang were reviewed during this inspection and found to be acceptable. Purchase orders for tubing for fuel cladding were reviewed and found to be satisfactory with respect to imposition of 10 CFR Part 21 as well as specificity of other quality requirements.

3. San Onofre-3 (SO-3) Leaking Fuel - The first core for San Onofre 3 is exhibiting leaks which began soon after start-up although the leaks are presently still within technical specifications. This inspection evaluated the potential for hydriding of the San Onofre-3 cladding as a possible failure mechanism for the leaking fuel rods. Moisture is considered to be the most likely source of hydrogen and fuel pellet moisture is the item of greatest concern. CE has established limits on fuel pellet moisture based on the results of hydride failures[1] in zircaloy clad fuel in the Halden test reactor. CE controls hydrogen at a level that should not result in hydriding of the cladding. An evaluation of statistical sampling and hydrogen analysis results for the SO-3 fuel rods indicates that the probability of hydriding of the SO-3 fuel rod cladding is extremely low.

   The last deviation notices (DN) for out of specification hydrogen values and the dates written were as follows:

DN W20922	August 1981
DN W21180	August 1981
DN W21388	October 1981
DN W21696	October 1981

   The nine (9) pellets analyzed exceeded the .74 parts per million hydrogen specification and the fuel rods which these samples represented were scrapped. This is a very conservative requirement in light of the fact that none of the analyses exhibited hydrogen values equal to or greater than 25 ppm which is the value reported by Reference 1 to be necessary for hydride failures to occur.

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(1) Steinar, Aas, Primary Hydride Failure in Zircaloy Clad Fuel, HPB-144, Quarterly Progress Report for July-September 1971.

ORGANIZATION: COMBUSTION ENGINEERING, INC.
POWER SYSTEMS GROUP
WINDSOR, CONNECTICUT

REPORT NO.: 99900002/84-01	INSPECTION RESULTS:	PAGE 5 of 5

The subject of SO-3 fuel will be reviewed further during a future inspection after the results of the evaluation of the leaking fuel in SO-3 are known.

ORGANIZATION: CONAX BUFFALO CORPORATION
BUFFALO, NEW YORK

REPORT NO.: 99900323/84-01	INSPECTION DATE(S): 9/24-28/84	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: Conax Buffalo Corporation
ATTN: Mr. W. S. Rautio
President
2300 Walden Avenue
Buffalo, New York 14225-0237

ORGANIZATIONAL CONTACT: Mr. R. E. Farchmin, Quality Assurance Manager
TELEPHONE NUMBER: (716) 684-4500

PRINCIPAL PRODUCT: Containment electrical penetrations and environmental qualification testing services.

NUCLEAR INDUSTRY ACTIVITY: Manufacture of electrical penetrations, electric conductor seal assemblies, adapter modules for other manufacturer's penetrations, heat sensing probes, and specialized cabling for nuclear power plants. Also provides environmental test facilities capable of loss-of-coolant accident (LOCA) testing Class 1E equipment. Approximately 45% of the corporate activity is devoted to nuclear product manufacture and testing.

ASSIGNED INSPECTOR: Larry B. Parker 12/6/84
L. B. Parker, Equipment Qualification Section (EQS) Date

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

APPROVED BY: Uldis Potapovs 12-6-84
U. Potapovs, Chief, EQS, VPB Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: This inspection consisted of: (1) a review of Conax Buffalo Corporation (Conax) evaluations, corrective actions, and actions to prevent recurrence for the following items, (a) a 10 CFR Part 50.55(e) report by the St. Lucie Nuclear Generating Station Unit 2 (SLNGS) concerning Conax electrical cable ring-tongue termination deficiencies, (b) a River Bend (continued on next page)

PLANT SITE APPLICABILITY: 50-271, 50-389, 50-440, 50-441, 50-445, 50-446, and 50-458.

Station Unit 1 (RBS) 10 CFR Part 50.55(e) report concerning deficiencies in coaxial connector terminations (Amphenol), cuts or breaks in electrical cable insulation, an open in a electrical power cable, and electrical shorts between shield and ground, (c) a 10 CFR Part 21 report by Conax concerning electrical cable opens in power lead gland assemblies, (d) a 10 CFR Part 50.55(e) report by Comanche Peak Steam Electric Station (CPS) concerning electrical cable termination deficiencies; 2. a technical review of test plans and procedures used in the Conax equipment qualification program; and 3. the review of Conax's implementation of their corrective actions and actions to prevent the recurrence of deficiencies identified in previous inspections.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

1. Contrary to the requirements of Criterion V of Appendix B to 10 CFR Part 50 and the M90 Calibration Record Logs, serial numbers of equipment calibrated had not been recorded on the MS90 Calibration Record Logs.

2. Contrary to the requirements of Criterion V of Appendix B to 10 CFR Part 50 and paragraph 1 of the Conax "Procedural Memorandum #3," a notice of anomaly (NOA) was not instituted when three out of four test specimens failed during qualification testing.

3. Contrary to the requirements of Criterion V of Appendix B to 10 CFR Part 50 and Material Disposition Report (MDR) No. 27546, only three of nine pieces designated for scrap were indicated as having been scrapped.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (82-01): Conax failed to specify that the provisions of 10 CFR Part 21 applied in a procurement document issued for irradiation services to the Georgia Institute of Technology.

The NRC inspector: a. reviewed five Conax purchase requisitions (PR) and five purchase orders (PO) placed with subcontractors for safety-related services; b. interviewed Conax personnel responsible for these PR's and PO's; c. verified documentation of the training Conax personnel received on imposing 10 CFR Part 21 provisions on PO's. The records, corrective actions, and preventive measures were found to be acceptable.

2. (Closed) Nonconformance (82-01, B.1): Exhibit A of Nuclear Quality Assurance (NQA) Procedure 14.1 was entitled "Operation and Inspection Record (traveler)" Form Nos. N-30 and N-30A when in reality Exhibit A of NQA Procedure 14.1 was a table of "Conax inspection stamps."

   The NRC inspector reviewed Revision E of NQA Procedure 8.4, dated July 8, 1983 and paragraph 8.4.2(a) now references Exhibit B of NQA procedure 14.1 which is the "Operation and Inspection Record (traveler)." The records, corrective actions and preventive measures were found to be acceptable.

3. (Closed) Nonconformance [82-01, B.2.(a)]: Procedures had not been written or approved by the quality control manager for the calibration of the Veeco helium leak detectors.

   The NRC inspector reviewed Quality Control Instruction (QCI) 29-4-11 issued on November 2, 1982 to "All Quality Control and Inspection Personnel" and the subject was "Calibration Procedures for Model SC-4 Veeco Leak Detectors Models MS-90(3), MS-170(1). The records, corrective actions and preventive measures were found to be acceptable.

4. (Closed) Nonconformance [82-01, B.2.(b)]: Serial numbers of the Veeco helium leak detectors which had been calibrated were not recorded in the MS90 calibration record logs.

   The NRC inspector: a. reviewed the training record of 12 inspectors where they had been instructed to complete records properly; and b. inspected the "MS90 Calibration Record Logs" for two Veeco helium leak detectors. Nonconformance B.1 was identified in this area.

5. (Closed) Nonconformance (82-01, B.3): A material disposition report (MDR) was not prepared and affixed to Part No. 7769-20002-01, Unit 10-8 as required by paragraph 15.1.3 of the NQA manual after failure in the dielectric test.

Conax personnel stated that the Unit 10-8 in question had been scrapped. The NRC inspector reviewed an internal memorandum reinstructing personnel of the importance of documenting all nonconformances on an MDR. The Conax response on this item was accepted.

6. (Closed) Violation (83-01): The 10 CFR Part 21 implementing procedure did not provide for the evaluation of deviations or a method to cause evaluation by the licensee or purchaser.

   The NRC inspector reviewed: a. paragraph 1.5.5 of NQA Procedure No. 1.5, Revision C, dated January 18, 1984 and b. IPS-1071 "Procedure for the Evaluation of Deviations in Accordance with 10 CFR 21 (sic)." The records, corrective actions, and preventive measures were found to be acceptable.

7. (Closed) Nonconformance (83-01, B.1): The records for a lead auditor indicate that in three out of the last five years the record update was not accomplished within the required time.

   The NRC inspector reviewed: a. a tickler log which had been established to track lead auditor record reviews and b. current lead auditor records. The records, corrective actions, and preventive measures were found to be acceptable.

8. (Closed) Nonconformance (83-01, B.2): Written reports outlining corrective action to resolve noncompliances identified in the Conax internal audit report of June 10, 1982, and the reaudit report of August 10, 1982, were not submitted to the quality assurance manager within the required time period.

   The NRC inspector reviewed: a. the corrective action report by the delinquent manager in which he stated that future audit reports will be reviewed and responded to in ten working days; and b. 14 internal audit reports for the period January 27, 1984 through August 21, 1984. The records, corrective actions, and preventive measures were found to be acceptable.

9. (Closed) Nonconformance (83-01, B.3): 10 CFR Part 21 had not been posted in accordance with the Conax NQAM.

   The NRC inspector: a. reviewed the revised NQAM section 1.5 which no longer required the posting of current copies of 10 CFR Part 21 and b. observed the alternate posting of a notice in compliance with Section 21.6 of 10 CFR Part 21. The records, corrective actions, and preventive measures were found to be acceptable.

10. (Closed) Nonconformance (83-01, B.4): Testing of Brand-Rex control cables was not performed using a test procedure that had been revised and approved in accordance with Conax procedures.

    A member of the NRC inspection team reviewed: a. Revision D of IPS-800 "Design Qualification Test Plan for Control and Instrumentation Cables for the Brand-Rex Company," dated May 4, 1983, which deleted IR readings during the loss of coolant accident (LOCA) portion of the test; b. a letter from Brand-Rex approving Revision D of IPS-800; and c. a QA Corrective Action Report in which Nuclear Products Test Facility Personnel were instructed that a customer request for test revisions must be made in writing and approved in accordance with the NQA manual. The records, corrective actions and preventive measures were found to be acceptable.

E. OTHER FINDINGS OR COMMENTS:

1. Deficiency Reports:

    a. Florida Power and Light Company (FPL) made a 10 CFR Part 50.55(e) report concerning installation of heat shrink insulation tubing on Conax supplied ring tongue connector assemblies. These assemblies were terminations on SLNGS electrical penetrations. The tubing was found to extend over the ring tongue face, reducing the contact area.

    Conax tested six terminal block test assemblies configured to simulate the terminations as installed on the SLNGS electrical penetrations. This testing produced an approved Test Report IPS-910, revision A, which through the approved Test Plan IPS-881, revision C, met the aims and objectives of IEEE Standard 317-1976, "IEEE Standard for Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations."

    It was the conclusion of this testing that the ring tongue connectors when installed as they were at SLNGS were capable of performing the required Class 1E and other functions. In order to make a positive correlation between the Conax test report and the field conditions, FPL retorqued all Class 1E and certain non-IE terminal block retaining nuts.

The NRC inspector reviewed a corrective action report cautioning assembly personnel and inspectors to insure that heat shrink tubing did not cover the bent portion of ring tongue connectors. The records, corrective actions and actions to prevent recurrence were acceptable.

b. Gulf States Utilities Company (GSU) made a 10 CFR Part 50.55(e) report concerning separation of coaxial cables from coaxial connectors on Conax Electrical Penetration Assemblies (EPA). An NRC Vendor Program Branch (VPB) inspection of this deficiency was made on September 4-7, 1984 at the RBS. GSU had also established that other deficiencies existed with the Conax EPA's. These deficiencies and their dispositions follows:

(1) Deficiencies were found in the installation of Amphenol coax and twinax connectors terminating cable pigtails on EPA's. Subsequently, Stone & Webster Engineering Corporation (S&W) conducted a Quality Verification Inspection (QVI) at RBS of these connectors. The QVI was observed by a Conax field engineer. A total of 132 connections were examined, and it was determined that 126 were acceptable, in that any of 15 listed deficiencies would not affect functionality. The 15 deficiencies ranged from, "not enough braid over braid clamp," to "pin damage (scrape & file marks)." Of the six unacceptable connections one pin was bent, three pins came off with the connector (with the conductor broken at the dielectric), one pin had insufficient solder, and no evidence of solder was observed on one conductor. This problem of coax and twinax installation by Conax is plant specific and unique to RBS.

The disposition of the above termination deficiencies was to: (a) have Conax revise their coax/twinax connector to flexible cable assembly instructions and schedule training for assembly and quality control personnel according to the revised assembly instruction procedures, and (b) reassemble penetrations and reinstall all connectors using revised Conax procedures. The records, corrective actions and actions to prevent recurrence were acceptable.

(2) Two #12 AWG polyimide (Kapton) insulated conductors each had a nick in their insulation, these conductors in the presence of moisture shorted to each other. To establish the extent of this broken insulation problem S&W conducted a sample inspection at RBS of 201 conductors out of a lot size of 5471 conductors. The method used to conduct this inspection was a wet dielectric test. The NRC inspector observed (in situ) breaks in the Kapton insulation on #12 AWG cable of two installed modules. Fifteen out of the 201 conductors sampled were found defective. Evaluation of this data was continuing at the time of this inspection at RBS.

During the NRC inspection at Conax Buffalo, engineering was evaluating the data available from RBS. A firm concept of the cause or a base for the problem's generic effect had not been established at the time of the inspection. The NRC inspector reviewed: (a) two audit reports of the manufacturer from whom Conax purchases the Kapton insulated wire, and it was noted that a bubbling in the Kapton had been observed on the December 1982 trip report; and (b) IPS-30, Revision L., "Specification for Polyimide Insulated Electrical Penetration Conductors" which called for impulse dielectric testing only.

This item will be further addressed on a future inspection.

(3) A #2 AWG power conductor pigtail was not adequately inserted into a butt splice barrel on a Conax EPA. This resulted in the pigtail cable separating from the butt splice causing an open electrical circuit. To establish the extent of this problem S&W conducted a sample inspection at RBS of 50 conductors out of a lot size of 498. The method used to conduct this inspection was radiography. The NRC inspector reviewed the radiographs of these 50 butt splices. No deficiencies were identified by the radiography. The defective splice was examined by the NRC inspector in the RBS nonconforming storage area.

At the time of the RBS inspection the EPA module was to be returned to Conax for rework. Since no other deficiencies were identified by radiography this deficiency is considered an isolated incident. The proposed corrective action and records are considered acceptable.

(4) On a feedthrough module, conductor #9 (a shield) was shorted to ground. RBS returned the module to Conax. Conax tested the feedthrough module, installed and torqued it into a header plate. Erratic and low insulation resistance between shield #9 and ground were then obtained. Conax then cut the feedthrough apart and found the cause of the problem. The cause was a metal burr on the inside of the monitoring gas entry hole in the wall of the stainless steel tube. The burr had cut through the kynar insulation, covering the outer shield, to the copper tube shield. Conax is to supply a new module to RBS to replace the deficient module.

At Conax Buffalo the NRC inspector reviewed: (a) six operation and inspection records; and (b) four material disposition records to determine that deburring was an operation and that it was an inspection point. The review revealed that Conax had inspected monitoring gas entry holes, and that stainless steel tubes had been rejected and repaired for burrs on monitoring gas entry holes. From the records available it was concluded that the cause of the reported deficiency was an inadvertant isolated occurrence. However, during review of the material disposition records, the Nonconformance of paragraph B.3 was identified.

(5) GSU reported another deficiency, shield drain wires were shorted together on three feedthrough modules installed at RBS. To reproduce this condition in Buffalo, Conax conducted a test on a feedthrough module containing three cables of twisted triples. The cables were soaked overnight in water and then removed from the water. This resulted in lowering the insulation resistance (IR) values from 1011 ohms range to 106 ohms range. These IR values did not change until the outer overall double layer of heat shrink tubing was removed from the areas where the copper braid of the cables terminated to the stranded pigtails and the copper tubes of the feedthrough. Over a two day period the IR readings returned to the original values. Conax's recommendation was to remove the heat shrink tubing and allow the wet area to dry. While in Buffalo, the NRC inspector reviewed documentation of this testing.

Conax IPS-594 "Packaging and Shipping Procedure for Electric Penetration Assemblies for River Bend Station - Unit 1" was also reviewed by the NRC inspector. This

review revealed that "Storage of electric penetrations at the plant site per ANSI N45.2.2 Level B is the responsibility of the customer. The deficient cables at RBS had been subjected to moisture due to installation in an area which did not meet this recommended storage level. Therefore, it was concluded that this deficiency was not a generic defect associated with the cabling manufacture or design.

c. In a 10 CFR Part 21 report by Conax a Power Lead Gland Assembly problem was found at both Vermont Yankee and Perry 1 and 2 Nuclear Power Plants. The problem manifests itself by causing the conductor to "neck down" until a discontinuity occurs (i.e., an open circuit condition). A member of the NRC inspection team reviewed IPS-1093, Revision C. Test Plan for the Power Lead Gland Assemblies; IPS-1139 Revision B, Test Report for the Power Lead Gland Assemblies; and IPS-1131 (Orig) Seismic Qualification Test Report for the Power Lead Gland Assemblies. No areas of concern were noted.

The problem was discussed with Conax engineering personnel to determine the present status of their investigation. Conax offered the following information:

(1) Conax has made this assembly in various sizes for over 20 years, many thousands of units, without experiencing this problem.

(2) The assemblies have been qualified (Ref. IPS-1139 and IPS-1131 above).

(3) Failure occurs only in two conductor assemblies, attempts to fail eight conductor assemblies (a larger physical unit of the same design) have been unsuccessful.

(4) Knopp (hardness) tests on the conductors in failed units are the same as on samples from Conax stock.

(5) X-rays of four samples, two with fluorolube and two with vydex lubricant showed no "necking" in the area of concern.

(6) New York State University at Buffalo is currently investigating the problem.

(7) This design is unique to the Power Lead Gland Assembly and does not resemble the design of Conax Electric Conductor

Seal Assemblies (ECSA) nor the design of feedthroughs in EPA's.

It appears Conax is continuing a satisfactory evaluation of this defect as they indicated in paragraph VII, corrective action, of the letter Rautio, Conax, to I&E, USNRC, dated 8/31/84, Subject: Notification of a Potential Defect.

This item will be addressed further during a future inspection.

d. At the time of this inspection CPS reported on a 10 CFR Part 50.55(e) that an EPA connector came off during unpacking in preparation for testing. Conax was awaiting delivery of the returned defective module.

This item will be addressed in a future inspection.

2. Technical Evaluation of Equipment Qualification Program

a. Review of Test Plans/Procedures

A member of the NRC inspection team conducted a technical evaluation of two qualification packages, one for Brand Rex NIS triax cables and one for Conax Power Lead Gland Assemblies (see paragraph E.1.c).

Qualification testing of the Brand Rex NIS triax cable assemblies in accordance with IPS 1086 Rev. C Test Plan was recently completed by Conax. Test specimens failed to meet the acceptance criteria of the test plan; however, Conax had not written the Design Qualification Test Report at the time of the inspection.

During testing, the following was noted:

(1) Four units were subjected to thermal aging. Two of the units developed open circuit center conductors. The Conax project test engineer stated these cables

were returned to Brand Rex for post-mortem; two substitute cables were subjected to thermal aging.

(2) Four assemblies were subjected to MSLB/LOCA environment. After the first temperature spike, the following was noted.

Unit #8 (not thermally aged) developed an open circuit while hot. It recovered continuity at ambient temperature.

Unit #3 (not thermally aged) developed an open circuit while hot and at ambient.

Unit #4 (thermally aged) had a short circuit (five ohms) between center conductor and the first shield.

Unit #5 (thermally aged) was satisfactory.

All units had splits in the Raychem tubing and specimens 3 and 4 had splits in the Brand Rex jacket material.

Procedural Memorandum #3, dated 4/14/82, Dulski to Distribution, states in part: 1.a "Notice of Anomaly" should be instituted on Form NPTL 82-2 when any type test program plan or procedure acceptance criteria is exceeded. Contrary to this memo, no "Notice of Anomaly" was available for review for the failures (open and short circuit and the cable insulation and Raychem splice splits which occurred during/after the first MSLB/LOCA ramp. Since no NOA had been issued, this failure to follow established procedures (Procedural Memo #3) is listed as a Nonconformance paragraph B.2.

Note: Notice of Anomaly #2 for PO 67305 (Brand Rex NIS triax cable) on Test Procedure IPS-1086 Revision C Section 6.6 was written after the inspector requested the NOA for the LOCA/ MSLB failures.

b. Observation of Testing Activities

No testing was being performed at the Conax Test Laboratory.

A member of the NRC inspection team surveyed the laboratory equipment and capabilities. A complete description of the Conax Nuclear Products Test Laboratory Facility is contained in

IPS-557 Revision D dated 1/4/84. The major assets of the laboratory are six Blue M ovens and one Thermotron test chamber with a Conax built insulated temperature box approximately 4'x4'x20' which are used for temperature cycling and accelerated aging of qualification specimens. There are three Conax autoclaves which are used for MSLB/LOCA type testing. A steam heater with two superheaters provides steam to 600°F at 690 lbs. pressure. There is a redundant chemical spray system. Conax cannot always meet the 10-second LOCA rise time specified in IEEE-74, depending on the chamber used and on the test specimen.

No qualification work is currently being conducted. Seismic qualification has been performed by Southwest Research Institute, while radiation testing has been conducted by Georgia Tech.

ORGANIZATION: CONTOURS INCORPORATED
ORRVILLE, OHIO

REPORT NO.: 99900890/84-01	INSPECTION DATE(S) 11/28-29/84	INSPECTION ON-SITE HOURS: 16

CORRESPONDENCE ADDRESS: Contours Incorporated
ATTN: Mr. Michael Ferringer
Quality Assurance Manager
East Pine and Lake Streets
Orrville, Ohio 44667

ORGANIZATIONAL CONTACT: Mr. M. Ferringer, QA Manager
TELEPHONE NUMBER: (216) 683-5060

PRINCIPAL PRODUCT: Specialty Wire Products

NUCLEAR INDUSTRY ACTIVITY: Less than 1/2 % by weight

ASSIGNED INSPECTOR: R. E. Oller — 12-17-84
R. E. Oller, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S):

APPROVED BY: E. W. Merschoff — 12-21-84
E. W. Merschoff, 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 result of an allegation received by the NRC concerning potential improper certification of consumable weld wire inserts by Contours Inc., which may have been used in nuclear power plant construction. Concurrently selected areas of Contours quality system program manual, and conformance to 10 CFR Part 21 were inspected.

PLANT SITE APPLICABILITY: Not identified

ORGANIZATION: CONTOURS INCORPORATED
ORRVILLE, OHIO

REPORT NO.: 99900890/84-01	INSPECTION RESULTS:	PAGE 2 of 5

A. VIOLATIONS:

1. Contrary to Section 21.6 of 10 CFR Part 21, Contours Inc. failed to post: (a) a current copy of 10 CFR Part 21, (b) Section 206 of the Energy Reorganization Act of 1974; (c) procedures adopted to meet Part 21 requirements, or (d) a notice as described in Part 21.

   This is a Severity Level V violation (supplement VII)

2. Contrary to section 21.21(a) of 10 CFR Part 21, Contours Inc., had not adopted appropriate documented procedures to provide for: evaluating deviations; informing the purchaser, and assuring that a responsible officer is informed of a defect in a basic component supplied for a facility.

   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 Subparagraph NCA-3864.1 of the ASME Code Section III, Contours Incorporated did not provide measures in their Quality Control Instructions (QCI) Manual, Revision 2, to define the QA Managers' authority, responsibilities and line of reporting to a company officer who is free of production responsibilities.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Subparagraph NCA-3864.2 of the ASME Code, Section III, Contours Inc., did not provide measures in their QCI Manual, Revision 2, to assure that QC inspectors are properly qualified.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Sub-Paragraph NCA-3869.1 of the ASME Code, Section III, there were no records available to verify that internal audits had been performed, and Contours Inc. did not provide measures in their QCI Manual, Revision 2, to assure that internal audits would be performed.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and paragraph NCA-3861 of the ASME Code, Section III, Contours Inc. did not provide measures in their QCI Manual, Revision 2, to provide for surveying, qualifying and auditing of subcontractors.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50; subparagraph NCA-3868.1 of ASME Code, Section III, and Contours Inc. quality control instruction Nos. 4.C.1, 4.D.1, 4.D.2 and 4.E.2, four (4) measuring and testing devices had not been recalibrated within the required frequencies.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Initial Management Meeting and Exit Interview:

The Contours Inc. management representatives were informed of the allegation which was the reason for the inspection. They were also given an overview of the NRC organization activities and responsibilities. They were informed of the authority and responsibility contained in Section 206 of the Energy Reorganization Act of 1974 and its implementing regulation 10 CFR Part 21. The scope of the inspection and its required documentation were explained. During the exit meeting, the written responses required of the vendor to the Notice of Violation and the Notice of Nonconformance were explained, as well as the inspection findings.

2. ALLEGATION:

a. Introduction:

On October 17, 1984, the NRC Region III office received information with regard to potential improper certification by Contours Incorporated (Contours), Orrville, Ohio, of consumable weld wire inserts which may have been used in nuclear power plant construction. The alleger inferred that Contours supplied weld wire inserts which were ASME Code certified, but Contours did not have an ASME N stamp authorization. As a result of this allegation, an NRC inspection was performed at the Contours plant on November 28-29, 1984.

b. Findings:

Contours is a manufacturer of specialty wire products. A small part of the plant output is consumable weld wire inserts. These items are provided to Robvon Backing Ring Company (Robvon), the only customer, and they are fabricated to Robvon's design. The finished products are shipped in coils and are certified in accordance with the customer's purchase orders. The end user of the weld inserts is not known to Contours. In 1982, the period referred to by the alleger, Contours furnished inserts in accordance with the customer's designs and materials. Contours' Certificates of Analysis and Test included: customer drawing number; identification of the Contours' material manufacturer,

an NCA-3800 statement to the effect that production of the inserts was performed under the control of Contours' QC department, which was approved by the customer for NCA-3800, and the materials were in accordance with the appropriate AWS specification for welding materials, as specified by the customer. The certification also included chemical and physical test data. Currently, (1984), Contours' customer P.O.s are for conversion of materials supplied by the customer. The required documentation includes material producer, date, customer P.O. number, mill order and heat number, specification, size and NCA-3800 statement. The P.O. also invokes 10 CFR Part 21.

Contours has a quality control instructions manual which is the basis for their quality system manufacturing activities as required by ASME Code, Section III, NCA-3800. In 1982 Contours chose the NCA-3800 provision for being audited for approval by their customer, Robvon. This was done in February 1982 and annually thereafter. Contours procured their materials from manufacturers whom they approved in accordance with NCA-3800 by either an on-site survey or the manufacturer being a holder of an appropriate ASME Quality System Certificate (Materials).

c. Conclusion:

Based on the above review, it was determined that the allegation was without a valid basis, no safety issues were involved, and Contours' certifications of the consumable weld wire inserts were in accordance with subarticle NCA-3800 of the ASME Code Section III.

3. OTHER QUALITY SYSTEM AREAS INSPECTED:

Concurrently with the allegation followup, an inspection was made of the areas of: (a) the quality control instruction manual conformance to NCA-3800; (b) personnel qualification; (c) calibration of measuring and test equipment, and (d) internal audits. As a result of this inspection, five nonconformances were identified. The items included the failure to provide measures in the QC manual for: (a) definition of the QA Managers' authority, responsibilities and line of reporting; (b) measures to assure that QC inspectors are properly qualified; (c) measures to assure that internal audits are performed, and (d) measures to provide for surveying, qualifying and auditing subcontractors. Although the QCI Manual omissions were identified, it was verified that most of required activities with the exception of internal audits were being performed by Contours. Although there were provisions in the QCI manual to control the recalibration of measuring

and testing equipment, it was found that four of the M&TE devices had not been recalibrated within the required frequencies.

4. 10 CFR Part 21

The NRC inspector held discussions with Contours management personnel concerning the 10 CFR Part 21 requirements with regard to evaluation and reporting of defects, posting, procedure adoption and record retention. As a result of this review, two violations were identified. One item concerned the failure of Contours to adopt documented procedures to accommodate the 10 CFR Part 21 requirements, and the second item concerned the failure of Contours to post the documents required by 10 CFR Part 21.

ORGANIZATION: CROSBY VALVE & GAGE COMPANY
WRENTHAM, MASSACHUSETTS

REPORT NO.: 99900052/84-01	INSPECTION DATE(S): 9/11-14/84	INSPECTION ON-SITE HOURS: 26

CORRESPONDENCE ADDRESS: Crosby Valve and Gage Company
ATTN: Mr. J. J. Greene
Quality Assurance Manager
43 Kendrick Street, P. O. Box 308
Wrentham, Massachusetts 02093

ORGANIZATIONAL CONTACT: J. J. Greene, QA Manager
TELEPHONE NUMBER: (617) 384-3121

PRINCIPAL PRODUCT: Nuclear safety valves.

NUCLEAR INDUSTRY ACTIVITY: Approximately 20%.

ASSIGNED INSPECTOR: _____ 10/11/84
FOR R. E. Oller, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S):

APPROVED BY: _____ 10/11/84
E. W. Merschoff, Chief, RIS, VPB Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: Implementation of the ASME valve QA program in the areas of status of previous inspection findings, internal audits, nonconformances, and corrective action. Followup on questions concerning (1) cracks in an eductor at Salem Unit 1 and (2) pressure gages furnished to the Duane Arnold nuclear facility.

PLANT SITE APPLICABILITY: Safety valve eductor 50-311, Pressure Gages 50-331.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

None.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (83-01): Crosby Valve and Gage Company (Crosby) failed to have a current copy of 10 CFR Part 21 posted. The NRC inspector verified that Crosby has posted a current copy of the documents required by 10 CFR Part 21.

2. (Closed) Nonconformance (83-01): Crosby's Chief Engineer/Safety Valves failed to notify the QA Manager about a broken spring in a valve that had been shipped to the Sequoyah Unit 2 nuclear facility so the QA manager could form an evaluation committee to determine whether or not the broken spring could create a substantial safety hazard.

   During the current inspection, the NRC inspector verified that in accordance with Crosby's response letter dated August 17, 1983, the Chief Engineer provided a written summary concerning the broken spring to the QA Manager. The QA Manager and the Vice President-Engineering then performed an evaluation which concluded that the broken spring would not create a substantial safety hazard. To prevent recurrence, a notice was sent to all departments and posted on the employee bulletin board, reminding employees to report defects and nonconformances.

E. OTHER FINDINGS OR COMMENTS:

1. Internal Audits:

The NRC inspector reviewed the applicable section of Crosby's ASME valve QA manual No. QC-110, to verify that an adequate, documented quality assurance plan was in effect to control the internal audit activities. A review was also made of: (a) internal audit schedules for 1983 and 1984; (b) 1984 audit records for six areas in the valve QA program; (c) briefing records for auditors; (d) certification records for two lead auditors; (e) the list of qualified audit personnel; and (f) a record of 1983 Section III Management Audits.

Within this area of the inspection, no nonconformances were identified.

2. Nonconformances and Corrective Action:

The NRC inspector reviewed the applicable sections of the Crosby ASME valve QA program manual No. QC-110 to verify that adequate documented measures were in effect to control the handling of nonconformances and corrective action. Observations were made of nonconforming nuclear valve parts, the attached Reject Tags and accompanying Manufacturing Route Sheets. Items in the receiving inspection hold area were also examined. The following documents were reviewed: (a) Defective Stock Reports; (b) a weekly summary of Defective Stock Reports; (c) a monthly Management Report; (d) the Corrective Action Request Log; and (e) Corrective Action Requests.

Within this area of the inspection, no nonconformances were identified.

3. Crack Indications In an Eductor for Salem Unit 1:

a. Background:

On July 16, 1984, Wyle Laboratory reported to Public Service Electric and Gas Company of New Jersey (PSE&G), that they had identified cracks in the eductor portion of a safety valve for Salem Unit 1.

b. Findings:

The NRC inspector examined the eductor, held discussions with Crosby's QA Manager and Chief Engineer/Safety Valves, and reviewed the following documents: (1) QA manuals No. QC-110 and No. QC-105; (2) PSE&G's purchase order and change order to Crosby for analysis of the eductor problem; (3) Crosby's analysis and recommendation letter to PSE&G; and (4) Crosby valve drawings. This review provided the following information.

Observations verified that the eductor, a Stellite No. 6 casting, contained lineal indications approximately 1/2 inch long located 180 degrees apart. The indications start at the inside diameter of the casting in an unmachined upper horizontal surface and run radially towards the outer diameter. Crosby advised PSE&G that the eductor was in good condition except for the indications which were in a non-critical area of the eductor and are not highly stressed and, as such, it is not likely they would propagate. Also, it appeared that the indications could be removed by blend grinding without adversely effecting the eductor. The part could then be reinstalled in the valve with no further corrective action.

