

NUREG-0040
Vol. 21, No. 1

Licensee Contractor and Vendor Inspection Status Report

Quarterly Report
January-March 1997

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation



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Division of Inspection and Support Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001



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ABSTRACT

This periodical covers the results of inspections performed by the NRC's Special Inspection Branch, Vendor Inspection Section, that have been distributed to the inspected organizations during the period from January 1997 through March 1997.

INTRODUCTION

A fundamental premise of the U. S. Nuclear Regulatory Commission (NRC) licensing and inspection program is that licensees are responsible for the proper construction and safe and efficient operation of their nuclear power plants. The Federal government and nuclear industry have established a system for the inspection of commercial nuclear facilities to provide for multiple levels of inspection and verification. Each licensee, contractor, and vendor participates in a quality verification process in compliance with requirements prescribed by the NRC's rules and regulations (Title 10 of the *Code of Federal Regulations*). The NRC does inspections to oversee the commercial nuclear industry to determine whether its requirements are being met by licensees and their contractors, while the major inspection effort is performed by the industry within the framework of quality verification programs.

The licensee is responsible for developing and maintaining a detailed quality assurance (QA) plan with implementing procedures pursuant to 10 CFR Part 50. Through a system of planned and periodic audits and inspections, the licensee is responsible for ensuring that suppliers, contractors and vendors also have suitable and appropriate quality programs that meet NRC requirements, guides, codes, and standards.

The Vendor Inspection Section (VIS) of the Special Inspection Branch reviews and inspects nuclear steam system suppliers (NSSSs), architect engineering (AE) firms, suppliers of products and services, independent testing laboratories performing equipment qualification tests, and holders of NRC construction permits and operating licenses in vendor-related areas. These inspections are done to ensure that the root causes of reported vendor-related problems are determined and appropriate corrective actions are developed. The inspections also review vendors to verify conformance with applicable NRC and industry quality requirements, to verify oversight of their vendors, and coordination between licensees and vendors.

The VIS does inspections to verify the quality and suitability of vendor products, licensee-vendor interface, environmental qualification of equipment, and review of equipment problems found during operation and their corrective action. When nonconformances with NRC requirements and regulations are found, the inspected organization is required to take appropriate corrective action and to institute preventive measures to preclude recurrence. When generic implications are found, NRC ensures that affected licensees are informed through vendor reporting or by NRC generic correspondence such as information notices and bulletins.

This quarterly report contains copies of all vendor inspection reports issued during the calendar quarter for which it is published. Each vendor inspection report lists the nuclear facilities inspected. This information will also alert affected regional offices to any significant problem areas that may require special attention. Appendices list selected bulletins, generic letters, and information notices, and include copies of other pertinent correspondence involving vendor issues.

INSPECTION REPORTS



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 4, 1997

Mr. Roy P. Reindl, Branch Manager
ACCUTECH
A Division of B&G Manufacturing Co. Inc.
3873 W. Oquendo Road
Las Vegas, NV 89118

SUBJECT: NRC INSPECTION REPORT 99901307/96-01 AND NOTICES OF VIOLATION AND
NONCONFORMANCE.

Dear Mr. Reindl:

On January 30, 1997, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the ACCUTECH Division of B&G Manufacturing Co. Inc. The enclosed report presents the results of that inspection.

During this inspection, the NRC inspectors found that certain of your activities appeared to be in violation of NRC requirements. Specifically, contrary to the requirements of 10 CFR 21.21 of the Code of Federal Regulations, you did not perform an adequate evaluation of certain deviations identified by your customers in order to determine their relationship to the conclusions of your previous evaluations and to determine whether any additional notifications were required. You also failed to identify the existence of additional potentially defective material that required an evaluation. In a separate instance, after your evaluation determined the existence of a defect, you failed to notify the NRC within the time limits required by the regulation. The failure to perform an adequate evaluation of potentially reportable conditions is of special concern since it is an essential part of the process that assures that NRC licensees are informed of situations where they may have been supplied with basic components that contain defects which could create a substantial safety hazard.

These violations are cited in the enclosed Notice of Violation (NOV), and the circumstances surrounding the violation(s) are described in detail in the enclosed report. You are required to respond to this letter and should follow the instructions specified in the enclosed NOV when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In addition, the NRC inspectors determined that the implementation of your quality assurance program failed to meet certain NRC requirements imposed on you by your customers. Specifically, for material supplied to the requirements of Section III of the ASME Code, you failed to provide your customers with all of the documentation as required by the ASME Code. Additionally, in at least one instance, your files did not contain documentation to show that all tests required by the material specification had been performed on material obtained from a supplier, or that the supplier of this material had been qualified to the ASME Code requirements.

Further for non-Code material supplied to the requirements of 10 Part CFR 50, Appendix B (Appendix B), the inspectors identified instances where the available documentation did not demonstrate that the material manufacturers had been surveyed and audited in accordance with the requirements of Appendix B. Although ACCUTECH performed limited physical testing of this material, the sampling plan used for this testing did not have a documented basis to demonstrate that this material was equivalent to material purchased from a supplier qualified to Appendix B requirements. The inspectors also determined that, contrary to your QA manual and implementing procedure requirements, there was no evidence to indicate that material and documents acquired from Cardinal Industrial Products as warehouse stock had been reviewed and approved before its sale by ACCUTECH as safety related material.

Additionally, the inspectors identified that you did not initiate a corrective action report for nonconformances described in NRC Report 99901076/94-01. Although the nonconformances were issued to Cardinal Industrial Products, corrective actions, including correspondence with the NRC continued after B&G's acquisition of the company and ACCUTECH continued to supply material using processes (sampling) related to a previously identified nonconformance. This nonconformance (99901076/94-01-03) is considered open and needs additional response from ACCUTECH.

These nonconformances are cited in the enclosed Notice of Nonconformance (NON), and the circumstances surrounding them are described in detail in the enclosed report. You are requested to respond to the nonconformances and should follow the instructions specified in the enclosed NON when preparing your response.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC's Public Document Room (PDR).

Sincerely,

ORIGINAL SIGNED BY

Robert M. Gallo, Chief
Special Inspection Branch
Division of Inspection and Support Programs
Office of Nuclear Reactor Regulation

Docket No. 99901307

Enclosures: 1. Notice of Violation
2. Notice of Nonconformance
3. Inspection Report 99901307/96-01

NOTICE OF VIOLATION

ACCUTECH
Las Vegas, Nevada

Docket No.: 99901307

During an NRC inspection conducted at ACCUTECH's Las Vegas facility on November 12 through 14, 1996, and January 28 through 30, 1997, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violations are listed below:

- A. 10 CFR 21.21, "Notification of failure to comply or existence of a defect and its evaluation," requires, in part, that a director or responsible officer must notify the Commission when he or she obtains information reasonably indicating a defect in a basic component. Notification to the NRC must be made by facsimile or by telephone within two days following the receipt of the information and written notification to the NRC within 30 days following receipt of the information.

Contrary to the above, ACCUTECH, after determining that heat lot TS7 contained defective fasteners, did not notify the NRC within two days of obtaining information of a defect affecting a basic component and did not provide the written notification within the required 30 days of obtaining information of a defect affecting a basic component.

This is a Severity Level IV violation (Supplement VII).
(99901307/96-01-01)

- B. 10 CFR 21.21, "Notification of failure to comply or existence of a defect and its evaluation," requires, in part, that deviations and failures to comply be evaluated in order to identify a reportable defect or failure to comply that could create a substantial safety hazard were it to remain uncorrected.

Contrary to the above, ACCUTECH did not adequately evaluate whether the identified defects in heat lots TS7 and K7 affected the validity of the conclusions documented in the November 1995, Final Report to determine if additional notifications were required. ACCUTECH also did not evaluate available information related to the heat treatment of heat lot K7 to identify the existence of an additional suspect heat lot (M2).

This is a Severity Level IV violation (Supplement VII).
(99901307/96-01-02)

Pursuant to the provisions of 10 CFR 2.201, ACCUTECH, is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington D.C. 20555, with a copy to the Chief, Special Inspection Branch, Division of Inspection and Support Programs, Office of Nuclear Reactor Regulation, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for

for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. However, if you find it necessary to include such information, you should clearly indicate the specific information that you desire not to be placed in the PDR, and provide the legal basis to support your request for withholding the information from the public.

Dated at Rockville, Maryland
this 4th day of March 1997

Enclosure 1

NOTICE OF NONCONFORMANCE

ACCUTECH Division of B&G Mfg. Co., Inc.
Las Vegas, Nevada

Docket No.: 99901307

Based on the results of an inspection conducted on November 12 through 14, 1996, and January 28 through 30, 1997, 1996, it appears that certain of your activities were not conducted in accordance with NRC requirements.

- A. Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50, requires, in part, that measures shall be established to assure that purchased material conforms to procurement documents.

Paragraph NCA-3862.1(b) of Section III of the ASME Code states that "When required chemical analyses (including mill heat analysis), heat treatment, tests, examinations, or repairs are subcontracted, the approved supplier's certification for the operations performed shall be furnished as an identified attachment to the Certified Material Test Report."

Paragraph NCA-3853.3(a) of Section III of the ASME Code states that the Materials Organization shall be responsible for establishing and verifying that the suppliers controls applicable to the activities performed are adequate by surveying and auditing the supplier's established quality program which is consistent with the requirements of this Subarticle or having the supplier perform the activities with controls established by the Material Organization's program.

The following four examples demonstrate ACCUTECH's failure to comply with the requirements and constitute Nonconformance 99901307/96-01-03.

1. Contrary to the above, ACCUTECH's Certified Material Test Report (CMTR) for material supplied to PECO Energy Company (PECO) under Purchase Order (PO) LS 605919, dated January 18, 1996, certified that this material was supplied in accordance with their ASME Quality Systems Certificate (QSC), but did not reference or include the mill heat analysis as an identified attachment.
2. Contrary to the above, ACCUTECH's CMTR for material supplied to PECO under PO LS 607801, dated March 3, 1996, certified that this material was supplied in accordance with their QSC, but did not include or reference the mill heat analysis or certification for heat treatment performed by an approved supplier as identified attachments.
3. Contrary to the above, ACCUTECH's CMTRs for material supplied to Consumers Power Company under PO G 0183280, dated December 7, 1995, and to Entergy under PO MP 96L093, dated November 8, 1995, certified that the material was supplied under their QSC, but did not include or reference reports of mill heat analysis or mechanical testing performed by approved suppliers. Additionally, documentation for

this material did not verify that all tests required to be performed (Macroetch) had been completed.

4. Contrary to the above, for material described in 3, above, ACCUTECH could not provide documentation that organizations supplying this material had quality assurance programs that complied with the requirements of NCA 3800 or with controls established under ACCUTECH's program.

- B. Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50, requires, in part, that measures shall be established to assure that purchased material conforms to procurement documents.

Paragraph 6.1 of ACCUTECH's Quality Systems Manual assigns to QA Department the responsibility for work order review prior to certification and states that, as a minimum, this review shall include verification that customer PO requirements are met and the material conforms to the specification requirements.

Contrary to the above, ACCUTECH's QA Department did not provide adequate verification that material supplied to PECO under their PO LS 606821, dated February 15, 1996, and to Wisconsin Electric Power Co. under their PO 4500021861, dated November 1, 1996, complied with the PO requirements. Specifically, ACCUTECH could not demonstrate that the suppliers of this material had been surveyed and audited to verify their conformance with the applicable provisions of 10 CFR, Appendix B.

Although ACCUTECH performed limited physical testing of this material, the sampling plan used for this testing did not have a documented basis to demonstrate that the material supplied under these POs was equivalent to material purchased from suppliers qualified under the requirements of Appendix B. (Nonconformance 99901307/96-01-04).

- C. Criterion XVI, "Corrective Action" of Appendix B to Part 50 states, in part, "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material, and equipment, and nonconformances are promptly identified and corrected. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management."

ACCUTECH Standard Operating Procedure (SOP) 17.001, "Corrective Action," Revision 5, dated November 15, 1995, states, in part, in Section 3.1 that a failure of the QA program to comply with an approved regulation or commitment (ASME, ASTM, ANSI, MIL-STD etc.), is one of the conditions considered as adverse to quality. Section 3.2 states that conditions adverse to quality may be identified during an Internal Audit, Management Audit, Supplier Audit or by other means. Section 3.3 states that the individual (usually a Lead Auditor or Auditor) identifying what appears to be a condition adverse to quality shall initiate a Corrective Action Report (CAR).

Contrary to the above, ACCUTECH failed to identify two nonconformances described in NRC Inspection Report No. 99901076/94-01, i.e. failures to comply with a regulation (10 CFR 50, Appendix B), as conditions adverse to quality and did not enter them in the corrective action process by initiating a CAR. Although these nonconformances were issued to Cardinal Industrial Products, corrective actions, including correspondence between ACCUTECH and NRC, continued after ACCUTECH's acquisition of Cardinal Industrial Products. (Nonconformance 99901307/96-01-05)

- D. Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR 50, requires, in part, that activities affecting quality be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and that such activities be accomplished in accordance with these instructions, procedures, or drawings.