Crosby suggested that PSE&G authorize Crosby to blend grind the indications. Crosby's position was that the eductor was not safety-related, not a pressure retaining valve part, and was manufactured to a commercial part QA program and therefore, 10 CFR Part 21 did not apply. The QA Manager indicated to the NRC inspector that the eductor part was manufactured under QA program manual No. QC-105 which is a commercial ASME Code program. The NRC inspector verified that this information was accurate. The controlling manufacturing procedure was MICP-2710. The eductor was manufactured in 1970 and was a non-serialized valve part which required only a Certificate of Compliance. Crosby is waiting for PSE&G's final disposition of the eductor problem.

Within this area of the inspection, no nonconformances were identified.

4. Series 104 Pressure Gages Furnished to the Duane Arnold Nuclear Facility:

As a result of information obtained by the NRC concerning an invalid Product Certification supplied by Crosby for pressure gages furnished to the Duane Arnold/Iowa Electric Light and Power Company (IELP) nuclear facility, a review was made of the circumstances surrounding this procurement by IELP.

The NRC inspector verified that the pressure gages were sold by Crosby's Instrumentation Department which is separate from the Valve Department. The pressure gages are commercial catalog items, manufactured for Crosby for resale and, as such, Crosby does not have or need a QA program for the gages. The Series 104 gages were ordered by IELP from a Crosby distributor who ordered them from Crosby. Both IELP and the distributor mistakenly imposed the requirements of "supplier's IELP-approved quality assurance program," and 10 CFR Part 21 on the purchase order (PO). This PO went to Crosby's Instrumentation Department where it was processed and the gages were shipped. Unknown to the QA Manager of the Crosby ASME Valve Department an employee of the Instrumentation Department completed an unauthorized "Product Certification" QC-6A form and sent it to IELP with the gages. IELP thereafter performed an audit of Crosby and informed the ASME Valve QA Manager of the invalid Product Certification. Since adverse findings were directed at the ASME Valve QA program, the QA Manager dispositioned the discrepancies through the Crosby Corrective Action Request procedure. A written acknowledgement was sent to IELP regarding their audit. This acknowledgement identified Crosby's corrective action for the deficiencies identified in the IELP audit. The Crosby QA Manager indicated he will write IELP and void the unauthorized Product Certification for the pressure gages.

ORGANIZATION: ELMA ENGINEERING INCORPORATED
PALO ALTO, CALIFORNIA

REPORT NO.: 99900827/84-01	INSPECTION DATE(S): 11/5-8/84	INSPECTION ON-SITE HOURS: 75

CORRESPONDENCE ADDRESS: Elma Engineering Incorporated
ATTN: Mr. T. A. Beno
Vice President and QA Manager
1066 East Meadow Circle
Palo Alto, California 94303

ORGANIZATIONAL CONTACT: Mr. T. A. Beno, Vice President & QA Manager
TELEPHONE NUMBER: (415) 494-7303

PRINCIPAL PRODUCT: DC Power Supplies and Cast Coil Transformers.

NUCLEAR INDUSTRY ACTIVITY: The plant currently has two active orders for DC power supply units.

ASSIGNED INSPECTOR: R. E. Oller — 12-17-84
R. E. Oller, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): J. J. Petrosino, RIS
W. E. Gunther, Brookhaven National Laboratory

APPROVED BY: E. W. Merschoff — 12-21-84
E. W. Merschoff, Chief, RIS — 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 deficiencies reported in Elma Engineering DC power supply units at Peach Bottom, Vermont Yankee, and Browns Ferry Nuclear Power Stations and by Nutherm International Incorporated. Concurrently the implementation of the Elma QA program and compliance with 10 CFR Part 21 were inspected.

PLANT SITE APPLICABILITY: Degradation of power supply units 50-277/278 and 50-271. Defective workmanship in power supply units 50-259/260 and 50-296.

A. VIOLATIONS:

1. Contrary to Section 21.6 of 10 CFR Part 21, Elma Engineering failed to post: (a) a current copy of 10 CFR Part 21; (b) Section 206 of the Energy Reorganization Act of 1974; (c) procedures adopted to meet Part 21 requirements; or (d) a notice as described in Part 21.

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

2. Contrary to Section 21.21(a) of 10 CFR Part 21, Elma Engineering had not adopted appropriate documented procedures to provide for: evaluating deviations, informing the purchaser, and assuring that a responsible officer is informed of a defect in a basic component supplied for a facility.

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

3. Contrary to Section 21.21(b)(1)a of 10 CFR Part 21, Elma Engineering failed to evaluate and report the following defects in Class 1E power supply units shipped to customers:

   a. Unacceptable workmanship deviations in power supply unit SN 573801 and spare capacitors, transformers, and diodes furnished to Browns Ferry Nuclear Power Station on TVA contract No. 83PN7-341119.

   b. Unacceptable workmanship deviations in several Model 164C5261P004 Class 1E power supply units shipped to Nutherm International Incorporated on purchase order No. 1214-15 for use in safety related systems.

   c. Damaged transformers in Class 1E power supply units SN's 5124001, 5124002 and 5124004 shipped to Vermont Yankee Nuclear Power Station, and low voltage output in Class 1E power supply units SN's 545001 and 545002 also shipped to Vermont Yankee NPS.

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

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR 50, and the Preface in Elma Engineering's QA manual, Issue 4, the following were identified:

a. The QA manual did not provide measures for identification and control of materials, parts and components. (Reference Section 9 of ANSI N45.2.)

b. The QA manual did not provide measures to control tools utilized in activities affecting quality, (such as wire terminal crimpers and wire strippers), as required by ANSI N45.2.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Sections 11.3 and 14.1 of Elma's QA manual, quality records, such as: Procedure Test Data Sheets, Planning Route Sheets or Route Tags; were not filed and retained in the Elma job order file No. 5738 for TVA Contract No. 83PN7-341119.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and customer purchase order no. 1214-15, dated June 15, 1983, from Nutherm International for 10 ferroresonant 24 VDC power supply units, Elma failed to include Output Ripple test values on the Production Test Data Sheet records for P.S. units SNS 572001 and 572010.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Section 5.2, 7.1, and 7.2, of Elma's QA manual, Production Test Data Sheet records for Elma job order Nos. 5601, 5616, 5794, and 5834 did not reference a test procedure and an issue date. Production Test Data Sheet records for job order nos. 5865, 5450, 5437, 5601, 5610, and 5794 did not identify acceptance criteria such as voltage limits or percent ripple voltage allowed. Production Test Data Sheet records for job order nos. 5601 and 5616 had test data voltage values below the specified minimum of 23.5 volts and the test results had been approved by Elma test engineers.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Section 1.4(b) of Elma's QA manual, Issue 4, qualification records for one of three test personnel who performed tests on Class 1E P.S. units for job order No. 5450, could not be located.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Section 10.1(b) of Elma's QA manual, Elma test inspectors have been performing P.S. unit assembly work, inspections, and functional tests during the same period of time.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50; Section 8.1 of Elma's QA manual, and Section 13 of ANSI N45.2, the following were identified:

a. Wire terminal crimping tools and wire stripping tools had not been identified or controlled by written procedures to assure calibration.

b. Elma's "schedule of inspections" for measuring and test equipment had not been maintained to assure calibration at the required intervals.

c. Functional electrical testing instruments for the P.S. units, did not have unique identification numbers assigned to assure traceability.

d. One Weston A.C. ammeter SN 151350, had not been recalibrated on schedule. A six month calibration frequency was required but the sticker indicated a one year calibration frequency was performed.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 10.1 of Elma's QA manual, and Section 6 of ANSI N45.2, documented quality assurance procedures or instructions were not available to assure that P.S. unit process activities were verified in conformance with requirements.

C. UNRESOLVED ITEMS:

None.

D. OTHER FINDINGS OR COMMENTS:

1. Deficiencies Reported In Elma Engineering Power Supply Units at Peach Bottom, Vermont Yankee, and Browns Ferry Nuclear Power Stations and by Nutherm International Incorporated:

a. Introduction:

The two problems concerning Elma Engineering (Elma) 24 V.D.C. power supply (PS) units were: (1) degradation of operation possibly due to capacitor overheating, and (2) alleged defects consisting of defective wiring, inadequately soldered joints, a leaking oil filled capacitor and overall poor workmanship. The degraded P.S. units were identified in NRC Information Notice No. 83-04, dated February 18, 1983, as having occurred at Peach Bottom Units 2 and 3 on June 19, 1982, and at Vermont Yankee on May 13, 1982. The alleged defective workmanship was reported by the Tennessee Valley Authority Browns Ferry Nuclear Power

Station (TVA/BF) in a 10 CFR Part 21 report dated January 11, 1984, and by Nutherm International Incorporated (NI) in a letter dated June 21, 1984, to the NRC. As a result of these reports an inspection was performed on November 5-8, 1984 at Elma Engineering, located in Palo Alto, California.

b. Findings:

The NRC inspectors and an NRC consultant performed an independent verification of the problems by means of interviews with cognizant Elma personnel, review of documents and observations. As a result of this review, the following information was obtained.

The TVA/BF reported problem was verified to have been found in a TVA stores replacement Model 164C5261P004 P.S. unit and in spare transformers, capacitors and diodes shipped to TVA/BF by Elma in September 1983 on TVA/BF contract No. 83PN7-341119. These items were returned to Elma by TVA/BF in December 1983. The defects reported by TVA/BF were defective wiring, inadequately soldered joints, overall poor workmanship in the P.S. unit, and physical damage to the spare parts. Elma then repaired this equipment; tested it and issued a new Certification of Compliance.

Discussions with Elma management and review of records indicated that the assembler who had performed the soldering on the defective P.S. unit was certified on April 2, 1982, as an electrical test engineer, but had worked as an assembler on ferroresonant DC P.S. units during the period of July through December 1983. This person is no longer employed at Elma. Review of the Elma Customer Order Book verified that during the above period this assembler may have performed assembly work on the following customer orders:

1. NI P.O. No. 1214-15 (entered by Elma Sales June 15, 1983) for 10 1E P.S. units.*

2. TVA/BF P.O. No.3PN7-341119 (entered by Elma Sales August 1, 1983) for one 1E P.S. unit.

*Two of these units were identified by NI as containing inadequate soldering and one as having a leaking oil filled capacitor.

3. Philadelphia Electric (Peach Bottom) P.O. No. 368284-N, (entered by Elma Sales December 30, 1983) for four 1E P.S. units.

4. General Electric (material Services Warehouse, San Jose, California) P.O. No. 20583E887 (entered by Elma Sales December 28, 1983) for one non-1E P.S. Unit.

Discussions indicated that Elma had not evaluated the above deficient conditions in the NI and TVA/BF equipment nor reported them to the NRC with regard to the reporting requirements of 10 CFR Part 21. This matter is identified as a violation.

Review of the records in the job file No. 5738 for the TVA/BF order, verified that while there were signed Certificates of Compliance for the original equipment shipped to TVA/BF in September 1983, there were no Production Test Data Sheet records or inspection records available. This matter is identified as a nonconformance.

Since the NI letter, dated June 21, 1984, to the NRC had identified defects in a P.S. unit Model 164C5261P004 in a lot of 10, purchased on NI P.O. No. 1214-15, July 22, 1983, a review was made of job order file 5720 for this NI work. It was found that while the Certificates of Compliance were in order, the "Ripple P to P" test data, test acceptance criteria and test procedure identification were omitted from the Production Test Data Sheets for the 10 P.S. units. These omissions are identified as nonconformances.

Further review included job order file No. 5470, concerning NI's earlier P.O. No. 1078-9, dated June 3, 1982 for 41 P.S. units of the same model. The Production Test Data Sheets in this order file did not contain the test values for the "Ripple P to P" tests (in all cases), the acceptance criteria or the test procedure identification. The Ripple test values were later sent by Elma to NI on February 2, 1983.

The problems reported by Vermont Yankee and Peach Bottom NPSs were reviewed by the NRC's consultant. Job order files for several orders to both customers were reviewed. One file, job order no. 5437, contained information concerning three P.S. units SNs 5124001, 5124002, and 5124004, which were returned to Elma on February 18, 1981 by Vermont Yankee due to damaged

transformers which resulted in zero output of these P.S. units. These original units had been shipped to VY on January 9, 1980 by Elma. Another job file, No. 5450, contained information concerning two P.S. units SNs 545001 and 545002 which were returned by Vermont Yankee to Elma on May 14, 1982 due to low voltage output. These original units were shipped to VY on July 31, 1981 by Elma. Elma failed to perform fault analyses for the above problems to determine their 10 CFR Part 21 applicability, and as a result did not notify the NRC. These matters are categorized as a violation.

Other job order files were also reviewed for this period. Job order Nos. 5601, 5616, 5794 (for Peach Bottom orders) and 5834 (for a Reliance Electric order) were also found to contain Production Test Data Sheet records which did not reference a test procedure and an issue date. Records for Job order Nos. 5865, 5450, and 5437 (Vermont Yankee orders) and nos. 5601, 5616 and 5794 (Peach Bottom orders) did not identify test acceptance criteria. Also, contrary to General Electric design specification No. 164C5261, Production Test Data Sheet records for job order nos. 5601 and 5616 (Peach Bottom orders) had test voltage values below the specified minimum limit of 23.5 volts and ripple test values were not recorded. These test results had been approved by Elma's test engineer.

2. 10 CFR Part 21 Requirements:

The NRC inspector, discussed the requirements of 10 CFR Part 21 with Elma Management, and observed the employee bulletin board. Elma's management indicated that they had not adopted documented procedures to provide for defect evaluation and notification. Observation verified that the documents required by 10 CFR Part 21 had not been posted. These conditions were identified as violations.

3. Elma's Quality Assurance Program:

Selected sections of Elma's Quality Assurance Manual-Magnetic Products, Issue 4, dated January 22, 1981, concerning ferroresonant power supply units, were reviewed for adequacy to Regulatory requirements and National Standards. Review verified that contrary to the manual commitment to ANSI N45.2, there were no provisions in the manual for identification and control of materials, parts and

components as referenced in Section 9 of ANSI N45.2. The QAM also, did not provide measures to control tools utilized in activities affecting quality (such as wire terminal crimpers and wire strippers).

The areas of indoctrination and training were not adequately addressed. Discussions with personnel and review of qualification training documents appear to indicate that little or no indoctrination of new or existing personnel was performed. The manual omissions were identified as nonconformances.

4. Design Change:

Review of Elma's control of design changes showed that once equipment is qualified for Class 1E applications, design control must be maintained to insure that this qualification is maintained. The original specification and testing of the Elma power supply unit occurred in 1975 in close coordination with General Electric who was interested in a 24 VDC power supply for its Analog Trip system, a system which relates to ECCS and RPS instrumentation channels. The design specification by General Electric, dwg. no. 164C5261, actually became the Elma part/model number. The original specification and bill of material were reviewed against present documents, including revision 8 of the General Electric drawing issued in July 15, 1978 and revision E of the power supply bill of material issued on January 5, 1984. This review indicated no significant design revision since its qualification testing. Capacitor C1 was changed in September 17, 1979 from 54 F, 660 volt, General Electric Part number 45F607 to 64 F, 660 volt, General Electric part number 26F6623FA. There was a generic revision to the transformer bill of material BM-6256 on January 14, 1982, however, the changes were cosmetic in nature.

5. Measuring and Test Equipment (MT&E):

In this area, the NRC inspector reviewed M&TE records of calibration and identification, a card file, and a schedule of inspection. Observations of M&TE were made and Elma personnel were interviewed. Meters which were examined had calibration stickers from outside calibration services, but the meters were not uniquely identified to provide traceability to M&TE records or specific P.S. units which were tested. The Elma's schedule of inspection, to control calibration status, was not up to date. Review of the calibration record book identified a Weston AC Ammeter which was designated on a six

month calibration frequency, however, the calibration sticker on the meter indicated it was on a one year frequency. With regard to assembly tools, several electrical wire strippers and wire terminal tools were observed to be without calibration stickers or unique identification numbers. No records were available to verify that these tools were controlled and calibrated. These matters were identified as nonconformances.

Three electrical test personnel were selected from the test data sheets for review of their qualification records. One of the testers who performed testing on 1E P.S. units, did not have a qualification record on file as required by the QA manual. This matter was identified as a nonconformance.

Review of a procedures manual verified that an appropriate documented production test procedure was not available. A "Functional and Environmental Test Procedure" No. 4037-FETP dated April 1, 1977 was made available, however, there was no evidence in any of the job files inspected, to verify that this procedure had been utilized.

6. Current Ferroresonant Power Supply Manufacturing Practices:

The NRC inspector and the consultant reviewed the P.S. manufacturing processes and held discussions with cognizant Elma personnel. Observations of the assembly and testing area were also made. The processes reviewed included P.S. component assembly, wiring methods, inspection methods and functional testing.

Current P.S. unit component assembly is performed utilizing pictorial information which is shown on the below listed Elma drawings, specifically:

1. D6119C F.P.S. Assembly 20A, No. 164C5261-4, 10/15/79;
2. D8640A F.P.S. Assembly 20A, No. 164C5261B, 10/15/79;
3. D8642A F.P.S. Assembly 10A, No. 164C5261-7, 10/9/79;
4. D8641A F.P.S. Assembly 10A, No. 164C5261-3, 10/9/79;
5. 5965C Outline F.P.S., No. 164C5261, 8/1/80.

These drawings appeared to be adequate for P.S. component mounting, electrical wire routing and interconnections.

Two P.S. units being assembled were inspected. Overall workmanship appeared adequate. A book of workmanship standards was made available to the NRC inspectors, but the Elma P.S. assembler did not appear to be aware of the presence of this standard.

Further discussions and a review revealed that Elma did not have documented quality assurance procedures or instructions to control inprocess and final inspections or functional testing of the P.S. units. During the period of mid 1979 to present Elma, has had five employees performing assembly work. Currently there is one assembler. The NRC inspector learned that the assemblers had also inspected their own work and performed functional testing on the units which they assemblied. The need for separation of QA/QC activities from production was discussed with Elma management. The above deficiencies were identified as nonconformances.

ORGANIZATION: EXXON NUCLEAR COMPANY
NUCLEAR FUELS DEPARTMENT
RICHLAND, WASHINGTON

REPORT NO.: 99900081/84-02	INSPECTION DATE(S): 9/10-14/84	INSPECTION ON-SITE HOURS: 72

CORRESPONDENCE ADDRESS: Exxon Nuclear Company
Nuclear Fuels Department
ATTN: Mr. C. J. Volmer, QA Manager
2955 George Washington Way
Richland, Washington 99352

ORGANIZATIONAL CONTACT: Mr. C. J. Volmer, QA Manager
TELEPHONE NUMBER: (509) 375-8257

PRINCIPAL PRODUCT: Nuclear fuel assemblies.

NUCLEAR INDUSTRY ACTIVITY: Nuclear fuel reload supplier for various designed cores.

ASSIGNED INSPECTOR: _____ 12/13/84
for P. M. Sears, Special Project Inspection Section (SPIS) Date

OTHER INSPECTOR(S): J. Conway, Reactive Inspection Section, VPB
W. Shier, Brookhaven National Laboratory

APPROVED BY: _____ 12/13/84
Gary G. Zech, Acting Chief, SPIS, VPB Date

INSPECTION BASES AND SCOPE:

A. BASES: Exxon Topical Report XN-NF-1A, Revision 6.

B. SCOPE: Review of Exxon Nuclear Company's (ENC) QA program in the areas of fuel fabrication, thermohydraulic computer code verification, computer code error handling, and status of previous inspection findings.

PLANT SITE APPLICABILITY:

Not identified.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

1. Contrary to Criterion XVII of 10 CFR 50, Appendix B, no requirements concerning any necessary action to report significant error in Structural/Dynamic/Heat Transfer computer codes such as NASTRAN or ANSYS have been established at ENC. NASTRAN and ANSYS have been used for safety related design at ENC.

2. Contrary to Section 1.2.8 of ENC Topical Report XN-NF-608, Rev. 4, the Software Department Record for an ENC version of the RELAP5 computer code, designated as UJUL83A, did not contain an indication of the review of three code modifications by a second qualified individual. RELAP5 is a USE Code that has been submitted for NRC approval for use in safety-related analyses.

3. Contrary to Criterion XVII of 10 CFR 50, Appendix B and ENC Quality Assurance Procedure XN-NF-P00,002, Rev. 4, the documentation of the verification and qualification calculations for modifications for the RELAP5 computer code were not complete and were not independently reviewed.

4.a. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Sections 2.1 and 3.2.1 of QC procedure P69075 and Section 2.3.c of QA procedure, No. 7, a review of calibration records and external audits revealed that Pacific Scientific calibrated the tensile tests (S/N 109670) and Hanford Engineering Development Laboratory (HEDL) calibrated two sets of metric weights (S/N QC-40-7 and S/N QC-40-51) and a pressure gage (S/N CM-40287), but neither vendor was on the Approved Vendor List (AVL) for providing calibration services. In addition, there was no documented evidence that an audit of Pacific Scientific had been performed.

b. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 0.0 of XN-NF-1A, Section 5.4 of ANSI N45.2.23, Section 5.3 of ANSI N45.2.12, Section 3.2.7 of ANSI N45.2.9, and Section 3.7.3 of QA procedure No. 18, a review of external audits and lead auditor qualification records revealed the following:

i. T. Davis audited Mannesmann in November 1979 and J. Koi audited Woit et Cotrico, Etienne Bonne-Fortune (EBF), and Formetal in March 1980, but there were no auditor qualification records for the two individuals.

ii. K. Rodet audited EBF in October 1983, Woit et Cotrico in January 1982, Formetal in January and October 1983, and Cezus in October 1982 and July 1983, but the only qualification records were dated January 1984.

iii. QA Manuals for two suppliers (Formetal supplied tie plate castings in 1984 and EBF supplied leaf springs and supports in 1984) were not on file.

c. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 12.2a of XN-NF-1A, and Section 2.3 of XN-NF-P69018, a review of calibration records revealed that Pacific Scientific calibrated the tensile tester (S/N 109670), recorder (S/N 108200) and three extensometers (S/N's 110110, 110449, and 111739) in March 1984, but the certificate of verifications for the tester and the four instruments did not contain a statement of traceability to the National Bureau of Standards.

C. UNRESOLVED ITEMS:

The RELAP5 computer code available at ENC is currently under review by NRC staff (ENC Topical Report XN-NF-82-49(P)). This review has generated a significant number of questions and requests for additional information by the staff that have not been resolved by ENC at this time. (The ENC response is scheduled for March 1, 1985.) The resolution of these items could involve additional code modifications and verifications by ENC and thus, affect the inspection results. This inspection report includes the findings determined following a review of the work completed to date; additional inspection findings and observations could result following resolution of the staff comments.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Open) Nonconformance (84-01): ENC failed to prescribe adequate definition of the instruction for satisfactory completion of safety related computer codes.

   a. The main document governing computer code development and use (XN-NF-608) identified "guidelines" to be used and has an optional connotation rather than mandatory.

      XN-NF-608 has been revised, (Rev. 4), and the title has been changed to "Procedure for Use and Control of Computer Codes for Engineering Design Calculations." This part of the item is considered closed.

   b. Procedures do not exist that require computer code input data to be independently verified.

      A requirement for independent checking of computer code input has been added to the ENC QA Topical Report XN-NF-608, Rev. 4. A similar requirement is scheduled to be added to the "QA Procedure For Design Control" (XN-NF-P00,002) at the next revision. This part of the item will be reviewed in a future inspection.

   c. Procedures do not address Section 9, "Corrective Action," of ANSI N45.2.11-1974 concerning actions to be taken.

      Section 3.6 of XN-NF-608, "Errors in Codes" has been expanded to address corrective actions as related to "ECCS" computer codes. However, this section should address all safety-related computer codes. This part of the item will be reviewed in a future inspection.

   d. The definition of "Use" and "Special" codes in XN-NF-608 are not specific with respect to testing requirements.

      Section 3.4 of XN-NF-608, Rev. 4, "Special Codes" has been expanded to address testing requirements. However, the test requirements for "Use" codes are not described. This part of the item will be reviewed in a future inspection.

e. XN-NF-608 does not require the establishment of a test procedure prior to testing of a code. In addition user notification of options untested is not required by the procedure.

Revision 4 of XN-NF-608 Section 1.2.12 requires a test plan prior to starting qualification testing of a code. In addition, Section 3.1.1.c requires that each major code path be executed at least once in the test cases. This part of the item is considered closed.

f. Section 3.1.1.e of XN-NF-608 does not require identification of the computer type used in an analysis.

Revision 4 of XN-NF-608 Section 3.1.1.e has been revised to require identification type of computer used in an analysis. This part of the item is considered closed.

g. XN-NF-608 does not require that the Computer Code Council document the reasons for dissenting votes.

Section 3.1.1.f of XN-NF-608, Rev. 4, has been revised to require that the rational for dissenting Computer Code Council votes be included in the Council minutes. This part of the item is considered closed.

h. XN-NF-608 does not specifically require the reporting of errors in ECCS evaluation models per 10 CFR 50.46 and 10 CFR 50, Appendix K.

Section 3.6 of XN-NF-608 in Rev. 4 specifically requires error reporting in ECCS evaluation models. This part of the item is considered closed.

2. (Closed) Nonconformance (84-01): Lack of independent review of calculation no. E-T122-969-1.

The calculation folder no. E-T122-969-1 has been independently reviewed with the signature and date of the checker noted. This item is considered closed.

3. (Open) Nonconformance (84-01): The Software Development Records for the REFLEX and TOODEE-2 computer codes were incomplete with regard to identification of purpose, preparer and the independent review.

The SDR for new versions of the REFLEX and TOODEE-2 codes did not include an independent review of the code inputer for verification calculations as required by ENC Topical Report XN-NF-608, Rev. 4. This item will be reviewed during a future inspection.

4. (Closed) Nonconformance (84-01): Supporting documentation for verification and qualification calculations for the REFLEX and TOODEE-2 codes were not available,

   ENC Topical Report XN-NF-608, Rev. 4 has been revised (Section 1.2.8 "Software Development Record) to define requirements for SDR content, organization, and retrievability.

   ENC stated that the REFLEX and TOODEE-2 documents were not retrievable; however, the procedural changes would prevent a recurrence of this lack of documentation. This item is considered closed.

5. (Closed) Nonconformance (82-01): Component vendor quality assurance program effectiveness was not fully assured in the area of Inspection and Test Plans, as evidenced by the following examples:

   a. Revision 6 of an Inspection and Test Plan identified to be used on a purchase order (R-010645) by a fuel clad vendor was not consistent with purchase order requirements, in that it failed to identify the required CSR testing.

   b. Although Exxon had approved Revision 7 of this Inspection and Test Plan, not all of the agreed to changes in respect to Revision 6 were incorporated.

   c. An Inspection and Test Plan submitted by a poison pellet supplier and approved by Exxon allowed a deviation from the product specification in regard to pellet perpendicularity and length sampling.

      The NRC inspector reviewed: (a) a twx dated November 24, 1982 from Sandvik to Exxon which stated that the Contractile Strain Ratio (CSR) Test was done in accordance with Exxon's Specification XN-NF-35018, Appendix D; (b) Sandvik's QC Plan M-75010, Revision 7 "Zircalloy Cladding" dated May 7, 1982 which incorporated a new paragraph on the CSR test; (c) Exxon's "ENC Internal Approval" form dated June 5, 1984 which documented Exxon's approval of Revision 7 to M-75010;

and (d) QA procedure XN-NF-P000, 018 "Procurement Control" which was revised and issued in May 28, 1982 to assure component vendor QA program effectivity in the area of inspection and test plans. These items are considered closed.

6. (Closed) Nonconformance (82-01): Nonconforming items were not always controlled in accordance with written procedures, as evidenced by the following examples:

   a. QA Procedure 15, paragraph 3.4.1, requires suspected material to be segregated and tagged. A bin (No. 550) was observed in the pellet storage area which contained two trays of pellets that had become oxidized after their release. This bin was not identified with a red hold tag.

   b. QC Procedure XN-NF-P69072, paragraph 4.1.2, requires deviating rods to be identified with a red hold tag. A review of bin 13 found that the bin was tagged, but the bin contained acceptable material. Further examination found that the tag in question should have been applied to bin 12 which contained the referenced nonconforming rods.

   c. Approval of a Variance Report (VR 1798) was not in accordance with paragraph 3.5.7 of QA Procedure 15, in that only two of the required three signoffs had been obtained.

   The NRC inspector reviewed: (a) a memo dated January 4, 1983 from the QC Manager to management and QC staff which addressed the responsibilities of identifying and controlling nonconforming material; (b) two reports which addressed the corrective action taken with regards to the identification and control of nonconforming material in the pellet fabrication area (CAR No. 460) and in the QC area (CAR No. 461); QC Procedure XN-NF-069072 "Control of 'In Process' Deviate Material" which was revised on December 7, 1982 to be consistent with observed practice and the QA procedure; and (d) Variance Report No. 1798 which had been rerouted to the Material and Inventory Control Department for the required signoff that was dated November 23, 1982. These items are considered closed.

7. (Closed) Nonconformance (82-01): Certain managers were not transmitting records to the custodian in accordance with requirements, as evidenced by the following examples:

   a. Quality Assurance Audit Reports are required to be transmitted yearly, but only 1974 through 1978 reports were on file.

b. Quality Assurance Management Reviews, Procurement and Logistics Approved Vendor Lists, and Instrument Repetitive Maintenance records are required to be transmitted yearly, but, in fact, there were not any on file.

The NRC inspector reviewed: (a) a report which addressed the corrective action taken with regards to QA Records (CAR No. 463); (b) QA procedure XN-NF-P00,023, Rev. 4 "QA Records" (QAC #17) which was issued on December 23, 1982 to better reflect the requirements for transfer of QA records to the Central Vault; (c) memo dated March 16, 1983 from QC Manager which discussed the requirements of Revision 4 to QAP #17; and (d) internal audit report no. FF-83-4 conducted on October 31, 1983 which verified the implementation of the corrective action taken on CAR No. 463. These items are considered closed.

E. OTHER FINDINGS AND COMMENTS:

1. RELAP5 Computer Code

ENC has obtained the RELAP5 computer code (RELAP5/MOD1/CY14) and is currently modifying the code for use in small break loss of coolant accident (SBLOCA) analyses. This work is being performed in response to TMI Action Item II.K.3.30. During this inspection, the ENC code modification and verification programs were reviewed with respect to quality assurance requirements. ENC Quality Assurance Topical Report XN-NF-608 and ENC Quality Assurance Manual XN-NF-1 were also reviewed and utilized throughout the inspection. Findings and other observations are summarized in the following paragraphs.

a. The RELAP5 code has been developed by the Idaho National Engineering Laboratory (INEL) for the NRC. ENC stated that the code version they received will be modified and verified according to their procedure, thus error detection and correction will be ENC responsibility.

b. The Software Development Record (SDR) for RELAP5 was reviewed. ENC has implemented three modeling modifications prior to submitting a Topical Report to NRR. These modifications (implementation of the Moody critical flow model, correction of the fission product decay heat model, and implementation of a revised flow regime map for a particular modeling component) were described in the SDR but were not independently reviewed as required by Topical Report XN-NF-608.

c. ENC Topical Report XN-NF-82-49(P) provides a description of the ENC code modifications and verification analyses. The report has been submitted for NRR review and approval for use in SBLOCA analyses. The verification program consists of the analysis of both separate effects and integral tests; however, the review of the Topical Report revealed that only the separate effects analyses were performed by ENC. The integral test calculations were performed by INEL and obtained by ENC from the open literature. ENC could not confirm that these INEL calculations were performed with the same code version ENC received. In addition, the INEL analyses did not contain the code modifications implemented by ENC. It was stated that the integral test analyses constitute an important part of the verification program and that the calculations will be performed with the same code version that ENC will use in future application analyses. In addition, the verification calculations will be performed on the same computer system that ENC will use.

d. The supporting documentation for the separate effects analysis that were performed by ENC were requested. The review of these documents indicated that an adequate description of the test analyses was not presented and that a review by a qualified individual was not performed as required by ENC procedures.

e. During the review of the RELAP5 SRD, it was observed that ENC had obtained another version of the code designated as RELAP5/MOD1/CY25. ENC stated that this could would be used for steamline break analyses. It was observed that a number of code modifications and corrections were incorporated into this code version by INEL. However, ENC had not evaluated the affect of these code changes on the Cycle 14 version being developed for SBLOCA analyses. It was stated that these changes should be reviewed for applicability to the Cycle 14 versions, particularly with regard to error corrections.

f. The NRR review of ENC Topical Report XN-NF-82-49(P) has generated a number of comments, questions, and requests for additional information. It was stated that the resolution of these items could require additional code development, modification, and verification and thus, affect the O/A inspection of the code package. Since ENC has not completed a response to the NRR comments, the current inspection concentrated on the work completed to date

and the inspection results include the RELAP5 code as an unresolved item. ENC stated that a response to the NRR comments would be submitted by March 1, 1985.