ACCUTECH Quality System Manual Section 22.0, "Interface Activities for Material and Associated Documentation Which Has Been Legally Transferred From Cardinal Industrial Products Corporation (CIPC) to ACCUTECH. (Note: This material has not been removed from the warehouse facilities or control of ACCUTECH's Quality Assurance Department)," Revision 0, dated November 29, 1995, states, in Section 22.6, that ACCUTECH record packages shall contain CIPC documentation used to justify acceptance of the material.

Standard Operating Procedure (SOP) 22.001, "Transference of Material and Associated Documentation Between CIPC and ACCUTECH," Revision 2, dated November 15, 1995, states, in part, in Section 1.1 that the purpose of the procedure is to "ensure that ACCUTECH materials and documents are properly reviewed and approved prior to acceptance and use by ACCUTECH as Code and safety-related materials." Section 2.2 requires evidence of document review to be recorded on a "Document Review Checklist" form for each ACCUTECH P.O. item reviewed.

Contrary to the above, no documentation existed to verify that ACCUTECH had implemented the requirements of SOP 22.001 since July 1995 and had ensured that material and documents were properly reviewed and approved before material acquired from Cardinal Industrial Products warehouse stock was sold to utilities as ASME Code or safety-related 10 CFR 50, Appendix B. (Nonconformance 99901307/96-01-06)

- E. Criterion V, "Procedures," of 10 CFR Part 50, Appendix B, requires in part that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings

ACCUTECH Standard Operating Procedure (SOP) 17.002, "Reporting of Defects and Noncompliance," Revision 6, dated November 15, 1995, requires the documentation of 10 CFR Part 21 evaluations on SOP Form 17.2.

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Report No: 99901307/96-01

Organization: ACCUTECH Division of B&G Mfg. Co., Inc.
3873 W. Oquendo Road
Las Vegas, Nevada 89118

Contact: Roy P. Reindl, Branch Manager
(702) 739 1966

Nuclear Industry
Activity: Manufacturer and supplier of threaded fasteners,
fittings, flanges, and other items used primarily in
nuclear applications.

Dates: November 12-14, 1996
January 28-30, 1997

Inspectors: Uldis Potapovs, Senior Reactor Engineer
Richard P. McIntyre, Senior Reactor Engineer
Billy H. Rogers, Reactor Engineer

Approved by: Gregory C Cwalina, Chief
Vendor Inspection Section
Special Inspection Branch
Division of Inspection and Support Programs

1 INSPECTION SUMMARY

During this inspection, the NRC inspectors reviewed the implementation of selected portions of B&G Division of ACCUTECH (ACCUTECH) quality assurance (QA) program with emphasis on commercial grade material dedication practices and upgrading of unqualified source material for applications requiring certification to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) requirements. The inspectors also reviewed the implementation of ACCUTECH's program for reporting of defects under Part 21 of Title 10 of the Code of Federal Regulations (10 CFR Part 21). This inspection was a part of an NRC pilot program in the development of inspection procedures for assessing licensee oversight of supplier quality. In that regard, this inspection can be considered as vendor shop follow up of an NRC inspection of PECO Energy Company (PECO).

The inspection bases were:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50)
- 10 CFR Part 21, "Reporting of Defects and Noncompliance"
- ASME Code, Section III, Subarticle NCA 3800.

During this inspection, two violations of NRC requirements were identified and are discussed in Section 3.2.2.c of this report.

During this inspection, five instances where ACCUTECH failed to conform to NRC requirements imposed upon them by NRC licensees were identified. These nonconformances are discussed in Sections 3.2.2.c, 3.3.2, 3.4.3, 3.6, and 3.8 of this report. Also, Nonconformance 99901076/94-01-03 remains open.

2. STATUS OF PREVIOUS INSPECTION FINDINGS

Although this was the first inspection under B&G's ownership of this company (previously Cardinal Industrial Products, Limited Partnership [Cardinal]), inspection findings from the NRC, December 1994 inspection of Cardinal that relate to material currently being supplied by ACCUTECH were reviewed.

2.1 Nonconformance 99901076/94-01-03 (OPEN)

Contrary to Criterion VII of 10 CFR Part 50, Appendix B, Cardinal had not established a documented basis to substantiate that its destructive testing sampling plan for verifying critical characteristics provided reasonable assurance that dedicated commercial grade items (CGIs) met the applicable procurement document requirements.

a. Background

Several exchanges of correspondence took place between the NRC staff, Cardinal, and B&G in 1995. The last letter, dated August 30, 1995, was written after B&G's acquisition of the company and included a rationale for selecting sampling plans for commercial grade item dedication. NRC's acknowledgement of this letter, dated December 5, 1995, stated that, while the rationale presented in the August 30, 1995, letter could be expected to improve the overall assurance of product integrity, it placed heavy reliance on visual and dimensional inspection to assure lot homogeneity. With respect to the acceptability of the proposed destructive sampling plan, the NRC December 5, 1995, letter stated that, for sampling nonhomogeneous product lots, the NRC staff has generally accepted a confidence level of 90-95 % that no more than 5-10 % of the sampled items are nonconforming. It stated further that the destructive sample size and rationale described in the August 30, 1995, letter does not appear to provide this level of confidence for random lots (unverified traceability) of material, especially for the verification of critical characteristics related to the physical properties of materials.

The NRC December 5, 1995, letter also stated that a supplier who certifies his product as complying with 10 CFR Part 50, Appendix B can either supply a product that has been designed and manufactured under the applicable provisions of Appendix B, or supply a dedicated commercial grade item after verifying all of the item's critical characteristics. If verification is based on product sampling, confidence level of the sampling plan should meet the criteria discussed above. The letter further stated that suppliers with dedication programs that do not demonstrate this confidence level for verifying critical characteristics have the option of supplying such material under their licensee approved quality programs, but without certifying compliance with Appendix B.

b. Observations and Findings

The inspectors attempted to verify the sampling plan rationale as described in Cardinal's August 30, 1995, letter. This was done by reviewing the documentation that would support Cardinal's statements concerning visual and dimensional inspection and trending data and the use of this information as a basis for sampling decisions. Cardinal contended that for finished fasteners procured from non-approved/non-audited suppliers, Cardinal performs 100% visual inspection to identify visual discontinuities per the applicable material specification. It further stated that visual inspection can identify mixed fastener lots since different types or size of product markings; product color difference; and different forging indications all could be an indication of a mixed fastener lot. It went on to say that after a product has received a dimensional and visual inspection, the probability of the product complying with the chemical and mechanical requirements are extremely high, based on nonconformance report (NCR) trending data and years of manufacturing and testing of fasteners.

The inspectors reviewed ACCUTECH Standard Operating Procedures (SOP) 4.001, Purchase Order Processing, Revision 8, dated November 15, 1995, and SOP 9.001, Material Receiving Inspection, Revision 12, dated November 15, 1995, to verify that it included appropriate receipt inspection guidance to effectively identify mixed fastener lots that could provide an indication of lot homogeneity. The inspectors determined that SOPs 4.001 and 9.001 did not include any procedural guidance for determining lot homogeneity beyond normal visual inspection and review for manufacturing process defects and shipping damage. Also, several fastener receipt inspection records reviewed did not include any documentation to indicate that visual inspection addressed lot homogeneity and mixed fastener lots. The inspectors also reviewed several Quality Trending Reports for internal and external (vendor) NCRs, but these reports also did not include any specific trending data on fastener testing failures related to sample plans.

In response to inspector questions concerning documentation and control of indicators of lot homogeneity, ACCUTECH stated that they did not have a documented basis to support the information that was previously described to the NRC in Cardinal's August 30, 1995, letter.

c. Conclusions

In conclusion, the inspectors determined that ACCUTECH continues to place heavy reliance on visual and dimensional inspection to support the verification of lot homogeneity. Based upon this method for lot verification of lot homogeneity, ACCUTECH then utilizes the ASTM A-325 shipping lot sampling plan for destructive testing (material chemistry and mechanical properties) and the EPRI guidelines for nondestructive testing (dimensional). The NRC inspectors determined that visual inspection for shipping damage and manufacturing defects can not assure that all items in the same product lot were manufactured from the same heat of material or were heat treated under the same conditions. Additionally, the inspectors noted that, as discussed in Inspection Report 99901076/94-01, the use of ASTM A-325 shipping lot sampling plan is inappropriate for this application.

Based on the above information, Nonconformance 99901076/94-01-03 is considered **Open**, and requires additional response from ACCUTECH to address the original concerns documented in Nonconformance 99901076/94-01-03 and discussed further with the NRC inspectors during the November 1996 inspection.

3. **INSPECTION FINDINGS AND OTHER COMMENTS**

3.1 Description of Facilities and Activities

B&G Manufacturing Co., Inc. (B&G) purchased the name and certain assets of Cardinal on July 10, 1995, and operated the acquired company as Cardinal Industrial Products Division of B&G (B&G-Cardinal) until

December 1995, when they renamed it ACCUTECH. The transition included acquisition of some new production equipment, upgrading of in-house heat treatment capability, and changes in company management.

According to ACCUTECH management, standard fasteners (ASTM/ASME) constitute about 80% of the company's product line. Specialty fasteners account for 10% of the product volume and standard material forms (plate, flanges) make up the remaining 10%. ACCUTECH has been accredited by the ASME as a Materials Organization (MO). Their ASME Quality Systems Certificate (QSC) expires on January 9, 1999.

3.2 10 CFR Part 21 Program

3.2.1 Implementing Procedure

The inspectors reviewed ACCUTECH SOP 17.002, "Reporting of Defects and Noncompliance," Revision 6, dated November 15, 1995, and representative documentation to verify implementation. Procedure 17.002 established the responsibilities and actions for the reporting of defects and informing of deviations in accordance with the requirements of 10 CFR Part 21. The inspectors reviewed procedure 17.002 to determine whether the weaknesses identified during the previous inspection and documented in Inspection Report 99901076/94-01, had been adequately addressed.

Inspection Report 99901076/94-01 identified that procedure 17.002 did not contain provisions to inform customers of deviations that Cardinal could not evaluate. This weakness was addressed in Revision 6 of procedure 17.002, paragraph 2.4.3, which stated that, in the cases when ACCUTECH could not determine if a significant safety hazard exists, the Quality Assurance Manager should notify all affected customers within five working days.

Inspection Report 99901076/94-01 identified that procedure 17.002 did not contain provisions for documentation of evaluations to determine whether a deviation was a defect. This weakness was addressed in Revision 6 of procedure 17.002, paragraphs 2.2, 2.3, 2.4.1, 2.4.2, and 2.7, which required that deviations be documented on form CF 17.2 and reviewed by the Quality Assurance Manager to determine whether a substantial safety hazard existed, or whether the deviation information should be provided to the customer for evaluation.

Inspection Report 99901076/94-01 identified that procedure 17.002 did not contain provisions to notify the NRC when a defect was determined to exist. This weakness was addressed in Revision 6 of procedure 17.002, paragraph 2.4.2, which required that the NRC be notified within two days by telefax and thirty days in writing when ACCUTECH had evaluated a deviation and determined that a substantial safety hazard existed.

The inspectors concluded, for the weaknesses discussed above, that the applicable revisions to procedure 17.002 had addressed the weaknesses and had adequately proceduralized the requirements of 10 CFR Part 21.

In addition, Inspection Report 99901076/94-01 identified that procedure 17.002 interchanged the terms "defect" and "deviation" in several places. The inspectors determined that this weakness had not been completely addressed in Revision 6 of procedure 17.002. There were two instances where the term defect (or defective) was used in place of the appropriate term, deviation. Paragraph 2.3 stated "when an employee is aware of defective material which has been shipped to a customer, he shall complete form CF 17.2 and submit one copy to the following: Branch Manager and Quality Assurance Manager." As stated in 10 CFR Part 21, a defect results from an evaluation of a deviation. An employee could become aware of material containing a deviation which would require evaluation by ACCUTECH management, or the customer, to determine if a defect exists. Additionally, paragraph 2.4.1 stated, "In cases where the defect does not create a substantial safety hazard...." By the 10 CFR Part 21 definition, a defect can create a substantial safety hazard, and the correct term in the context of paragraph 2.4.1 is deviation. The inspectors concluded that this revision had partially address the weakness identified in Inspection Report 99901076/94-01 and a weakness still existed concerning the correct use of the terms deviation and defect. This was discussed with ACCUTECH management who indicated that this issue would be addressed in a subsequent revision of procedure 17.002.

3.2.2 Part 21 Program Implementation

a. Background

In the following discussion Cardinal is used to refer to the pre-July 10, 1995, business and B&G-Cardinal or ACCUTECH are used to refer to the B&G owned business as applicable to the particular activities, correspondence, or documentation reviewed.

ACCUTECH had performed several 10 CFR Part 21 evaluations, all related to a single topic, during the period since the previous NRC inspection of Cardinal in 1994. The subject of the 10 CFR Part 21 evaluations was the failure of certain ASME SA-193, Grade B7 (B7) fasteners, of various sizes, to meet the required mechanical specifications. The failures to meet specifications were determined to be due to inadequate heat treatment, performed during the production of the fasteners, which had occurred during the time period prior to B&G's purchase of Cardinal on July 10, 1995.

ACCUTECH used Heat Numbers, Trace Codes, and Heat Codes to provide traceability of the fasteners it manufactured, as follows: When ACCUTECH purchased raw material from the manufacturing mill, the material was received with a mill assigned Heat Number which identifies a specific melt of the material with uniform chemical properties. ACCUTECH assigned a Trace Code to the first heat lot of a particular sized fastener manufactured from this material. ACCUTECH used the same Trace Code, combined with a Heat Code, for additional heat lots of the fastener manufactured from the same material (each additional heat lot was assigned a unique Heat Code). As a result, the fasteners size,

Trace Code and Heat Code uniquely identified the material that a fastener was produced from and during what furnace operation a fastener was heat treated.

b. Identification of Defective and Suspect Heat Lots of Cardinal Manufactured B7 Fasteners

The inspectors reviewed the ACCUTECH 10 CFR Part 21 evaluations performed in accordance with ACCUTECH Standard Operating Procedure (SOP) 17.002, "Reporting of Defects and Noncompliance," Revision 6, dated November 15, 1995, including representative documentation, to verify implementation of the requirements of 10 CFR Part 21.

Shortly after the July 1995, B&G acquisition of Cardinal, the Duquense Light Company (Duquense) informed B&G-Cardinal that one of two B7 capscrews, purchased from Cardinal, had failed during the performance of acceptance testing and, when an additional three specimens were tested, one failed the tensile test. In July 1995, Duquense witnessed additional testing at B&G-Cardinal of four fasteners during which one failed the tensile test. In addition, an August 15, 1995, letter from Metallurgical Testing Corporation to B&G-Cardinal, which documented a metallurgical examination of the failed fasteners, discussed possible causes of the fastener failures and identified inadequate heat treatment as a likely cause.

B&G-Cardinal generated an internal document on August 29, 1995, form CF 17.2, "Reporting Defects and Noncompliance 10 CFR Part 21," which noted the improper heat treating of heat lot TU1 where the center of the heat charge had apparently not reached heat treatment temperature. This was evaluated, determined to be a defect, and to be reportable to the NRC. Supporting documentation identified the customers, which included eight licensees. B&G-Cardinal followed with an August 29, 1995, letter to the NRC which identified three heat lots S4, S5, and TU1 as being defective, indicated that all customers had been notified, and indicated that a complete report would be provided to the NRC within 60 days. B&G-Cardinal issued letters on August 30, 1995, to all affected customers informing them that they had been supplied fasteners from a heat lot which contained defective product (heat lots S4, S5, and TU1). In addition, on September 5, 1995, B&G issued letters to the affected customers, reiterating that defective heat lots existed and that B&G intended to investigate and appraise the customers of the results. On September 11, 1995, B&G-Cardinal issued a letter to the NRC which summarized previous events concerning the three defective heat lots (heat lots S4, S5, and TU1), stated that all affected customers had been notified, and that all B7 inventory was on hold and being tested.

On September 11, 1995, B&G-Cardinal issued letters to all affected customers addressing a fourth heat lot, TS1, that contained defective product. On September 12, 1995, B&G issued a letter to all affected customers of heat lot TS1, reiterating that the defective heat lot existed and that B&G intended to investigate and appraise the customers of the results. On September 12, 1995, B&G-Cardinal issued a letter to

the NRC which identified the additional affected heat lot TS1, for a total of four affected heat lots and identified the customers which had received material from the four affected heat lots.

On September 26, 1995, B&G-Cardinal issued a letter to the NRC which identified five additional suspect heat lots of B7 fasteners (Q5, CX1, TU2, L6, and TU1 (this is an additional heat lot, of different sized fasteners, than the TU1 listed in the August 29, 1995, ACCUTECH letter)). The letter indicated that all customers had been notified, and indicated that a complete report would be provided to the NRC within 60 days. On September 29, 1995, B&G issued a letter to all affected customers notifying that they had been supplied fasteners from a heat lot suspected of containing defective product (for the fifth through ninth heat lots Q5, CX1, TU2, L6, and TU1).

On November 21, 1995, B&G issued a letter to NRC, containing the ACCUTECH Final Report, which discussed the heat treatment concerns, immediate action, investigation, findings, conclusions, and summary. The Final Report documented the extensive testing and analysis that ACCUTECH had performed to determine the cause of the defective B7 fasteners and to bound the concern. ACCUTECH had performed a sequence of tests in which twenty-two fastener heat lots, representative of earlier Cardinal productions heat lots, were heat treated and then tested for applicable mechanical properties. Six of the twenty-two test heat lots produced fasteners with unacceptable properties. The main process variables affecting the heat treatment were determined to be the total weight of the furnace charge, packing density of the material being heat treated, and the time at the required temperature. The larger the weight and density of the fastener heat lot and the shorter the length the of heating time, the more likely the fastener heat lot would contain fasteners which exhibited unacceptable mechanical properties. ACCUTECH then took the weight/heat-time combinations of the failed test heat lots, compared the information with Cardinal production heat lots, and determined that an additional five Cardinal production heat lots of B7 fasteners were potentially defective (suspect). The five heat lots identified as suspect (TU1, Q5, CX1, TU2, and L6) had been addressed earlier in the September 26, 1995, B&G-Cardinal letter to the NRC and the September 29, 1995, letter to the applicable customers. In addition, the report indicated that B&G-Cardinal believed that the problem of substandard fasteners did not extend beyond the heat lots of B7 fasteners identified as defective or suspect, including any other materials heat treated by Cardinal. The report also indicated that this conclusion could not be guaranteed and that the customer should consider replacing fasteners from the identified heat lots and consider testing other heat lots as necessary. On February 5, 1996, B&G issued a letter, which provided the B&G final report to all affected customers of the identified heat lots (through November 1995).

On March 22, 1996, ACCUTECH received information from Washington Public Power Supply System (WPPSS) which indicated that WPPSS had determined that defective material had been provided to them from a heat lot which had not been included in the final report as defective or suspect (heat

lot TS7). ACCUTECH had previously removed heat lot TS7 from inventory, but had some of the removed material still on site. In addition, material from another heat lot, K7, which had also been removed from inventory was still on site. ACCUTECH tested both heat lots, TS7 and K7, and determined that some items, in both heat lots, did not meet specification. ACCUTECH notified the NRC of the defective heat lots TS7 and K7 by letter dated May 8, 1996.

In addition, during the January 1997, NRC inspection, ACCUTECH identified an additional heat lot, M2, which had been heat treated as a part of the same furnace charge as heat lot K7. Subsequent to the completion of the inspection, ACCUTECH filed a 10 CFR Part 21 report to the NRC which provided notification of the suspect heat lot M2.

During the NRC inspection, ACCUTECH indicated that, as part of the corrective action process, all B7 fasteners heat treated by Cardinal, had been removed from ACCUTECH inventory shortly after Duquense had informed ACCUTECH of the defective B7 fasteners.

c. Control of the Heat Treatment Process

The inspectors reviewed the available furnace logs, temperature recorder charts, and Cardinal heat treating procedure, SOP 18.001 Rev. 6, dated December 6, 1994, "Heat Treating," as a part of an assessment of ACCUTECH's final report, "Investigation and Analysis of Suspect Fasteners," dated November, 1995. Furnace records were available for the last five years of operation of the heat treating furnace. During that time 1,418 separate furnace charges were processed. The operations included quenching and tempering, stress relieving, age hardening and solution annealing. Materials included carbon and medium carbon alloy steels, precipitation hardenable materials, and austenitic and martensitic stainless steels.

Review of SOP 18.001 indicated that this procedure provided very little guidance on the operation of the heat treating oven. Specifically, there were no instructions to control the material charge size and distribution in the furnace, or thermocouple location with respect to the furnace charge. As demonstrated by ACCUTECH's investigation, these variables can have a significant effect on the heat treatment results. Inadequate or inconsistent control of these variables would tend to significantly expand the bounding load density and furnace time limits established by the investigation (conducted under controlled conditions) to include heat lots not previously reported. The probability that inadequate process controls existed is supported by the situations discussed above where defective fasteners were identified from heat lots that were considered acceptable based on ACCUTECH's investigation.

The inspectors also noted that a significant amount of austenitic stainless steel was solution annealed in the furnace during this time period. While this material was not specifically addressed in ACCUTECH's investigation, a review of furnace logs and heat treatment charts showed some instances where the charge characteristics and

furnace times similar to those considered suspect in ACCUTECH's assessment of alloy steel fasteners were also recorded for solution annealing treatment of stainless steel fasteners. Under these conditions, if some fasteners did not reach the solution annealing temperature, they could become severely sensitized as a result of the heat treatment cycle and, therefore, be highly susceptible to intergranular corrosion. There was no physical evidence to indicate that improper solution annealing had actually occurred.

d. Conclusions

- Failure to Inform the NRC of a Defect In the Required Time
Heat lot TS7 was evaluated and determined to contain a defect as documented on the ACCUTECH Form 17.2, which was approved by the Branch Manager on March 28, 1996. However, the NRC was not notified by facsimile or telephone within two days as required by ACCUTECH SOP 17.002 and 10 CFR Part 21.21(c)(3). In addition, the written notification was not sent by ACCUTECH to the NRC until May 8, 1996 (41 days after the ACCUTECH Form 17.2 evaluation) which does not meet the requirements of ACCUTECH SOP 17.002 or 10 CFR 21.21(c)(3) which require the written notification be provided to the NRC within 30 days. The inspectors concluded that the ACCUTECH had failed to notify the NRC within two days of the responsible officer obtaining the information of a defect affecting a basic component and had failed to provide the written notification within the 30 days of the responsible officer obtaining information of a defect affecting a basic component, as required by 10 CFR 21.21. Failure to notify within two days and provide written notification within 30 days was identified as a violation of 10 CFR Part 21. (Violation 99901307/96-01-01)
- Failure to Adequately Evaluate Heat Lot TS7
During discussion with the NRC inspectors, ACCUTECH indicated that the failures of heat lot TS7 were possibly due to commingling of non-heat treated fasteners with heat treated fasteners. This conclusion was based on the weight and length of heat treatment of the fasteners being well outside the bounds of suspect fasteners established by the test documented in the November 1995 Final Report. However, the April 1, 1996, WPPSS letter to ACCUTECH reporting the defective fasteners of heat lot TS7 indicated that, subsequent to the mechanical test performed on the defective fastener, a metallurgical examination of a defective fastener had confirmed that the fastener had been inadequately heat treated. In addition, the inspectors concluded that ACCUTECH had not adequately evaluated whether the identified defects in heat lot TS7 could affect the validity of conclusions documented in the Final Report where the weight and length of heat treatment boundaries for suspect heat lots had been established, and to determine if any further review of the earlier research was required. The failure to perform an adequate review of heat lot TS7 was identified as a violation of 10 CFR Part 21. (Violation 99901307/96-01-02)
- Failure to Adequately Evaluate Heat Lot K7 and Identify Heat Lot M2
The production heat lot K7 had been modeled as one of the test heat lots

used to establish the weight and heat treatment boundaries documented in the Final Report. The test heat lot modeled after heat lot K7 had not produced any defective fasteners and, therefore, heat lot K7 had not been reported earlier as a suspect heat lot. ACCUTECH had not documented any evaluation activities for heat lot K7, as discussed above, and also indicated during the inspection that ACCUTECH had not reviewed the contradictory situation of the existence of a "good" test charge modeled after a production heat lot later determined to contain defective material (heat lot K7). In addition, during the NRC inspection, the ACCUTECH review of the K7 furnace records indicated that an additional heat lot had been heat treated in the same furnace charge as heat lot K7. ACCUTECH indicated that the additional heat lot, M2, would also be considered suspect, since it had been heat treated together with the known defective heat lot, K7. On January 31, 1997, subsequent to the completion of the NRC inspection, ACCUTECH notified the NRC of the suspect heat lot M2 by facsimile. The inspectors concluded that ACCUTECH had performed an inadequate review of the heat lot K7 defect as indicated by ACCUTECH failing to identify the additional suspect heat lot M2. The failure to perform an adequate review of heat lot K7 was identified as an additional example of Violation 99901307/96-01-02.