Two nonconformance and one unresolved item were identified during this point of the inspection (see B.2, B.3 and C above).

2. The NRC inspector reviewed the verification and error report handling at ENC of structural/dynamic/heat transfer computer codes. Those codes are classified by ENC as special codes. ENC does not have access to the source listing for those codes because the use of those programs is procurred from UCCEL. UCCEL is a computer service corporation and regards its computer programs as proprietary and does not allow access to the source listing for either information or for change in the program. Inspection of the purchase agreements between UCCEL and ENC showed that both 10 CFR Part 21 and 10 CFR Part 50, Appendix B had been imposed on UCCEL by ENC. The NRC inspector was informed that ENC has never received an error report from UCCEL concerning ANSYS or NASTRAN, the uses of which are procurred from UCCEL and covered by 10 CFR Part 21 and 10 CFR Part 50, Appendix B. ENC has contracted with MacNeal Schwendler Corp. for an error and information reporting service concerning NASTRAN. That service has reported literally hundreds of errors, most of which are not serious, even though UCCEL has not reported any concerning NASTRAN. The error reports concerning NASTRAN were found to have been properly filed but evaluations of the effects of those errors on past or current designs were not documented. ENC does not at present, have in place procedures requiring such documentation. The NRC inspector was informed that such procedures will be promulgated and implemented in the near future. That implementation will be audited during a future inspection at ENC.

   ENC has conducted one audit of UCCEL's QA program in November 1983, but that audit did not cover UCCEL's error report handling procedures or implementation of those procedures.

   One nonconformance, B.1, resulted from this part of the inspection.

3. Two Hazard Review Board analyses were reviewed during this inspection. ENC procedures require the convening of a Hazard Review Board upon the receipt of a report from an ENC employee of a condition that could cause a substantial safety hazard. The Hazard Review Board is then required to evaluate the condition

and take action on its findings.

a. The first analysis reviewed concerned an Emergency Core Cooling System (ECCS) analysis for the H. B. Robinson Unit 2 nuclear power plant.

b. The second analysis reviewed concerned an allegation by a ENC employee that technical specifications could be exceeded under certain conditions when the present PTS PWR 2 code is used.

No violations or nonconformances were identified during this part of the inspection.

4. Calibration of Measuring and Test Equipment (M&TE): The inspector reviewed Section 12 of the QA Topical Report; two procedures; calibration records for six M&TE; and certifications from Pacific Scientific (calibrated Tinius Olsen Tensile Tester), Hanford Engineering Development Laboratory (HEDL) (calibrated a pressure gage and two metric weight sets), Precision Inspection (calibrated two sets of gage blocks), and Page-Wilson (supplied test blocks for Rockwell Hardness Tester). This review was performed to assure that the devices were properly identified, controlled, calibrated at specified intervals and calibration was traceable to the National Bureau of Standards.

One nonconformances was identified in this are of the inspection. (See B.4.C above).

5. Control of Purchased Material and Services: The inspector reviewed Sections 4, 7, and 18 of the QA Topical Report; three procedures; the AVL for June 1983 and March 1984; three purchase requisitions (PR), three POs and three audit reports for four calibration service vendors; and six PRs, six POs and 17 audit reports for five material vendors located in Europe. This review was performed to assure that applicable regulatory, technical, and QA program requirements are included or referenced in procurement documents and that material was purchased from qualified suppliers.

The PRs to Pacific Scientific, Precision Inspection, and Page-Wilson had been approved by QA, and the POs referenced the applicability of 10 CFR Part 21 requirements. There was no PR or PO to HEDL who calibrated a pressure gage for the Tube Burst Tester in June 1984 and two metric weight sets in December 1981 and June 1983. The inspector was informed that communication

between ENC and HEDL for calibration services was conducted on a verbal basis. In addition, ENC did not perform audits of HEDL, but met their vendor audit commitment by utilizing the results of audits of HEDL's Standards and Calibration Program by Pacific Northwest Laboratory in February 1980 and Primary Standards Laboratory from Sandia in September 1981. There was no documented evidence that ENC had approved or audited either laboratory to conduct audits on the behalf of Exxon.

The two PRs/POs to Formetal (Belgium) for stainless steel castings and one PR/PO each to: (a) Cezus (France) for zircalloy tube hollows, (b) Woit et Cotrice (Belgium) for end caps, (c) Etienne-Bonne-Fortune (Belgium) for leaf springs, and (d) Mannesmann (West Germany) for Zircalloy-2 cladding included adequate technical, QA, and regulatory requirements.

Audit checklists were missing for six of the 17 audits of the European suppliers as follows: Mannesmann in June 1984 and August 1980, Formetal in January and October 1983, Woit et Cotrico in January 1982, and Etienne-Bonne-Fortune in October 1983. For the audits conducted in January and October 1983 of Formetal, the auditor stated that the vendor had implemented the QA program for "Manual de la Qualite," and for the audit conducted of Etienne-Bonne-Fortune in October 1983, the auditor stated that the vendor had implemented the QA program as outlined in "Manual du Service Controle Qualite." It was noted that the two QA manuals were not on file at ENC.

In addition, there was no auditor qualification records for T. Davis who audited Mannesmann in 1979 and J. Koi who audited Woit et Cotrico, EBF, and Formetal in 1980. Qualification records dated January 1984 were the only ones in the file for K. Rodat who performed six audits of foreign manufacturers in 1982 and 1983.

Two nonconformance (See B.4.a and B.4.b above) were identified in this area of the inspection.

6. Plant Tour: The inspector toured the manufacturing facilities, neutron absorber fuel building, analytical laboratory, gage calibration laboratory, and physical test laboratory. Items witnessed included: pellet fabrication, component machining, parts assembly, welding, etching, autoclaving, nondestructive examination (NDE), inspection, and bundle assembly.

7. Defective Fuel Rods: Consumers Power Company issued a preliminary notification in June 1984 of leaking fuel rods in three assemblies at Big Rock Point reactor. The assemblies H206, H207, and H208 were fabricated by ENC in the fall of 1981 and were in the reactor for two cycles. Following sipping tests, eddy current tests and visual examination indicated that approximately 110 rods showed cladding degradation. All of the degraded rods were made from one single lot of cladding that was fabricated by Mannesmann, a West Germany manufacturer. Other rods made from the same cladding lot had reached two and three cycles in the reactor, but did not show excessive corrosion.

   QC records show that the mechanical and chemical properties of the suspect cladding as certified by the manufacturer and overchecked by ENC are within the specification requirements. A review of processing and fabrication history was undertaken to determine if any abnormal or unique conditions occurred which selectively affected the clad lot, and no unusual occurrences or conditions were recorded. QC records did not contain any deviating material reports or variance reports relating to the failed fuel rods or fuel assemblies. A review of the loading sequence of assemblies H201 through H208 did indicate that the failed rods were loaded at the end of bundle assembly manufacturing.

   Autoclave corrosion testing by ENC of cladding samples from the suspect lot purposely contaminated with a variety of agents has not revealed a containment responsible for the fuel failures. Based on the investigations to date, ENC believes that the failure mechanism is accelerated water-side corrosion of the cladding. To determine the cause of the failures, a detailed inspection of fuel rods from two failed assemblies H206 and H207 and one sound assembly H205 is planned by ENC.

ORGANIZATION: GAULIN CORPORATION
EVERETT, MASSACHUSETTS

REPORT NO.: 99900286/84-01	INSPECTION DATE(S): 8/13-17/84	INSPECTION ON-SITE HOURS: 26

CORRESPONDENCE ADDRESS: Gaulin Corporation
ATTN: Mr. Regis Bopp, Manager
Quality Assurance
44 Garden Street
Everett, Massachusetts 02149

ORGANIZATIONAL CONTACT: Mr. Regis Bopp
TELEPHONE NUMBER: (617) 387-9300

PRINCIPAL PRODUCT: High Pressure - Low Volume Pumps

NUCLEAR INDUSTRY ACTIVITY: Less than 0.1% of Gaulin's 1983-1984 sales and service is related to the domestic nuclear power industry.

ASSIGNED INSPECTOR: J. T. Conway 11-5-84
J. T. Conway, Reactive Inspection Section (RIS) Date

OTHER INSPECTOR(S): E. H. Trottier, RIS

APPROVED BY: 11-5-84
E. W. Merschoff, Chief, RIS, VPB 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 10 CFR Part 21 report of cracked blocks on model NP-18, three-cylinder positive displacement pumps used for reactor coolant system makeup at Millstone Nuclear Power Station, Unit 2.

PLANT SITE APPLICABILITY:

Cracked blocks: 50-336, 50-313, 50-285, 50-287.

A. VIOLATIONS:

Contrary to Section 21.31 of 10 CFR Part 21, a review of purchase orders (PO) for three pumps manufactured to Section III of the ASME Code indicated that while 10 CFR Part 21 was imposed upon Gaulin by Mill-Power Supply Company (PO E-77140-73) and Duke Power Company (Specification 05-351-1), Gaulin's POs to Cann and Saul Steel (PO-35231), Mercury Welding (PO-38900), Peter Frasse (PO-37120), and Southern Bolt and Fastener (PO-37927) did not similarly specify that 10 CFR Part 21 requirements would apply.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 6.2 of Combustion Engineering (CE) Specification 00000-WQC 11.1, Rev. D, a review of documentation records for nuclear pumps (contract no. 3072) indicated that procedures or instructions were not referenced for the "stress relief" and "dimensionally inspect" steps documented on the Integrated Manufacturing and Quality Plans (IMQCPs). The associated manufacturing steps were subbase weldment, base weldment, and the cylinder weldment assembly.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 9.7.1 of SNT-TC-1A, a review of records for nondestructive examination (NDE) personnel revealed that Gaulin's Level II examiner for liquid penetrant (PT) had performed PT examination in August 1980. While he was originally certified in June 1977 and recertified in May 1983 without examination, there was no documented evidence that he was recertified in 1980.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 9.7.3 of SNT-TC-1A, a review of procedure QAP-8, Rev. 5, "Qualification of NDE Personnel - PT & Visual" revealed that the procedure did not contain specific rules covering interrupted services.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 6.2.2.2 and 10.3.1.2 of the Quality Assurance Manual (QAM), a review of NDE records revealed the following:

   a. Cann and Saul Steel (CSS) performed ultrasonic examination of the cylinder block, and the suction and discharge flanges of nuclear pumps, but Gaulin did not have a copy of CSS's training program or written practice on file.

   b. Initial certification by the QA Manager for the examiner's Level III visual qualification was missing.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Paragraph A of Section 2 and Section 6.1.1 of the QAM, a review of drawings for nuclear pumps revealed that drawing no. C15381, Rev. 1, for the cylinder block on contract no. 3072 was not reviewed by QA or IE.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 3.3.4 of the QAM, a review of training records for the QC Supervisor and Stockroom Supervisor revealed that neither received training in the requirements of Operations Procedures Manual (OPM) 4-7, Fraud or Falsification, in 1982 or 1983.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 3.3.5 of the QAM, incomplete training records were filed as evidence of training received.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 17.8 of the QAM, a review of calibration service vendor audit records revealed that Angle Repair Services and Jones and Lamson had never been audited. The subject vendors provide calibration services for torque wrenches and the optical comparator.

C. UNRESOLVED ITEMS:

None.

D. FOLLOWUP ON PREVIOUS INSPECTION FINDINGS:

(Closed) Nonconformances A and B (78-02): Two findings resulted from the Quality Control Inspector's failure to stamp and date the Standard Operations Sheet properly. The relevant QA procedure required inspection and verification before the component proceeded to the next manufacturing operation.

The inspector reviewed Gaulin's commitment to corrective and preventive action and found them in order. The training session committed to was held and documented.

(Closed) Nonconformance C (78-02): This finding resulted from failure to follow the specified heat treat procedure and failure to document that another procedure was used in its stead.

The inspector reviewed Gaulin's commitment to corrective and preventive action and found them in order. Gaulin's review of this item revealed that the heat treatment as performed met the intent of the material specification. However, a new heat treat procedure was prepared,

reviewed, and approved by Gaulin. The inspector also reviewed Gaulin's internal memo written to impress upon all persons involved in this finding the importance of following and documenting heat treat procedures used. The inspector also reviewed the results of Gaulin's internal audit following this finding of nonconformance. Special attention was devoted to the requirements of Gaulin's QA Manual in the area of control of special processes during the October 2, 1979 audit.

(Closed) Nonconformance D (78-02): This finding was the result of ambiguous wording in a previous revision of Gaulin's QA Manual regarding changes to nuclear purchase orders and design specifications. The current QA Manual (Rev. 0, dated 5/25/82) requires that changes receive the same procedural control as original design documents.

(Closed) Nonconformance E (78-02): This finding resulted from inadequate qualification of a subcontracted visual inspector. The NRC inspector reviewed Gaulin's corrective and preventive action and found them to be in order. The subject NDE visual inspector received the required three part NDE visual examination and was certified on November 13, 1978. Gaulin has also qualified one of their full-time employees to Level III, Visual, in accordance with SNT-TC-1A.

(Closed) Nonconformance F (78-02): This finding resulted from use of improperly qualified weld procedure specifications. The subject weld procedures were performed using both gas and shielded metal arc welding, after which, each weld was post weld heat treated. The procedure qualification records did not, however, accomodate post weld heat treatment (PWHT).

The inspector reviewed Gaulin's corrective and preventive action and found them to be in order. Each weld procedure was qualified for PWHT (1150°F ± 50°F for 1 hour) on October 30, 1978.

E. OTHER FINDINGS OR COMMENTS:

1. Nondestructive Examination (NDE): The inspector reviewed the applicable Sections of the QAM, one procedure addressing qualification of personnel and 10 procedures pertaining to examination techniques [2-ultrasonic (UT), 2-magnetic particle (MT), 2-visual, 3-PT, and 1-radiographic (RT)]. It was noted that NDE services were obtained from 2 vendors for UT examination of cylinder blocks and suction and discharge flanges and PT examination of welds on pumps fabricated to the requirements of Section III of the ASME Code.

Certification records for four examiners (1-Level III and 3-Level II) from Mercury Company, one Level II examiner from Cann and Saul Steel Company, and four examiners (1-Level III and 3-Level II) from Gaulin were reviewed to assure that personnel performing and verifying activities affecting quality were trained and qualified. Three examiners (1-Level III and 2-Level II) from Gaulin were certified to the visual discipline in accordance with SNT-TC-1A.

Nonconformances B.2, B.3, and B.4 were identified in this area of the inspection.

2. Reporting of Defects: The procedure relating to the reporting of defects and failures was reviewed, and the implementation of the procedure in regard to posting requirements was verified by inspecting the shop fabrication areas.

3. Procurement Control: The inspector reviewed the applicable sections of the QAM and procurement documentation packages for six pumps fabricated to Section III/Class 2 requirements (three to 1974 Edition - 1975 Summer Addenda and three to 1977 Edition - 1978 Winter Addenda). The documentation packages consisted of customer POs and specifications, Gaulin POs to suppliers and certified material test reports (CMTR) for the purchased material. The review was undertaken to assure that applicable regulatory, technical, and QA program requirements were included or referenced in procurement documents and that material was purchased from qualified vendors.

Violation A.1 was identified in this area of the inspection.

4. 10 CFR Part 21 - Reactor Coolant Charging Pumps: In May 1984, Northeast Utilities (NNECO) notified the NRC in a 10 CFR Part 21 report of three failures in Reactor Coolant System charging pumps used in Millstone Unit 2. The Model NP-18 three-cylinder, positive displacement pumps failed due to initiation and propagation of cracks in the pump blocks. The pumps were originally fabricated by Gaulin to Combustion Engineering Specification No. SYS80-PE-403 and Section III/Class 2 (1974 Edition - 1975 Summer Addenda) requirements. (The pumps were originally delivered to Boston Edison Company for installation at Pilgrim, Unit 2, which has since been cancelled).

The cylinder blocks were supplied to Gaulin as a forging which had been heat treated and ultrasonic examined. Gaulin subsequently performed the machining operations on the block. The NRC

inspector reviewed the manufacturing records for each block and records for other components for the three pumps. (The records included data reports, assembly inspection records, NDE reports, heat treat charts, welding records, travelers, and QC log reports.)

NNECO had noted that the cracks initiated within the pump blocks and propagated between one or more of the three cylinders and the outside surface. A metallurgical failure analysis performed by J. G. Sylvester Associates on one failed pump block indicated that the crack most likely resulted from overstressing and fatigue, and the initiating flaw was either porosity or sulfate segregation of a size (0.025 inch) that is smaller than that detectable by UT methods.

Gaulin believes that the pump design is adequate and that the Model NP-18 pumps at Millstone have been exposed to abuses due to off-normal operating conditions. Accordingly, Gaulin plans to solicit an independent company to perform a study of the parameters for which the pumps are designed against operating conditions to justify their contention.

5. Manufacturing Controls: The final documentation records were reviewed by the NRC inspector for six Model NP-18, three-cylinder, positive displacement pumps manufactured to a Combustion Engineering specification. All six pumps were fabricated to Section III/ Class 2 requirements of the ASME Code. The records consisted of data reports for pump and "component supports," assembly inspection records; and certified material test reports, nondestructive examination reports and heat treat charts as applicable for various components (e.g., cylinder block, suction and discharge flanges, cap stud and nut, and cylinder stud and nut); integrated manufacturing quality plans for the subbase weldment, seal cylinder assembly, base weldment, cylinder weldment, and pump outline; travelers; NDE reports; and hydro test reports. Three of the pumps were sent to Boston Edison and three were shipped to Duke Power.

   Nonconformance B.1 and B.5 were identified in this area of the inspection.

6. Training: The inspector reviewed Section 3.3 of the QAM, Training, and its various implementive procedures found in the Operations Procedures Manual. Following this review, departmental and individual training records were reviewed to assess the level of adherance to procedures.

Approximately six training records (both departmental and individual) were reviewed. It was noted that two supervisors had not received required annual training, and training was not being documented in accordance with procedures.

This inspection came at a point in time that found the organization and documentation of training undergoing a complete change in philosophy. As is usually the case during such transitions, there was some difficulty keeping track of requirements and documentation between "old" and "new" systems.

Nonconformances B.6 and B.7 were identified in this area of the inspection.

7. Audits: The inspector reviewed approximately 30 records consisting of both internal and external audit schedules and reports. The purpose of the review was to ensure that vendor services/audit activities were being performed in accordance with the applicable requirements of the QAM. The review revealed that two vendors of calibration services had never been audited.

Nonconformance B.8 was identified in this area of the inspection.

ORGANIZATION: GENERAL ELECTRIC COMPANY
WILMINGTON MANUFACTURING FACILITY
WILMINGTON, NORTH CAROLINA

REPORT NO.: 99900003/84-01	INSPECTION DATE: August 13-17, 1984	INSPECTION ON-SITE HOURS: 55

CORRESPONDENCE ADDRESS: General Electric Company
Wilmington Manufacturing Facility
ATTN: Mr. G. Lees, General Manager
Post Office Box 780
Wilmington, North Carolina 28402

ORGANIZATIONAL CONTACT: Mr. C. W. Doyle, Manager, Quality Audits & Customer Service

TELEPHONE NUMBER: (919) 343-5874

PRINCIPAL PRODUCT: Nuclear Fuel Assemblies and Core Hardware

NUCLEAR INDUSTRY ACTIVITY: Major nuclear fuel and BWR Core hardware for GE designed reactors and fuel pellet fabrication for B&W cores. The total effort committed to nuclear activities comprises 1800 of the 2300 person staff at this facility.

ASSIGNED INSPECTOR: John R. Costello for R. L. Cilimberg 10/1/84
R. L. Cilimberg, Special Proj. Inspec. Sec. (SPIS) Date

OTHER INSPECTOR(S): P. D. Milano, SPIS

APPROVED BY: John R. Costello 10/1/84
John R. Costello, Acting Chief, SPIS, VPB Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: Manufacturing and special process control including fuel pellet and tubing fabrication, fuel rod loading, and bundle assembly, and followup on previous inspection findings.

PLANT SITE APPLICABILITY: All BWR and Babcock & Wilcox Cores.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

Contrary to Criterion V of 10 CFR 50, Appendix B, and GE Quality Control Operator Requirements (QCOR) 14.1.4, complete tubeshell corrosion improvement heat treat analog temperature recordings (strip charts) are not being obtained for all tubeshells.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance B.1 (82-02): Verification of all purchase order requirements in purchase specification D27A1 for anhydrous ammonia was not being performed. The vendor did not comply with the requirement on noncondensable gases. However, the shipments were accepted five times since 1978. The requirement for noncondensable gases has been determined to be not necessary and was deleted from the purchase order.

2. (Closed) Nonconformance B.2 (82-02): Purchased bulk chemicals, such as gases, are not always examined upon delivery. This resulted in their use without verification of the quality. WMD Practice and Procedure Number 60-29, Indirect Material - Selected Items, has been revised to define receiving responsibilities during non-work hours.

3. (Closed) Nonconformance B.3 (82-02): Hardness tester, serial no. W02182, was calibrated during 1982 at an interval of 6 months and not at the prescribed interval of 3 months. The instrument was checked for calibration, and the inspection foreman was advised on the calibration requirements in the GIS procedures.

E. OTHER FINDINGS OR COMMENTS:

1. Manufacturing and Special Process Control - The control of the manufacturing of fuel pellets for use in the GE BWR fuel rods was verified. Fuel pellets are being fabricated for Babcock and Wilcox for use in PWR fuel rods, but this portion of the process was not reviewed. During the inspection emphasis was on material traceability and the performance of both in-process and final inspection. The performance of the required steps by the process operators in accordance with the applicable Quality Control Operator Requirements (QCOR) was found to be acceptable. Upon completion of each major process operation, such as pellet pressing, pellet sintering, and pellet grinding, the quality control acceptance inspections were witnessed to the requirements specified in the applicable Quality Control Inspection Instruction (QCII). The inspection instruments and equipment used by both the operators and QC inspectors were verified to be in calibration by observation of the calibration check or a review of the attached calibration sticker. Quality Control Operator Requirements QCOR 3.1.4.1, Revision 8, dated June 5, 1984, Pellet Grinding, states in parameter number 3 that pellet diameter will be measured using a 3 point micrometer for the dimension of .4093" minimum to .4103" maximum. While this level of readability can be extrapolated from a micrometer, this type of instrument does not normally have that degree of accuracy and/or repeatability.

   The fabrication of the cladding tubes was also reviewed. The purchased tube-shells are given a heat treatment to improve corrosion resistance properties prior to the start of the tube rolling operation. During the review of this process, the performance of the heat treat operator to the requirements of Quality Control Operator Requirement QCOR 14.1.4, Revision 7, dated June 8, 1984, FCO Tubeshell Heat Treat, was observed. It was noted that parameter number 1 of this procedure requires a strip chart of surface temperature to be obtained to verify heat treatment. A complete chart for a tubeshell was not obtained because of the lack of sufficient chart paper. The operator stated that this occasionally occurs. He was not aware of the marking on the chart paper that warns of insufficient remaining paper, and the QCOR does not require a check for this potential condition. Three tubeshells were heat treated with the process control panel alarm board indicating a high temperature alarm. The alarm occurs at the start of each run so the operator is accustomed to leaving this alarm cutout and not reset. If this practice is to be allowed, the actual need for this alarm function is questionable. This practice will be reviewed further on the next inspection. The final dimensional acceptance and

flaw detection of the cladding tubes is performed by an automatic ultrasonic examination method. After witnessing the performance of the required system calibration with the appropriate dimensional standard and verifying the completion of a complete calibration, the processing of several fuel tubes was observed to be satisfactory.

During the inspection of the special process control, a spot check of the qualification of several inspectors and operators was performed. The certifications were found to be current and satisfactory. Also, a check of the deficiency reporting mechanism was conducted by reviewing the processing of a nonconforming condition observed from the final annealing of one lot of tubing. The required documentation and appropriate corrective action was taken based on the deficiency. Within this area of the inspection, one nonconformance was identified.

2. Final Inspection of Final Assemblies - The final visual and dimensional inspection of BWR fuel assemblies was witnessed for compliance with the requirements of Quality Control Inspection Instruction QCII-5.2.8, Revision 29, dated April 1, 1983, Final Bundle Inspection. The inspection was satisfactory and used the added requirements of Quality Notice F-G1096, Revision 3, dated July 12, 1984, Final Bundle Inspection Orientation Procedure.

   The fuel rod/bundle leak test per the requirements of Project Process Quality Plan PPQP 5.0.0, Rev. 13, dated April 15, 1982, Fuel Bundle Assembly, and Quality Control Inspection Instruction QCII 5.2.7, Revision 26, dated April 1, 1983, was observed to be satisfactory.

   No items of nonconformance were found in this area of the inspection.

3. Radiological Control and Personnel Dosimetry - During the performance of the product and process inspection, several items of concern were noted within the area of radiological control. A TLD badge and pocket dosimeter were found unattended on a desk in a controlled area rather than being stored in the proper location when not in use, as required by Job Hazard Analysis Number 961, Fuel Fabrication Quality Control. It was also noted that TLD badges for some personnel working near the bundle assembly area are generally not worn but left hanging near the person's work area/desk. One personnel survey instrument for alpha detection in the male personnel change area outside the fuel manufacturing area was defective. The unit was known to be in this condition by personnel in the area, but they did not report to the appropriate radiological control personnel to have it removed from service until the problem was brought to their attention by the NRC inspector. The

detector was turned off when found to be inoperable by the inspector. An individual subsequently attempted to survey himself with the unit secured. The inspector informed him that the unit was turned off and inoperable. A sliding glass window on a door entering a posted potential airborne activity area was observed open and unattended. The hood over a fuel dumping station was noted to have a hand hole cover not securely in place (i.e., hanging partially to the side of the hole with tape). This station was not in use at the time of the observation. Several of the composite rubber material covers are permanently deformed from use and do not return to the seal position when not in use.

ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900911/84-02	INSPECTION DATE(S): 8/27-31/84	INSPECTION ON-SITE HOURS: 58

CORRESPONDENCE ADDRESS: General Electric Company
Nuclear Energy Business Operations
ATTN: Mr. W. H. Bruggeman, Vice President
and General Manager
175 Curtner Avenue
San Jose, California 95125
ORGANIZATIONAL CONTACT: Mr. N. G. Shirley, Senior Licensing Engineer
TELEPHONE NUMBER: (408) 925-1192

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 7000 people with approximately 98 percent of that work force devoted to domestic nuclear activity. Approximately 100 of the 7000 personnel are assigned to the environmental qualification (EQ) test program.

ASSIGNED INSPECTOR: G. T. Hubbard 10/4/84
G. T. Hubbard, Equipment Qualification Inspection Section (EQIS) Date

OTHER INSPECTOR(S): E. H. Richards, Sandia National Laboratories

APPROVED BY: for U. Potapovs, Chief, EQIS, VPB 10/4/84
Date

INSPECTION BASES AND SCOPE:

A. BASES: GE Quality Assurance (QA) Topical Report (TR) No. NEBO-11209-04A and 10 CFR Part 21.

B. SCOPE: This inspection consisted of: (1) verification of the implementation of the corrective action (CA) and preventative measures on the violation and nonconformances identified in NRC Inspection Report No. 99900911/84-01; and (2) review and technical evaluation of EQ activities under NEBO control.

PLANT SITE APPLICABILITY:

Docket Nos.: 50-263, 50-271, 50-298, 50-321/366, 50-331, 50-416/417.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

None.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (84-01): GE did not evaluate the deviations from GE Product Performance Qualification Specification (PPQS) No. 23A1213, Revision 3, dated November 11, 1983, which states EQ requirements for testing the Pressure Controls, Inc. (PCI) pressure switches, Model Nos. 219B4684; 147D8668P001; and 14D8668P003 with (a) Brand-Rex lead wires attached to PCI Model No. 147D8668, and (b) Bostrad 19 lead wires attached to PCI Model No. 219B4684.

   a. The NRC inspector and Sandia consultant's examination of one test report, one qualification report, and three PCI pressure switch test specimens (sample numbers 123, 121, and 30) verified that the pressure switches were tested with "16 AWG Rockbestos Firewall SIS Type 600 V Nuclear" lead wires and not Brand-Rex wires as previously stated in test documentation. The consultant verified that the qualification report has been revised to reflect the usage of Rockbestos lead wires during testing. Since cracks in Brand-Rex lead wires did not occur during this testing, further evaluation of cracks in Brand-Rex wires for reportability under 10 CFR Part 21 is not required (see paragraph D.6.b for further discussion of Rockbestos wire).

   b. The NRC inspector reviewed and evaluated the potentially reportable condition (PRC) file relative to the Bostrad 19 lead wire failure during immersion testing. The file includes documentation of NEBO's evaluation of the PRC conducted in January 1984. NEBO's evaluation supported their position that the Bostrad wire failure was not reportable under the requirements of 10 CFR Part 21 and GE Procedure No. 70-42.

The NRC inspector examined one employee bulletin, material used in NEBO's Procedure No. 70-42 training classes, class attendance records, and the latest revision of Engineering Operating Procedure (EOP) 35-3.00 to verify the implementation of preventative measures taken by NEBO to assure that test deviations are adequately considered for reportability under Procedure No. 70-42 and 10 CFR Part 21. During a review of two test plans and procedures (TP&Ps) for recent EQ testing, the NRC inspector observed that two deviations had been identified for evaluation as PRCs.

2. (Closed) Nonconformance (84-01): 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. The NRC inspector examined one employee bulletin, material used in Procedure No. 70-42 training classes, class attendance records, the latest revision of EOP 35-3.00, a proposed revision to Procedure No. 70-42, and one PRC file to verify the implementation of adequate CA and preventative measures to assure that identified PRCs are adequately evaluated under Procedure No. 70-42 and that individuals identifying PRCs are properly notified of the evaluation results.

3. (Closed) Nonconformance (84-01): 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 NRC inspector reviewed and evaluated two PRC files, two TP&Ps, a proposed revision to Procedure No. 70-42, the test nonconformance report log, three test nonconformance reports, the latest revision to EOP 35-3.00, the material used in Procedure No. 70-42 training classes, class attendance records, the Procedure No. 70-42 training schedule, and two training files to verify that GE's program for reporting and evaluating PRCs is consistent with the requirements of 10 CFR Part 21. The inspector identified no further problems with GE's PRC reporting program during the inspection.

4. (Open) Nonconformance (84-01):

   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 Procedure No. 70-42.

   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.

   The NRC inspector reviewed and evaluated one letter, one PRC file, one audit file, and a proposed revision to Procedure No. 70-42 to verify the implementation of adequate CA and preventative measures relative to this nonconformance. The inspector also evaluated Audit Report No. Q8402, dated May 10, 1984, which identified seven corrective action requests that were issued and are now closed. This audit was conducted to evaluate GE's disposition of EQ program deviations. This nonconformance will remain open until the issuance of a revision to Procedure No. 70-42 is accomplished and verified. The revised procedure is presently scheduled for issuance by November 30, 1984.

5. (Closed) Nonconformance (84-01): 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 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. The Sandia consultant evaluated available dose rate documentation for the RTDs and pressure switches and determined that the tests in question used dose rates only a few times (as opposed to orders of magnitude) greater than the IEEE requirements. The consultant determined from review of GE Document No. 22A7011, Revision 3, "Qualification Program Requirements for Hatch 1 & 2," that actual plant total integrated dose (TID) requirements for Hatch components are much less severe than test conditions. For example the test TID for the pressure switches was 220.5×10^6 rads when the plant requirement was only 12×10^6 rads. The consultant's evaluation, which included discussions with GE personnel, determined that GE's analysis supported their position that they had accounted for oxygen gas-diffusion effects of radiation aging in the application of test results to Hatch requirements. The consultant verified by examination of Table 5.2.2 of EQ

Report No. 24A1206CA, Revision 2, that a footnote had been added stating that qualification was achieved for TIDs less than the requirements for generic qualification listed in the table. This footnote was added so that the qualification report is not misused in the future for installations with 220 x 10^6 rads requirements. The consultant verified by examination of two pressure switch PPQSs and two RTD Product Analysis Reports (PARs) that they had been revised to specify a maximum dose rate of 1 x 10^6 rad/hr during future testing. The consultant verified by examination of an internal memo that responsible engineers had been informed of dose rate requirements.