- Failure to Document the K7 Evaluation in Accordance With Procedure
The evaluation of heat lot TS7 had been documented on SOP Form CF 17.2, dated March 28, 1996, however no form CF 17.2 was on file documenting the evaluation of heat lot K7. The inspectors concluded that although ACCUTECH had performed an evaluation of heat lot K7, (based on the notification of the defect), ACCUTECH had failed to document the evaluation in accordance with ACCUTECH SOP 17.002, which was identified as a Nonconformance to Criterion V, "Procedures," of 10 CFR Part 50, Appendix B. (Nonconformance 99901307/96-01-07)

3.3 Material Supplied under ASME Code Rules

3.3.1 Procedural Controls

The controls for processing orders for material supplied under the rules of the ASME Code are described in ACCUTECH's Quality Systems Manual (QSM), which had been reviewed and accepted by the ASME. Second Edition, Revision 0 of this manual, dated 11/29/95, was in effect at the time of this inspection. SOPs supplement various sections of the manual.

3.3.2 Implementation Review

The inspectors selected a sampling of purchase orders from NRC licensees (emphasis on material supplied to PECO) for ASME Code material that ACCUTECH had processed within the last year. The documented bases for compliance with the applicable ASME Code requirements in the processing of these orders were reviewed with significant observations summarized below:

- PECO Purchase Order (PO) LS 605919, dated January 18, 1996, for forty four 1 1/4 inch by 8 inches long ASME SA-193, grade B7 bolts in accordance with the requirements of Section III of the ASME Code, 1992 edition.

ACCUTECH supplied this material under their ASME (QSC) and provided a Certified Material Test Report (CMTR) and a Certificate of Compliance (COC). The CMTR contained transcribed ladle analysis results for this material as well as mechanical property test results and heat treatment description. Review of supporting documentation indicated that ACCUTECH obtained the starting material in the form of cold finished SA-193 bars from Republic Steel Co., an approved vendor. ACCUTECH heat treated the material and performed two sets of chemical analyses, impact tests and tensile tests. Review of documentation supplied to PECO indicated that ACCUTECH failed to include the mill heat analysis in documents provided to the customer. Paragraph NCA 3862.1 of Section III of the ASME Code requires that certifications for subcontracted chemical analyses, including melting mill heat analyses, heat treatment, tests, and examinations to be furnished as an identified attachment to the CMTR.

Section 6.9, "Control of Certifications" of the ACCUTECH QSM requires that CMTRs include the actual results of chemical and mechanical attributes, description of heat treatment, and nondestructive examination reports. It does not require, however, that mill heat analysis reports provided by approved suppliers be included with the CMTR. ACCUTECH staff acknowledged that their standard practice was to provide the original mill heat analysis reports only when specifically requested by the customer. Failure to provide all of the documentation required by Paragraph NCA 3862.1 of Section III of the ASME Code was identified as Nonconformance 99901307/96-01-03.

- PECO Purchase Order LS 607801, dated March 28, 1996, for twenty 1/2-13 by 2 1/4 inches long ASME SA-193, grade B7 bolts in accordance with ASME Code, Section III, Class 2.

ACCUTECH supplied this material in accordance with their QSC and provided a CMTR and a COC. The CMTR contained identification of the item supplied, transcribed ladle analysis, check analysis, tensile properties, description of the heat treatment performed, QSC number, and statement certifying compliance with the applicable requirements. The COC contained identification of the item supplied, ACCUTECH's QSC number and certified compliance with the PO requirements, including 10 CFR Part 21 and 10 CFR50, Appendix B. The COC also described the heat treatment performed and certified that satisfactory macroetch test had been performed, visual inspection conducted per SOP 11.002, Rev. 9 (report attached) and that no welding had been performed on this material.

ACCUTECH (then Cardinal) purchased the starting material, cold finished SA-193, grade B7 bar on September 25, 1990, from Republic Steel Co., an approved supplier. On August 27, 1993, Cardinal issued a purchase order to Rooke Manufacturing, an approved supplier, to cut and hot-head this material and, on the same date, issued a purchase order to Phoenix Heat Treating, an approved supplier, to normalize, harden and temper the hot headed blanks to SA-193 requirements. Cardinal then performed 2 tensile tests on this lot of material.

The inspectors noted that, contrary to the ASME Code requirements, neither the mill heat analysis report nor Phoenix Heat Treatment certification were furnished as attachments to ACCUTECH's CMTR that was provided to PECO. This was identified as an example of Nonconformance 99901307/96-01-03.

- Consumers Power Company Purchase Order G 0183280, dated December 7, 1995, for 100, 1/2-13, SA-194, grade 2H nuts to the requirements of ASME Code, Section III, Class 1, 1989 Edition with 1990 Addenda.

and

- Entergy Purchase Order MP 96L093, dated November 8, 1995, for 76, 1/2-13, SA-194, grade 2H nuts to the requirements of ASME Code, Section III, NB.

ACCUTECH supplied this material from existing stock. The nuts used to fill this order were from the same heat of material, and had the same manufacturing history, as discussed in Paragraph 3.4.3 of this report under Wisconsin Electric Power Co. Purchase Order 4500021861.

ACCUTECH certified the material for the above procurements as being provided in accordance with their ASME QSC. The certifications did not indicate that the material was supplied as "size excluded," therefore all of the NCA quality requirements were considered applicable for these procurements. The inspector noted that the mill heat analyses and mechanical test certifications by approved suppliers were not included with, or referenced on ACCUTECH's certification and that there was no evidence in the document package that a macroetch test was performed on the source material as required by ASME SA-194. The inspector also noted that there was insufficient documentation (audit reports) to demonstrate that the suppliers of this product were qualified to the requirements of NCA 3800.

Failure to provide adequate documentation to demonstrate compliance with NCA 3800 and with the applicable requirements of the material specification was identified as an example of Nonconformance 99901307/96-01-03.

3.4 Non-Code Material Supplied Under 10 CFR Part 50, Appendix B.

3.4.1 Procedural Controls

ACCUTECH's controls for processing non-Code material that is to be supplied under the rules of 10 CFR Part 50, Appendix B are described in Addenda No. 1 to its ASME QSM described above. According to ACCUTECH, the intent of this Addenda is to modify sections of its QSM to assure compliance with 10 CFR 50, Appendix B, ANSI N 45.2, ANSI/ASME NQA-1 and other quality related standards as it applies to non-Code items. SOPs are used to supplement the controls described in Addendum 1 to the QSM. For example, ACCUTECH's commercial grade item (CGI) dedication program is described in SOPs 4.001, 9.001, 10.010, 11.001, and 11.002.

3.4.2 Use of Sampling in the Dedication Process

a. Observations and Findings

As part of the review of Open Nonconformance 99901076/94-01-03, (previously described in Section 2.1), the inspectors reviewed the current sample plan methodology as part of the commercial grade dedication process in place at ACCUTECH. The inspectors determined that it is basically the same process that was reviewed during the NRC's December 1994 inspection at Cardinal, in that it places heavy reliance on visual and dimensional inspection to support the verification of lot homogeneity. No additional controls had been implemented in the ACCUTECH QA program to support the sampling process rationale described in Cardinal's August 30, 1995, letter. In fact, the nondestructive dimensional inspection sampling plan described in Section 3.13.1 of revision 8 of SOP 4.001, which references the EPRI guidelines, is actually less conservative than the sampling plan reviewed (Revision 6 of Cardinal Standard Practice 4.001) during the December 1994 inspection.

ACCUTECH representatives stated that they did not have a documented basis to support the information that was previously described to the NRC in the August 30, 1995, letter concerning sampling. ACCUTECH had recently written a "white paper" that described proposed changes to the ACCUTECH sample plan methodology for testing and examination. This document was dated November 7, 1996, but had not as yet been implemented as part of the ACCUTECH QA program. The inspectors did not review this document during the inspection since it had not been approved and implemented as part of the QA program and did not reflect the process for the dedication activities that were reviewed.

b. Conclusions

The inspectors determined that ACCUTECH places heavy reliance on visual and dimensional inspection to support the verification of lot homogeneity. Based upon this method for verification of lot homogeneity, ACCUTECH then utilizes the ASTM A-325 shipping lot sampling plan for destructive testing (material chemistry and mechanical

properties) and the EPRI guidelines for nondestructive testing (dimensional). The inspectors determined that visual inspection for shipping damage and manufacturing defects can not assure that all items in the same product lot were manufactured from the same heat of material or were heat treated under the same conditions and that, as discussed in Inspection Report 99901076/94-01 and related correspondence, the use of ASTM A-325 shipping lot sampling plan is inappropriate for this application.

Nonconformance 99901076/94-01-03 is considered Open, and requires additional response from ACCUTECH to address the original concerns documented in this nonconformance and discussed further with the NRC inspectors during the November 1996 inspection.

3.4.3 Implementation Review

The inspectors selected a sampling of recent POs from NRC licensees (emphasis on material supplied to PECO) for non-Code items ordered to the quality requirements of 10 CFR Part 50, Appendix B. The documented basis for compliance with the applicable Appendix B and customer PO requirements were reviewed with significant observations summarized below:

- PECO Purchase Order LS 606821, dated February 15, 1996, for twenty four 7/8-9 by 2 1/4 inches long ASTM A-325 bolts.

ACCUTECH's certification for this material included heat number identification, transcribed ladle analysis, description of the heat treatment, hardness test results, and certification that this material was manufactured in accordance with ACCUTECH's QSM, Second edition, Revision 0, Addenda 1, and that the material supplied complies with the PO requirements.

ACCUTECH drew this material from existing stock of 7/8-9 by 7 1/4 inch bolts, performed chemical analyses and hardness tests on two samples, and cut the required number of bolts to the 2 1/4 inch length specified in the PO. ACCUTECH (then Cardinal) had purchased the bolts from Mitsuboshi Sangyo Co. Ltd., who obtained the starting material from Azuma Steel Co., Chiba, Japan. The inspector noted that the Azuma CMTR was dated November 19, 1980, but contained a typed statement that the material was manufactured and supplied in accordance with Azuma Steel Co. QA program that had been surveyed and approved by Cardinal on April 1, 1982. ACCUTECH staff could not explain the apparently erroneous date or dates on the Azuma CMTR and could not produce an audit report to indicate if or when an audit of Azuma Steel Company was performed. The inspector noted that, if the steel was produced in November of 1980, Cardinal did not have adequate assurance that the steel manufacturing process complied with a quality assurance program that they approved in April, 1982.

The inspector further noted that the limited testing performed by ACCUTECH (two hardness tests and two chemical analyses) did not provide an adequate basis for certifying this material as conforming to the requirements of 10 CFR 50, Appendix B.

Subsequent to the first phase of the NRC inspection, ACCUTECH issued Shop Order PC 327982 for additional inspections consisting of two hardness tests, two proof load and wedge tests, and two chemical analyses on samples from 3/2" bolts from the same heat lot which remained in stock. The results from these tests (satisfactory) were included in a supplemental certification issued to PECO on December 26, 1996. Failure to provide documented basis that material certified as conforming to the requirements of 10 CFR Part 50, Appendix B actually conforms to these requirements was identified as Nonconformance 99901307/96-01-04.

- Wisconsin Electric Power Co. Purchase Order 4500021861, dated November 1, 1996, for 100 1/2-13 SA-194, Grade 2H heavy hex nuts.

ACCUTECH supplied this material from existing stock. ACCUTECH (then Cardinal) had purchased the nuts from Unytite Fastener Mfg. Co. Ltd., Akashi Factory, Japan, who apparently obtained the starting material from Kobe Works, Kobe Steel Ltd. through a supplier, Mitui-Unitaito-Nishikobe. Kobe issued a "Mill Sheet" for the starting material on June 30, 1984. The only pertinent information appearing on the mill sheet was the heat number (KC8972), material specification (KCH45KT-W), and chemical analysis. A stamp on the mill sheet indicated that it had been accepted by Unytite on July 10, 1984. Unytite issued an "Inspection Certificate" on the finished product (252,717 nuts) on June 18, 1984, apparently before they received the mill sheet from Kobe and apparently before the acceptance of this document by Unytite. This certificate identified the material by a heat number traceable to the Kobe mill sheet and a lot number. It contained the results of chemical analysis (transcribed from the Kobe mill sheet), and indicated that five proof load, cone stripping, and hardness tests had been performed with satisfactory results. The certificate contained a quality program statement stating that the material was produced in accordance with Unytite's QA program M-00 Rev. 4, dated April 14, 1983, that had been reviewed and accepted by Cardinal on October 7, 1983. The file also contained a letter from Kobe Steel, Ltd., stating that material heat KC8972 had been produced in accordance with Kobe QA program, Rev. 6, dated January 20, 1983, that had been surveyed and approved by Cardinal on October 6, 1983.

ACCUTECH supplied this material as having been manufactured in accordance with the current edition of their their QA manual and 10 CFR Part 50, Appendix B.

The inspector identified the following concerns with the documentation described above:

- a) None of the documentation reviewed provided verification that the starting material produced by Kobe Steel Co. complied with the internal quality requirements of the applicable material specification (SA-194). Specifically, SA-194 requires a macroetch test in accordance with ASTM E-381 on each bar lot produced by the supplying mill. The Kobe mill sheet contained no reference to indicate that the material met the requirements of SA-194, and the Unityte inspection certificate did not contain any reference to a macroetch test.
- b) Unityte apparently received the starting material from Kobe Steel and completed their manufacturing and testing activities before receiving Kobe's mill sheet for this material.
- c) ACCUTECH could not produce reports of Cardinal's surveys or their bases for accepting the validity of such surveys of either Unytite or Kobe which would have approved these companies as qualified suppliers.

This item was identified as an example of Nonconformance
99901307/96-01-04

3.5 Nuclear Utilities Procurement Issues Committee (NUPIC) Audit of ACCUTECH

The inspectors reviewed the Comanche Peak Steam Electric Station TU Electric (TUE) QA Audit Report QAA-96-010 of ACCUTECH dated May 23, 1996. The audit, conducted April 29 through May 2, 1996, was led by TUE and performed in accordance with the requirements of the TUE QA program, under the auspices of NUPIC. The audit also included representatives of Iowa Electric Services, Houston Light and Power, and Northern States Power.

The inspectors reviewed the applicable sections in the TUE audit report that addressed the issues from NRC Inspection Report No. 99901076/94-01, commercial grade dedication and sampling relating to commercial grade dedication. It appears that the audit reviewed the applicable portions of the ACCUTECH program as it relates to sampling as part of commercial grade dedication, however, the audit describes the process just as Cardinal/ACCUTECH letters described it to the NRC after the 1994 inspection. It does not appear that the NUPIC audit verified or attempted to verify the ACCUTECH basis for the sampling plans utilized for destructive and nondestructive testing.

Also, when reviewing the documentation on the NUPIC audit checklist, the inspectors did not identify any evidence that the auditors reviewed ACCUTECH's rationale for verifying lot homogeneity for finished fasteners that are purchased from nonapproved suppliers. This method, in turn formulates the basis for ACCUTECH's selection of the CGI sampling plans.

In conclusion, the inspectors determined that the NUPIC audit did not address the ACCUTECH basis for their rationale for verification of lot homogeneity for finished fasteners that are purchased from nonapproved suppliers. Also, the audit apparently did not review the adequacy of documentation included with ACCUTECH's CMTRs for safety-related material supplied to licensees under the rules of the ASME Code (See section 3.3 of this report).

3.6 Corrective Action Activities

The inspectors reviewed QSM Section 17, "Corrective Action," Revision 0, dated November 29, 1995 and SOP 17.001, "Corrective Action Report," Revision 5, dated November 15, 1995. The purpose of the SOP is to establish a method of identifying and establishing the responsibilities for initiating, processing, and resolving internal or external Corrective Action Reports (CARs).

Section 3.1 of SOP 17.001 lists a failure of the QA program to comply with an approved regulation or commitment (ASME, ASTM, ANSI, MIL-STD etc.), as one of the conditions that defines conditions adverse to quality. Section 3.2 states that conditions adverse to quality may be identified during an Internal Audit, Management Audit, Supplier Audit or by other means. NRC Inspection Report No. 99901076/94-01 identified two instances (as Nonconformances) where Cardinal/ACCUTECH failed to meet the requirements of 10 CFR Part 50, Appendix B. These NRC Nonconformances appear to meet the threshold as a "condition adverse to quality" as defined in SOP 17.001 but were not entered into the corrective action process through the initiation of a CAR.

When the inspectors requested to review the CARs written to address the NRC Nonconformances, ACCUTECH stated that CARs were not written for the evaluation and disposition of the two NRC findings. Therefore, nothing had been documented by ACCUTECH to support the information described in the various letters submitted to the NRC in response to the two Nonconformances, beyond the letters themselves. This made it difficult to review the actions to prevent recurrence for Nonconformance 99901076/94-01-04 described in Cardinal's January 30, 1995 letter.

ACCUTECH's failure to identify the two NRC Nonconformances as conditions adverse to quality i.e. failures to comply with a regulation (10 CFR 50, Appendix B), and enter them into the corrective action process through the initiation of CARs, as required by SOP 17.001, was identified as Nonconformance 99901307/96-01-05.

3.7 Trending Activities at ACCUTECH

The inspectors reviewed SOP 16.006, "Trending," Revision 1, dated November 15, 1995. The purpose of this procedure is to establish a method of identifying and recommending appropriate action for quality trending activities at ACCUTECH. This process produces a Quality Trend Report that provides details of the number and disposition of External Nonconformance Reports and percentage of rejection of items received by suppliers; Internal Nonconformance Reports, by source; customer returns; status of open Nonconformance Reports; and a QC Production Log. The Quality Trend Report also includes information on customer inquiries and an internal performance report breakdown that is used

to identify any problem areas. These reports are issued by the QA manager as a minimum of every six months, but were closer to being issued on a monthly basis.

A review of Quality Trend Reports for the last three years indicated that the trending program for ACCUTECH supplied products and material/items received from vendors is effective in providing valuable information to the quality, technical, and manufacturing departments concerning the status of the QA program and important trends in the overall quality process at ACCUTECH. However, when reviewing the corrective actions for Nonconformance 99901076/94-01-03, the inspectors did not identify any objective evidence in the Quality Trend Reports to support the correlation of trending data of NCRs to the selection of testing and inspection sample plans as described in ACCUTECH's August 30, 1995, letter concerning the sample plan nonconformance.

3.8 ACCUTECH Use of Cardinal Industrial Products Warehouse Inventory

a. Inspection Scope

The inspectors reviewed SOP 22.001, "Transference of Material and Associated Documentation Between CIPC and ACCUTECH," Revision 2, dated November 15, 1995, to determine the process used by ACCUTECH to verify that warehoused material inherited from the previous owner, Cardinal, would meet the current QA program material qualification requirements for supply as ASME Code and safety-related materials. The purpose of SOP 22.001 is to ensure that materials and documents are properly reviewed and approved prior to use by ACCUTECH as ASME Code and safety-related materials.

b. Observations and Findings

The inspectors were told by ACCUTECH that this procedure was originally implemented in 1985 to handle bankruptcy proceedings material sales and was not really intended for regular program implementation. However, during review of various material data packages during the inspection, the inspectors determined that the process described in SOP 22.001, including use of the Document Review Checklist, was still being implemented until approximately June 1995. B&G assumed control of Cardinal in July 1995.

The inspectors requested material documentation data packages for old Cardinal material from warehouse stock that had been recently sold as safety-related or as ASME Code to nuclear utilities. The inspectors were told that they could not identify the entire population of old Cardinal material that was currently being sold by ACCUTECH, but they were currently in the process, as time permitted, to identify and determine full material qualification for all the Cardinal inventory in the warehouse. The inspectors then requested the data packages for Cardinal material still in inventory.

The inspectors began with a review of the issue described in Section 3.4.3 of this report, concerning PECO PO LS 606821, dated February 15, 1996. This package was chosen since the items that were sold to PECO in 1996 were from existing warehouse stock that was acquired from Cardinal after the B&G purchase of Cardinal in 1995. The inspectors reviewed the data package for

PECO PO LS 606821 to determine compliance to SOP 22.001 as it relates to the material shipped to PECO. The inspectors determined that for the material shipped to PECO, ACCUTECH could provide no evidence of any document review as required by SOP 22.001 to be performed and recorded on the Document Review Checklist form. The specifics of the material sold to PECO is described in Section 3.4.3 of this report.

It was also determined that additional warehouse inventory from the same material heat lot sold to PECO had been sold to additional utilities such as Union Electric (PO No. 093879 dated April 15, 1996) as safety-related 10 CFR 50, Appendix B material. The inspectors then inquired if ACCUTECH addressed the problems with the PECO order from a generic standpoint to determine if other material from the same heat lot number was sold to other utilities. The inspectors were told that subsequent to the first phase of the NRC inspection, ACCUTECH issued Shop Order PC 327982 for additional inspections consisting of two hardness tests, two proof load and wedge tests, and two chemical analyses on samples from 325 bolts of the same heat lot which remained in stock. The results from these tests (satisfactory) were included in a supplemental certification issued to PECO on December 26, 1996. ACCUTECH stated that they also conducted additional testing for other data packages where material was supplied from the above heat lot, based upon the sample plans identified in their SOPs. The NRC has stated, in previous correspondence, that these sample plans did not provide an adequate basis for certifying material as conforming to the requirements of 10 CFR 50, Appendix B.

ACCUTECH did not initiate a Corrective Action Report (CAR) and did not evaluate the finding for its generic applicability for other material sold from the same heat lot and for other types of old Cardinal material sold from warehouse stock.

The inspectors reviewed a second package for items that were also supplied from warehouse stock inherited from Cardinal and sold to utilities in 1996. This package was for material that was supplied to Wisconsin Electric under PO 4500021861, dated November 1, 1996. The technical details of this PO and supply is described in Section 3.4.3 of this report. Again, as in the previous example, the inspectors determined that for the material shipped to Wisconsin Electric, ACCUTECH could provide no evidence of any document review as required by SOP 22.001 to be performed and recorded on the Document Review Checklist form. The inspectors then determined that similar material from the same warehouse stock, that represents the same heat of material, was sold to numerous utilities since mid-1995.

c. Conclusions

The inspectors concluded that ACCUTECH had not implemented the requirements of SOP 22.001 since July 1995 and failed to ensure that material and documents are properly reviewed and approved for old Cardinal material sold from warehouse stock to utilities as ASME Code or safety-related 10 CFR 50, Appendix B. At the time of the inspection, ACCUTECH could not identify the entire population of old Cardinal material that was currently in warehouse stock and being sold by ACCUTECH with questionable material certification. This issue is identified as Nonconformance 99901307/97-01-06.

The inspectors also concluded that subsequent to the first phase of the inspection in November 1996, ACCUTECH failed to initiate a Corrective Action Report (CAR) and did not evaluate the finding concerning the material supplied under PECO PO LS 606821 for its generic applicability for other material sold from the same heat lot or for other types of old Cardinal material sold from warehouse stock.

3.9 Source Inspection Activities

The inspectors reviewed QSM Section 8.0, "Control of Purchased Material and Services," Revision 0, dated November 29, 1995 and SOP 8.005, "Performance of Source Inspection," Revision 3, dated November 15, 1995. The purpose of the SOP is to establish the method for performing and documenting source inspections.

The inspectors reviewed the 1996 Source Inspection Log and selected the source inspections performed at Nortec Specialty Steel (Nortec), Lubbock Texas and Atlas Specialty Steel (Atlas), Welland, Canada for review. Two inspection trips were made to both facilities in 1996 in support of two different ACCUTECH purchases, one to fill a PO received from ABB Combustion Engineering Nuclear Power (ABB CENP) and one to fill a PO from a Korean company. Both POs issued to ACCUTECH were for 1.600-0 A276-93 type 304 stainless steel round bars, but for different quantities and length. The Korean order was for 78 bars 310 inches long. The PO issued by ABB CENP to ACCUTECH was for 85 bars 210 inches long and stated on their PO that it was for use at commercial nuclear power plants.

ACCUTECH placed the POs for the round bar with Nortec. Nortec subcontracted to Atlas, who as the original steel mill supplied the bars to Nortec. Nortec performed the straightening and grinding prior to delivery to ACCUTECH. The inspectors reviewed the Source Inspection Plans (SIPs) for Atlas (96-010, dated September 17, 1996, and 96-021, dated November 19, 1996) and for Nortec (96-013, dated October 9, 1996, and 96-018, dated December 4, 1996). The SIPs documented ACCUTECH's verification and comments for the inspection attributes identified on the SIP.

The inspectors discussed with ACCUTECH the fact that the SIP for both Atlas and Nortec did not include documentation for heat treatment as an inspection attribute. Considering the fact that the ABB CENP Purchase Specification for Quality Requirements listed heat treatment as an item requiring certification by ACCUTECH, heat treatment should have been included as an inspection attribute.

The inspectors concluded, with the exception of the failure to include the review of heat treatment activities and records at both facilities, the implementation of source inspection activities appeared to document the verification of the appropriate inspection attributes for the scope of supply.

3.10 Lead Auditor Qualification

The inspectors reviewed QSM 8.0, "Control of Purchased Material and Services," Revision 0, dated November 29, 1995, Section 8.5, and SOP 20.001, "Qualification of Auditors and Lead Auditors," Revision 2, dated November 15, 1995. The purpose of the SOP 20.001 is to ensure that personnel performing either internal or supplier audit/surveys are adequately qualified to perform those quality activities.