6. (Closed) Nonconformance (84-01): 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 No. 23A1213 nor does the EQR provide adequate justification for the substitution of different brands of wire in the qualification test.

   a. The Sandia consultant reviewed and evaluated the EQR, an EQR supplement, and final test Report No. NEDE-30283 to verify that GE had documented that the qualification of the pressure switches with Bostrad 19 lead wire was limited to applications where immersion was not a consideration. The final test report documented a separate qualification program for pressure switches with Bostrad lead wires. This program had no immersion test requirement; the switch passed this qualification effort. The consultant also examined GE Design Review File No. AOD-1477, Volume 3 to determine the location (plant) and application for every pressure switch of this type supplied by GE. None of the switches with Bostrad lead wires were found to have applications where they are subject to an immersion environment.

   b. The Sandia consultant verified (see discussion in paragraph D.1.a) that Rockbestos lead wires were on the pressure switches tested and not Brand-Rex wires as previously stated in test documentation. Since Brand-Rex wires were not tested, the consultant determined there was no need for a similarity analysis for Rockbestos and Brand-Rex lead wires to show qualification of Brand-Rex wires. The consultant also examined test data for other qualification tests of Rockbestos wire and determined that the data supported GE's position that the cracked lead wires (first identified as Brand-Rex, later shown to be Rockbestos) were a result of mishandling during test activities.

The consultant reviewed and evaluated one internal memo to verify that GE had notified responsible engineers of their responsibilities in properly conducting and documenting EQ test activities. The memo stressed the concerns identified in this nonconformance.

7. (Closed) Nonconformance (84-01): 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 Sandia consultant examined one engineering change notice and the EQP to verify that the EQR had been revised to reflect consistent data with the Wyle test report. The GE internal memo discussed in paragraph D.6 above provided appropriate reminders and advice to responsible engineers relative to the completeness and accuracy of qualification reports.

8. (Closed) Unresolved Item (84-01): The NRC inspector and Sandia consultant performed a preliminary evaluation of Franklin Research Center (FRC) Report No. F-C5120-1, for Brand-Rex wire and determined: (a) the subject report does not contain page 5-2 which describes cable failures that occurred during test; and (b) 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. The NRC inspector and Sandia consultant's determination during this inspection that Brand-Rex wire was not tested during the PCI pressure switch testing makes further evaluation of the FRC test report unnecessary for this application.

9. (Closed) Nonconformance (83-03): There was no documented objective evidence that out-of-specification conditions for baseline functional data, thermal aging calibration data, and radiation aging data [recorded for CO3 temperature elements tested under TP&P No. 524-1020, Revision A, dated May 11, 1983] were documented or that the test requestor had been notified of the out-of-specification conditions. The NRC inspector reviewed and evaluated three nonconformance reports, two TP&Ps, and the deviation log to verify that test deviations or out-of-specifications conditions are being adequately documented and appropriate people are being notified.

10. (Closed) Nonconformance (83-03): There was no documented objective evidence that the single application of the initial accident transient and dwell at peak temperature, as required by Attachment 1 to engineering work authorization (EWA) No. EAJ08-23, Revision 2, issued June 20, 1983, had been justified for the CO3 temperature element qualification tests. The NRC inspector verified that EWA No. EAJ08-23 had been revised on December 29, 1983, to include the requirement for a double accident transient and dwell at peak temperature as required by GE Topical Report NEDE-24326-1-P, dated January 1983. The inspector also evaluated a memorandum, sent to the managers of the qualification program, which clarified the requirements of NEDE-24326-1-P relative to this nonconformance.

E. OTHER FINDINGS OR COMMENTS:

1. Review of Test Plan/Procedures and Supporting Documents: The Sandia consultant reviewed and evaluated the following documents concerning qualification of Limit Switches (NAMCO Model EA 740-80100, Rev. K) for a Main Steam Isolation Valve (MSIV):

   a. Product Performance Qualification Specification - GE Document No. 22A5768, Rev. 2.

   b. Product Analysis Report - GE Document No. 126-21-83/ 22A8460.

   c. Equipment Environmental Qualification Specification - GE Document No. 22A8461.

   d. Test Plan and Procedure - GE Document No. 524.0982, Rev. A.

   e. Additional TP&P - GE Document No. 524.1090, Rev. A.

   f. Engineering Work Authorizations - GE Nos. EAJ08-22, Revs. 1, A/1, B/1, D/1, E/1.

   A complete list of the appropriate activation energies was given in the PPQS, along with the thermal aging calculations. No problems were identified with the activation energies, the calculations were found to be correct, and adequate margins were included.

Appropriate radiation aging values for both total integrated dose and dose rates were specified. Adequate margins were included.

No nonconformances were identified.

2. Observations of Test Activities: The NRC inspector and Sandia consultant observed the test chamber and instrumentation being used for the 100 day post-design basis event environment exposure on the MSIV limit switches.

   The NRC inspector and Sandia consultant also observed the thermal aging of two Seitz solenoid coils used on the Dikkers Main Steam Safety Relief Valve. The coil, a new improved version, is undergoing EQ qualification testing since previous models of the coil have failed during testing. The complete TP&P and PAR for this qualification effort was in final typing and was not available for review. These documents will be evaluated during a future inspection. The thermal aging testing was being conducted per an approved TP&P which only covered test requirements through thermal aging.

   No nonconformances were identified.

3. Pressure Switch Specification Change: The Sandia consultant evaluated a change made in the specification of the PCI pressure switches during testing because the original design failed to meet the acceptance criteria for set point. An epoxy was added to secure the micro switch and improve repeatability. The pressure switches were then retested and they met the acceptance criteria.

   The consultant's review determined that there are switches without epoxy installed in plants; however, the acceptance criteria for the test was determined to be more stringent than necessary (± 2 psig). The actual set-point tolerances needed in the plants are much looser (+ 15 psig, -5 psig); the switches tested without epoxy were well within these tolerances. The consultant verified that PPQS No. 23A1213, Revision 3 and Specification No. 23A1231 for the pressure switches had been revised to reflect the looser set-points.

ORGANIZATION: GUYON ALLOYS, INCORPORATED
HOUSTON TEXAS

REPORT NO.: 99900875/84-01	INSPECTION DATE(S): 7/24-27/84	INSPECTION ON-SITE HOURS: 61

CORRESPONDENCE ADDRESS: Guyon Alloys
Post Office Box 42345
3400 Rogerdale Road
Houston, Texas 77042

ORGANIZATIONAL CONTACT: William Obergfell
TELEPHONE NUMBER: (713) 974-7208

PRINCIPAL PRODUCT: Bolting, structural shapes, pipe, fittings

NUCLEAR INDUSTRY ACTIVITY: 20% of overall business

ASSIGNED INSPECTOR: E T Baker
E. T. Baker, Reactive Inspection Section (RIS) 9/21/84 Date

OTHER INSPECTOR(S): L. Burns, BNL

APPROVED BY: E W Merschoff
E. W. Merschoff, Section Chief, RIS 9/24/84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR 21, 10 CFR 50 Appendix B, NCA-3800

B. SCOPE: This inspection was made to verify implementation of the Guyon Alloys, Incorporated Quality System Program with respect to its activities as a major supplier of products to the nuclear industry. It included verification of Guyon's compliance with the quality assurance provisions
(continued on page 2)

PLANT SITE APPLICABILITY: 50-498, 50-410, 50-341, 50-528, 50-529, 50-530, 50-352, 50-329, 50-313, 50-368, 50-325.

ORGANIZATION: GUYON ALLOYS, INCORPORATED
HOUSTON, TEXAS

REPORT NO.: 99900875/84-01	INSPECTION RESULTS:	PAGE 2 of 7

B. SCOPE: (continued)

contained in Sub-article NCA-3800 of Section III of the ASME Boiler and Pressure Vessel Code, Appendix B to 10 CFR Part 50, contractural requirements, and 10 CFR Part 21.

A. VIOLATIONS:

1. Contrary to Section 21.21 of 10 CFR Part 21, Guyon's Part 21 procedures were inadequate in the areas of requiring review of deviations/nonconformances for Part 21 implications and reviewing files to establish a comprehensive list of customers affected by a deviation/nonconformance.

2. Contrary to Section 21.31 of 10 CFR Part 21, Guyon did not include Part 21 applicability statements on purchase orders (POs) for nuclear material purchased for inventory, although this material was required to be produced under a quality system which meets the requirements of NCA-3800.

B. NONCONFORMANCES:

1. Contrary to Criterion IV of Appendix B to 10 CFR Part 50, NCA-3866.3(a) and Subarticles NB/NC/ND-2700, in conjunction with ANSI B36.10 and the individual material specifications, Guyon failed to impose the necessary requirements to assure that hot formed seamless piping ordered from Phoenix Steel and Jones & Laughlin Steel met minimum wall thickness requirements.

2. Contrary to Criterion VII of Appendix B to 10 CFR Part 50, paragraphs 7.4.1, 7.4.2, 7.5.2, and 7.5.3 of the Quality System Program Manual (QSPM) and Guyon PO A-27811-NW, Guyon accepted Certified Material Test Reports (CMTRs) which did not include the required reference to NCA-3800.

3. Contrary to Criterion XV of Appendix B to 10 CFR Part 50 and NCA-3867.3:

   a. Neither Guyon's QSPM nor their Quality Control Procedures (QCPs) provided a method for documenting, evaluating, or responding to non-conformance reports (NCRs) received from customers or

suppliers. Because of this lack of procedures, sales personnel were responding to customer NCRs and authorizing remarking of material without documented QA involvement.

b. Neither the QSPM nor the QCP provided written acceptance criteria for accepting material which was originally dispositioned as nonconforming due to a lack of traceability upon receipt at Guyon.

4. Contrary to Criterion XVI of Appendix B to 10 CFR Part 50, NCA-3869.2, and Paragraph 16.0.1 of the QSPM, Guyon failed to take corrective action as to cause with vendors with poor quality histories.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

This was the first inspection at the Houston facility of Guyon Alloys, Inc.

E. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 21 Procedures and Implementation

a. The inspectors reviewed correspondence files for 30 different customers, Nonconformance-Dispositioned Reports (NDRs) issued since January 1, 1981, and Part 21 procedures. On November 15, 1978, an internal memorandum was distributed by Guyon which established as corporate policy that 10 CFR Part 21 would not be applied to purchase orders for inventory, regardless of ASME Code classification or safety significance.

Guyon's position is that inventory material, although purchased to nuclear quality assurance requirements, NCA-3800, is a commercial grade item and therefore Part 21 does not apply until dedication of the material by Guyon. According to Guyon, dedication of the material occurs at the time the material is pulled from stock for delivery to a nuclear power plant.

Paragraph 21.3(a)(4)(a-1) of 10 CFR Part 21 states, in part: "'Commerical grade item' means an item that is (1) not subject to design or specification requirements that are unique to facilities or activities licensed pursuant to Parts 30, 40, 50, 60, 61, 70, 71, or 72 of this chapter...." Article NCA-3800 of

Section III of the ASME Boiler and Pressure Vessel Code is a quality assurance specification unique to facilities licensed under Part 50 and has been incorporated by reference into Section 50.55a of 10 CFR Part 50. As such, material ordered under NCA-3800 does not qualify as a commercial grade item and Part 21 must be applied to all purchase orders. Guyon's corporate policy on Part 21 resulted in Violation A.2.

b. On November 10, 1981, Guyon received written notification from Associated Piping & Engineering Corporation (AP&E) that some centrifugally cast 4" schedule 40 SA-376 Type 304 pipe supplied by Guyon and manufactured by Combustion Engineering (CE) was found to be below the minimum wall thickness allowed by specification when the pipe was cut in preparation for bending. Guyon in turn, informed CE of the problem. On November 20, 1981, CE replied to Guyon's letter. CE's reply stated that CE realized that their manufacturing process did not produce pipe which had a consistent wall from end to end. Prior to the report from Guyon, CE had established .010" as an adequate compensation factor for the variance in wall thickness and had modified their acceptance criteria by adding the compensation factor to the minimum wall thickness acceptable by specification. As a result of the nonconforming material, CE increased the compensation factor to .015".

The "designated person" at Guyon, at this point, knew that a basic component supplied by Guyon for a nuclear facility contained a deviation.

Based on the nature of the deviation, i.e., the deviation was the result of the inability of the manufacturing process to produce pipe with a consistent wall thickness, it should have been classified as generic and Guyon should have informed all customers who received similar pipe manufactured by CE of the deviation. There was no documented evidence that Guyon had compiled a comprehensive list of customers who had received similar pipe manufactured by CE nor that any customer other than AP&E was notified of the deviation.

Violation A.1 addresses this area.

2. Organization

The organization chart, descriptions of duties and responsibilities, and reporting requirements were reviewed. No nonconformances were identified.

3. Procurement Document Control

Forty two purchase orders were reviewed. With the exception of applying Part 21 to POs for inventory material and adding additional requirements to control problem manufacturers, Guyon passed all requirements on to the manufacturers through their POs. NCA-3866.3(a) requires that POs include whatever requirements are necessary to assure compliance with Section III of the ASME Boiler and Pressure Vessel Code. From nonconformance reports received from their customers and their own inspections, Guyon knew that the requirements for dimensional inspection imposed by the applicable material specification were not sufficient to detect pipe which did not meet minimum wall thickness requirements. However, no additional requirements were imposed on Jones and Laughlin Steel or Phonenix Steel to compensate for the lack of manufacturing process control and ineffective final inspection.

4. Instructions, Procedures, and Drawings

The QSPM and QCPs were reviewed and no nonconformances were noted except for those discussed in Sections E.1 and E.10 of this report.

5. Control of Purchased Material, Equipment, and Services

During the review of forty two purchase orders, only one instance of Guyon accepting material or documentation which did not meet the requirements to which it was ordered was found. See Nonconformance B.2.

Guyon's audits of vendors were, for the most part, perfunctory. There were no instances found where a vendor was not accepted nor were any significant findings noted in the audits reviewed by the inspector. Jones and Laughlin and Phoenix Steel are two examples where vendor history and lack of corrective action as to cause should have warranted consideration of their removal from Guyon's Approved Vendor List. However, a review of Guyon's audits of these suppliers revealed that the problem areas were not discussed with the vendors and no significant weaknesses in these vendors' quality assurance programs were noted, in spite of the four year history of problems with both vendors.

6. Identification and Control of Materials, Parts, and Components

A review of applicable procedures and an inspection of the warehouse were performed. No nonconformances were noted. The following comments are made based on observations by the inspector:

a. Although the QSPM does not address the labeling of storage bins, some bins are labeled and others are not. The material in the bins was not always the same as the material listed on the bin label.

b. The QSPM requires that material be segregated and stored according to size. A piece of 1/8" schedule 80/SA-106, Grade B pipe was found in a stack of 3/8" schedule 80/ SA-106, Grade B pipe. When this apparent nonconformance was brought to the attention of the QA manager, he stated that size actually referred to schedule and not nominal pipe size (nps). Since both pieces were adequately marked there was no loss of identification or control. However, consideration should be given to revising the QSPM to state what is actually intended, i.e., segregation by schedule not NPS.

c. Several lengths of pipe were noted where the white stenciled markings were difficult to read.

7. Inspection

Inspection procedures were reviewed and the NRC inspector witnessed the Guyon inspector performing a shipping inspection. No nonconformances were noted in this area.

8. Inspection, Test and Operating Status

Applicable portions of the QSPM and QCPs were reviewed, and an inspection of material in the receipt and hold areas, and material covered by pending NCRs was conducted. No nonconformances were noted.

9. Nonconforming Materials, Parts or Components

A review of the NDR log and file from 1981 to present and correspondence files for thirty different customers identified two instances (a TWX from Bill Strittmatter to Chicago Bridge & Iron dated 10/20/78 authorizing the re-marking of some material and a letter from Ken Anderson to CP&L forwarding a corrected Certificate of Compliance)

where sales personnel had responded to customer nonconformance reports without documented QA involvement and one instance where a nonconformance should have been reported to Guyon's customers and the NRC as a 10 CFR Part 21 report.

Closer review of Guyon's procedures for handling nonconformances revealed that there were no procedures for processing nonconformance reports originating from sources external to Guyon, or for assuring that nonconformances, regardless of origin, were reviewed for Part 21 implications. Violation A.1 and Nonconformance B.3 cover this area.

10. Corrective Action

In reviewing the NDR forms and correspondence files for Phoenix Steel and Jones and Laughlin, no documented evidence of requests for corrective action as to cause for either the below minimum wall condition or the marking problems noted previously in this report were found. Both problems recurred frequently (as noted by the NDRs issued) throughout the 1981-1984 time period. Nonconformance B.4 addresses this issue.

ORGANIZATION: LTV STEEL COMPANY
YOUNGSTOWN, OHIO

REPORT NO.: 99900881/84-01	INSPECTION DATES: 10/1-5/84	INSPECTION ON-SITE HOURS: 70

CORRESPONDENCE ADDRESS: LTV Steel Company
Tubular Division
P. O. Box 1000
1315 Albert Street
Youngstown, Ohio 44501

ORGANIZATIONAL CONTACT: Robert S. Spinetti, Manager, Quality Assurance
TELEPHONE NUMBER: (216) 742-5934

PRINCIPAL PRODUCT: Seamless Pipe

NUCLEAR INDUSTRY ACTIVITY: Currently less than 1%.

ASSIGNED INSPECTOR: E. T. Baker — Edward T. Baker, RIS, VPB — 12/6/84 Date

OTHER INSPECTOR: E. H. Trottier, RIS, VPB

APPROVED BY: E T Baker for — E. W. Merschoff, Chief, RIS, VPB — 12/6/84 Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21, NCA-3800, Material Specifications.

B. SCOPE: This inspection was made to verify implementation of LTV Steel Company's (LTV) Quality Assurance Program with respect to its activities as a manufacturer of seamless pipe for the nuclear industry. It included verification of LTV's compliance with quality assurance provisions contained in Subarticle NCA-3800 of Section III of the ASME Boiler and

PLANT SITE APPLICABILITY: Not determined.

B. SCOPE: (continued)

Pressure Vessel Code, material specifications, contractual requirements and 10 CFR Part 21.

A. VIOLATIONS

1. Contrary to Section 21.6 of 10 CFR Part 21, LTV had not posted Part 21, Section 206 of the Energy Reorganization Act of 1974 or their Part 21 procedures.

2. Contrary to Section 21.2 of 10 CFR Part 21, LTV did not evaluate or notify their customers of piping which did not meet minimum wall thickness requirements.

B. NONCONFORMANCES

1. Contrary to Subparagraph NCA-3866.2 of Section III of the ASME Boiler and Pressure Vessel Code and Section 5 of the LTV Quality Assurance Manual (QAM), LTV had not developed and implemented procedures to control the distribution of, changes to, or use of the Standard Procedures and Process Control Manual (SPPCM).

2. Contrary to Subparagraph NCA-3867.1 of Section III of the ASME Boiler and Pressure Vessel Code and ASTM/ASME SA-530, LTV had not developed and implemented examinations and tests that would assure that the minimum wall thickness at any point is not more than 12.5% less than the nominal wall thickness specified, for piping manufactured prior to August 1983.

3. Contrary to Subparagraph NCA-3867.3 of Section III of the ASME Boiler and Pressure Vessel Code, the Disposition Instructions in the Standard Procedures and Process Control Manuals (SPPCM) do not adequately address identification of nonconforming material.

4. Contrary to Subparagraph NCA-3868.1 of Section III of the ASME Boiler and Pressure Vessel Code, LTV did not have a procedure for the calibration of the rotary hearth temperature gages/controllers.

5. Contrary to Subparagraph NCA-3869.2, LTV had not taken adequate or timely corrective action on nonconformances reported in customer claims due to procedural inadequacies.

C. UNRESOLVED ITEMS

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS

This was the first inspection at LTV's Campbell Works, Seamless Tube Plant.

E. OTHER FINDINGS OR COMMENTS

1. 10 CFR Part 21 Procedures and Implementation

Inspection of shops, offices and production areas of the LTV-Campbell Works Seamless Tube Plant did not reveal any posting of a current copy of Section 206 of the Energy Reorganization Act of 1974, or a current copy of 10 CFR Part 21. Further, no procedures to implement the requirements of 10 CFR Part 21 (or a description of such implementing procedures) could be found.

A procedure addressing 10 CFR Part 21 requirements was prepared in 1978 by a company since subsumed by LTV. This procedure did not address the areas of nonconformance evaluation, or customer notification.

Violations A.1 and A.2 address this area.

2. Training

Although NCA-3800 does not have any requirements on training for other than nondestructive examination personnel, LTV has held training sessions with all production and quality personnel to familiarize them with the new Integrated Process Control program.

3. Manufacturing and Quality Control Procedures

LTV recently implemented a new Integrated Process Control program which combines in a single manual the manufacturing and quality control procedures. The procedures are written so that manufacturing and inspection instructions for a specific operation, e.g., piercing of rounds, are contained in a pocket size manual which describes critical manufacturing parameters and acceptable ranges; inspection methods, characteristics to be inspected and acceptance/rejection criteria; and the responsibilities of all personnel involved, e.g., the machine operator, inspector, production foreman, and quality control supervisor. The procedures were well written, easily understood and except for a problem in the area of identification of nonconforming material, were complete.

The Disposition Instructions for Control Areas 9.3.1, 11.1.1, 11.2.1, 12.1.1, 12.2.1, 12.3.1, 30.3.2, 39.3.2 and 41.1.1 do not provide instructions on how nonconforming material is to be tagged or marked, what color the tag should be, what marking material should be used, or what color banding should be used. Disposition Instructions for Control Areas, 10.1.1, 14.2.1, 29.1.1, 30.2.1, 37.1.1, 38.1.1, and 39.3.1 do not address the identification of nonconforming material at all.

Nonconformance B.3 addresses this area.

4. Document Control

The QAM and SPPCM were reviewed for procedures on controlling their distribution, the distribution and control of changes to them, and their use. No problems were found with the QAM. However, LTV had not developed any procedures covering the SPPCM.

Nonconformance B.1 addresses this area.

5. Examinations and Tests

The inspector reviewed inspection procedures, manufacturing/process control instructions, records of wall thickness examinations for piping produced both before and after the mill was rebuilt, and the monthly "light and heavy" reports for 1982.

a. The inspector reviewed strip charts of wall thickness measurements made by a third party on 7 pieces of petroleum industry pipe produced prior to rebuilding the mill. All of the pipe was 7" outside diameter, with the nominal wall thickness ranging from .317" to .453". Due to eccentricity of the pipe, the wall thickness of the .453 nominal wall pipe varied from .510" at 0° to .415" 180° from the thickest wall. The thickness along the length of the pipe, starting at the point on the end which measured .415", varied .055". This results in the thinnest section of the pipe varying 12% along its length.

When measured along the thinnest section of the pipe, two pieces of pipe exhibited a 12% variation along the length of the pipe, four pieces of pipe exhibited an 11% variation, and one piece exhibited a 7% variation.

The inspection method used by LTV was to mechanically gage both ends of the pipe using a go/no-go, with an acceptance or go size equivalent to the allowable minimum wall thickness. The combination of this inspection technique with the 12% variation in wall thickness along the thinnest section of the pipe could result in piping which just meets the minimum thickness requirements when gaged on both ends and is, in the worst case, 12% below the minimum allowable wall thickness somewhere along its length, being accepted and shipped.

b. The inspector reviewed strip charts from wall thickness measurements made by LTV during their 100% ultrasonic inspection for approximately 500 pieces of SA-106 piping produced after the mill had been rebuilt. All of the pipe was 7-5/8" outside diameter with .328" nominal wall thickness. For each run of pipe LTV was aiming for a .341" average wall. The worst case observed was a total variation in wall thickness of .053" from the target thickness, a reduction in variance of 50% over the old mill. The thickest section measured .371" and the thinnest measured .318". The worst case variation measured along the thinnest section of the pipe was only 6%, again a 50% reduction over the old mill.

c. In addition, LTV instituted 100% ultrasonic inspection on all pipe produced in the new mill. This provides LTV with the ability to monitor the manufacturing process and detect when process control parameters start to deviate from the allowable range. It also provides assurance that the wall thickness at any point is not more than 12.5% under the nominal thickness specified.

Nonconformance B.2 addresses this area.

6. Control of Measuring and Test Equipment

a. The inspector reviewed the applicable section of the QAM and yearly calibration records for 11 "working" measurement rods, 16 "master" measuring rods, outside micrometers and master ring and plug (thread) gages. In addition, certificates of calibration traceable to the National Bureau of Standards were reviewed for the master measuring rods (NBS Test No. 738/227676), and gage blocks (NBS 738/223690). Certificates of calibration traceable to the Watertown Arsenal were reviewed for the impact testing machines for the past two years. The calibration laboratory, storage area and record keeping functions were particularly well organized and managed.

The instructions on what to do when equipment used for acceptance of material, is found to be outside allowable tolerances when it is calibrated, were located in Paragraph 14a-1a of the QAM, under the title "Inspection Rejects". These provisions would be more appropriately placed under Paragraph 8c "Calibration Procedures and Frequency".

b. During the plant tour it was observed that there were no calibration stickers on the temperature gages/controllers for the rotary hearth. In pursuing this issue it was discovered that the calibration of instruments for the rotary hearth was not covered by existing calibration procedures. However, the rotary hearth instruments had been calibrated by a subcontractor, according to a schedule established by LTV.

Nonconformance B.4 addresses this area.

7. Corrective Action

Seventeen customer claim files were reviewed to determine the effectiveness of corrective action taken by LTV in response to nonconformances brought to their attention by purchasers. (The nonconformances were in every case piping having a wall thickness below the minimum required.) The review revealed the absence of a formal, documented mechanism by which the root cause (as opposed to the result) of such nonconformances is evaluated and corrected. To date, emphasis is concentrated on fiscal responsibility, with judgments rendered - usually by an LTV field representative - in the form of reshipments or credits. Corrective action is not routinely applied to the cause of the nonconformance, only the result.

Nonconformance B.5 addresses this area.

ORGANIZATION: NATIONAL VALVE COMPANY
PITTSBURGH, PENNSYLVANIA

REPORT NO.: 99900023/84-01	INSPECTION DATE: 8/6-10/84	INSPECTION ON-SITE HOURS: 114

CORRESPONDENCE ADDRESS: National Valve and Manufacturing Company
Box 100
701 Alpha Drive
Pittsburgh, Pennsylvania 15238

ORGANIZATIONAL CONTACT: George A. Koch, QA Manager
TELEPHONE NUMBER: (412) 963-8200

PRINCIPAL PRODUCT: Pipe hangers and piping.

NUCLEAR INDUSTRY ACTIVITY: 3% of total work.

ASSIGNED INSPECTOR: Edward T Baker 10/17/84
E. T. Baker, Reactive Inspection Section, VPB Date

OTHER INSPECTOR(S): R. P. McIntyre, SPIS, VPB
T. Burns, BNL

APPROVED BY: E W Merschoff 10/17/84
E. W. Merschoff, Chief, RIS, VPB Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21, Appendix B to 10 CFR Part 50, Subsection NF.

B. SCOPE: This inspection was made to verify implementation of the National Valve and Manufacturing Company (NAVCO) Quality Assurance Program with respect to its activities as a fabricator of supports for use in the nuclear industry. It included an evaluation of an allegation that NAVCO had not informed all their customers or the NRC of defective component supports as required by Part 21, NAVCO's compliance with the quality

(continued on next page)

PLANT SITE APPLICABILITY:

Docket Nos. of plants affected by allegation:50-313, 50-244, 50-461, 50-462, 50-514, 50-282, 50-306, 50-250, 50-251, 50-397, 50-395.

B. SCOPE: (continued)

assurance provisions contained in Article NCA-4000 and Subarticle NCA-3800 of Section III of the ASME Boiler and Pressure Vessel Code, Appendix B to 10 CFR Part 50, contractural requirements, and 10 CFR Part 21.

A. VIOLATIONS

1. Contrary to 10 CFR Part 21, NAVCO failed to notify the NRC of defective component supports supplied to nuclear power plants due to an inadequate evaluation of the problem.

2. Contrary to 10 CFR Part 21, NAVCO failed to include the Part 21 applicability statement on purchase orders for nuclear material ordered for inventory.

B. NONCONFORMANCES

1. Contrary to Criterion II of Appendix B to 10 CFR Part 50 and NAVCO Company Procedure, CPH-25, training records for engineering personnel are not being properly maintained by the Engineering Department Manager.

2. Contrary to Criterion IV of Appendix B to 10 CFR Part 50, Section 10 of the NAVCO QAM, and Company Procedure CPH-7, NAVCO procured weld filler material which did not meet all specification and procedural requirements.

3. Contrary to Criterion VIII of Appendix B to 10 CFR Part 50, Section 5 of the NAVCO QAM, and Company Procedures CPH-7 and CPH-20, NAVCO was not controlling material as required.

4. Contrary to Criterion IX of Appendix B to 10 CFR Part 50, Sections 11 and 12 of the NAVCO QAM, and Company Procedure CPH-7, NAVCO was not controlling special processes, welding and nondestructive testing, in accordance with procedural requirements.

5. Contrary to Criterion XII of Appendix B to 10 CFR Part 50, neither the QAM, the Company Procedure nor the Basic Engineers Standards address what corrective actions are to be taken when nonconformances are found during the verification program for rod oven thermometers and manual welding machines. Additionally, NAVCO was not maintaining calibration in accordance with the procedural requirement of the aforementioned documents.

6. Contrary to Criterion XV of Appendix B to 10 CFR Part 50 and Company Procedure CPH-27, NAVCO did not inform all affected parties of Nonconformance Notice (NCN) H-080, which involved design and accumulative tolerance problems.

7. Contrary to Criterion XVI of Appendix B to 10 CFR Part 50, neither the NAVCO QAM, Company Procedures, nor the Basic Engineers Standards address the documentation, investigation, disposition of and corrective action taken on significant conditions adverse to quality reported to NAVCO by their customers.

C. UNRESOLVED ITEMS

During the inspection, the inspector identified the following unresolved item while investigating Vendor Item Tracking System (VITS) Item 82-282.

The Tennessee Valley Authority (TVA) filed five 10 CFR 50.55(e) reports with the Region II Office of the Nuclear Regulatory Commission which pertained to linear indications found in the base material of six 8" OD schedule 120 spool pieces that were fabricated by NAVCO using piping manufactured by U.S. Steel Co. All six spools were manufactured from the same material, heat code no. L63687. These indications were found by TVA personnel at Bellefonte Nuclear Plant Unit 2 during an installation inspection. In their final report to the NRC, dated December 23, 1983, TVA stated that they considered the deficiency reportable under Part 21. During the inspection NAVCO/Basic Engineers personnel could not produce any correspondence with TVA or proof that they had investigated this deficiency to assure that other material from the same heat code has not been shipped to other nuclear plant sites. NAVCO has agreed to investigate and reply to this open item with their response to the other inspection findings.

D. OTHER FINDINGS AND COMMENTS

1. Investigation of Concerns Expressed In Allegation

The NRC received an anonymous report that NAVCO had manufactured and sold "fittings" which had "improper clearances" which could result in binding of the support. The alleger also stated that a nonconformance report had been submitted to NAVCO by the Clinton Nuclear Plant that detailed the problem, that other nuclear power plants had received defective items, and that NAVCO had not informed the other affected plants of the defective items.

The concerns expressed above were substantiated during the inspection. See the section on Violations below for a detailed description.

2. Violations

a. Based on a 50.55(e) report submitted by Illinois Power and an allegation received by the NRC, the inspector reviewed all records and correspondence associated with the interference problem between the male rod end and the pipe clamp or rear bracket. The following is a history of the interference problem and actions taken by NAVCO to resolve the problem.

During September 1982 Baldwin Associates contacted NAVCO because of interference problems encountered with NAVCO manufactured items , e.g., male rod ends, rear brackets, and pipe clamps, at the Clinton Nuclear Power Station. NAVCO investigated the problem, reviewing all sizes manufactured for potential interferences between the welded male rod extension piece and the rear bracket and/or pipe clamp. The following list indicates the items where an interference could possibly occur due to accumulative tolerances, and what field rework NAVCO recommended be done to eliminate the interferences.

Fig. No.	Size	Potential Interference	NAVCO Recommended Rework (if required)
BE-415-1	1/2	Rear bracket & pipe clamp edge distance	Recut bracket or clamp edge distance to 5/8"
BE-415-1	1	Rear bracket & pipe clamp edge distance at 5° off set	Recut bracket or clamp edge distance to 1"
BE-415-1	3	Rear bracket & pipe clamp edge distance	Recut bracket or clamp edge distance to 1-1/4"
BE-415-1	10	Rear bracket & pipe clamp edge distance	Recut bracket or clamp edge distance to 4", if rod end is over welded, also grind weld to size

Fig. No.	Size	Potential Interference	Rework (if required)
BE-415-1	11	Rear bracket & pipe clamp edge distance	Recut bracket or clamp edge distance to 5", if rod end is over welded, also grind weld to size
BE-411-2	PSA-10	Rear bracket & pipe clamp edge distance	Recut bracket or clamp edge distance to 1-1/4"

In a letter dated October 5, 1982, NAVCO informed their two largest customers, Westinghouse Electric Corporation and the Clinton Nuclear Power Station, of the possible interference problem. However, NAVCO did not inform the following customers who received similar items; V. C. Summer Nuclear Plant, Prairie Island Nuclear Plant, Turkey Point Nuclear Plant, Babcock & Wilcox (Pebble Springs Project) and Southwest Fabricators. On October 21, 1982, Illinois Power Company notified Region III of the problem via a 10 CFR 50.55(e) report. On October 26, 1982, NAVCO was informed by Baldwin Associates that a 50.55(e) report had been submitted to the NRC. The 50.55(e) report covered the accumulative tolerance problem as well as a fabrication problem (excessive weld material on the male rod extension piece).