During the review of source inspection activities described above, the inspectors noted that the Quality Director, B&G Manufacturing had performed source inspections activities on behalf of ACCUTECH in 1996. According to the ACCUTECH QA Manager, this individual had been qualified as an lead auditor per the requirements of the ACCUTECH QA program and performed all audit and source inspection activities under the ACCUTECH QA program. This information was verified through review of auditor qualification records.

The inspectors discussed with ACCUTECH that this personnel interface between B&G and ACCUTECH is not described in QSM Section 2.0, "Organization," or identified on the ACCUTECH Organizational Chart. Based on the review of auditor qualification documentation, with the exception of the observation concerning the use of B&G personnel for ACCUTECH audits, audit activities performed by ACCUTECH were determined to be adequately implemented.

3.11 Entrance and Exit Meetings

Entrance and exit meetings were held for each segment of the two-part inspection. In the entrance meetings, held on November 12, 1996, and on January 28, 1997, the NRC inspectors discussed the scope of the inspection and outlined the areas to be inspected. In the exit meetings, held on November 14, 1996, and on January 30, 1997, the inspectors discussed their findings and concerns with ACCUTECH management.

PARTIAL LIST OF PERSONS CONTACTED

William A. Edmonds, President, B&G Manufacturing Company
Jim Sands, Quality Director, B&G Manufacturing Company
Roy P. Reindl, Branch Manager
Bill Sulhan, Quality Assurance Manager
Greg Kelier, Marketing & Technical Services Manager

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

99901307/96-01-01	VIO	exceeding Part 21 notification timeliness limit
99901307/96-01-02	VIO	inadequate Part 21 evaluation
99901307/96-01-03	NON	incomplete documentation supplied to customer
99901307/96-01-04	NON	inadequate verification of conformance
99901307/96-01-05	NON	inadequate corrective action
99901307/96-01-06	NON	inadequate review of material in Warehouse stock
99901307/96-01-07	NON	inadequate documentation of Part 21 evaluation

Discussed

Nonconformance 99901076/94-01-03 remains open and requires a response.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 27, 1997

Mr. Calvin R. Hastings
President and Chief Executive Officer
Caldon, Inc.
2857 Banksville Road
Pittsburgh, PA 15216

SUBJECT: NRC INSPECTION REPORT 99901311/97-01

Dear Mr. Hastings:

On January 21, 1997, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Caldon, Inc. facility. The enclosed report presents the results of that inspection.

The inspection was conducted to ascertain your corrective actions relating to the Point Beach Nuclear Plant, Unit 2, Licensee Event Report (LER) 94-001-01, "Potential Feedwater Flow Measurement Inaccuracies," dated July 29, 1994, regarding degradation in the signals from the leading edge flow meter (LEFM) Model 601, used to measure main feedwater flow in nuclear power plants. We also assessed whether you informed other licensees of this event, and your screening for Part 21 applicability.

During this inspection, the inspector determined that Westinghouse Electric Corporation manufactured the Model 601 and that you purchased the LEFM technology from Westinghouse but did not sell the Model 601 to the industry. Your corrective actions pertinent to LER 94-001-01 involved upgrading the LEFM Model 601 to Model 8300 at Point Beach to improve detection of degraded signals from LEFM transducers. You did not alert licensees about Model 601 inaccurate readings because the LEFM Model 601 was sold as a commercial-grade item and because you do not have a Part 21 program at your facility.

The inspector observed that you did not have information on which licensees operated Model 601 in their facilities. Based on your sales of Model 8300 to facilities, you currently believe that the Model 601 is no longer used in the industry.

During this inspection, the NRC inspector did not identify any instances in which your activities failed to meet NRC requirements for the areas inspected. Therefore, no response to this letter is required.

In accordance with 10 CFR 2.790, a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

C. Hastings

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If you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

ORIGINAL SIGNED BY

Robert M. Gallo, Chief
Special Inspection Branch
Division of Inspection and Support Programs
Office of Nuclear Reactor Regulation

Docket No. 99901311

Enclosure: Inspection Report 99901311/97-01

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Report No: 99901311/97-01

Organization: Caldon, Inc.

Contact: Calvin R. Hastings
President and Chief Executive Officer
412/341-9920

Nuclear Industry Activity: Flow monitoring systems

Date: January 21, 1997

Inspector: Anil S. Gautam, Senior Engineer

Approved by: Gregory C. Cwalina, Chief
Vendor Inspection Section
Special Inspection Branch
Division of Inspection and Support Programs

Enclosure

1 INSPECTION SUMMARY

During this inspection, the NRC inspector reviewed activities associated with the adequacy of Caldon's corrective actions in response to the Point Beach Nuclear Plant, Unit 2, Licensee Event Report (LER) 94-001-01, "Potential Feedwater Flow Measurement Inaccuracies," dated July 29, 1994, regarding degradation of signals from the leading edge flow meter (LEFM) Model 601 transducers when installed in the Point Beach Nuclear Plant, Unit 2, and whether Caldon informed other licensees of problems with the Model 601. The inspector also assessed Caldon's screening and reporting of issues for Part 21 applicability.

The inspection bases were as follows:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50).
- 10 CFR Part 21, "Reporting of Defects and Noncompliance."
- LER 94-001-01, "Potential Feedwater Flow Measurement Inaccuracies, Point Beach Nuclear Plant, Unit 2," dated July 29, 1994.

For the areas inspected, the inspector did not identify any instances in which Caldon's practices did not conform to NRC requirements.

2 STATUS OF PREVIOUS INSPECTION FINDINGS

This was the first NRC inspection of Caldon.

3 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 Response to Point Beach Nuclear Plant, Unit 2, LER 94-001-01

a. Inspection Scope

The inspector examined Caldon's corrective actions in response to LER 94-001-01, ascertained whether Caldon informed licensees of corrective actions, and evaluated Caldon's screening and reporting of issues for Part 21 applicability.

b. Observations and Findings

About 1980, Westinghouse Electric Corporation manufactured and sold the LEFM Model 601 to licensees for correction of the feedwater flow venturi readings. The correction for the venturi was needed because water corrosion and fouling in the throat of the venturi had resulted in reactor power being reduced. The feedwater flow readings are used to calibrate the power range instruments, calculate reactor coolant system flow, and as the basis for the over temperature delta temperature and over pressure delta temperature setpoint calculations.

Model 601 was a digital ultrasonic flow measurement system consisting of a pressure-retaining spool piece (pipe section) installed in the main feedwater header. Each spool piece contained four pairs of high-temperature transducers (see Figure 1) to measure feedwater flow velocities along four ultrasonic paths. The feedwater flow measurement was based on the difference in transit times of upstream and downstream ultrasonic pulses between the transducers. The LEFM main feedwater reading was considered by licensees to be more reliable than the venturi reading and was used to determine a correction factor applied to the feedwater venturi reading to account for fouling of the venturi. The correction factor was normally calculated at the beginning of each operating cycle and verified approximately once a month to ensure no significant changes had occurred during the cycle.

The LEFM Model 601 had the potential to develop inaccurate flow readings because of inadequate detection of any degraded transducer signals. In June 1989, Caldon purchased the LEFM technology from Westinghouse but did not sell the Model 601 to the industry. Caldon used the LEFM technology to develop an upgraded LEFM Model 8300 capable of improved detecting and compensating for degraded transducer signals. Between 1992 and 1996, Caldon upgraded the Model 601 to Model 8300 at several facilities, including Point Beach Units 1 and 2.

Wisconsin Electric Power Company (WEPC) identified conditions which indicated that feedwater flow in Unit 2 may have been underestimated since the beginning of Cycle 20 on October 30, 1993. WEPC established a team of engineers to evaluate the problem, including contracting Caldon to conduct an assessment of the Point Beach Nuclear Plant feedwater flow measurement system. The assessment centered around the accuracy of the LEFM Model 601. On December 15-17, 1993, Caldon temporarily installed the LEFM Model 8300 to provide an independent measure of the feedwater flow in both units. Caldon's assessment indicated that the Model 601 was accurately measuring Unit 1 feedwater flow but was underestimating Unit 2 feedwater flow by approximately 1%. Other factors evaluated by WEPC increased this estimation to approximately 2%. On July 29, 1994, WEPC issued LER 94-001-01 which identified underestimation of feedwater flow by approximately 2% at Point Beach Unit 2 and believed this problem to be caused by degradation of signals from the LEFM Model 601 transducers. About April 1995, Caldon permanently upgraded the LEFM Model 601 to Model 8300 at Point Beach. The inspector determined that the LEFMs were classified as non-safety-related at Point Beach and not included in its calibration program.

The inspector observed that Caldon did not notify other licensees about the Model 601 problems at Point Beach, and did not have information on which licensees operated Model 601 in their facilities. Caldon stated that it did not inform licensees of the event because the LEFM Model 601 was sold to licensees as a commercial-grade item, and because Caldon did not have a Part 21 program. Caldon stated that Westinghouse did not tell Caldon the names of licensees who had purchased the Model 601 from Westinghouse, but that based on its sale of the upgraded LEFM Model 8300 to licensees it currently believes that the Model 601 is no longer used in the industry.

The inspector contacted a representative of Westinghouse who informed the inspector that Westinghouse sold the LEFM Model 601 commercial-grade to the following licensees: Northern States Power Company (Prairie Island 2), Consolidated Edison Company (Indian Point 2), Wisconsin Electric Power Company (Point Beach 1 and 2), TU Electric Company (Comanche Peak 1 and 2), Southern Nuclear Operating Company (Farley 1 and 2), Duquesne Light Power Company (Beaver Valley 1), and Kansas Gas & Electric Company (Wolf Creek). The inspector contacted licensees and reviewed evidence of Caldon's sales of Model 8300 to licensees, and determined that the Model 601 LEFMs purchased by the aforementioned licensees were no longer operable in those nuclear plants.

The inspector observed that Caldon did not evaluate the LEFM 601 problem in accordance with Part 21. Caldon stated that it did not evaluate under Part 21 because both LEFM models were sold as commercial-grade items to licensees.

c. Conclusions

In general, Caldon's corrective actions were adequate. Based on records and discussions with Caldon and Westinghouse, Model 601 is no longer used in the industry. Caldon did not inform licensees of the Model 601 problems because it was sold commercial-grade.

3.2 Entrance and Exit Meetings

In the entrance meeting on January 21, 1997, the NRC inspector discussed the scope of the inspection, outlined the areas to be inspected, and established interactions with Caldon's management. In the exit meeting on January 21, 1997, the inspector discussed his observations.

4 PERSONNEL CONTACTED

Caldon

Calvin R. Hastings, President
Ernest M. Hauser, Sales Manager
Don Augustine, Engineer

Licensees (contacted by telephone)

William Hennessy, Senior Project Engineer, Point Beach Nuclear Plant
Kirk Castell, Licensing, Point Beach Nuclear Plant

Westinghouse Electric Corporation (contacted by telephone)

Richard Miller, Principal Engineer, Equipment Design and Regulatory Engineering

Nuclear Regulatory Commission

Jacob F. Ringwald, Senior Resident Inspector, Wolf Creek
Carl F. Lyon, Senior Resident Inspector, Beaver Valley Unit 1
Thierry M. Ross, Senior Resident Inspector, Farley Units 1 and 2

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None.

Closed

None.