On November 4, 1982, NAVCO initiated a Nonconformance Notice (NCN), NCN H-080, on the interference problem. The corrective action taken immediately was to institute a 100% inspection of all male rod ends, rear brackets, and pipe clamps that had not been shipped to assure that no binding occurred and the specified range of motion was available. The long range corrective action was to redesign the parts and place a maximum dimension on the weld on the male rod end.

For supports on site at Clinton, but not yet installed, a 100% inspection for binding and the specified range of motion was performed. For supports installed on site, each support was examined and a determination was made whether a sufficient range of motion was available for the intended use of each support. The supports were then either accepted, repaired, modified, reworked, or replaced.

As a result of the NCN and the 50.55(e) report, NAVCO performed a 10 CFR Part 21 evaluation. The result of the evaluation was that the problem was not reportable under Part 21 because there was no safety hazard. This determination was based on the following assumptions:

"(1) There is less movement available than specified in L.C.D. [Load Capacity Data Sheet] but some movement is still provided for.

(2) All points of binding should be detected during installation, inspection or hot functional test.

(3) Redesign of Parts

a. Engineering has already redesigned the rear brackets and male rod ends on the smaller sizes to eliminate welding and manufacture as one-piece items.

b. Engineering will increase B-B openings, limit weld maximum sizes and reduce tolerances to eliminate interferences.

(4) Inspection

a. Shop - Immediate shop inspection of all snub/struts to verify that the pivot angle meets the angles specified in L.C.D.

b. Field - NAVCO will inspect all installed snub/struts at Clinton site and rework as required."

These assumptions resulted in an inadequate evaluation for the following reasons:

(1) Whether or not sufficient movement was available for supports or parts furnished to nuclear plants other than Clinton could not be determined by NAVCO. They were supplying a component standard support which was supposed to have ±5° of motion. They were not designing the support for a particular application and therefore could not determine what range of motion, less than ±5°, was acceptable

(2) There are two basic errors in this assumption. The first is that an inspection during installation may not always detect a support with less than the required ±5° range of motion. The second is that all supports are not examined during the preservice hot functional test. Specifically, supports which appear to be binding at room temperature may not bind at elevated temperatures due to thermal growth. Conversely, supports which appear free at room temperature may bind at elevated temperatures. In addition, Subsection IWF of Section XI of the ASME Boiler and Pressure Vessel Code only requires that supports which will be examined during inservice inspections be examined during preservice hot functional testing. In some plants this amounts to less than 25% of the total number of supports. Therefore, there is no assurance that suspect supports would be examined during preservice hot functional testing. Consequently, the interference problem may not be detected and reasonably could cause a safety hazard.

(3) Although NAVCO had redesigned the rear brackets and male rod ends prior to the interference problem being detected at Clinton, parts manufactured based on the previous design that were in stock continued to be used in assemblies or sold as parts until the problems at Clinton were reported to NAVCO.

(4) The shop inspections and the inspections at Clinton had no effect on supports or parts shipped to other sites prior to November 4, 1982.

Violation A.1 addresses this subject.

b. NAVCO's QA manager informed the NRC inspector that it was NAVCO's policy that POs for material purchased for inventory not impose Part 21 on the subtier supplier or manufacturer. The reasoning was that although the material was ordered under a nuclear QA program, NCA-3800, the material was considered commercial material until dedicated as nuclear by NAVCO. However, nuclear grade material is considered a basic component under Part 21, rather than a commercial grade item, because it is subject to specification requirements unique to the nuclear industry, i.e., NCA-3800, and has physical and chemical properties which are important to safety and testing is required to assure that the desired properties are present.

Violation A.2 addresses this subject.

3. Other Areas Inspected

During a walk-through inspection and subsequent record review at the Johnstown manufacturing facility, the areas of purchasing, material control, special processes, final inspection, calibration, and QA records were inspected. The inspection in the areas of nonconforming material, training, corrective action, and audits was performed at the corporate offices.

a. Indoctrination and Training

The inspector reviewed NAVCO Company Procedure CPH-25, Rev. 2, "Indoctrination and Training." To verify that company personnel performing activities affecting quality are being properly trained, a review was done of the following: (1) BE-888, Indoctrination and Training Program for the Engineering Department, (2) Indoctrination and Training Modules T1 to T10, and (3) Records of Indoctrination and Training Sessions for the Engineering Department which were available. The records of indoctrination and training sessions were not up to date.

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

b. During the review of POs for welding filler metal, the following problems were found:

(1) The weld filler metal listed below had been procured, receipt inspected and designated for "nuclear" use in accordance with ASME Section III by NAVCO without obtaining, mechanical property test results in the post weld heat treated (PWHT) condition as required by Section 10 of the NAVCO QAM:

Manufacturer	Class	Size	Heat/Lot	ASME II
Chemetron	E70T-1	3/32"	None/H6689	SFA5.20
Chemetron	E70T-1	3/32"	None/H6699	SFA5.20

(2) One lot of filler metal (Alloy Rods, E71T-1, .045" dia., lot no. 1551, SFA5.20) was procured, receipt inspected and designated for "nuclear" use in accordance with ASME Section III with test results in the PWHT condition obtained from test samples which had been PWHT for four (4) hours. The four (4) hour heat treatment will not qualify the material for the ten (10) hours of accumulated

post weld heat treatment time required by Section 10 of the NAVCO QAM.

(3) The weld filler metal listed below had been procured, receipt inspected and designated for "nuclear" use in accordance with ASME Section III without the Charpy V-notch test having been performed as required by Company Procedure CPH-7:

Manufacturer	Class	Size	Heat/Lot	ASME II
Atom Arc	E7018	5/32"	401K6071/3C023L03	SFA5.1
Chemetron	E70T-1	3/32"	None/6698	SFA5.20
Alloy Rods	E71T-1	.045"	None/51551	SFA5.20

Nonconformance B.2 was identified in this area of the inspection.

c. During the walk through of the material storage area the inspector identified the following problems:

(1) NAVCO procedure CPH-7 requires that weld rod conditioning ovens be maintained between 150°F and 225°F, only one classification and heat/lot per electrode size be permitted in an individual oven bin, that each conditioning oven shall be identified for either nuclear or non-nuclear material and separate distribution ovens be used for nuclear welding material.

Distribution dry-rod oven no. 2083 was found marked for both nuclear and non-nuclear filler material and contained 3/32" and 1/8" E308-15 nuclear weld rod and 3/32" E309-15 non-nuclear weld rod. In addition, reconditioning dry-rod oven no. 2086 was found marked for both nuclear and non-nuclear filler metal. The oven was empty at the time of the examination.

(2) A stack of SA-36 bottom flange plates, purchased under PO-J56371, was found which did not have markings on each piece and were not bundled. In reviewing the procedures on the control and marking of material, it was found that the procedures did not address how the material was to be controlled when the bundle strapping is removed.

Nonconformance B.3 was identified in this are of the inspection.

d. A review of welding and nondestructive examination (NDE) procedures, their implementation, and welder and NDE personnel qualifications was performed.

(1) The inspector examined the weld procedure specifications available at the work stations of welders ADA, ACX, and ADD and found them to be complete and current. No nonconformances were identified in this area.

(2) The NAVCO Performance Qualification Testing program for welders and welding operators was reviewed. This activity at NAVCO is governed by the requirements of ASME III - Division I subsection NF, ASME IX and NAVCO Quality Assurance Manual, Section 11, Rev. 10. The program and activities were reviewed for compliance with the requirements established in the aforementioned documents.

Selected for this review were the performance qualification records of six welders who were noted on the "Status of Welder Qualification Record" as being currently qualified to weld on ASME II items. The records examined covered the performance qualification history for welders ADF, ADD, ACE, ADO, ADR, and ACJ during the period 1981 to 1984. Each welder was found to be appropriately qualified for the weld procedures indicated on the "Status of Welder Qualification Record." Also each welders' qualification had been maintained during this period as required by ASME Section IX, QW-322. No nonconformances were identified regarding this activity.

(3) NDE activities at the NAVCO Hanger Division are governed by the requirements of ASME III - Division 1 subsection NF, ASME V and NAVCO Quality Assurance Manual Section 12, Rev. 10. During the inspection, the training and qualification records for seven certified NAVCO inspectors (six-level II and one-level III) were examined for compliance with the above referenced requirements. Documentation examined pertained to examination test results (general, specific and practical), education level, work experience and vision test results. This documentation was found to be in accordance with the requirements and all activities had been accomplished within the established time frame. No nonconformances were identified in this area.

(4) The following weld procedure specifications (WPS) were qualified and issued for use but did not address variables QW403.9 (essential) and QW410.13 (non-essential) as required by ASME IX, QW200.1.

WPS	Revision	Date	WPS	Revision	Date
1-Hw-1	2	4/5/78	1-Hb-1	1	12/13/77
1-Hx-1	0	4/5/78	1-Hd-1	5	3/27/77
1-Hz-1	5	8/15/77	1-Hn-1	3	1/5/78
1-Faf-1	3	4/5/78	1-Hq-1	5	5/18/78
1-Fz-1	0	4/5/78	1-Fd-1	1	4/5/78
1-Fab-1	3	4/5/78			

(5) NAVCO had developed and placed into use without qualification (demonstration), the "Visual Examination" procedure CPH9E, Rev. 0, which was the procedure to be following by QC inspectors in performing visual examination of assemblies fabricated in accordance with "ASME Section I, III and VIII code items." This procedure was not qualified (demonstrated) until May 24, 1978. However, NAVCO had been involved in the manufacture of items in accordance with ASME III, subsection NF from June 1976 to May 1978.

Nonconformance B.4 was identified in this area.

e. Final Inspection

The inspector reviewed NAVCO Company Procedure CPH-19, Rev. 2, "Final Dimensional Check." To verify that company procedures are being implemented, a final dimensional check by a NAVCO QC inspector was witnessed. A pipe clamp assembly, per standard parts drawing Fig. BE-412-N-8 and assembly drawing A-409-3, was checked to verify all dimensions were within required tolerances and noted appropriately on the QC data sheet, including the QC inspector's initials and the date of the inspection. No nonconformances were identified in this area.

f. Calibration

The inspector reviewed NAVCO Company Procedure CPH-8, Rev. 5, "Calibration of Measuring and Testing Equipment," and observed the calibration status of numerous measuring and testing devices. To verify that inspection, test, and other measuring devices

used in activities affecting quality are controlled and calibrated on a scheduled basis, and the results documented in accordance with written procedure CPH-8, a review was made of instrument calibration log records for 10 devices. The devices, which are required to have calibration stickers with calibration dates and due dates, were checked for accuracy. The record review did not reveal any instruments out of calibration.

Calibrated electrode storage oven thermometers being used to monitor the temperature in nuclear material storage ovens were checked to verify they were within the permitted temperature range. The following list shows a history of deviations from the ± 10° tolerance specified in NAVCO's company procedure, CPH-8.

Oven (Nuclear)	Date of Verification	Calibrated Thermometer Reading °F	Oven Thermometer Reading °F	Deviation °F	Oven Set Point °F
J01	8/6/84	218	175	-43	180
J01	3/6/84	196	150	-46	180
J01	2/3/84	232	200	-32	200
J01	1/4/84	220	200	-20	200
J01	12/2/83	234	200	-34	225
J02	7/10/84	194	150	-44	210
J02	6/6/84	210	150	-60	215
J02	5/1/84	188	150	-38	215
J02	4/84	230	210	-20	220
J02	3/84	216	180	-36	220
J02	2/84	216	170	-46	220
J02	1/84	172	160	-12	200
J05	8/6/84	218	170	-48	150

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Oven (Nuclear)	Date of Verification	Calibrated Thermometer Reading °F	Oven Thermometer Reading °F	Deviation °F	Oven Set Point °F
J05	7/10/84	240	160	-80	155
J05	6/6/84	212	150	-62	160
J05	5/1/84	168	140	-28	150
J05	4/5/84	200	160	-40	150
J05	3/6/84	262	180	-82	170
J05	2/3/84	192	150	-42	170
J05	1/4/84	246	200	-46	180
J06	7/10/84	246	180	-66	175
J06	6/6/84	242	200	-42	180
J06	4/5/84	154	140	-14	170
J06	2/3/84	242	170	-72	175
J06	1/4/84	250	210	-40	200
J06	12/2/83	220	180	-40	200

Although NAVCO records indicate attempts were made to adjust the oven temperature control, these efforts were not successful. No nonconformance report was initiated, the oven thermometers were continued in use and no correction factor was affixed to the thermometers.

Nonconformance B.5 was identified in this area of the inspection.

g. Nonconformances and Nonconforming Material Procedures for handling nonconforming material and processing NCNs were reviewed. NCNs issued between 1981 to present were reviewed for implementation of the procedures. All nonconformances reviewed had been properly handled, except NCN H-080. Three NCNs had been evaluated for Part 21 reportability and with the exception of NCN H-080, had been properly dispositioned.

Violation A.1 and Nonconformance B.6 were identified in this area.

h. Two areas where problems were found with corrective action are the handling of customer generated NCNs and the operating temperature of the filler metal storage ovens.

(1) For the NCNs reviewed, corrective actions taken were reviewed for appropriateness and timeliness. NAVCO did not have any procedure for documenting, investigating, dispositioning, and replying to customer NCNs. However, the records on customer generated NCNs reviewed by the inspector were complete.

(2) The following "nuclear" filler metal storage ovens were determined to be operating outside of the specified temperature range during NAVCO's monthly rod oven temperature verification:

Oven	Date	Temperature (°F)
J01	2/3/84	232
J01	12/2/83	234
J02	4/1/84	230
J05	7/10/84	240
J05	3/6/84	262
J05	1/4/84	246
J06	7/10/84	246
J06	6/6/84	242
J06	3/6/84	120
J06	2/3/84	242
J06	1/4/84	250

Although the results of the inspections were documented, an NCN was not written and as can be seen from the continuing nature of the nonconformance, effective corrective action has not been taken.

Nonconformance B.5 was identified in this area of the inspection.

Nonconformance B7 was identified in this area of the inspection.

i. Audits

NAVCO Corporate Quality Assurance Manual, Section 18, Rev. 9, "Audits" was reviewed. This included both internal audits and vendor quality assurance source surveys.

No nonconformances were identified in this area

j. Audits

(1) Internal Audits. Planned periodic audits of all aspects of the QA program are required to be performed twice a year in accordance with written procedures and checklists, by qualified personnel. The results are to be documented and reviewed by management, and followup audits are performed when needed. To verify that this is being done, a review of the following was conducted: the internal audit schedule for 1984, Qualification and Training Records for 1984, Qualification and Training Records for five auditors, three audit reports, and corrective action and followup audits.

No nonconformances were identified.

(2) Vendor Audits. The vendor audit schedule for 1984, including audits performed by American Pipe Fittings Association (APFA) Members was reviewed. APFA is a joint vendor audit program. A list of APFA auditors, their qualification records, and three APFA audit checklists were also reviewed.

No nonconformances were identified.

ORGANIZATION: NUTHERM INTERNATIONAL INCORPORATED
MOUNT VERNON, ILLINOIS

REPORT NO.: 99900779/84-01	INSPECTION DATES: 10/22-25/84	INSPECTION ON-SITE HOURS: 50

CORRESPONDENCE ADDRESS: Nutherm International Incorporated
ATTN: Mr. R. J. Heifner
Quality Assurance Manager
501 South 11th Street
Mount Vernon, Illinois 62864

ORGANIZATIONAL CONTACT: Mr. R. J. Heifner, QA Manager
TELEPHONE NUMBER: (618) 244-6000

PRINCIPAL PRODUCT: Environmental Control and Systems

NUCLEAR INDUSTRY ACTIVITY: Approximately 99%.

ASSIGNED INSPECTOR: R. E. Oller — 12-14-84
R. E. Oller, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR: J. J. Petrosino, RIS

APPROVED BY: E. W. Merschoff — 12-21-84
E. W. Merschoff, 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: (a) potential deficiencies in Elma Engineering 24 V d.c. power supply units furnished by Nutherm to several nuclear power stations, and (b) Nutherm's 10 CFR Part 21 reports concerning nicked cables in Analog Trip Cabinets furnished by Nutherm to several nuclear power stations, and (c) status of previous NRC inspection findings.

PLANT SITE APPLICABILITY: Elma Engineering Power Supply Units 50-293/471, 50-461, and 50-259/260. Nicked Cables 50-293/471, 50-237/249, and 50-254/265.

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Nutherm International QA Manual, Revision 3, Sections 18.1.1 and 18.1.2, test records identifying type of observation, results and acceptability were not maintained by the QA Manager for functional tests for 41 Elma Model 164C5261P004 power supply units received on purchase order nos. 1078-9.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Nutherm International QA Manual, Revision 3, Section 8.1.2, records were not in evidence to assure that 100% receiving inspection was performed on Elma ferroresonant power supply units which were supplied by NI to Pilgrim, Clinton and Browns Ferry Nuclear Power Plants.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Boston Edison (Pilgrim), and Sargent & Lundy (Clinton), specifications for Analog Trip Cabinets, and Nutherm International QA Manual, Revision 3, Section 5.1.4, NI failed to impose requirements of 10 CFR Part 50 Appendix B and 10 CFR Part 21 on purchase orders numbers 1214-15, 1155-27, 1162, and 1078-9.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Boston Edison (Pilgrim) specification for Analog Trip Cabinets, Bechtel (Dresden and Quad Cities) Material Requisition No. 13524-E-2P(Q), Revision 2, for Safety Related System Equipment, and Nutherm International QA Manual, Revision 3, Section 6.1.1 and 11.1.1, the following nonconformances were identified in regard to nicked insulation on electrical conductors:

   (a) Documented procedures were not available to provide criteria for electrical cable jacket removal and QA records were not in evidenced to assure that the jacket removal activities were performed in accordance with written procedures or requirements.

   (b) No QA records were in evidence to assure that the remainder of the internal wiring in the NI electrical equipment was installed and inspected in accordance with written specifications.

   (c) Electrical installation and wiring inspection procedures or specifications were not identified by the QA manager, on the applicable Procedure Travelers for the following work with

the exception of procedure No. 412:

(1) Traveler No. 5001-55015-13, Revision 0, for Boston Edison Equipment Numbers C2228-A1 and -A2, C2229-B1 and -B2.

(2) Traveler No. 7013-55206-13, Revision 1, for Commonwealth Edison equipment numbers 2201-73A and -73B; 2202-73A (QC2) and 73B (QC2); 2202-73A (D2) and -73B (D2); and 2203-73A and 73B.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Violation (Report No. 82-01): Nutherm International (NI) failed to post 10 CFR Part 21, Section 206 of the Energy Reorganization Act of 1974, and adopted procedures, or an appropriate notice as required by Section 21.6 of 10 CFR Part 21.

   During the current NRC inspection, the inspector verified that NI is now in conformance with the posting requirements of 10 CFR Part 21.

2. (Closed) Nonconformance A-1 (Report No. 82-01): Nutherm failed to provide written instructions, procedures or drawings to control the assembly of heater elements.

   The NRC inspector verified that written procedure No. 618 was adopted on June 25, 1982 to control the mounting of heater elements and tightening of hardware. To prevent recurrence NI has entered this procedure into the procedure distribution control log.

3. (Closed) Nonconformance A-2 (Report No. 82-01): Nutherm failed to perform bending of Part No. 064 in accordance with fabrication drawing No. 7003-51054-23, dated 3-31-82.

   The NRC inspector verified that Drawing No. 7003-51054-23 was revised and approved on 6-25-82 to include inprocess fabrication steps which were not originally shown. To prevent recurrence, a meeting of Engineering, Purchasing and Quality Assurance was held on 7-5-82 to discuss the error and prevent it recurrence.

4. (Closed) Nonconformance A-3 (Report No. 82-01): Nutherm failed to perform wiring in accordance with Drawing No. 1023-51151-43, Revision 1.

   The NRC inspector verified that the subject drawing was revised on 6-29-82 to include the correct wire manufacturer. To prevent recurrence the QA Manager and Project Engineer reviewed the error and QA has increased efforts to tighten its review of drawings.

5. (Closed) Nonconformance B (Report No. 82-01): Nutherm failed to provide review and approval for release prior to use of the numerical control programs and tapes which describe activities affecting quality.

   The NRC inspector verified that programming sheets for Westinghouse CNC Producer (tape programming) are now being reviewed, approved and signed and dated by Engineering and Quality Assurance personnel. To prevent recurrence, this area of control of engineering documents is being included in the internal audit program.

6. (Closed) Nonconformance C-1 (Report No. 82-01): Nutherm failed to use the weld filler metal specified in the qualified procedure during welding of Part No. 064.

   The NRC inspector verified that the welders were given training in weld monitoring to correct the problem and QA performs monitoring of welding activities to preclude recurrence of the problem.

7. (Closed) Nonconformance C-2 (Report No. 82-01): Nutherm failed to use the weld wire feed rate of 170-205 inches per minute specified in the qualified procedure.

   The NRC inspector verified that electrode wire speed charts (Procedure No. 522) were developed and implemented on 7-3-82 for three welding machines dial settings to meet the welding procedure requirements. To prevent recurrence of the problem. QA periodically checks the wire speed at various dial settings and signs off on the back of the wire speed charts.

8. (Closed) Nonconformance D (Report No. 82-01): Nutherm personnel failed to note separate dispositions for all nonconforming parts on the Inspection Report - Quality Assurance record for a remote panel in Project No. A-1089.

The NRC inspector verified that the Inspection Report was modified to show three separate dispositions. To prevent recurrence the QA inspector was given training in the correct method of writing up a three part nonconformance.

9. (Closed) Nonconformance E (Report No. 82-01): Nutherm failed to prepare design drawings in accordance with customer requirements with regard to wire manufacturers.

   The NRC inspector verified that the affected drawings were the same drawings as in Nonconformance A-3 and they were revised to show wire furnished by Rockbestos. To prevent future occurrences of this kind, Nutherm will secure customer approval for any change from customer specification.

10. (Closed) Nonconformance F) (Report No. 82-01): Nutherm failed to include purchaser witness and hold points (welding and shop test) on Inspection Report Travelers for a Remote Control Panel and an Electric Air Handling Heater for Project No. A-1089.

    The NRC inspector verified that the customer witness and hold points had been waived by the customer and the final customer hold point was marked "NA" as the customer provides a completed and signed shipping release but will not sign Nutherm's inprocess travelers.

11. (Closed) Nonconformance G (Report No. 82-01): Nutherm failed to provide a written procedure to control the calibration of wire terminal crimping tools.

    The NRC inspector verified that both hand and bench mounted crimping tools have now been added to the Nutherm Calibration Frequency Procedure No. 507, Revision 4.

E. OTHER FINDINGS OR COMMENTS:

1. Potential Deficiencies in Elma Engineering Power Supply Units Furnished By Nutherm International to Pilgrim, Clinton and Browns Ferry Nuclear Power Plants

   (a) Introduction

   An inspection was performed at Nutherm International, Inc. (NI), located in Mount Vernon, Illinois, on October 22-25, 1984, as a result of deficiencies identified in Elma's Engineering (Elma) 24 V d.c. power supply (P.S.) units. These deficiencies

were reported at Vermont Yankee and Peach Bottom Nuclear Power Stations (NPP) in May and June 1982, respectively, and at Browns Ferry Units 1 and 2 in January 1984. NRC Headquarters personnel held telephone conversations with cognizant persons at both Elma and NI. These conversations provided inconsistent information with regard to the Elma P.S. units. NI, thereafter, submitted a letter to the NRC in which they identified deficiencies in the Elma Model No. 164C5261P004 P.S. units which they supplied to Browns Ferry, Clinton and Pilgrim NPPs. NI also identified deficiencies consisting of inadequate soldered joints and a leaking oil-filled capacitor, which they claimed to have found in an Elma P.S. unit procured as part of the order for Boston Edison/Pilgrim. In January 1984, the Tennessee Valley Authority (TVA) submitted a 10 CFR Part 21 report to the NRC. This report also identified similar deficiencies found in an Elma Model 164C5261P004 P.S. unit procurred on Contract No. 341119.

(b) Findings

The NRC inspectors performed an independent verification of information associated with the Elma P.S. units procurred by NI and furnished to Browns Ferry, Clinton and Pilgrim Nuclear Power Plants, by means of: Discussions with cognizant NI personnel and review of documents. This review provided the following information.

In June 1982, NI ordered 41 Elma Model 164C5261P004 P.S. units from Elma, of which thirty-two (32) were delivered to Browns Ferry Nuclear Power Plant, four (4) to Clinton Nuclear Power Plant and five (5) retained by NI for Equipment Qualification Testing. These units were reported to have been received by NI and 100% receipt inspected and functional tested. In July 1983, NI ordered ten (10) additional P.S. units of the same model to be used for the Boston Edison/Pilgrim Nuclear Power Plant and equipment qualification testing. These P.S. units were also reported by NI to have been 100% receipt inspected and functional tested by NI. However, the NRC inspectors found that NI had not maintained adequate records to assure that the units were 100% inspected on receipt and functional tested. The available records consisted of a copy of the two purchase orders with only initials, date and number of units noted. The NI QA Manager indicated the entries represented inspection and test records. The P.O. for ten (10) P.S. units had an attached nonconformance report, on which, the function test data for the ten (10) units was recorded. Prior to the time P.S. units were ordered for

Pilgrim, Boston Edison requested these units be equipped with 105°C capacitors in lieu of 85°C capacitors. NI ordered the P.S. units delivered from Elma with the higher temperature capacitors, but the units were shipped to NI with 85°C capacitors. The delivery to NI of the new capacitors was such that NI shipped the P.S. units to Pilgrim without installing them. These higher temperature capacitors were shipped at a later date. At this time NI indicated they disassembled one of the spare P.S. units in order to provide Boston Edison with a procedure for installing the higher temperature capacitors, and found inadequate soldered joints and a leaking oil filled capacitor. The separate dates of shipment of the eight P.S. units and the 16 105°C capacitors was verified by review of shipping invoices. NI then notified TVA, Boston Edison and American Air Filter/Clinton, of their findings and the potential for deficiencies in the P.S. units shipped to them by NI. These notifications were verified by the NRC inspectors.

The NRC inspectors then visually examined two Model 164C5261P004 Elma P.S. units and observed that one unit contained a leaking oil filled capacitor in a compartment on the bottom of the unit under a bolted on component mounting plate (CMP). Also, the soldered wiring connections, (solder joints) in this compartment of the P.S. units, appeared to be inadequately soldered. Subsequent discussions with NI personnel indicated that the CMPs were not removed to inspect the solder joints and oil filled capacitors during the receiving inspection of the 41 P.S. units ordered in June 1982. NI management personnel indicated that their 100% inspection policies did not include removing the CMP and inspecting the solder joint terminations under it.

Further discussions and review of the two P.O.s to Elma for the 51 P.S. units verified that NI had not imposed the requirements of Appendix B to 10 CFR 50 and 10 CFR Part 21. Review had established that the customer specifications for the Clinton and Pilgrim equipment did impose these requirements on NI subtier suppliers. In the case of the TVA specification, the reference imposing Appendix B and 10 CFR Part 21 to subtier suppliers was omitted, but TVA imposed the requirements of ANSI N45.2 and clearly noted that the equipment was for use in safety related systems.

Discussions were held with NI concerning the TVA 10 CFR Part 21 report issued in January 1984, concerning wiring deficiencies in an Elma P.S. unit delivered to Browns Ferry nuclear power plant by NI. This report identified the P.S. unit was furnished under Contract No. 341119. The NI representative indicated

this was not the number of any TVA contracts with NI. This item will be followed up on with TVA by the NRC inspector at a later date.

Based on the above information, three nonconformances were identified by the NRC inspectors. (See paragraph B of this report).

2. Nutherm's 10 CFR Part 21 Report Concerning Nicked Cables In Analog Trip Cabinets Furnished to Pilgrim, Dresden and Quad Cities Nuclear Power Plants

(a) Introduction:

On July 11 and 18, 1984, Nutherm International (NI) issued a 10 CFR Part 21 report to the NRC concerning nicks in the insulation of cable conductors in Analog Trip Cabinets delivered to Pilgrim Unit 1, Dresden Units 2 and 3 and Quad Cities Units 1 and 2. The defects were caused by poor workmanship at the NI factory in Mount Vernon, Illinois, during the jacket stripping of Rockbestos Firewall III single pair shielded cable.

On June 21, 1984, Boston Edison Company (BECo) notified NI of their finding of the defects. NI's QA Engineer performed a 100% inspection at Pilgrim and found 264 of 672 conductor ends contained nicks. All of the affected cables were replaced by BECo. NI then determined that other analog trip cabinets containing Rockbestos jacketed cables had been delivered to Quad Cities Units 1 and 2 and Dresden Units 2 and 3. On July 10, 1984 NI QA Engineer inspected 100% of the conductors in the Quad Cities cabinets and found five conductors with nicked insulation. These cables were replaced by Commonwealth Edison Company (CEco). On July 11, 1984, NI requested to inspect at Dresden but was unable to inspect until July 16, 1984. At that time the insulation on 20 conductor ends were found to contain nicks. The cables containing these affected conductors were replaced by CECo on July 16 and 17, 1984.

(b) Findings

By review of records and interviews with NI personnel, the NRC inspectors verified that the information supplied in the July 11 and 18, 1984 10 CFR Part 21 reports was accurate and complete in regard to the identified deficiency. The NRC inspectors also verified the adequacy of customer notifications.

To assess the cause of the deficiency, the NRC inspectors reviewed manufacturing procedures, records, conducted personnel interviews, observed selective NI processes and inspected deficient cable/conductor samples from Pilgrim Station.

The NI Procedure Travelers #7013-55206-13, dated 3/22/84, and 5001-55015-13, dated 6/18/83 were reviewed in conjunction with the NI "Practice Procedure Book" index. This was to determine if each specific procedure that was listed on the traveler could be combined to represent a complete process control without omitting any specific verifications within the manufacturing area.

QA records for each applicable unit were reviewed for verification of activities directly concerning conductor insulation and interna wiring inspections. No inspection records were in evidence to verify that internal wiring, including cable jacket stripping and conductor termination, were performed and installed according to specifications. However, it was indicated by the NI QA inspector that during the verification, per NI Procedure 412, "Point to Point Inspection," that many other internal wiring and termination inspection attributes are verified, but not documented, or delineated as requirements.

Since cable jacket removal was not being performed during the NRC inspection, a general overview which included crimping and internal wiring was conducted. One area of concern, which had previous NRC inspection findings, was wire lug crimping tools. The NRC inspector requested to see two AMP brand wire terminal lug crimpers, of the two, one had no unique identification number affixed and the other tool was identified but had no record of calibration. This area will be evaluated during a subsequent NRC inspection.

Samples of the nicked conductors, taken from the NI equipment at the subject nuclear station, were inspected by the NRC inspectors. The samples were cut off in a manner to preserve the area at which the jacket was removed to expose the insulated conductors. It was apparent that the insulation of the conductors was cut, and the cuts were uniformly visible on the conductor insulation, at the juncture where the conductors exit the jacket. The metallic shield, which is between the jacket inner surface and the insulated conductors, also showed evidence of being cut with a sharp instrument. In addition, other cuts

were visible on several of the conductors. These cuts were parallel to the axis of the conductor and were superficial.

Based on the above findings, three nonconformances were identified. (See paragraph B.4 of this report).

ORGANIZATION: PHOENIX STEEL CORPORATION
PHOENIXVILLE, PENNSYLVANIA

REPORT NO.: 99900878/84-01	INSPECTION DATE(S): 8/27-31/84	INSPECTION ON-SITE HOURS: 74

CORRESPONDENCE ADDRESS: Phoenix Steel Corporation
Tubular Products Division
121 Bridge Street
Phoenixville, Pennsylvania 19460

ORGANIZATIONAL CONTACT: Mr. Thomas Stoner, QA Manager
TELEPHONE NUMBER: (215) 935-5400

PRINCIPAL PRODUCT: Seamless Alloy and Carbon Steel Pipe.

NUCLEAR INDUSTRY ACTIVITY: Approximately 1% of pipe sold is nuclear grade.

ASSIGNED INSPECTOR: E T Baker — 12/17/84
E. T. Baker, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): T. F. Burns, BNL

APPROVED BY: E W Merschoff — 12/17/84
E. W. Merschoff, Chief, RIS, VPB — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21, NCA-3800, ASTM-106, 333, 335, and 530.

B. SCOPE: This inspection was made to verify Phoenix Steel Corporation's Quality Assurance Program with respect to its activities as a manufacturer of seamless pipe for use in the nuclear industry. It included verification of Phoenix's compliance with the quality assurance provisions contained in Subarticle NCA-3800 of Section III of the ASME Boiler and Pressure Vessel Code, ASTM Standards, contractural requirements, and 10 CFR Part 21.

PLANT SITE APPLICABILITY: Various.

A. VIOLATIONS:

1. Contrary to Section 21.6 of 10 CFR Part 21, Phoenix Steel Corporation (Phoenix) failed to post Section 206 of the Energy Reorganization Act of 1974.

2. Contrary to Section 21.21 of 10 CFR Part 21, Phoenix failed to evaluate or report to their customers, seamless pipe which did not meet the minimum wall thickness requirements.

B. NONCONFORMANCES:

1. Contrary to Subparagraph NCA-3864.2 and Quality Control Procedure (QCP) NDT-PQC-1, vision examinations for nondestructive test personnel were not being conducted semi-annually as required.

2. Contrary to Subparagraph NCA-3867.1 and Section 11 of SA-530, Phoenix's method of inspecting pipe wall thickness does not assure that the minimum wall thickness at any point is not more than 12.5% under the nominal wall thickness specified.

3. Contrary to Subparagraph NCA-3867.3, Phoenix's procedures for controlling nonconforming material do not adequately address the marking of nonconforming material or the re-marking of material when it is reclassified, nor have the procedures for controlling nonconforming material been adequately maintained.

4. Contrary to subparagraph NCA-3868.1, QCP NDT-UT1, QCP PXPGQC-1, QCP PXIN-2, and MPS PXTT-1, Phoenix failed to calibrate measuring and test equipment in accordance with established requirements.

5. Contrary to subparagraph NCA-3869.2 and paragraphs 12.2.3 and 13.2 of the Quality Assurance Manual (QAM), Phoenix failed to identify and document conditions adverse to established quality levels; the cause of such conditions; the corrective actions taken on such conditions, including actions to prevent future occurrence. Phoenix also failed to inform management of conditions adverse to established quality levels within the required time period.

C. UNRESOLVED ITEMS:

NCA-3820(c) states: "Except as provided in NCA-3867.4(e) and NCA-3867.4(f), any party performing and certifying to an operation, process, or to the results of tests, examinations, repairs, or treatments required by the material specification or by this Section shall have

a Quality System Program which shall cover the operations, processes,or services performed. This Quality System Program shall be surveyed, qualified, and audited by the Material Manufacturer ... who directly receives the certification of work performed (NCA-3861), except when the party holds a Quality System Certificate (Materials) which covers those operations."

Phoenix purchases ingots from Birdsboro Corporation (Birdsboro) a steel foundry, based on material chemistry only. Purchase orders issued by Phoenix did not impose NCA-3800 on Birdsboro, but did state that the material was to be produced under Birdsboro's QA program. Phoenix had audited Birdsboro to Birdsboro's QA program, but not to NCA-3800, and had approved Birdsboro as a supplier. During a future inspection Birdsboro's QA program should be reviewed to assure that the operations, processes, and services performed are adequately covered.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

This was the first inspection at the Phoenix Steel Corporation, Tube Division, Phoenixville, Pennsylvania.

E. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 21 Procedures and Implementation

a. The inspectors reviewed Part 21 procedures and other related procedures, e.g., Claims Procedure, Nonconforming Material Control, and Corrective Action. The procedures do not require that deviations noted in nonconformance or claims reports be evaluated for Part 21 implications, no person is designated as being responsible for evaluating deviations or notifying customers of deviations affecting their basic components (piping), nor do the procedures require that customers or the NRC be notified of basic components which contain deviations or defects. While the inspection was being performed, a revised Part 21 procedure was prepared which appeared to meet the requirements of Part 21. Implementation of the procedure should be checked during a future inspection.

b. Implementation of Part 21 requirements was checked by reviewing action taken by Phoenix on ten nonconformance/ claims reports from Guyon Alloys, Inc. for piping which did not meet minimum wall thickness requirements. The claims were against orders for nuclear grade piping, i.e., piping required to be produced under a quality system which meets

the requirements of Article NCA-3800 of the ASME Boiler and Pressure Vessel Code.

No evaluations were conducted to determine what might have caused the deviations, what other customers were affected, or what the safety significance of the deviations could be. Phoenix's sole response was to provide new material, which to the best of their knowledge met all the requirements of the material specification.

Violation A.2 addresses this area.

2. Organization

Phoenix Steel Corporation had just undergone a major reorganization and neither a new organization chart nor a description of duties, responsibilities, and reporting requirements were available. This area should be checked during the next inspection.

3. NDT Personnel Qualification and Certification

This activity at Phoenix is governed by QCP, NDT-PQC-1, "NDT Personnel Qualification and Certification." This document was reviewed for compliance with the recommended practice of SNT-TC-1A (American Society for NonDestructive Testing) and was found to meet or exceed the recommended requirements. Although SNT-TC-1A recommends an annual vision test for non-destructive test personnel, Phoenix had established a requirement that a vision test be administered on a semi-annual schedule. However, Phoenix then failed to adhere to this requirement for its personnel (and contracted inspectors) and only performed the vision examination annually. The personnel involved were:

Employee No.	Level	Method
#3511	I	UT
#3630	II	UT
#3630	I	LP
Alicia Employee	III (Examiner)	LP, MP, RT, UT

Since the minimum requirements of SNT-TC-1A had been met, this nonconformance would not have had an adverse effect on the pipe inspected and accepted by these personnel.

The qualifications of the Level III Examiner were reviewed and

found to be in compliance with the recommended practice in SNT-TC-1A. All qualifications of this inspector were current and, the proper delegation had been made by the Phoenix Quality Assurance Manager (since this is a sub-contract at Phoenix).

Nonconformance B.1 addresses this area.

4. Pipe Wall Thickness Tests

An examination was conducted of several pieces of completed pipe to determine what variation in pipe wall thickness would be found over the length of a pipe. All material tested was ASTM A 106 Grade B or API (15# mod.). The BNL technical specialist utilized a Nova 201 with Transducer C-1 ultrasonic thickness gage meter using a straight beam technique with calibration being performed before and after each pipe length was tested. Calibration was also performed when questionable readings were obtained.

Surfaces were prepared by lightly sanding with a medium grit sandpaper or filing lightly where lacquer or oxide was especially heavy. Wall thickness readings were taken at approximately two foot intervals with further exploration in areas where unusually low readings were obtained. Wall thickness results were as follows (in inches):

Pipe 1		Pipe 2		Pipe 3		Pipe 4	
Nominal .844 Minimum .739	Deviation From Nominal	.500 .437	Deviation From Nominal	.406 .355	Deviation From Nominal	.594 .520	Deviation From Nominal
.867	+.023	.473	- .027[1]	.425	+ .019	.568	- .026
.868	+.024	.484	- .016	.419	+ .013	.580	- .014
.836	-.008	.492	- .008	.397	- .009	.558	- .036
.829	-.015	.506	+ .006	.410	+ .004	.600	+ .006
.825	-.019	.499	- .001	.386	- .020	.551	- .043
.798	-.046	.489	- .011	.392	- .014	.601	+ .007
.830	-.014	.439	- .061[2]	.392	- .014	.563	- .031
.768	-.076	.461	- .039			.580	- .014
		.468	- .032				
Over Nominal (max)	+.024		+.006		+.004		+.007
Under Nominal (max)	-.076		-.061		-.019		-.036
Total Spread	.100		.067		.023		.043
Percent Below Nominal	9%		12.2%		4.7%		6.1%

Note 1: A ground spot was observed in the location of this reading. This spot was tested and revealed a wall thickness of 0.451. The grinding is presumed to be the result of surface imperfection removal.

Note 2: Additional testing (circumferentially) in this area revealed it was a localized "low" spot. Readings, taken at approximately 1/2" intervals on each side were, .448, .457, .451 and .486. These readings were verified by Phoenix personnel utilizing their ultrasonic equipment.

The results of the pipe wall examination revealed a substantial variation in wall thickness along a normal pipe length (20 to 35 feet). Also, it was noted that the deviation from nominal wall thickness was predominantly below nominal and, in some cases, approaching the minimum wall required. The specification requirements (ASTM A106) permit a variation in wall thickness of "not more than 12.5 percent under the nominal wall thickness specified." Although no readings were found to be below minimum wall, certain pipe (#1 and 2) could be brought to below minimum wall as a result of even minor surface preparation by the producer or user.

Discussion with Phoenix personnel revealed that it was their impression (as supported by "weight" data and wall thickness checks on pipe ends) that their pipe was actually being shipped on the "heavy" side rather than at nominal or below. This is entirely possible since wall thickness measurements for final acceptance are taken on pipe ends (only) using a mechanical "thickness caliper." This practice presumes a uniformity of manufacturing and process control that does not appear to exist. Using the worst case from the table, 12.2% below nominal, if the pipe just met the minimum wall thickness requirements when measured at both ends, there is the possibility that the pipe could be 12.2% below minimum in the middle and still be considered acceptable and shipped as such.

Nonconformance B.2 addresses this area.

5. Control of Nonconforming Material

Phoenix's procedures for controlling nonconforming material were reviewed. A major revision of the procedures covering this area is needed because of changes in the manufacturing process, inaccurate references, inadequate instructions and conflicting

requirements between procedures covering this area. Examples of the problems identified are:

a. Neither the QAM nor the company procedures address what method of identification or marking material is to be used to identify material as "scrap," "rework," "referred," "hold," or "stock."

b. Paragraph 2.2 of PXAP-4 states that the Inspection Foreman can reclassify or reject all material not suitable for customer referral. However, there is no statement which gives the categories into which nonconforming material can be reclassified and there are no instructions as to how the markings on the material are to be changed from "HOLD" status when the material is reclassified.

c. Paragraph 5.1 of PXAP-4 states that upon receipt of disposition from the customer, the disposition is noted on the weight ticket. If referred material is not accepted the material must be reclassified to an appropriate grade or as non-standard pipe. Paragraph 6.0 of PXAP-4 states that the Production Control Expeditor arranges for rescheduling, stocking, or scrapping of the material according to instructions on the weight ticket. No instructions are given as to how markings on the material are to be changed from "HOLD" status to be consistent with the disposition instructions on the weight ticket.

d. Paragraph 1.2.3 of PXGQC-4 states that all ingots melted by a vendor must meet the visual requirements of PXGQC-3. PXGQC-3 is the Barrel Furnace Survey Procedure and does not contain visual acceptance criteria for ingots.

e. Paragraph 1.2.3 of PXGQC-4 also states that any ingot not meeting the requirements of PXGQC shall be referred to Phoenix Steel's Open Hearth Metallurgist. Since the open hearth furnaces were shut down in 1982, Phoenix has not had an open hearth metallurgist.

f. Paragraphs 2.1.4 and 2.1.5 of PXGQC-4 conflict with each other. Paragraph 2.1.4 states that material which cannot be reworked or stocked shall be referred to the inspection foreman. Paragraph 2.1.5 states that the inspection foreman will determine if the material can be reworked, stocked, or scrapped.

6. Qualification and Certification of UT Equipment

This activity at Phoenix is governed by requirements established in QCP, NDT-UT1, "Qualification and Certification of Ultrasonic Equipment." The procedure provides the minimum requirements for basic ultrasonic instrument qualifications. The procedure was reviewed for technical adequacy and found to be acceptable. A review of the actual Phoenix practices did reveal that adherence to the qualification test schedule was deficient with some instruments not tested for extended periods of time.

The following "T" (Thickness) gage UT equipment had not been qualified for various periods which exceeded the six month requirement:

Meter	Date Last Performed	Next Due Date	Date Performed	Lapse (mo.)
NOVA 201D-#338	11/18/80	5/18/81	6/4/81	1/2
(This instrument was noted as "stolen" on or about July 1981 in memo to file)				
AUTM 110 TG-#4337	9/8/83	2/8/84	2/9/84	-
(This instrument was stated to have been "stolen" but, no memo to file or documentation was available)				
Sonic 502-#03146E	12/4/81	6/4/82	6/17/83	27
Krautkramer TG-#70021	11/18/80	5/18/81	2/10/83	21

The following flaw detection UT equipment had not been qualified for the noted periods which exceeded the three month requirement:

Meter	Date Performed	Due Date	Date Done	Lapse (mo.)
Sonic MK IV-#760710	4/14/82	7/14/82	2/10/83	10
	3/12/81	6/12/81	7/14/81	4
Sperry 721-#3176-8	8/6/82	11/6/82	2/10/83	6
	1/14/81	4/14/82	5/6/82	4
	3/12/81	6/12/81	10/14/81	7

Nonconformance B.4 addresses this area.

7. Calibration Responsibility, Frequency, and Records

Product quality at Phoenix is in large part due to effective process control. These processes are verified as being within specification by the use of various tools, gauges, and instruments and a comprehensive calibration program. Also, these items are utilized to determine if final acceptance criteria are met.

During a review of this activity, numerous discrepancies were discovered wherein prescribed calibrations were not performed or were performed at periods which exceeded (by substantial amounts) the established frequency requirements.

The failure to calibrate or to adhere to the established calibration frequency as noted in Nonconformance B.4 can result in erroneous or misleading results and a possible lessening of product quality levels as follows:

a. The extension stamp is the device used to mark the "gage length" on material samples (tensile test bars) prior to destructive testing. An error in this control dimension will result in an error in computing and reporting certain physical properties determined by the test. Although the requirement to calibrate this device had been in QCP, PXGQC-1, Rev. 1 (8/22/83) since at least the date of Rev. 1, this calibration had never been performed and, personnel responsible for accomplishment of this test were unaware of the requirement.

b. Process control (and confidence in that control) is essential in the production of low carbon and alloy tubular products at Phoenix. The failure to perform the calibration of various temperature measuring instruments (and the calibration device) at the established frequency increases the risk of loss of process control.

The potentiometers used for these calibrations had greatly exceeded the established frequency for their calibration as follows:

- Biddle, 72-310-02, SN 48599 was to be calibrated annually. Calibration dates were:

11/8/79 to 5/21/81 18 month span (was due 11/8/80)
5/21/81 to 3/11/83 22 month span (was due 5/21/82)
3/11/83 to 7/17/84 16 month span (was due 3/11/84)

- Biddle, 72-310-02, SN 48598 was to be calibrated annually. Calibration dates were:

3/12/80 to 8/28/81 17 month span (was due 3/12/81)
8/28/81 to 1/8/82
1/8/82 to 6/1/83 17 month span (was due 1/8/83)

- Fluke Mfg., 8024B, SN 2865590 had been calibrated on 2/2/82 but no identifying sticker had been affixed and, the instrument had not been recalibrated to date (over 2 years having lapsed). The instrument would have been due 2/2/83.

- Transmation Model 1040, SN 104001581SP had no calibration sticker attached and no supporting documentation could be located to indicate it had ever been calibrated (even when supplied by the manufacturer).

Phoenix personnel stated that only the "Biddle" instruments were used to perform calibration of the temperature controlling and measuring instrumentation, however, there were no controls to assure that the Fluke or Transmation instruments could not be used to calibrate or verify the production instrumentation.

- Calibration of temperature controlling instrumentation had not been performed for December 1983, September 1982, June or July 1982 (due to plant shutdown) and January 1982. Usually, a "note to file" was placed in the record to provide an explanation for the failure to perform the required calibrations but, they were found to be lacking in substance as:

Dec. 1983 - note reads "will do as soon as possible."
Sept. 1982 - note reads "equipment and instrument tech was on line one week during that period."
Jan. 1982 - note reads "not done - delay due to tunnel furnace modification and startup."

Nonconformance B.4 addresses this area.

8. Calibration of Working Standards

The working standards are 2" x 1" x 1/2" reference blocks used to calibrate the "wall thickness caliper gages." The caliper gage is used on a daily basis for final inspection of pipe wall thickness. This thickness would be an accept/reject criteria.

It appears this nonconformance resulted when conflicting frequency requirements for the test were established in two different but related documents. The calibration procedure (PXTT-1, Rev. 2) establishes the frequency to be "monthly" while the calibration responsibility frequency and maintenance of records procedure (PSGQC-1) establishes (Table 1) the frequency to be "annually."

Nonconformance B.4 addresses this area.

9. Calibration of Wall Thickness Caliper Gage

The wall thickness caliper gage is a hand held mechanical device used to measure pipe wall thickness. The device can be used to measure the wall thickness only on the pipe end(s). This calibration effort is governed by QCP, PXIN-2 at Phoenix and is a vital test since this gage is used for final determination (accept/reject) of pipe wall thickness. The accuracy and reliability of this tool is of such importance that calibration is required twice each shift (as a minimum) and more often if any significant wall thickness change occurs on the material to be inspected.

The Final Inspection/Production report is used to record the accomplishment of this activity but, for some unexplained reason, the space provided for these entries on this form was deleted when the form was revised in August 1982. Consequently, no objective evidence was available to verify that the calibration had been performed as specified since that date.

Nonconformance B.4 addresses this area.

10. Quality Control Procedures

There were numerous procedures referenced in Phoenix documents which had never been developed or issued. This was due to the anticipated procurement of a specific item or piece of equipment, typographical error or, intentions to eventually develop these procedures. The following examples are found in PXGQC-1, Table I, II, and III:

a. PXMT-4 is referenced as the procedure to be used for the calibration of the "elongation stamp." It was discovered no such procedure had ever been developed.

b PXTT-4 is referenced as the procedure to be used for the calibration of the Digital II Vernier Caliper. This device was never procured and consequently the procedure was never developed (but is still referenced in PXGQC-1).

c. NDT-15 is referenced in two places as the procedure to be used for calibration of ultrasonic thickness gage and flaw detection equipment. There is no procedure identified as NDT-15. It appears this should be NDT-UT-1.

d. PXTT-3 is referenced as the calibration procedure to be used to calibrate the pipe Go-No-Go outside diameter gages. This procedure is, however, a "flattening procedure."

Nonconformance B.4 addresses this area.

11. Color Code Program for Go-No-Go Gages

A color code program has been established to identify the Go-No-Go gages used for the dimensional test of pipe outside diameter. This color code identifies those gages to be used for nuclear material and consequently also identifies a greater frequency of calibration for these gages (black-monthly calibration, blue, red and green-annually).

It was noted that the paint had worn off several gages such that it was very difficult to determine what the gage classification was (black-nuclear, blue, red and green-non nuclear). One "black" gage was found to be badly damaged (missing a complete "foot") and another was found to be out of calibration (monthly requirement for nuclear) but, further investigation revealed that both gages were non-nuclear and, the color code had simply worn off. Phoenix removed both gages from the production floor for repair and re-coating.

A total of twelve nuclear grade gages were examined for status of calibration and general conditions. They were found to be satisfactory.

Nonconformance B.4 addresses this area.

12. Corrective Action

Corrective Action procedures and their implementation were inspected. Several procedural inadequacies and implementation problems were found. Examples of these are:

a. Neither the QAM nor the company procedures require that the cause of conditions adverse to quality be determined or corrected when Phoenix is notified of an adverse condition by way of a customer claim.

b. Paragraph 13.1 of the QAM allows the Chief Metallurgist to assign and handle corrective action informally.

c. A review of the monthly quality reports shows that during 1984 the reports were not being prepared monthly, but in some instances were being prepared quarterly. In addition the reports for 1984 did not contain the status of QA internal audits and customer audits, statistical analysis of claims or the summary of progress for corrective action assignments.

13. Plant Tour

A tour of the Phoenix facilities (at Phoenixville) was conducted to evaluate the technical adequacy of activities being performed. Unfortunately, major maintenance efforts were underway and for the most part, the plant was idle at this time. Activities which were observed were: pipe straightening, incoming material identification, heat treating, pipe cutting, pipe coating and surface grinding (removal of surface imperfections). No discrepant practices were identified.

ORGANIZATION: PYROTRONICS
CEDAR KNOLLS, NEW JERSEY

REPORT NO.: 99900883/84-01	INSPECTION DATE(S) 10/15-19/84	INSPECTION ON-SITE HOURS: 60

CORRESPONDENCE ADDRESS: Pyrotronics
ATTN: Mr. Robert Byrnes
Vice President, Manufacturing
8 Ridgedale Avenue
Cedar Knolls, New Jersey 07927

ORGANIZATION CONTACT: Mr. Harry M. Lee, Acting Quality Assurance Manager
TELEPHONE NUMBER: (201) 267-1300

PRINCIPAL PRODUCT: Fire Detection, Halon Extinquishing, Voice Evacuation, Intrusion and Monitoring Systems.

NUCLEAR INDUSTRY ACTIVITY: Less than 2 percent of total sales.

ASSIGNED INSPECTOR: J. T. Conway — 12-4-84
J. T. Conway, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): K. Naidu, RIS

APPROVED BY: E. T. Baker for — 12/5/84
E. W. Merschoff, Chief, RIS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21

B. SCOPE: This inspection was made as a result of the receipt of an allegation pertaining to the fabrication of faulty fire detection equipment for nuclear facilities. In addition, the inspection included an evaluation of QA program implementation with respect to training/qualifications, document control, control of purchased material and services, inspection, calibration of measuring and test equipment (M&TE), QA records, audits, and reporting of defects.

PLANT SITE APPLICABILITY: Not identified during the inspection.

A. VIOLATION:

1. Contrary to Section 21.6 and 21.21 of 10 CFR Part 21:

   a. Current copies of 10 CFR Part 21 and Section 206 of the Energy Reorganization Act of 1974 were not posted in a conspicuous area.

   b. Appropriate procedures to evaluate deviations or inform the licensee or purchaser of the deviation did not exist.

2. Contrary to Section 21.31 of 10 CFR Part 21, a review of procurement/documentation packages revealed that four customer purchase orders (PO) (2-Illinois Power Company, 2-Johnson Controls) specified 10 CFR Part 21 as an applicable requirement, but 14 Pyrotronic POs to vendors of electronic components (10) and calibration services (4) did not similarly specify that 10 CFR Part 21 would apply.

B. NONCONFORMANCES:

None

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. Allegation - In July 1984, an allegation was received pertaining to the manufacture of faulty fire detection equipment due to a poor QA program. No specific concerns or areas in the QA program were identified. Since the fire detection equipment supplied by Pyrotronics is not classified as safety-related, a QA program meeting the requirements of Appendix B to 10 CFR Part 50 was not imposed upon Pyrotronics by their nuclear customers. Accordingly, the inspector evaluated implementation of the QA program in a number of areas as documented in the QA Manual (QAM) and QA workmanship standards. Specific areas that were reviewed included training, document control, control of purchased material and services, calibration of M&TE, inspection/testing, records, and audits. As noted in the following findings, implementation of certain activities was not fully effective. However, based upon other positive aspects noted in the QA program, including extensive inspection and testing activities, the inspector could not substantiate the existence of a "poor QA program" as alleged.

2. QA Progam - A detailed review of documentation (e.g., QAM, procedures, workmanship standards, POs, certifications, audit reports) and a tour of the facilities led to the following observations:

a. Indoctrination/training program is deficient as noted by an absence of records to demonstrate that: personnel received adequate and proper training including certification of inspection and test personnel by the department supervisor; eye exams were given to inspection and calibration personnel; and QA/QC, engineering, manufacturing, and marketing personnel were indoctrinated in the QA program.

b. There was no requirement for management (above or outside the QA organization) to regularly assess the scope, status, and compliance of the QA program.

c. The organizational positions with stop-work authority were not identified.

d. A document control system was not in place to identify the current revisions of documents and to assure that obsolete/superseded documents at work stations are removed and replaced by applicable revisions.

e. There was no procedure/instruction for completing the "Pyrotronics Move Order" form which is used for transferring items from one manufacturing step to the next.

f. Pyrotronics was unable to retrieve inspection and test records for POs 295090, 106394, and 103119 even though the Certificate of Compliance for the applicable item(s) states "Inspection and Test Records are on file and available for audit at our facility."

g. QA personnel review and approve only those POs which are originated by the QA department.

h. Inadequate segregation of acceptable smoke detectors from rejected smoke detectors in the storage vault for items containing radioactive material.

3. Reporting of Defects - The implementation of the reporting of defects and noncompliances and compliance with the posting and procedural requirements of 10 CFR Part 21 were assessed by inspecting the shop fabrication area and reviewing POs to suppliers. Violations A.1 and A.2 were identified in this area of the inspection.

4. Control of Purchased Material & Services - The inspector reviewed the applicable Sections of the QAM; 10 POs to material suppliers, and 3 POs to calibration service vendors to assure that applicable

technical and QA program requirements are included or referenced in POs and that material was purchased from qualified vendors. There was no documented evidence of an approved vendors list or that quality requirements were imposed upon suppliers. Pyrotronics did not require a QA program or perform preaward evaluations and postaward audits of the following vendors: Instrument Controls, Schneider Instruments, and Hosica Labs (calibration services); Microtronics, Centerline Circuits, and DVH Corporation (printed circuit boards); Jaco Electronics (capacitor); R. Ohm and Schweber Electronics (resistor); R. McKeown (solder); and Princeton Circuit Supplier (flux).

5. Plant Tour - The inspector toured Pyrotronic's manufacturing facilties at various times during the inspection in the company of Pyrotronic personnel. The manufacturing area consists of the following departments; Receiving, Sound System, Audio Insertion, Component Preparation, Detector, Wave Solder, Visual Inspection, Automatic Test Equipment, System III, and Packaging. Activities witnessed in these departments included: incoming inspection, manual and machine insertion of electrical components on printed circuit boards (PCB); automatic wire cutting and stripping, automatic wire soldering and cleaning system, preparation of radioactive detectors, in process inspection, testing of assembled PCBs, installation of PCBs into modules, installation of modules into control panels, final inspection and packaging of completed items.

6. Calibration of M&TE - The inspector reviewed the applicable sections of the QAM, two procedures, records for 25 M&TE (6-electrical and 19-mechanical) calibrated by Pyrotronics and 22 certification for reference standards calibrated by outside vendors (12-Hosica Labs for electrical equipment, 8-Schneider Instruments for gages, and 2-Industrial Controls for air velocity instruments). 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.

   In the Recieving Department, it was noted that a gage block set (S/N 791733) used to calibrate mechanical equipment did not contain a certificate of calibration. A calibration sticker on the box showed a date of June 1984, but the inspector was told this date referred only to a visual examination of the gage blocks. In addition, a metric gage block set (S/N 133) was in the same department with a certificate of calibration dated November 1981, which was not traceable to the National Bureau of Standards. It also contained a calibration sticker dated October 4, 1984 which indicated only a visual examination.

7. Inspection/Testing - The inspector reviewed the applicable sections of the QAM, one procedure, QA workmanship standards and inspection and test stations to assure that an effective inspection and test

program has been established. Inspection in the receiving department is performed on electrical components and plastic and sheet metal products. Sampling is in accordance with MIL-STD-105 and the inspection is documented on a vendor history card. Unacceptable material is segregated from acceptable material which is sent to stock. Traceability is maintained on the PCBs but not on the other electrical components.

QA workmanship standards are used at the inspection stations. These stations in the manufacturing area include inprocess visual inspections at: assembly lines, detector manufacturing, and the end of the automatic cleaning system; final visual of assembled PCBs; and final electrical inspection of power supplier, modules, and control panels. In addition, each assembled PCB is tested on the Gen-Rad 2270 In-Circuit/Functional Test System. During inspection and testing, reports are generated identifying nonconformances. A Material Review Board consisting of individuals from Design Engineering, Manufacturing, QA, and Purchasing evaluates the report and dispositions the nonconforming item(s).

8. Limited Shelf-life Components - The inspectors verified that the control of limited shelf-life components (e.g., battery, rubber gasket, potting and Lock-Tite components) was acceptable. Batteries are installed in smoke detectors, and there are provisions to test the detectors to verify the functional life of the battery. Potting compounds are prepared in batches periodically and are used in smoke detector assemblies to hold electronic devices in place. The inspector observed samples of the potting compound being routinely tested at specific intervals after being cured.

   Rubber gaskets and Lock-Tite compound are used to seal valves on Halon gas cylinders which serve to quench fires. A cognizant individual informed the NRC inspector that the seals and the integrity of the Lock-Tite compound are routinely tested. Pyrotronics provides a PYR-A-LON 1301 Field Charging Manual to their customers which outlines the test procedures.

9. Audits - The QA Manager prepared a matrix listing twenty-three activities and the audit frequency (daily, weekly or monthly). The results of the audits are documented on the QA audit schedule and are forwarded to management. Written procedures were available for audits of: static discharge control, calibration, engineering change requests, lot control traceability, inspection stamps, flux control, wave solder equipment, detector/clean room radiation protection, and halon stock transfer.

10. Cerificate of Compliance (CofC) - The inspector reviewed 38 CofCs (13 dated 1984 to 6 licensees and 4 suppliers; 10 dated 1983 to 4 licensees, one architect/engineer (A/E) and 3 suppliers; and 15 dated 1982 to 4 licensees, 2 A/Es and 3 suppliers) which accompanied fire detection units that were ordered for nuclear power plants. The CofCs were not specific in that they certified that the material shipped on a particular Pyrotronic order number and against the customer's PO number was manufactured in compli rce with Pyrotronic's QA program. The specific identity, revision and date of the QA program was not given, and the serial numbers of the individual units were not listed. The inspection code numbers that are stamped on the individual units and provide traceability were also missing from the CofC.

11. Customer File - The inspector reviewed the documentation for 11 customers (6-licensees, 3-A/E, and 2-suppliers) contained in the "Customer File." It was noted that Grinnell Fire Protection Systems and Florida Power and Light had conducted audits of Pyrotronics in June 1982 and December 1981, respectively and Northeast Utilities filled out a supplier evaluation report in August 1978. For Texas Utilities, Mississippi Power and Light, and Johnson Controls, Pyrotronics filled out a questionnaire or survey form in May 1978, May 1981 and May 1982, respectively, and returned the form to the customer. There were no records to show that customer audits or self-audits by Pyrotronics were conducted for American Electric Power, Georgia Power, Baldwin Associates, Brown & Root, and Daniel International.

ORGANIZATION: THE ROCKBESTOS COMPANY
A MEMBER OF THE MARMON GROUP
NEW HAVEN, CONNECTICUT

REPORT NO.: 99900277/84-02	INSPECTION DATE(S): 8/20-24/84	INSPECTION ON-SITE HOURS: 36

CORRESPONDENCE ADDRESS: The Rockbestos Company
A Member of the Marmon Group
ATTN: Mr. George A. Jones - General Manager
285 Nicoll Avenue
New Haven, Connecticut 06511

ORGANIZATIONAL CONTACT: Mr. George C. Littlehales
TELEPHONE NUMBER: (203) 772-2250

PRINCIPAL PRODUCT: Electrical Wire and Cable Manufacturer.

NUCLEAR INDUSTRY ACTIVITY: Commercial nuclear production of The Rockbestos Company's East Granby facility is 25% of the total production.

ASSIGNED INSPECTOR: _____ 10/9/84
FOR J. J. Petrosino, Reactive Inspection Section Date

OTHER INSPECTOR(S): E. W. Merschoff, Reactive Inspection Section

APPROVED BY: _____ 10/9/84
E. W. Merschoff, Chief, Reactive Inspection Section Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: This inspection was conducted as a result of the receipt of allegations pertaining to personnel performing production tasks for which they were not certified. Additionally, corrective actions for previous inspection findings were reviewed to determine if compliance was achieved and has been maintained.

PLANT SITE APPLICABILITY:

Docket Nos. 50-247, 50-220, 50-312, 50-498, 50-499.

ORGANIZATION: THE ROCKBESTOS COMPANY
A MEMBER OF THE MARMON GROUP
NEW HAVEN, CONNECTICUT

REPORT NO.: 99900277/84-02	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

None.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 4 and 5 of the Rockbestos Company's Quality Procedure Q-10A, dated 4/24/84, traceability could not be demonstrated for a reel of single conductor insulated wire, (Shop order 90205-01). The reels of cable which utilized the above mentioned wire for inclusion as one conductor of a two conductor cable are: 4A-536/D34964, 4A-845/D34964B, and 4A-846/D34964A.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 13 of the Rockbestos Company's Quality Manual for tool and gage control, six timer units used for rework processes and one unit used for hot modulus testing had not been calibrated as required.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (82-02, Item A.1): Lack of instructions on a test data sheet for customer requirements.