Attachment: Figure 1

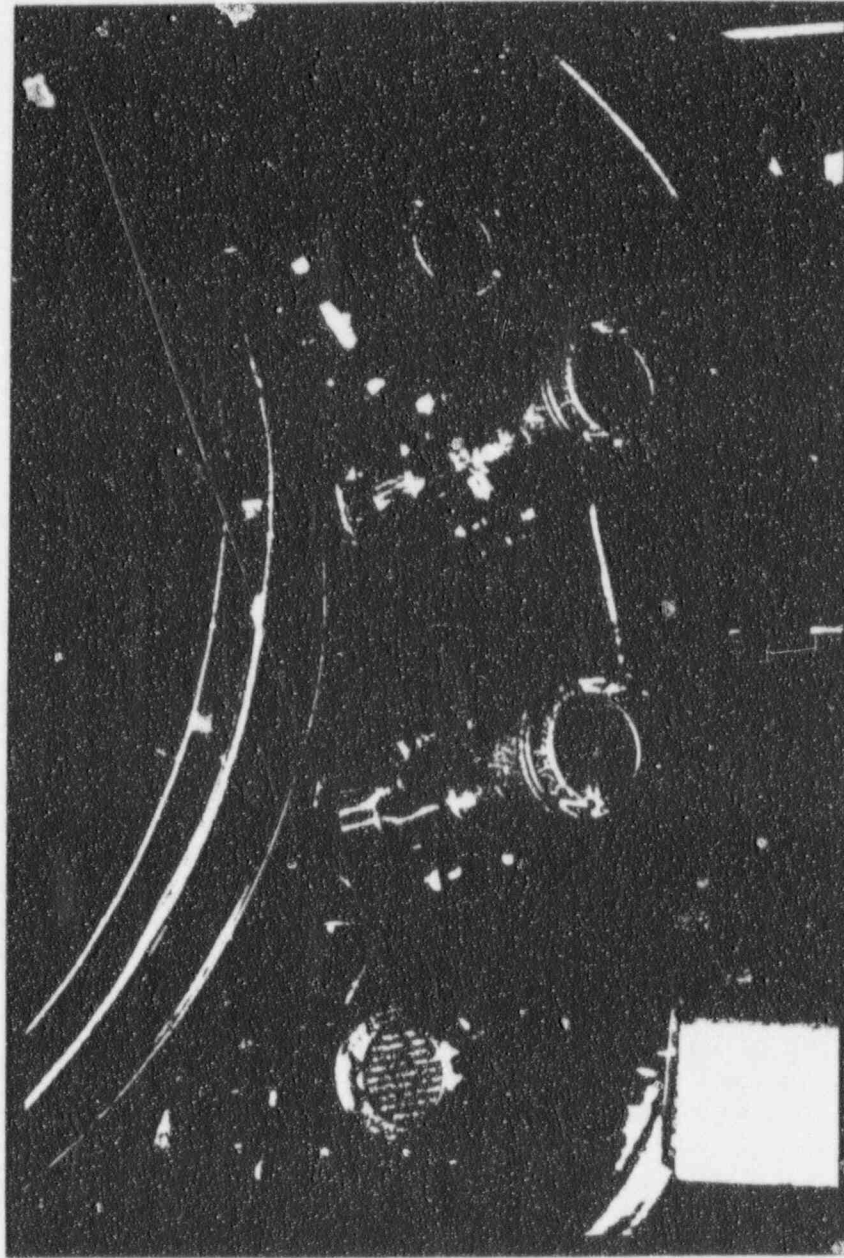


Figure 1

transducers for the leading edge flow meter (LIFM) Model 601 or Model 8300 mounted on spool piece welded to feedwater pipe.



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 10, 1997

Mr. Andrew Pike
President
Ellis & Watts
Division of Dynamics Corporation of America
4400 Glen Willow Lake Lane
Batavia, OH 45103

SUBJECT: NRC INSPECTION REPORT 99901308/96-01 AND NOTICE OF VIOLATION AND
NOTICE OF NONCONFORMANCE

Dear Mr. Pike:

On December 6, 1996, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Ellis & Watts (E&W) facility. The enclosed report presents the results of that inspection.

The inspection was conducted to ascertain specific attributes and implementation of your quality assurance (QA) program, and whether licensees effectively monitored your control of quality for safety-related heating ventilation and air conditioning (HVAC) systems and associated spare parts purchased by licensees for nuclear power plants. We assessed your commercial-grade dedication activities, your screening of issues for Part 21 applicability, and your monitoring of the control of quality by your subvendors.

During this inspection, the NRC inspector determined that certain of your activities appeared to be in violation of NRC requirements. Specifically, you failed to adopt appropriate procedures to ensure the evaluation and proper reporting of deviations, as required by 10 CFR Part 21. In your December 30, 1996, letter to the NRC, you reported taking appropriate corrective actions to address evaluation of deviations, including requiring pertinent training for appropriate employees. No further response is required.

In general, the QA manual and procedures were adequate, and your staff competent. However, the NRC inspector determined that the implementation of your quality assurance program did not meet certain NRC requirements imposed on you by your customers. Specifically, you did not verify the adequacy of design of certain HVAC components and spare parts supplied to licensees, and take effective corrective actions for deficiencies in your commercial-grade dedication program, as required by 10 CFR Part 50, Appendix B.

These nonconformances are cited in the enclosed Notice of Nonconformance (NON), and the circumstances surrounding them are described in detail in the enclosed report. You are requested to respond to the nonconformances and should follow the instructions specified in the enclosed NON when preparing your response.

A. Pike

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In addition, the inspector determined that licensee monitoring of your quality assurance program and commercial-grade dedication activities was adequate and effective. Licensees indicated that they continue to have concerns regarding your validation of certificates of conformance and certified material test reports. Lack of validation during dedication could result in unqualified HVAC equipment or spare parts. Reassessment of dedication activities appears warranted.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC's Public Document Room.

Sincerely,

ORIGINAL SIGNED BY
Robert M. Gallo, Chief
Special Inspection Branch
Division of Inspection and Support Programs
Office of Nuclear Reactor Regulation

Docket No. 99901308

Enclosures: 1. Notice of Violation
2. Notice of Nonconformance
3. Inspection Report 99901308/96-01

NOTICE OF VIOLATION

Ellis & Watts (E&W)
Batavia, Ohio

Docket No.: 99901308

During a U.S. Nuclear Regulatory Commission (NRC) inspection from December 2 through 6, 1996, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

Section 21.21 of Title 10 of the Code of Federal Regulations (10 CFR Part 21.21), "Notification of failure to comply or existence of a defect and its evaluation," requires, in part, that each corporation subject to the regulations adopt appropriate procedures to ensure the evaluation and proper reporting of deviations and failures to comply.

Contrary to the above requirement, E&W's procedure QA-112, "Compliance to Regulation 10 CFR Part 21 Procedure," Revision 3, failed to address the identification or evaluation of deviations. As a result, personnel were not alerted to the need to identify deviations from safety-related purchase order requirements, and to evaluate the deviations to determine if they could become defects. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised procedure QA-112 to address evaluation of deviations and require pertinent training for appropriate employees. No further response is required (99901308/96-01-01).

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

Dated at Rockville, Maryland
this 10th day of February 1997

Enclosure 1

NOTICE OF NONCONFORMANCE

Ellis & Watts (E&W)
Batavia, Ohio

Docket No.: 99901308

On the basis of an inspection by the staff of the U.S. Nuclear Regulatory Commission (NRC) from December 2 through 6, 1996, it appears that the following activities were not conducted in accordance with NRC requirements:

- 1 Criterion III of Appendix B to 10 CFR Part 50, "Design Control," requires, in part, that measures provide for verifying or checking the adequacy of design. The verification or checking process shall be performed by individuals or groups other than those who performed the original design.

E&W Quality Assurance Manual QC-4000N, Section 3, "Design Control," Revision 7, paragraphs 3.1, 3.1.4, and 3.1.6, require design requirements, as specified in the procurement documents, to be correctly translated into specifications, drawings, procedures, and instructions. Design control measures and product design shall be verified by E&W for adequacy of the design, and the verification or checking process shall be performed by individuals or groups other than those who performed the original design.

- A. Contrary to the above requirements, E&W did not verify the adequacy of design pressure ratings of four air conditioner units (ACUs) supplied by E&W to the Tennessee Valley Authority (TVA) for the Browns Ferry Nuclear Plant. The shell side pressure rating of the installed ACU condensers was less than the minimum pressure necessary. As a result, coolant leaked from the ACU condensers. (99901308/96-01-02).
- B. Contrary to the above requirements, E&W's commercial-grade dedication plans did not address the verification of the following critical characteristics (equipment performance features identified in licensee procurement specifications and E&W dedication documents): (i) that cooling coil fans would operate during tornado conditions at a reduced pressure, (ii) that an oil pump would develop a required minimum oil pressure, (iii) that a thermostatic expansion valve would provide the required flow of liquid refrigerant to the evaporator coil at the specified accident temperature, and (iv) that a gasket for an oil pump and bearing assembly would perform its safety function during the specified accident temperature (99901308/96-01-03).

Enclosure 2

2 Criterion XVI of Appendix B to 10 CFR Part 50, "Corrective Action," requires, in part, measures to assure that the cause of the condition is determined and corrective action taken to preclude recurrence.

E&W Quality Assurance Manual QC-4000N, Section 16, "Corrective Action," Revision 7, paragraphs 16.1 and 16.5 require, in part, assurance that conditions adverse to quality are promptly identified and corrected and that corrective actions taken are effective to preclude recurrence.

Contrary to the above requirements, E&W failed to establish effective corrective action for deficiencies in its commercial-grade dedication activities, including deficiencies related to critical characteristics and certified material test reports of commercial-grade materials (99901308/96-01-04).

Please send a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with a copy to the Chief, Special Inspection Branch, Division of Inspection and Support Programs, Office of Nuclear Reactor Regulation, within 30 days of the date of the letter transmitting this Notice of Nonconformance. Your reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should contain for the nonconformances (1) a description of steps that have been or will be taken to correct these items, (2) a description of steps that have been or will be taken to prevent recurrence of these items, and (3) the dates your corrective actions and preventive measures were or will be completed.

Dated at Rockville, Maryland
this 10th day of February 1997

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Report No: 99901308/96-01

Organization: Ellis & Watts
Division of Dynamics Corporation of America

Contact: Craig Hunt, QA Manager
513/752-9000

Nuclear Industry Activity: Heating, ventilation, and air conditioning (HVAC)
systems and associated spare and replacement parts

Dates: December 2-6, 1996

Inspector: Anil S. Gautam, Senior Engineer

Approved by: Gregory C. Cwalina, Chief
Vendor Inspection Section
Special Inspection Branch
Division of Inspection and Support Programs

1 INSPECTION SUMMARY

During this inspection, the NRC inspector reviewed activities associated with implementation of selected portions of Ellis & Watts' (E&W's) quality assurance (QA) program and licensee monitoring of E&W's control of quality.

The inspection bases were as follows:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50).
- 10 CFR Part 21, "Reporting of Defects and Noncompliance."
- NRC Regulatory Guide 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants."
- E&W's Quality Assurance Manual QC-4000N, Revision 7, dated September 7, 1995, and associated implementing procedures.

During this inspection, a violation of NRC requirements was identified. The violation is discussed in Section 3.1 of this report. In addition, the inspector noted three instances in which E&W failed to conform to NRC requirements imposed upon it by NRC licensees. This nonconformance is discussed in Section 3.1 of this report.

2 STATUS OF PREVIOUS INSPECTION FINDINGS

This was the first NRC inspection of E&W.

3 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 Quality Assurance Program

a. Inspection Scope

The inspector examined E&W's QA program, policy, implementing procedures, conformance to procurement documents, corrective actions in response to licensee audit findings, commercial-grade item dedication, Part 21 evaluations, and monitoring of subvendors.

b. Observations and Findings

E&W's QA staff comprised the QA manager, two quality engineers, three QA shop inspectors, and six test technicians. The QA manager reported directly to the president of E&W.

The inspector observed that E&W's procedure QA-112, "Compliance to Regulation 10 CFR Part 21 Procedure," Revision 3, failed to address the identification or evaluation of "deviations" from procurement document requirements. As a result, personnel were not alerted to the need to identify deviations from safety-related purchase order requirements, and

to evaluate the deviations to determine if they could become defects. Part 21 requires adopting appropriate procedures to evaluate deviations to identify defects and failures to comply associated with substantial safety hazards. Failure to adopt appropriate procedures, as required by 10 CFR Part 21.21, constitutes Violation 99901308/96-01-01. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised procedure QA-112 to address evaluation of deviations and require pertinent training for appropriate employees. No further response is required.

The inspector observed that E&W's Nonconformance/Deviation Control Procedure Form QC-12, "Request for Material Disposition," for documenting "major nonconformances," did not address screening of issues for Part 21 applicability. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised Form QC-12 to address Part 21 applicability. No further response is required.

The inspector observed that QA-112, Revision 3, page 5, stated, in part, that Part 21 regulations were on file for employee "off-shift review in the QA department during work breaks, and after working hours." The inspector was concerned that the procedure would discourage or prevent employees from adequately reviewing or implementing Part 21. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised QA-112 to remove restrictive instructions so that employees would review Part 21 regulations and procedures during work hours. No further response is required.

E&W issued Part 21 report No. 101, dated August 20, 1994, to address deficiencies in the design pressure ratings of four air conditioner units (ACUs) supplied by E&W to the Tennessee Valley Authority (TVA) for the Browns Ferry Nuclear Plant. The shell side pressure rating of the installed ACU condensers was less than the minimum pressure necessary. The deficiencies resulted in coolant leaking from the ACU condensers. In February 1995, TVA audited E&W's QA program and identified deficiencies in the design and configuration control of the ACUs. On the basis of E&W's April 28, 1995, letter in response to TVA's findings, the inspector observed that E&W believed the defects in the ACUs to be a result of errors in TVA's design documents. QC-4000N, Section 3, "Design Control," Revision 7, paragraph 3.1.6, requires product design to be verified by E&W for adequacy of the design and the verification or checking process to be performed by individuals or groups other than those who performed the original design. E&W's failure to verify the adequacy of design, as required by Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, constitutes Nonconformance 99901308/96-01-02.