   The NRC inspector verified the corrective actions by review of the customer requirement change document, Stone and Webster Engineering and Design Coordination Report (E&DCR) number P-4552. Responses and corrective actions were found to be acceptable.

2. (Closed) Nonconformance (82-02, Item H.2): Inadequate assurance that production test requirements had been satisfied.

   The NRC inspector verified that test results and requirements had been satisfied on the customer's E&DCR number P-4552 and on the Rockbestos Company's laboratory oxygen index report, dated 11/29/82.

3. (Open) Unresolved Item (82-02, Item C.2): Brazing of conductors in the conductor stranding area without the required inspections and procedures.

The NRC inspector reviewed ASTM standards applicable to the joining of conductors and observed the brazing process being conducted, and found corrective actions to be incomplete. Verification of corrective action per ASTM requirements will be performed on a subsequent inspection.

4. (Closed) Unresolved Item (82-02, Item C.3): Validity of performing electrical retests.

   The NRC inspector verified the validity of the applicable portion of the Rockbestos Company's production retest program by review of their retest procedure, dated 4/5/84 and the applicable requirements.

5. (Open) Nonconformances (83-04, Item B.1 and B.2): (B.1) Rockbestos had not maintained sufficient records to furnish evidence that activities affecting quality were maintained, (B.2) Rockbestos did not evaluate or document the evaluation of four cable failures.

   The NRC inspector took no verification action relative to these nonconformances.

6. (Open) Unresolved Item (83-04, Item C): Multiple conductor qualification testing.

   The NRC inspector took no verification action relative to this unresolved item.

7. (Open) Nonconformances (83-03, Items B.1, B.2, B.3, B.4, and B.5): (B.1) lack of calibration stickers on irradiation units; (B.2) lack of evidence of test data sheet review; (B.3) lack of evidence of elongation requirement revision; (B.4) lack of evidence of review and approval of Quality Control instructions; and (B.5) lack of records to substantiate thermocouple monitoring performance.

   The NRC inspector took no verification actions relative to these nonconformances.

8. (Open) Unresolved Item (83-03, Item C): Apparent lack of requirements for control of in-process test calculations.

   The NRC inspector took no verification action relative to this unresolved item.

9. (Open) Nonconformances (83-02, Item B.1 and B.2): (B.1) failure to establish and implement an adequate QA program for its safety related equipment qualification testing program; and (B.2) lack of evidence of equipment qualification activity record maintainence.

   The NRC inspector took no verification actions relative to these nonconformances.

10. (Open) Nonconformances (83-01, Items A.2, A.4.1, and A.4.2): (A.2) Inadequate test instrumentation for LOCA parameters; (A.4.1) inadequate documentation for PH level verification; (A.4.2) lack of documents to verify continuous energized condition of cables.

    The NRC inspector took no verification actions relative to these nonconformances.

E. OTHER FINDINGS OR COMMENTS:

1. Allegation Concerning Uncertified Personnel:

   This inspection was conducted in response to allegations which were received by the Nuclear Regulatory Commission by telephone on 4/3/84 and subsequently in person, on August 20, 1984. The allegation pertains to activities which may have been performed during the time period that The Rockbestos Company's (RC) production work forces were on strike at the East Granby facility.

   The alleged conditions reported to the NRC are as follows:

   a. Supervisors were performing a production process which involved hand brazing each individual strand of a single conductor wire in the small "Hypo" area.

   b. Supervisors were performing conductor insulation repair in the small "Hypo" area.

   c. Supervisors who performed above operations were not qualified due to the lack of a certification program for non-production workers.

   A document review for the above time period was performed by the NRC inspector. This review encompassed several hundred separate documents. The R.C. Daily Labor Reporting Tickets for the above time period were reviewed as well as all shop orders which may have contained brazing

or repair work. The nuclear shop orders were traced back to conductor/cable reel numbers, which were subsequently traced back to processes which could have involved the above allegations.

Interviews were conducted with the personnel who implemented the processes, supervisors, and quality control personnel. One of the operators during the time in question was no longer employed at Rockbestos, other personnel were queried in regards to the absent operator's activities in the specific areas being investigated.

An inspection of the actual processes and production facilities was also performed to assure standard industry practices and workmanship standards were being followed in these areas. Specifically:

(a) Procedures for hand brazing were reviewed for adequacy to standard industry requirements and the R.C. single conductor brazing policies and requirements, as applied to nuclear orders, were reviewed. Interoffice memoranda were reviewed which delineated frequency of repair. One such memorandum was posted at each machine station bulletin board, this guideline specifically states for nuclear single conductors that "... no brazing is allowed ...," and also states in part "any deviation from the following guidelines must be approved by quality control."

(b) The customer purchase order requirements for applicable nuclear orders were reviewed for insulation rework allowances, none were in evidence that allowed rework. Several manufacturing identification tickets (MIT) (travelers) were reviewed for customer requirements and all were found to not allow insulation rework. The following customer orders were reviewed: South Texas, Niagara Mohawk, Consolidated Edison, and Sacramento Municipal Utility.

The R.C. memorandum "Guideline for frequency of insulation and jacket repairs," which is posted at the machines, restricts insulation/jacket repairs unless specifically authorized and approved by quality control.

(c) The NRC inspector reviewed all training and certification records and determined that the machine operators during the strike were not certified to perform nuclear insulation rework. However, it was not determined that any activities were performed which would have required the certifications. It was determined

that R.C. repaired conductors/cable, for non-nuclear orders, as permitted by their policies and procedures. The hand brazing operation for nuclear orders is prohibited by the Rockbestos Company policies and guidelines, and personnel were cognizant of this policy as determined by the interviews conducted.

Results:

The NRC inspector's evaluation and review did not reveal any documents, practices, nonconformances or other information which supported the concerns expressed to the NRC by the alleger. Therefore, the allegations were not substantiated.

Nonconformance B.1 was identified during the document review portion of the inspection. This was an isolated incident where Rockbestos failed to adequately document activities concerning conductor insulation repair. This affects three reels of two conductor 16 awg cable and renders each reel as indeterminate for traceability of insulation rework.

Nonconformance B.2 was identified during specific manufacturing process inspections, and subsequent observations while touring the facilities. Machine numbers 810, 811, 812, 813, 814, and 815 utilize timers to control the length of time heat is applied to conductors and cables for insulation and jacket repair. The Rockbestos Company has procedures which delineate time and temperature parameters. However, it could not be demonstrated with records or documents that the timer units installed were calibrated as required to control these parameters. One timer, for hot modulus testing, was also found to be uncalibrated. This unit, number QC-2, was located in the production manufacturing test laboratory.

ORGANIZATION: TEXAS BOLT COMPANY
HOUSTON, TEXAS

REPORT NO.: 99900888/84-01	INSPECTION DATE(S): 11/12-15/84	INSPECTION ON-SITE HOURS: 30

CORRESPONDENCE ADDRESS: Texas Bolt Company
ATTN: Mr. W. E. Windt
QC/QA Manager
Post Office Box 1211
Houston, Texas 77001

ORGANIZATIONAL CONTACT: Mr. W. E. Windt, QC/QA Manager
TELEPHONE NUMBER: (713) 869-7111

PRINCIPAL PRODUCT: Threaded Fasteners

NUCLEAR INDUSTRY ACTIVITY: Approximately 40 per cent of the 1983 production.

ASSIGNED INSPECTOR: J. T. Conway — 12-14-84
J. T. Conway, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): L. Burns, Consultant

APPROVED BY: E. W. Merschoff — 12-21-84
E. W. Merschoff, Chief, RIS, VPB — 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 from Public Service of Colorado (PSC) pertaining to cracks in threaded rods for use in reinforcement of safety related masonry block walls at the Fort St. Vrain Nuclear Generating Station.

PLANT SITE APPLICABILITY:

Cracks in threaded rod: 50-267.

A. VIOLATIONS:

Contrary to Section 21.6 of 10 CFR Part 21, a copy of Section 206 of the Energy Reorganization Act was not posted in three areas of the manufacturing facility where 10 CFR Part 21 and Texas Bolt's (TB) Part 21 procedure were posted.

B. NONCONFORMANCES:

1. Contrary to Criterion V of 10 CFR Part 50, Section 1.7 of the Quality System Manual (QSM) and Sections 8.5.3(c), 9.6, 9.6.1, and 9.7.3 of SNT-TC-1A, a review of nondestructive examination (NDE) records revealed the following:

   a. Procedure No. TB-NDT-PQC-#1, "NDT-Personnel Qualification and Certification" dated March 2, 1981, did not contain rules covering interrupted service requiring re-examination and re-certification.

   b. Records for five NDE personnel (3-Level II and 2-Level III) from TB did not contain a statement indicating completion of training in accordance with TB's written procedure.

   c. Records for two NDE personnel from Industrial Inspection (II), who were certified as Level III - liquid penetrant (PT) and Level II - magnetic particle (MT), did not contain a physical examination(s) or copies of the PT and MT examinations.

   d. The practical examination for both of TB's Level III - MT examiners (QA/QC Manager and Assistant QA/QC Manager) was incomplete in that a specification or procedure for the performance of a MT examination was not written.

2. Contrary to Criterion V of 10 CFR Part 50, the Policy Statement of the QSM, Subsection NCA-3866.2 of Section III of the ASME Code, and Section 7 of ANSI/ASME N45.2, measures were not in place to identify individuals/organizations responsible for preparing, reviewing, and approving the procedures contained in the Procedure Manual.

3. Contrary to Criterion V of 10 CFR Part 50 and Sections 4.3 and 7.1b of the QSM, a review of purchase orders (PO) to suppliers and external audits conducted by TB revealed that the plating services of Southwestern Plating were utilized in September 1984 on nuclear bolts, and the calibration services of Honeywell Corporation, W. H. Kessler

Company, and Newport Instrument Company were utilized for quality-related temperature measuring equipment on November, June, and May 1984, respectively, although none of these firms were included on the approved vendors list.

4. Contrary to Criterion V of 10 CFR Part 50, Section 12.1 of the QSM, Subsection NCA-3868.1 of Section III of the ASME Code, and Section 13 of ANSI/ASME N45.2, II calibrated two magnaflux units (S/N 43253 and S/N 81409) but II's Machinery Inspection Report for each unit did not indicate the standards used for calibration to assure that traceability to national standards was maintained.

5. Contrary to Criterion V of 10 CFR Part 50, Sections 2 and 6 of ANSI/ASME N45.2, and Subsections NCA-3866.4 and NCA-3866.1, it was noted that procedures or instructions did not exist for the following activities:

   - Heat treating in the Electric Box Furnace (S/N F-10-65)

   - Material testing such as tensile strength, hardness, and proof loading evaluations.

   - Utilization of stamps such as "LAB," "NUCLEAR," and "Material Approved by Met Lab."

6. Contrary to Criterion V of 10 CFR Part 50 and Section 4.2 of the QSM, the Quality System Manager or his designee did not sign a total of 19 internal purchase order forms reviewed during the inspection.

7. Contrary to Criterion V of 10 CFR Part 50 and Section 12.5 of the QSM, on November 14, 1984, numerous discrepant gauges including a "no-go" gauge and a micrometer were not placed under lock and key and were not tagged with a "DO NOT USE" tag.

8. Contrary to Criterion V of 10 CFR Part 50 and Section 15.2 of the QSM, TB did not tag and segregate nonconforming material following final visual inspection as evidenced during a plant tour when bolts, nuts, and threaded rods were stored in untagged cartons which were mixed with cartons of acceptable materials pending final product packaging and shipment.

9. Contrary to Criterion V of 10 CFR Part 50 and Section 15.2 of the QSM, three nonconformance reports for 1984 and three nonconformance reports for 1982, constituting the total number of reports for each year, were dispositioned by the Assistant Quality Systems Manager/Laboratory Supervisor.

C. UNRESOLVED ITEMS:

None.

D. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 21 Report - Public Service Company of Colorado (PSCC) notified the NRC in a Part 21 report dated July 30, 1984, and a revised report dated September 6, 1984, of defective threaded rod material for use in reinforcement of safety related masonry block walls at the Fort St. Vrain Nuclear Generating Station. The material in question was ordered (PO No. 5401 dated May 14, 1984) from TB as 5/8 inch diameter all threaded rod, purchased under specification ASTM A193, Grade B16. It was noted that PSCC's PO did not specify that 10 CFR Part 21 should apply or that TB's QA program should meet the applicable requirements of NCA 3800 of Section III of the ASME Code or ANSI N45.2.

   All the defective rods came from bar stock (heat lot no. 8087367) purchased from Republic Steel on PO 3868. The inspector reviewed TB's internal PO 177786, traveler and certified material test report (CMTR) which showed that TB had upgraded the stock material by performing tensile tests and a chemical check. A visual examination of the threaded rod by TB failed to detect the longitudinal cracks which were identified in 15 of the total 60 rods by PSCC during receipt inspection. The remaining 45 rods were MT examined by PSCC, and an additional rod was rejected by this testing. The 16 defective rods were returned to TB to be scrapped.

   TB had II perform (PO 34057 dated June 18, 1984) MT examination on five threaded and 45 blank-5/8 inch diameter x 20 ft bars. II's NDE report dated June 20, 1984, indicated that magnaglo inspection was performed and no indications were noted. Accordingly, TB threaded 11 blanks and returned a total of 16 rods to PSCC. PSCC scrapped the entire shipment when five rods of this shipment contained defects similar to the original shipment.

   TB has acknowledged that the visual examination was conducted in a poorly lighted area, and the MT examination by II using portable equipment was conducted in TB's Hot-header Department where there was too much light to permit the identification of defects using black light. In August 1984 TB moved their Visual Inspection Department to a natural lighted area for easier detection of small defects by the naked eye, and moved the area for magnafluxing with a portable unit to another building where most light can be eliminated.

A visual examination by TB of 80 remaining bars noted that approximately 50% contained cracks. TB has scrapped all the 5/8 inch diameter bar from heat lot no. 8087367, and Republic Steel has confirmed the discontinuities in the bar stock and agreed to replace all the 5/8 inch stock from heat lot no. 8087367. TB told the inspector that PSCC was the only nuclear customer who received any product from the 5/8 inch stock on heat no. 8087367.

2. 10 CFR Part 21 Requirements - The posting of Part 21 accompanied by a Part 21 reporting instruction sheet was noted in three areas of the manufacturing facility. However, as of November 12, 1984, in no instance was Section 206 of the Energy Reorganization Act of 1974 posted. The Part 21 reporting instruction sheet was directed to all personnel and provided notice for the immediate relay of information concerning quality product defects or noncompliance to the Quality System Manager. The Part 21 reporting instruction sheet was observed to be lacking a procedure control number, revision status, and a signature block although the posted document had been initialed and dated by the Quality System Manager. The QSM and supporting formal procedures do not include the Part 21 reporting instruction sheet nor other provisions for ensuring Part 21 compliance.

   Violation A.1 was identified in this area of the inspection.

3. NDE - The inspector reviewed TB's procedure for NDE, one MT examination procedure, and the certification records for two Level III-MT and three Level II-MT. It was noted that the practical examination given in 1977 for both Level III examiners did not contain a written specification/procedure but was the practical examination specified in SNT-TC-1A for a Level II examiner. The certification records for the three Level II examiners were in accordance with SNT-TC-1A.

   II performed MT examination in June 1984 on threaded rod for a nuclear facility. II's written practice for NDE, the MT procedure used, and the certification records for the Level II-MT examiner were reviewed.

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

4. Control of Nonconformances - Nonconformance reports for several years were reviewed. TB does not maintain a nonconformance log but the Assistant Quality Systems Manager/Laboratory Supervision produced three reports for 1984 and three reports for 1982. All of the nonconformance reports lacked clarity and adequate information

concerning corrective action, and in every instance the report had not been dispositioned by the Quality Systems Manager. The six documented nonconformances dealt with material hardness deficiencies identified during laboratory testing, and TB-Quality System Department personnel indicated that no other nonconforming conditions had been identified in recent years.

Nonconformance B.9 was identified in this area of the inspection.

5. Procedures - The NRC inspector reviewed TB's Procedure Manual which contained 16 procedures addressing such areas as heat treating, calibration, document control, MT examination, charpy impact testing, NDE personnel qualifications, audit, plating, cleaning, and inspection. It was noted that the "Record of Revisions" section contained an issue block for each procedure, but the block was not signed or dated. Procedure No. TB-DC-#1 "Document Control" listed requirements for a "QC Manual" when in fact it was the "Quality System Manual." Also, there was no identification/control number on Procedure Manuals assigned to a total of five personnel.

   Although it was apparent from a review of test results for various customer orders that TB does in fact conduct material integrity evaluations, no formal documented procedures exist for the conduct of these tests other than charpy impact procedure TB-CIP-1. Tensile strength, hardness, and proof loading evaluations are performed in accordance with TB quality control document, TBF-1, "Final Inspection Procedure," which is a generic instruction lacking adequate procedural steps as well as test acceptance criteria. Furthermore, the Assistant Quality Systems Manager/Laboratory Supervisor indicated that, at the discretion of the technician conducting a Charpy impact test, use of TB-CPI-1 can be exchanged for uncontrolled Procedure No. 4, "Procedure for Charpy Test," dated January 3, 1984, and signed by the Quality Systems Manager.

   An inspection of production procedures revealed that uncontrolled index cards developed by the plant production superintendent are used as the reference and basis for fulfilling customer order requirements. For example, Carolina Power and Light PO B-22331 (TB PO 171488) required a total of 500, 3/4"-10, SA563-Grade B heavy hex nuts, and a review of the production process document package indicated that the "SA563-Grade B" (card system) procedure had been used as the guideline for manufacturing the order. "SA563-Grade B," as with all other (card system) procedures that were reviewed in the presence of the Assistant Quality Systems Manager/Laboratory Supervisor,

lacked a document control number, revision number, and signature block. There was no evidence that any of the production procedures had been formally evaluated and properly qualified.

Nonconformances B.2 and B.5 were identified in this area of the inspection.

6. Calibration of Measuring & Test Equipment (M&TE) - The NRC inspector reviewed records for M&TE and certifications for reference standards used by service vendors to calibrate M&TE. 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. The temperature recorders on 15 furnaces (seven spheroidizing, three continuous fed-line, two box-tempered, one electric box and two batch) were calibrated by Honeywell Corporation. Calibrating stickers denoting the date and the due date for the next calibration were attached to all M&TE. In the MT examination area, two MT units (S/Ns 81409 and 43253) were calibrated by II in September 1984. It was noted that the Machinery Inspection Reports from II did not specify the serial number of the electrical standards used to calibrate the two MT units to assure traceability to national standards.

Calibration status of laboratory test equipment was verified for the following items:

Equipment (S/N)	Vendor	Calibration Date
Charpy Impact Tester (83166)	Army Materials & Mech. Res. Center	3/15/84
Tinius-Olsen Universal Tester (73444-5)	J.M. Nash Company	7/24/84
King Brinell Hardness Tester (YX-59)	J.M. Nash Company	7/24/84
Service-Rockwell Hardness Tester (68002)	J.M. Nash Company	7/20/84
Wilson-Rockwell Hardness Tester (45RBB-5849)	J.M. Nash Company	7/20/84
Acco-Rockwell Hardness Tester (79128)	J.M. Nash Company	7/20/84
Newport Digital Pyrometer (2350263A-96)	Honeywell Corp.	11/13/84
Standard Immersion Thermometer (none)	W.H. Kessler Co.	6/29/84

The digital pyrometer was purchased from Newport Instrument Company on May 13, 1983 (PO 10R356) primarily for impact specimen cold-bath temperature measurement as required by TB quality control document, TB-CIP-1, "Charpy Impact Procedure." Calibration of this instrument was performed by Newport Instrument Company on May 16, 1984, and by Honeywell Corporation on November 13, 1984. A standard immersion thermometer used either as an alternate or as a supplement to the digital pyrometer for the Charpy tests was last measurement-qualified by W. H. Kessler Company on June 29, 1984. It was noted from the review of records that Newport Instrument Company, Honeywell Corporation, and W. H. Kessler Company had not been included on the current issue nor on preceeding issues of the approved vendor list.

TB's "1984 Monthly Calibration Log" was utilized to verify recent calibration status for various production gauges, including pitch and outside diameter micrometers as well as ring and plug gauges.

Nonconformances B.3 and B.4 were identified in this area of the inspection.

7. Documentation Packages-(DP) - The NRC inspector reviewed 84 DPs (65 for 1984 and 19 for 1983) for nuclear fasteners. A DP consisted of a customer's PO and specification, if applicable; TB's internal PO, work order (i.e., traveler), CMTR and/or Certificate of Compliance, CMTRs from material suppliers, and heat treat charts, if applicable. Following receipt of the customer's PO, TB transcribes quantity and quality specification requirements onto an internal PO form which is assigned a unique TB number. The intent of the internal PO form is to provide a manufacturing in-process record as well as a permanent record of the customer order. It was noted that the Quality System Manager or designee neglected to sign the internal PO form for the following TB numbers:

167563	172614	173810	174731	173644
168802	173437	173859	174774	173742
169315	173450	174047	170792	173760
169614	173557	174423	174488	

In addition, the minimum solution annealing temperature was not specified on TB's CMTRs for austenitic stainless steel fasteners for the following TB numbers:

176351	167563	178966	180763
173450	178734	175156	179022
173644	175660	180926	
169315	175597	175144	

Nonconformance B.6 was identified in this area of the inspection.

8. Plant Tour - The NRC inspector toured TB's manufacturing facility at various times during the inspection in the company of TB's personnel. Areas and activities witnessed included storage of incoming material, receipt inspection, heat treating, hot and cold forming, roll threading, machining, MT examination, destructive testing, metallography, final inspection, and packaging.

   The inspection revealed that nonconforming material identified during final product visual examination is not tagged and segregated pending packaging for shipment. However, cartons of acceptable bolts, nuts, and threaded rod were properly tagged and accompanied by the work traveler.

   It was noted that discrepant gauges were kept in a cardboard box on a shelf in an unlocked room, and although tagged in most instances, none of the tags explicitly stated "DO NOT USE."

   Nonconformances B.7 and B.8 were identified in this area of the inspection.

9. Audits - Semi-annual internal audit reports from May 1973 to August 1984 covering the areas of "Purchasing," "Production," and "Quality System" were reviewed. It was noted that the audit checklist forms were very general and limited in scope, and in no instance was any significant corrective action specified. TB internal memoranda dated March 22, 1983, and July 15, 1979, qualifying selected management and Quality System Department personnel to perform audits were reviewed, but there was insufficient evidence that all of the individuals had received QA training. In fact, it was observed that the TB Vice President responsible for performing the majority of internal audits is not even included on the QA manual controlled distribution list. In addition, certain internal audit reports revealed that the inspection is sometimes conducted by the same individual approving the findings, such as in the cases given below:

Audit Date	Audit Area	TB-Auditor/Audit Approval
8/6/84	"Production"	Quality Systems Manager
2/19/84	"Production"	Quality Systems Manager
2/19/84	"Quality System"	Vice President

External audits conducted by TB on Republic Steel, Carpenter Technology, U. S. Steel, and Colt Industries (including SCC Corporation) for maintaining approved vendor list status were reviewed. As with the internal audit forms, the external audit checklists are inadequate in that survey questions are non-specific and do not promote in-depth inspection. No corrective action requirements were observed to have ever been imposed on the aforementioned suppliers as a result of the audits.

The audit report of Bechtel Corporation compiled from a May 23, 1984, inspection which cited the failure of TB production personnel to sign the work traveler at various manufacturing process stages was reviewed. It was noted that TB responded promptly to Bechtel and provided suitable evidence of corrective action for the nonconformance.

10. QA Program - A detailed review of the Quality Systems Manual which documented a QA program description addressing 15 QA sections led to the following observations:

    a. The organization chart does not reflect the current management structure.

    b. QA responsibilities of each of the elements noted on the organizational chart were not described.

    c. Job titles comprising an existing Material Review Board (MRB) were not identified.

    d. The duties/responsibilities of the MRB and the procedure for a review of a material problem were not described.

    These observations were not considered as sufficiently severe deficiencies in the existing QA program or its implementation to be classified nonconformances, but were brought to the attention of appropriate TB management personnel for their evaluation and followup.

ORGANIZATION TIOGA PIPE SUPPLY COMPANY, INC.
PHILADELPHIA, PENNSYLVANIA

REPORT NO.: 99900879/84-01	INSPECTION DATE(S): 8/27-30/84	INSPECTION ON-SITE HOURS: 52

CORRESPONDENCE ADDRESS: Tioga Pipe Supply Company, Inc.
ATTN: Mr. Morton Keiser, President
2450 Wheatsheaf Lane
Philadelphia, Pennsylvania 19137

ORGANIZATIONAL CONTACT: Mr. Douglas Vickery, Quality Assurance Manager
TELEPHONE NUMBER: (215) 831-0700

PRINCIPAL PRODUCT: Pipe

NUCLEAR INDUSTRY ACTIVITY: Not identified during this inspection.

ASSIGNED INSPECTOR: J. T. Conway — 10-29-84
J. T. Conway, Reactive Inspection Section (RIS) — Date

OTHER INSPECTOR(S): N. Miegel, RIS

APPROVED BY: E. W. Merschoff — 10-29-84
E. W. Merschoff, Chief, RIS, VPB — Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: This inspection was made as a result of the 10 CFR Part 21 report submitted by Northern States Power Company (NSP) in regard to manufacturing defects found in components intended for use as replacement residual heat removal piping at the Monticello Nuclear Generating Plant. The components were supplied to NSP by the Tioga Pipe Supply Company (TPS).

PLANT SITE APPLICABILITY:

Docket Nos. 50-263.

ORGANIZATION: TIOGA PIPE SUPPLY COMPANY, INC.
PHILADELPHIA, PENNSYLVANIA

REPORT NO.: 99900879/84-01	INSPECTION RESULTS:	PAGE 2 of 6

A. VIOLATIONS:

Contrary to Section 21.31 of 10 CFR Part 21 a review of 51 documentation packages for Section III material revealed that 39 customer purchase orders (PO) to Tioga specified 10 CFR Part 21 as an applicable requirement, but seven Tioga POs to material manufacturers and service vendors (A 6765 to Teledyne Columbia, A 5573 and A 6471 to Combustion Engineering, A 8619 and A 8629 to Carson Non-Destructive Testing, A 8624 to Ramball Test Laboratories, and A 7231 to Kobe Steel) did not specify that 10 CFR Part 21 would apply.

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 4.3.1 of the Quality System Manual (QSM), a review of Tioga POs for nuclear material revealed that PO A-8856-RL to United States Steel for 18 inch, SA333 pipe was not reviewed by the QA Department.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 9.6.1 of the QSM, and Section 9.5 of SNT-TC-1A, a review of nondestructive examination (NDE) records revealed that Tioga had not reviewed and accepted the written practice [i.e., "NDT Procedures Manual" dated March 18, 1984 for Carson Non Destructive Testing (Carson) and "General Procedure Manual," GP-UTTL-2 submitted to Tioga in August 1982 by Universal Technical Testing Laboratories (UTTL)] for two NDE laboratories.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 9.6.2 of the QSM, and Section 9.6.1 of SNT-TC-1A, a review of NDE records revealed that two Level II examiners from Carson had performed ultrasonic (UT) and magnetic particle (MT) testing in June 1984 and May 1984, respectively, for Tioga but their qualification records were not maintained by Tioga.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 9.5.1.1 of the QSM, a review of NDE records revealed that Tioga did not have the documentation on file to demonstrate the capability of NDE procedures for Carson (UT-001, Addendum No. 1 and MT-1) and UTTL (QC Manual Revision D).

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Sections 4.3.1, 5.1.2, and 5.2.1 of the QSM, a review of Approved Vendors Lists (AVL) and POs issued by TPS for nuclear items revealed the following:

a. TPS issued a PO (#14595N) to the Ideal Forging Company in March 1984 for flanges, but Ideal Forging was not on the AVL.

b. Carson performed MT and UT during May and June 1984 for TPS. However, Carson was not placed on an AVL until June 29, 1984. This AVL was not issued until August 13, 1984.

c. TPS issued a PO (#A12404) to Pennsylvania Machine Works in March 1983. Pennsylvania Machine works has not been surveyed or audited by TPS since March 1981 and was not listed on the appropriate AVL.

d. The Gage Block Corporation has calibrated equipment for TPS as recently as July 1984. However, Gage Block Corporation has not been surveyed or audited by TPS since an initial audit performed in November 1977; nor are they listed on the AVL.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50, and Sections 11.1.1 and 11.1.3 of the QSM, a multistep gage (control #1243027) was calibrated in September 1982 and was not recalibrated until fourteen months later in November 1983.

C. UNRESOLVED ITEMS:

None.

D. OTHER FINDINGS OR COMMENTS:

1. 10 CFR Part 21 - Residual Heat Removal (RHR) Piping - In June 1984 Northern States Power Company (NSP) submitted a 10 CFR Part 21 report related to manufacturing defects in ASME Class 1 carbon steel pipe intended for use as replacement RHR piping at the Monticello Nuclear Generating Plant. The 18 inch pipe was ordered from Bechtel to specification SA-333 Grade 6 and SA-655 for examination. Bechtel procured the pipe, which was manufactured by United States Steel (USS), from TPS. TPS subcontracted examination of the pipe to Carson. Carson performed UT in two circumferential directions as required by SA-655 and reported no defects exceeding the specification requirements.

During fabrication of spool pieces, NSP noted a discontinuity on the inside surface of the pipe. NSP performed UT in two circumferential angle beam scans and noted the discontinuity in several areas, but it was within acceptable limits. Further UT using a circumferential straight beam scan followed by an axial angle beam inspection in two directions revealed that the discontinuity extended significantly into the pipe wall. Based on the UT performed, it is NSP's opinion that the angle beam circumferential scans are inadequate to locate and evaluate the particular type of discontinuity identified in the pipe.

The NRC inspector reviewed the requirements contained in: (a) Bechtel's PO for the Section III/Class 1 pipe; (b) TPS's PO to USS for 300 ft., 18 inch, SA-333 Gr. 6 ft pipe; and (c) TPS's PO to Carson for UT of the 30 ft. length of pipe supplied to Bechtel. Carson's procedure for UT, the qualification records of the Level III examiner, and the test report for UT of the pipe were reviewed and appeared to be satisfactory. USS's certified material test report (CMTR) dated October 21, 1981 indicated that nine lengths (30 ft. each) of SA-333 Gr. 6, 18 inch pipe from heat no. L23305 were furnished to TPS. Three lengths of the pipe are still in stock at TPS, one length was sent to Bechtel and five lengths were shipped as commercial orders (one to Custom Alloy and four to Gulfalloy).

It is TPS's opinion that the finished pipe conformed to both code and specification requirements, and the defect is a normal manufacturing discontinuity resulting from slag build-up or piercer hang-up during the fabrication of the pipe. Samples of the defective pipe material have been sent by NSP to USS and an independent laboratory for further testing.

The NRC has performed an independent analysis of this issue which has confirmed the TPS position that this is a manufacturing defect which may not be identified by the UT examination currently required by the ASME Code. This issue is scheduled to be addressed by the ASME Working Group on Materials (Section III) at a future meeting.

2. Reporting of Defects - The procedure relating to the reporting of defects and failures was reviewed, and the implementation of the procedure in regard to posting requirements was verified by inspecting the shop areas.

3. Control of Purchased Material and Services - The inspector reviewed the applicable sections of the QSM, one PO to each service vendor (Carson, Ramball Test Laboratory, and Gage Lab. Corp.) and 51 documentation packages from 16 customers (Baltimore Gas & Electric-4, Target Rock-1, General Electric-1, Carolina Power & Light-7, Metal Bellows-4, Gulfalloy-2, Taylor Forge-9, Power Piping-3, Capital Pipe & Steel-2, Bechtel-1, Sacramento Municipal Utility District-2, Florida Power & Light-3, Louis P. Canuso-5, Niagara Mohawk-3, Clouse Nuclear Energy Services-1, and Empire Valve & Fittings-3). The documentation packages consisted of customer POs, TPS's POs to material manufacturers, Certificates of Compliance (C of C) and Final Inspection checklists; and CMTRs from material manufacturers.

The review was undertaken to assure that applicable regulatory, technical, and QA program requirements are included or referenced in procurement documents and that material was purchased from qualified vendors.

It was noted that the customer order file for two POs (44712-5280N from Power Piping and 39546 from Louis P. Canuso) did not contain a confirming PO from the customer but did contain a telephone inquiry which was not approved by QA. Five CMTRs from material manufacturers (USS, Phoenix Steel, CE Tubes, Babcock & Wilcox, and Combustion Engineering) indicated that the material was manufactured under a QA program audited and approved by TPS as meeting the requirements of NCA-3800. These audits and approvals to ASME Section III requirement were performed in 1980 and 1981 prior to TPS receiving their Quality System Certificate (Materials) on November 5, 1982.

It was also noted that eight CMTRs from 5 material manufacturers referenced an edition and addenda of the ASME Code, but the applicable C of C from TPS referenced an earlier edition and addenda. In three cases, the CMTR did not reference Section III at all, but the C of C referenced an edition and addenda of the Code.

Violation A.1 and Nonconformances B.1 and B.5 were identified in this area of the inspection.

4. NDE - The inspector reviewed the applicable sections of TSP's QSM; Carson's NDT Procedure Manual which contains administrative procedures, personnel qualifications, and specific procedures for NDE; Universal Technical Testing Laboratories' (UTTL) QC Manual which contains eight NDE procedures; and UTTL's General Procedure Manual which contains the written practice and certification records for examiners.

   NDE procedures and the certification records of the examiners were reviewed to assure that NDE met the requirements of Section III of the Code and that personnel performing NDE activities were trained and qualified in accordance with SNT-TC-1A.

   Nonconformances B.2, B.3, and B.4 were identified in this area of the inspection.

5. Equipment Calibration - The NRC inspector reviewed Section 11.0, "Control of Measurement and Test Equipment," of the QSM, observed measuring equipment and reviewed the applicable records for the equipment.

   Nonconformance B.6 was identified in this area of the inspection.

6. Internal Audits - Section 12 of the QSM, and TPS Internal Audit reports for 1981, 1982, and 1983 were reviewed by the NRC inspector. Performance of the audits complied with the requirements set forth in the QSM.

7. Training/Qualifications - The training/qualifications records for three QA personnel and two management personnel were reviewed to assure that personnel performing and verifying activities affecting quality were trained and qualified.

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
PITTSBURGH, PENNSYLVANIA

REPORT NO.: 99900404/84-03	INSPECTION DATES: 10/1-10/5/84	INSPECTION ON-SITE HOURS: 150

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 (NTD) of Westinghouse Electric Corporation employs approximately 1500 people that are assigned to domestic nuclear power plant activities.

ASSIGNED INSPECTOR: P D Milano 1/9/85
P. D. Milano, Special Projects Insp. Section (SPIS) Date

OTHER INSPECTORS: R. Pettis, PDS
R. P. McIntyre, SPIS
P. M. Sears, SPIS
M. Rossel (EG&G)
R. Harris (EG&G)
J. C. Higgins (BNL)

APPROVED BY: Gary G. Zech 1/14/85
Gary G. Zech, Acting Chief, SPIS, VPB Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Parts 21 and 50, Appendix B, and WCAP-8370, Topical Report.

B. SCOPE: The purpose of this inspection was to review the development and use of computer codes utilized in design and to followup on previous inspection findings.

PLANT SITE APPLICABILITY: Not identified.

A. VIOLATIONS

None.

B. NONCONFORMANCES

1. Contrary to Criterion V of 10 CFR 50, Appendix B, and Westinghouse Topical Report, WCAP-8370, documentation was not maintained to support the accomplishment of corrective actions resulting from error reports in the computer program "WECAN".

2. Contrary to Criterion XV of 10 CFR 50, Appendix B, procedures were not available to review the effects of computer program and system errors on design.

3. Contrary to Criterion V of 10 CFR 50, Appendix B, and Westinghouse Water Reactor Division Policy and Procedure WRD-OPR-3.0, a proposed design change was not reviewed and verified by all functions involved in the original design.

4. Contrary to Criterion V of 10 CFR 50, Appendix B, and Westinghouse WRD Policy and Procedure WRD-OPR-15.0, the computer program ANSYS was utilized for design while errors were outstanding, and no documentation was available to justify its acceptability for continued use in this condition.

5. Contrary to Criterion V of 10 CFR 50, Appendix B, and Westinghouse WRD Policy and Procedures WRD-OPR-3.0, an error in the computer program "NOTRUMP" was not corrected in all verification calculation notes.

6. Contrary to Criterion V of 10 CFR 50, Appendix B, and Westinghouse Water Reactor Division Policy and Procedure WRD-OPR-3.0, comments for SEC-RFFA-1381-C0 and SEC-RFFA-1381-C1 did not include documented resolution and verifier's signature.

7. Contrary to Criterion V of 10 CFR 50, Appendix B, and Westinghouse WRD Policy and Procedure WRD-OPR-3.2, the set of problems for one element of the "WECAN" computer program did not support the program verification.

C. UNRESOLVED ITEMS

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS

1. (Open) Violation (84-02) - The report to the NRC of a substantial safety hazard in accordance with 10 CFR 21 failed to include all defective Barton transmitters in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulation in that the plants under construction were not listed. Westinghouse has subsequently issued additional guidance which now requires reporting when a deviation "could create a Substantial Safety Hazard if affected plants were to go into operation without appropriate corrective action." A review of recent reports indicates that this action is being implemented.

2. (Open) Violation (84-02) - Westinghouse procedures did not specify what was to be in the evaluation record or when the record was to be prepared for items of potential safety significance. Westinghouse responded to this violation with a letter to the NRC dated 7/12/84, and among other things, stated that additional opportunity should be given to locate necessary records. Westinghouse also outlined, in general, the corrective and preventive actions being taken. The files for the potential items in question were all reviewed again during this inspection. Some additional records had been produced, but none of these records change the substance of the violation. Westinghouse corrective and preventive actions have begun, but have not yet been completed. See paragraph E below for further discussion of this area.

3. (Closed) 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 no 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.

   Westinghouse has expanded the distribution list for WECAN error reports to include not only WECAN user manual holders, but also the management of all cognizant groups using the WECAN code for safety-related analyses. As required by Westinghouse procedures, these individuals assure that the impact of these errors are evaluated and appropriate corrective action initiated. In addition, each WECAN run includes a WECAN problem report, which is a current listing of all errors discovered, but not yet corrected, that have the potential for producing incorrect results. Furthermore, WECAN users memos, which include both current problems as well as previous corrected problems are accessible in a controlled file. This file

as well as internal correspondence addressing the distribution list, the error report, Westinghouse processing, WECAN users memos (including error reports), and a WECAN problem report were reviewed by the NRC inspector.

Additionally, a supplemental audit on computer code errors has been performed. The section on WECAN included a review of the error report files for documentation and content. Files were reviewed from present back to 1980 and revealed that no errors had been identified that impacted the usage of WECAN in nuclear safety related applications.

4. (Closed) Nonconformance (84-01) - No QA audit has been conducted on the development and use of a computer program in the past 2 years.

   As part of their Quality Assurance Program, Westinghouse Nuclear Technology Division audits the development and use of computer codes as an integral part of design control audits. This is done to assure that computer codes used in safety-related analyses have been verified, for both accuracy and proper application, and have been placed under configuration control. Internal procedures are established to assure the verification and configuration of computer codes used in safety related analyses. These procedures and audit reports were reviewed by the NRC inspector.

   Since safety related activities are audited annually or at least once within the lifetime of the activity, whichever is shorter per Westinghouse Topical WCAP-8370, Westinghouse feels it is not necessary to include a separate audit of computer codes as part of the internal audit program.

   In the future, Westinghouse NTD will include as part of its design control audits, review of the document controls applied to computer code error reports and review of the design controls applied to the evaluation of the impact of these errors on the adequacy of the design/analyses on which it was used. The NRC inspector reviewed the audit checklist used on SA-84-02, Supplemental Audit on Computer Code Errors, which will be used on all future internal audits to address computer code errors.

5. (Closed) Finding 84-02, E.2.b.(1): Outdated Procedure. Revision 7 to procedure NSID-OPR-210-2, dated 5/1/84, titled "Field Deficiency Reports", was reviewed. This procedure corrects the outdated information on organization and adds the new FDR form.

6. (Closed) Finding 84-02, E.2.b.(3): Deviation Notices (DN). While Deviation Notices potentially could contain items that may be Substantial Safety Hazards (SSH), the likelihood is low due to the nature of the report and the types of items for which it is used. Additionally, the cognizant engineer reviewing and signing the DN has the responsibility for ensuring that any SSH identified thereon is properly referred to the Safety Review Committee per WRD-OPR-19.0.

7. (Open) Finding 84-02, E.3.c.(1): Programmatic Control of Safety Review Committee (SRC) items. Westinghouse is taking action to address this finding. See paragraph E below for details.

8. (Open) Finding 84-02, E.2.b.(2): Documentation of Management Review. The nonconformance control procedures for Field Deficiency Reports and Operating Plant Deficiency Reports still do not contain a signature or initial block to document the review by the cognizant design manager, who is responsible for, among other things, the determination as to whether the item is a potential SSH per Part 21. Westinghouse is currently revising the pertinent procedures and forms and stated that they would consider adding this feature.

E. OTHER FINDINGS AND COMMENTS

1. Safety Review Committee (SRC) and Reporting Under 10 CFR 21

1.1 Discussion

The Westinghouse Program for review of significant safety issues is described in Procedure WRD-OPR-19.0, Rev. 1, dated December 18, 1980, titled "Identification and Reporting of Substantial Safety Hazards, Significant Deficiencies and Unreviewed Safety Questions" and consists of multileveled reviews by individual Westinghouse divisions, the Secretary of the Safety Review Committee, assigned Nuclear Safety Groups, the Safety Review Committee (SRC), and finally the Vice President and General Manager of Westinghouse Water Reactor Divisions. Items may be submitted by Westinghouse divisions or any individual for review to the Secretary of the SRC, whereupon they receive a Potential Item (PI) Number and a unique file is opened. If determined to be significant, the items are sent to the SRC. The Procedures, a number of selected files, or PIs, as described below, and associated backup analyses and data were reviewed. Overall, Westinghouse appeared to have established a positive atmosphere for reporting items to the SRC and has processed a significant number of items through their system.

1.2 New SRC Control Procedure

After completion of the NRC review documented in report 84-02, Westinghouse initiated an internal review to determine the adequacy of the SRC procedures and files. A thorough review was performed and recommended improvements were outlined. New guidelines/procedures are currently under development to address all identified concerns. Some of the improvements have already been implemented on an interim basis, e.g., a new computerized listing with sort capabilities, a clear status of items, and periodic review of open items by management. Other items were discussed with Westinghouse for inclusion in the program, including:

1. Assurance that the records for the Part 21 evaluations contain the information detailed on page 21.21(a)-2 of NUREG-0302, Revision 1, "Remarks Presented at Public Regional Meetings to Discuss Regulations (10 CFR Part 21) for Reporting of Defects and Noncompliance".

2. Documentation of the basis for reasonable assurance that the safety of potentially affected operating plants is not significantly affected in the interim, when a decision on reportability is deferred for extended evaluation.

3. A program for establishing target dates or required response time frames to assure followup on individual items. These would be established on a case-by-case basis as discussed in question 11 on page 21.21(a)-4 of NUREG-0302 and are needed to avoid excessive evaluation times noted during this review and during 84-02.

1.3 SRC Folder Review and Update

As part of the Westinghouse internal review discussed above, each Potential Item folder is being reviewed for completeness and is being supplemented as necessary. A number of items which were previously closed, were reopened by Westinghouse based on incomplete documentation available. Other items are temporarily listed as "indeterminate" pending a clear determination as to whether they are open or closed. Westinghouse was informed that after the new guidelines, discussed above, are implemented the folders should be reviewed against them. Additionally, review of recent Potential Items Folders during this inspection showed that the folders did not always contain confirmation

that all of the affected plants were notified of the defect, as called for in Procedure WRD-OPR-19.0. Westinghouse stated that the new procedure/guidelines and the folder review and update should both be completed by December, 1984 and would address all concerns.

1.4 SRC Items Reviewed

The below listed SRC Potential Items were reviewed. For those items which were reviewed during inspection 84-02, the additions to the folders were noted during this review.

PI-82-183: (ID-82-200) Westinghouse AR Relays - This item involved the use of unqualified magnetic type relays, ARMLA, as replacements for ARLA spring type relays. Westinghouse issued a Technical Bulletin to customers in June, 1982 and NRC issued Information Notice 82-55 in December, 1982 to address the concern. The folder has new information added in May, 1984, but still did not have a documented evaluation to support the decision not to report.

PI-82-165: (ID-82-198) Steam Generator (S.G.) J-tubes - In the summer of 1982, three plants were identified with corroded/eroded J-tubes in Westinghouse Steam Generators. Technical Bulletin 82-07 was issued in December, 1982 recommending J-tube inspections and replacements of all with less than 50% wall thickness remaining. In August, 1983, Surry-2 identified more rapid corrosion rates and fully perforated J-tubes. As a result, Rev. 1 to the Technical Bulletin was issued. Most other plants inspected to date, however, have shown little or no corrosion to their J-tubes.

Several additional memos and evaluations have been added to the file since May, 1984. However, the file still does not have an evaluation to support non-reportability or justify an extended study.

PI-82-162: Non-Seismic Cabinets - In July, 1982, Westinghouse became aware that some plants were locating non-seismic cabinets immediately next to seismic cabinets, thus compromising their qualification. As a result, modifications to some plants' cabinets were made. Further analyses are still underway.

The file now has memos dated 5/16/84 and 7/26/84, which document the basis for this item not being an immediate safety concern.

PI-82-154: Unqualified Valves: Westinghouse determined that steam dump block valve solenoids, feedwater isolation valve solenoids, and turbine trip valve solenoids are not fully qualified seismically and environmentally. Evaluation to date shows that while not meeting all required codes, this is not an immediate safety problem. Corrective actions are being planned.

PI-81-115: Reactor Coolant Pump (RCP) Seal Leakage - A number of cases were identified where the RCP seals could fail, creating a loss of coolant accident. The scenario of most concern was a station blackout causing a loss of seal injection water and a loss of Component Cooling Water, leading to failures of all 4 RCP seals.

PI-83-187: Discrepancies in Calculated Peak Temperatures - Based on NRC review of thermal-hydraulic codes, Westinghouse modified the steam break analysis to incorporate steam superheating upon steam generator tube uncovering. This resulted in higher temperatures both inside and outside containment during a post-accident scenario. Hence, some components are no longer fully qualified for the post-accident environment. The appropriate plants were notified. Westinghouse is working with NRR to resolve various aspects of the issue.

PI-84-269: Component Cooling Water (CCW) System Overpressure - Westinghouse identified three potential problems with the CCW system; two valve alignment problems and one overpressurization problem. The latter was reported on 7/13/84 as a substantial safety hazard per Part 21, but the other two were determined to be not reportable. The overpressure situation results from automatic closure of the surge tank vent valve on high radiation in the CCW System. As system pressure increases to the relief valve setpoint on the surge tank, CCW pump head creates an overpressure at the pump discharge. Westinghouse stated that all affected plants were notified of the overpressure potential. However, no documentation was produced during the inspection to confirm this.

PI-81-122: Foxboro Transmitter Leakage and Installation Problems - Westinghouse was informed by Barton Instruments of a bellows fill fluid seepage problem in the model M/764 DP transmitter. This was caused by a burr on either side of the O-ring groove on the center block. Additional information on these transmitters within this file described a problem with the Foxboro power supplies. A field modification kit was required to allow the regulated output voltage to remain

within tolerance during no-load conditions. Westinghouse is working to ensure the proper closeout of this different issue from that which the file was initially prepared.

PI-78-32: Steam Generator Support Welds (South Texas Project) - Full penetration welds in TGX lower lateral supports were found to have extensive UT indications. Several trip reports prepared by Westinghouse and their consultants indicated the deviations were acceptable and not generic in nature. However, Westinghouse cognizant engineer's letter formally closing out this issue was not available in file for review.

PI-78-37: Feedline Rupture Analysis Licensing Issue - Several problem areas have been identified which concern the assumptions used in the main feedwater line rupture analysis for many of the Westinghouse plants under the IEEE 323-1971 Environmental Qualification Program. By May, 1978 almost all of the problem areas cited had been analyzed with the exception of the Lo-Lo steam generator trip event. The solution to this problem indicated extensive computer analysis needs to be performed using the NOTRUMP computer code developed by Westinghouse.

However, due to the complexity of the computer modelling, much more time would be required to formally investigate and close out the issue. Internal documents revealed that Westinghouse would proceed on a low priority basis since it was reasonable to expect favorable results.

The inspector noted that since May 1978 this issue has not been resolved nor was there documentation available to support any ongoing analysis effort during this "interim evaluation period". Followup actions by the NRC inspector into disposition of this issue yielded Westinghouse internal memo NS-SLP-APFL-84-318 dated 10-3-84. This memo stated that as a result of a more improved NOTRUMP computer model, previous analysis results were waived, thus, enabling Westinghouse to formally close out this issue.

PI-82-167: Diaphragm Valve Frequency Issue - Numerous air-operated diaphragm valves furnished by ITT Grinnell possessed natural frequencies less than the 33 Hz required by Westinghouse Equipment Specification 678845 Rev. 1. This may affect valve qualification and associated piping analysis.

After in-house analytical evaluation by Westinghouse, it was

concluded on 8-14-84 by the Safety Review Committee that this issue was not reportable to the NRC under 10 CFR Parts 21, 50.55(e), or 50.59. However, Westinghouse Plant Engineering Division (PED) agreed to notify approximately 24 construction and 9 operating plants due to the departure from Westinghouse equipment specifications and possible product liability implications. The file documentation was incomplete as to a positive notification of all affected plant sites.

PI-83-185: Configuration Control Status of Design Programs - This problem file had been opened in early 1982 as a result of an internal memo to various Westinghouse managers requesting them to review the status of computer codes listed as part of that internal memo. Most of the computer codes on that memo were available for safety related designs. Not all of the computer codes on that list were listed as being configuration controlled. Many of the codes on that list were reported as not having verification material in the computer center files. The last entry into the PI file SR-3-83-185 is dated May 13, 1983 and is an update of the above mentioned list. The updated list showed little change from the status of that of the original list of computer codes.

The inspector, after a request, was shown an updated working list dated August 22, 1984 showing all computer codes available for safety related designs (approximately 1000). These codes are to be verified with documentation on file and to be configuration controlled with certain exceptions.

The codes which are available for safety related designs but without configuration control are licensed from outside vendors. Examples of these codes are NASTRAN, supplied by McNiel Schwindler, and ANSYS, supplied by Swanson Associates, Inc.

Procurement documents for ANSYS and NASTRAN were examined and it was found that 10 CFR Part 21 and 10 CFR 50, Appendix B were not imposed on the vendors. The verification of NASTRAN was, however, accomplished by running the verification problem sets accompanying the program.

No verification package was available for ANSYS and the NRC inspector was informed that none had been done at Westinghouse. Westinghouse is relying on Swanson Associates for any verification even though 10 CFR Part 21 and 10 CFR 50, Appendix B are not imposed on Swanson Associates. The NRC inspector was informed

that ANSYS has a limited use at Westinghouse. It is, however, listed as being available for use on safety related designs and has had approximately 70 uses during September, 1984. One application of ANSY's was on the development of the reactor internal structural system for the Clinch River project. When asked by the NRC inspector, the analyst on the Clinch River project replied that he had seen no error reports from Swanson Associates during 1984 and thus had done no evaluation of ANSYS errors on his designs.

PI-84-240: Unauthorized Changes to the Protection System - This problem is the installation of wiring added to the Instrumentation and Control (I&C) Protection System without Quality Assurance or Nuclear Safety reviews. This PI developed chronologically as follows:

(1) 10-22-79--Change Control No. 9455 was issued to modify the 7300 Series I&C protection system for Byron/Braidwood/Marble Hill plans (all of which were under construction).

(2) 11-11-80--Change Control No. 9455 was approved without Quality Assurance or Safety review. Field change notices were subsequently issued for installation.

(3) 01-25-84--The I&C Process Control organization became aware of a proposed change to Vogtle of Georgia Power. The change was to be similar to the Byron 7300 Series modification.

(4) 03-07-84--PI was initiated when investigations revealed that Change Control No. 9455 had not received the proper reviews.

(5) 10-02-84--Technical Report was received at licensing, indicating no nuclear safety problem with the modification installed at Byron. This report was "Design Review 84-10, ASTEC/7300 Process Equipment Interface," June 28, 1984.

This nonconforming condition was only detected when additional plants were being considered for similar modifications several years later. The PI Log indicates the status of this problem item is now listed "Indeterminant," because of insufficient documentation.

PI-83-216: Ferro-Resonant Transformers - This problem involves the incorrect termination of capacitors used in General Electric

ferro-resonant transformer assemblies utilized in the Westinghouse Vital 7.5 KVA inverters. The PI files first correspondence was dated 7-7-83, stating that the General Electric transformer assembly ".... was not controlled and allowed a poor quality of mismatched connection components at the fastening of wiring to the capacitor terminals." (Westinghouse Nuclear Services Integration Division Letter No. EQ/1 ES(83)-807).

Historically, a working group meeting discussed this problem on 7-20-83 and on 8-4-83. A PI number and file was established. Subsequently, the PI received sporatic attention in February and May. Finally, on September 13, 1984 (14 months later), NRC was notified of a reportable item affecting six operating plants and eleven plants under construction. The telephone notification was documented in Westinghouse letter NS-EPS-2961 dated 9-14-84.

The basic problem involved improper terminations and lack of quality control at General Electric. They allowed terminations to be used that could result in a loose connection after vibration or a seismic event. Westinghouse had failed to provide adequate instructions/controls to its vendor following a change from "Ring-tongue" to "Fast-on" connectors, which occurred in 1977.

When the improperly wired capacitors were detected, no Quality Assurance report (Deviation Notice, Field Deviation Report, etc.) was issued.

PI-84-268: This problem item was the result of the failure of three fan motors to start in an operating plant. One of these motors failed a second time after a short period of operation. These failures were attributed to uneven runout due to wear, resulting in low magnetic pullover because of large air gaps.

This PI was closed out on 8-17-84; however, the file appears to contain inadequate documentation and/or inadequate review of the concern. All of the above mentioned failures occurred in position No. 23 at the Salem No. 2 plant. No evidence was documented to explain why only position No. 23 had been affected. Although uneven runout or wear resulting in low magnetic pullover was judged as the cause of failure, only the motor in position No. 23 was modified to allow for air gap measurements. The other three fan motor positions, utilizing the same make and model of motor, were not modified and their air gap is not being monitored. It is therefore questionable that the full explanation of the cause of failure has been documented.

Although this problem item (PI 84-268) has been closed, this area of concern will be the subject of future review.

1.5 General Comments on the Potentially Reportable Item Files

The Potential Item (PI) file folders in general contain sketchy and/or incomplete information concerning the basic problem and the on-going evaluation. In most cases where a delay in the final determination of reportability was allowed on an operating unit, the information to support continued operation while the evaluation was continuing, i.e., Interim Safety Impact, was not present in the file. While the list of plants requiring notification was present, no confirmation of the completion of this action was in the file. Finally, several files contain irrelevant data in support of the specific issue. Files such as PI-81-122, PI-00099, and PI-81-129 contained information on problems other than for what the file was generated. After establishment of the revised Westinghouse procedures and guidelines, this area will be reviewed in a future inspection.

1.6 Part 21 Letters

Upon determination that an item is reportable to the NRC as a substantial safety hazard under Part 21, Westinghouse submits a letter to the NRC, containing certain specific information outlined in 10 CFR 21.21.(b)(3). A review of Westinghouse letters to the NRC showed that not all required information was included in each letter. For example, some letters did not include: (a) the date on which the information about the defect was obtained, (b) the name of the individual or organization responsible for the corrective action, and (c) the length of time that has been or will be taken to complete the corrective actions. Westinghouse stated that they would ensure each required item was addressed in future Part 21 letters.

1.7 Audits/Management Reviews of Part 21

The NRC has provided guidance in NUREG-0302, Rev. 1 that formal Quality Assurance (QA) Audits of the Part 21 system are not required. The NUREG states that normal management controls are an acceptable means to verify conformance to Part 21.

As described above, Westinghouse is revising their Part 21 and SRC system procedures and guidelines. Additionally, the SRC Potential Item folders are being upgraded. Since Westinghouse

does not perform QA Audits of their Part 21 system, it was noted that an independent management review or audit of the system appeared appropriate at some time after the new system had been functioning (i.e., about six months). Westinghouse concurred in this observation and stated that they intended to conduct such a management review.

Within this area of the inspection, one (1) nonconformance was identified (B.3).

2. Thermal-hydraulic Computer Programs

The inspection in the area of evaluation of thermal-hydraulic computer programs centered around an evaluation of the NOTRUMP program. NOTRUMP is a general one-dimensional network code which is used for the analysis of thermal-hydraulic transients. The program is applicable primarily to the analysis of small break LOCA transients. This code models the important phenomenon relative to these transients such as natural circulation flow, counter-current flows, mixture levels, and thermal non-equilibrium.

During the review and evaluation, the procedures relating to this area were reviewed. These procedures were located within the Westinghouse WRD Quality Assurance Topical Report, WCAP-8370, and in the WRD Policies and Procedures Manual, WCAP-9550, and the NTD/SOD Design Control Manual. These procedures required all NOTRUMP development and verification efforts to be controlled and documented while being subject to the similar design control and verification requirements as other design outputs.

The qualification and verification package for the NOTRUMP code was found to contain a description of the purpose of the code, the theory, model descriptions and the development of verification as documented in Westinghouse Report WCAP-10079. The verification of the applicability of NOTRUMP to Westinghouse plants was found to be documented in Westinghouse Report WCAP-10054. Addendum 1 of this report documented the verification of the applicability of NOTRUMP to CE-designed plants.

Westinghouse personnel provided the calculation notes pertaining to the development and verification of the NOTRUMP computer code. The calculation notes were found to document development of specific code models, noding sensitivity studies, small break LOCA break size spectrum analyses, and verification calculations for individual model behavior, as well as the integral behavior of the NOTRUMP code. Separate effects test data were used to verify individual models, and

integral test data were used for the verification of the complete code. These data were found by the NRC inspector to be applicable to the verification calculations to which they were applied. All calculation notes were complete and reviewed as required by the QA procedures.

During the review of the above documentation, several items of concern were noted as follows:

a. Westinghouse Report WCAP-10054 (Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code) stated, concerning the component models of NOTRUMP, "These models have a well-developed background and can stand alone on their own justifications and verifications." It appeared that the component models have been justified and verified where available test data exists and that noding sensitivity studies have been done to justify the acceptability of the component noding schemes. However, it was noted that verification data were not available for most component models, and it was concluded that those models could be verified only indirectly through the verification of the complete NOTRUMP computer code.

b. The steam generator noding study, documented in calculation notes SEC-SA-1404-C0, does not appear to be sufficient to justify the current noding scheme. Steam generator primary and secondary noding were varied independently and the maximum noding appeared to be too coarse to adequately verify the sensitivity.

c. It was noted in calculation note SEC-SA-1615-C0 (Semiscale S-UT-08 Simulation Using NOTRUMP) that the currently available data for a small break LOCA with steam generator liquid holdup were used for the verification calculation. The NRC inspector further noted that an adequate verification calculation had been performed. However, because of the uncertainties of the S-UT-08 data, it was concluded that further verification calculations would be desirable for this important transient, at such time that additional data become available.

d. Review of the verification calculation notes for the development and verification of the NOTRUMP code indicated that QA procedures had been adequately followed, with the following exceptions:

   (1) An error identified in NOTRUMP verification calculation note SEC-RFFA-1381-C1 was identified by the reviewer and

resolved by the author. However, the same error, which was known to exist in calculation note SEC-RFFA-1381-CO, was not corrected.

(2) It was noted in the review of verification calculation notes SEC-RFFA-1381-CO and SEC-1381-C1 that some review comments which required the author's resolution did not include the documented resolution in the calculation notes as required by the procedure WRD-OPR-3.0, Design Control.

Within this area of the inspection, two (2) nonconformances were identified (B.5 and B.6).

3. Structural Computer Code Development

To perform this area of the inspection, the WECAN Computer code was reviewed. WECAN is a large, general-purpose code that is widely used at Westinghouse for structural analysis. Verificaiton of the WECAN code was evaluated on the basis of Section 3.2 of the Westinghouse WRD Policies and Procedures Manual, WCAP-9550. Verification status of the code is described in Table 5-2 of the WECAN User's Manual. The table has a matrix format, with each row representing an element type, and each column representing an analysis type. Elements which have been verified for a particular analysis type have numbers entered in the appropriate space of the table. The numbers identify the particular problem(s) which were used to verify the combination of element and solution type. The problem description identifies the element type and the WECAN feature to be verified, and includes results from a solution run and a comparison of the results with a different solution to the problem based on hand calculations, a similar computer program, or experimental results.

Four structural elements were chosen from the table for the inspection: STIF 4, 13, 77, and 90. A summary of the results is provided below.

a. STIF 4 is an elastic/plastic beam with offset capability. This element had a large number of problems supporting its verification, but only a limited number were reviewed (Nos. 134, 169, 177, 222, 262, 275, 325, and 361). No errors or discrepancies were encountered.

b. STIF 13 is an elastic/plastic flat-shell element with pressure load capability. The element has thirteen problems supporting its verification (Nos. 3, 6, 12, 22, 23, 49, 156, 198, 232, 238, 257, 349, and 352). All problems were reviewed, with no discrepancies or errors encountered. All solution types for which Table 5-2 indicated verification of this element were represented in the problems.

c. STIF 77 is a gap element with added capability to simulate transfer of friction loads between the contacting surfaces. This element has five problems (Nos. 296, 297, 298, 365, and 381), and all were reviewed, with no discrepancies or errors encountered. However, all of the problems verified the friction transfer capability of the element without verifying the gap capability. The severity of this shortcoming was evaluated in a review of an ongoing Westinghouse analysis (No. 81-1E7-NESPP-M4), which included the STIF 77 element. This analysis showed that the gap capability of the element is functioning correctly. Therefore, lack of adequate verification could not compromise any analyses previously performed.

d. STIF 90 is an elastic/plastic bumper element with offset capability. It can be used in either the compression mode only, or in both tension and compression. The element has three problems supporting its verification (Nos. 337, 338, and 339), and all were reviewed, with no discrepancies or errors encountered. All solution types for which Table 5-2 indicated verification of this element were represented in the problems.

While performing the evaluation of computer program development and use, a review of the system for program error reporting and the methods for analyzing the errors on previous design calculations was conducted. Both Westinghouse developed and outside procured programs were reviewed for these aspects. With respect to the WECAN program, it was found that documentation was not available to indicate that an analysis was conducted to identify the effect of an error identified in Problem Report Number 1511. Additionally, for the program ANSYS that was procured from Swanson Associates, action was not found to have been taken to either limit the use or justify the acceptability for use of this program after Westinghouse had been notified of errors by the supplier. Further review of this area indicated that the Westinghouse procedures for computer and system error reporting

and control did not provide for the formal review and documentation of the effect of these errors on on-going and previously approved design calculations.

Within this area of the inspection, four (4) nonconformances were identified (B.1, B.2, B.4, and B.7).

4. Audit of Computer Code Error Reports

In response to an NRC inspection report finding from Inspection Number 99900404/84-01, a supplemental audit, No. SA-84-02, Computer Code Error Report, was performed by Westinghouse. The purpose was to evaluate the QA program for adequacy and implementation in the areas of computer code error identification, notification, evaluation, documentation and control.

The scope of this audit included documentation of identified errors, the notification of users, evaluation of these errors

for impact on past and present applications, and the QA records documenting this process. A total of ten computer codes were reviewed which included codes generated within Westinghouse, such as WECAN, and generated outside of Westinghouse, such as ANSYS and NASTRAN. The audit also included an indepth technical review of error reports on the WECAN computer code.

The NRC inspector reviewed the audit report including the audit findings, observations, recommendations, and corrective action responses from affected departments. Also, the audit checklist which verifies the inclusion of the impact of code errors on the adequacy of design was reviewed.

Within this area of the inspection, no items of nonconformance were identified.

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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. 4

2. TITLE AND SUBTITLE

Licensee Contractor and Vendor Inspection Status Report
Quarterly Report - October 1984 thru December 1984

3. LEAVE BLANK

4. DATE REPORT COMPLETED

MONTH	YEAR
December	1984

5. AUTHOR(S)

6. DATE REPORT ISSUED

MONTH	YEAR
January	1985

7. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

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

October 1984 thru December 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 October 1984 through December 1984. Also included in this issue are the results of certain inspections performed prior to October 1984 that were not included in previous issues of NUREG-0040.

14. DOCUMENT ANALYSIS - a. KEYWORDS/DESCRIPTORS

b. IDENTIFIERS/OPEN-ENDED TERMS

15. AVAILABILITY STATEMENT

Unlimited

16. SECURITY CLASSIFICATION

(This page)
Unclassified

(This report)
Unclassified

17. NUMBER OF PAGES

18. PRICE

U.S. GOVERNMENT PRINTING OFFICE : 1985 O-461-071/41421

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

120555078877 1 IAN1NV
US NRC
ADM-DIV OF TIDC
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