The inspector assessed E&W's design control and commercial-grade dedication activities by evaluating purchase orders (POs) from Texas Utilities Electric Company (TUEC), TVA, and Duquesne Light Company (DLC) to E&W for the following items:

<u>Item</u>	<u>Licensee</u>	<u>Licensee PO No.</u>	<u>P.O. Date</u>
Coil fan assembly	TUEC	S013040056D1	July 25, 1994
Oil pump	TVA	P-94N2S-105874-000	March 25, 1994
Thermal expansion valve	TVA	P-94N2S-115662-000	September 19, 1994
Gasket	TVA	P-94N2S-105639-000	March 18, 1994
Pressure switch	DLC	D134982	November 3, 1994

The inspector assessed E&W's commercial-grade dedication documents for the above items, including review and analysis of intended safety functions, identification and verification of critical characteristics (equipment performance features identified in licensee procurement specifications and E&W's dedication documents), tests conducted to verify characteristics, and any failures during testing. The inspector observed that dedication plans do not address verification of the following critical characteristics:

- that cooling coil fans would operate during tornado conditions at a reduced pressure of 11.7 psia at the Comanche Peak Steam Electric Station.
- that an oil pump would develop a minimum oil pressure of 11 psi at the Browns Ferry Nuclear Plant.
- that a thermostatic expansion valve would provide the required flow of liquid refrigerant to the evaporator coil at the specified accident temperature at the Browns Ferry Nuclear Plant.
- that a gasket for oil pump and bearing assembly would perform its safety function without degradation during the specified accident temperature at the Browns Ferry Nuclear Plant.

E&W stated that the items were qualified based on certificates of conformance (COCs) from subvendors but could not provide test documentation for the above characteristics. The inspector contacted TUEC and TVA to determine whether the above items were qualified to perform their intended safety functions. On the basis of a preliminary analysis, the licensees reported no operability concerns associated with the installed items. E&W's failure to implement measures to assure review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of systems and components, as required by Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, constitutes Nonconformance 99901308/96-01-03.

The inspector observed that there were continuing deficiencies in E&W's dedication program. The Nuclear Utilities Procurement Issues Committee (NUPIC) audited E&W in August 1995, to determine, in part, whether E&W had established and effectively implemented a QA program in compliance with 10 CFR 50 Appendix B. NUPIC identified deficiencies in the areas of design control, configuration control, and commercial-grade dedication. Deficiencies included E&W's failure to reference materials as a critical attribute during dedication, and to verify the validity of certified material test reports (CMTRs) and COCs supplied by E&W's commercial-grade

subvendors. In April 1996, NUPIC audited E&W's corrective actions and again identified deficiencies in E&W's dedication program, including E&W not identifying materials as a critical attribute and not verifying the validity of CMTRs. E&W failed to establish effective corrective action for deficiencies in its commercial-grade dedication activities that were identified by NUPIC. Similarly, documents reviewed by the inspector regarding E&W's dedication activities did not address verification of certain critical characteristics. The inspector concluded that E&W's continuing failure to assure that conditions adverse to quality are promptly corrected and that corrective actions are taken to preclude repetition, as required by Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50, constitutes Nonconformance 99901308/96-01-04.

E&W implemented measures to identify nonconforming items by applying appropriate tags. However, the inspector observed a lack of physical segregation between safety-related items and non-safety-related items in storage and staging areas. Criterion XV, "Nonconforming materials, parts or components," of Appendix B to 10 CFR Part 50, requires segregation of nonconforming materials, parts or components to prevent their inadvertent use or installation. QC-4000N, Section 15, "Nonconforming Materials, Parts or Components," Revision 7, paragraph 15.2.2, states, in part, that storage areas for nonconforming items shall be segregated. Based on E&W's December 30, 1996, letter to the NRC, E&W fabricated and installed a bonded locked cage to segregate nuclear non-conforming materials during "receiving inspection." E&W also reported that it was in the process of establishing a locked segregated and controlled area for storage of nuclear material. No further response is required.

The inspector observed that TUEC's PO S013040056D1 to E&W, dated July 7, 1994, included an agreement between E&W and TUEC to inform the licensee immediately of any allegations of discrimination (Section 211 of the Energy Reorganization Act of 1974) filed by an E&W employee or former employee with a Federal, State, or local administrative agency, in connection with E&W's activity related to the Comanche Peak Steam Electric Station. The inspector determined that TUEC included such agreements in its POs to increase TUEC's efforts in responding to allegations of discrimination filed by vendor employees. These efforts included monitoring the adequacy of the vendor's investigation and actions to achieve a remedy (as indicated by the Commission in its Statement of Policy [61 FR 24336], "Freedom of Employees in the Nuclear Industry to Raise Safety Concerns Without Fear of Retaliation," dated May 14, 1996). At the exit meeting, the inspector expressed concern that the agreement, as delineated in the PO, could inadvertently discourage an E&W employee from engaging in protected activity (as described in 10 CFR Part 50.7 (a)(1)(i)), for fear of retaliation from TUEC. However, after further review of the above policy statement, the NRC determined that the PO agreement was appropriate, and was consistent with the Commission Policy Statement referenced above. The inspector subsequently informed the vendor that the PO agreement was appropriate, and was not in violation of NRC requirements. E&W stated that it would take measures to inform employees that the PO agreement was meant to protect, rather than intimidate, employees who raised safety concerns. No further concerns were identified.

c. Conclusions

The QA manual and procedures were adequate, except for the violation and nonconformances described herein. Problems with dedication plans reviewed indicated a weakness in the areas of design control and commercial-grade dedication.

3.2 Review of Monitoring of E&W by Licensees

a. Inspection Scope

The inspector evaluated licensee monitoring of E&W's control of quality for safety-related items purchased by licensees, including audits and surveillances of E&W's commercial-grade dedication, Part 21 reports, and monitoring of subvendors.

b. Observations and Findings

The inspector contacted TVA, TUEC, DLC, and Carolina Power & Light (CP&L) to discuss the scope and findings of their audits and surveillance of E&W.

TVA audited E&W in February 1995, to evaluate, in part, the defects TVA identified in the ACUs supplied by E&W for the Browns Ferry Nuclear Station, Units 1 and 3. TVA determined that E&W had deficiencies in the areas of design control and configuration control. TVA made two findings: a lack of formalized design analysis review affecting equipment installed in Units 1 and 3, and inadequate control of changes to design documents. In February 1996, TVA accepted E&W's corrective actions but imposed procurement restrictions, one of which was that TVA review E&W's design for any new purchases.

NUPIC audited E&W in August 1995. The utilities represented on the NUPIC audit team included CP&L (team leader), TVA, and Niagara Mohawk Power Corporation. The scope of the audit, in part, was to verify whether E&W had established and effectively implemented a QA program in compliance with the requirements of 10 CFR Part 50 Appendix B and other industry standards. NUPIC concluded that E&W's QA program was "weak and partially ineffective" and made eight findings concerning E&W's QA program: (1) weak design control measures not assuring documented independent evaluations of materials and engineering changes, (2) computer software not controlled in accordance with E&W procedures, (3) various deficiencies in the monitoring of subvendors, (4) unqualified welder, (5) inadequate 1994 and 1995 internal audits and related corrective actions, (6) inadequate measures for traceability of weld filler material, (7) inadequate storage facilities for quality documents, and (8) lack of implementation of procurement requirements of one PO. NUPIC recommended that utilities explicitly communicate to E&W their expectations in the area of commercial-grade dedication through their purchase orders, and require E&W to provide objective evidence of dedication for review by the utility at receipt.

In March 1996, NUPIC (represented by CP&L) examined E&W's corrective actions in response to NUPIC's August 1995 findings. NUPIC found continuing deficiencies in E&W's dedication documents for commercial-

grade items. For example, certain dedication plans did not identify materials as critical attributes and did not verify the validity of the certified material test reports. NUPIC concluded that E&W had not developed a comprehensive program to control purchased material and equipment, and ensure that all critical attributes were adequately verified during commercial grade surveys. NUPIC recommended that licensees perform detailed verification of E&W's design reviews and surveillance before and during performance of work for future orders.

CP&L retained E&W on its list of approved suppliers with these procurement restrictions: that CP&L verify the design of any new purchases, that CP&L approve E&W's dedication plan for commercial-grade spare parts prior to E&W's performance of work, and that E&W verify the validity of COCs or CMTRs for material purchased through subvendors who did not have provisions for material verification.

TUEC and DLC's monitoring of E&W was based on the results of the NUPIC audits. DLC provided the inspector a copy of their evaluation of how NUPIC's audit applied to DLC's purchases. No concerns were identified.

c. Conclusions

In general, licensees effectively audited E&W in accordance with proper criteria, procedures, and checklists. Licensees continue to have concerns regarding E&W's design control and commercial-grade dedication activities despite E&W's corrective actions.

3.3 Entrance and Exit Meetings

In the entrance meeting on December 2, 1996, the NRC inspector discussed the scope of the inspection, outlined the areas to be inspected, and established interactions with E&W management. In the exit meeting on December 6, 1996, the inspector discussed his findings and observations.

4 PERSONNEL CONTACTED

E&W

Craig Hunt, QA Manager
Roger Schertler, QA Engineer
Jim York, Manager, Special Projects
Richard Porco, Manager, Engineering

Licensees (contacted by telephone)

Danny Leigh, Plant Overview Supervisor, TUEC
John Taylor, Procurement Engineer, TUEC
Hrach Minassian, Procurement Engineer, TUEC
William Sidberry, Senior Analyst, CP&L
R.G. Newsome, NUPIC Team Leader, CP&L
James Johns, Supervisor Quality Services, DLC
Larry Spiers, Procurement Engineer, TVA

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

99901308/96-01-01	NOV	inadequate Part 21 procedure
99901308/96-01-02	NON	inadequate design control
99901308/96-01-03	NON	inadequate design control
99901308/96-01-04	NON	inadequate corrective action

Closed

99901308/96-01-01	NOV	inadequate Part 21 procedure
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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D. C. 20555-0001

March 11, 1997

Dr. Ivan E. Wilkinson, P. E.
Director, Engineering
Limatorque Corporation
5114 Woodall Road
P.O. Box 11318
Lynchburg, VA 24506

Dear Dr. Wilkinson:

SUBJECT: NRC INSPECTION REPORT 99900100/97-01

On February 26, 1997, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Lynchburg facility. The enclosed report presents the results of that inspection.

During this inspection, the NRC team reviewed the root cause analysis you performed on a motor-operated-valve actuator from Oyster Creek Nuclear Generating Plant to determine why it had failed to electrically operate in 1996, and reviewed the corrective actions taken on a violation identified in Inspection Report 99900100/93-01 and an unresolved item identified in Inspection Report 99900100/91-01.

The inspectors did not identify any instances where your quality assurance program failed to meet NRC requirements for the areas inspected. Therefore, no response to this letter is required. The corrective actions taken on violation 99900100/93-01-01 and unresolved item 9900100/91-01-07 were determined to be adequate and are closed.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC's Public Document Room (PDR).

Sincerely,

A handwritten signature in cursive script that reads "Robert M. Gallo".

Robert M. Gallo
Special Inspection Branch
Division of Inspection and Support Programs
Office of Nuclear Reactor Regulation

Docket No.: 99900100/97-01

Enclosure: Inspection Report 99900100/97-01

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Report No.: 99900100/97-01

Organization: Limitorque Corporation
5114 Woodall Road
Lynchburg, Virginia 24506-1318

Contact: R. Segen, Director, Quality Assurance
Limitorque Corporation
5114 Woodall Road
Lynchburg, Virginia 24506-1318
(804) 528-4400

Nuclear Industry: Manufactures, services and provides replacement
Activity components and sub-assemblies for its motor-operated
valve actuators.

Date: February 26, 1997

Inspectors: Kamalakar R. Naidu, Senior Reactor Engineer
Joseph J. Petrosino, Q.A. Specialist

Approved by: G. C. Cwalina, Chief
Vendor Inspection Section (VIS)
Special Inspection Branch
Division of Inspection and Support Programs
Office of Nuclear Reactor Regulation

1. INSPECTION SUMMARY

The team reviewed the root cause analysis that Limitorque Corporation (Limitorque) performed on a SMB Size 1 motor-operated-valve (MOV) actuator from General Public Utilities (GPU) Nuclear Corporation to determine the cause of failure to electrically operate. The actuator had been installed in a nonsafety-related application at Oyster Creek Nuclear Generating Station (Oyster Creek).

Inspection bases were:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50, Appendix B)
- 10 CFR Part 21, "Reporting Defects and Noncompliance"

2. STATUS OF PREVIOUS INSPECTION FINDINGS

One violation identified in Inspection Report 99900100/93-01 and one unresolved item identified in Inspection Report 99900100/91-01-07 were reviewed during this inspection. The inspectors did not review information on unresolved items (9990100/91-01-03, 04, and 05) during this inspection.

Violation 93-01-01 (Closed). A May 10 through 14, 1993, inspection identified that contrary to 10 CFR Part 21.21, Limitorque failed to complete its evaluation and did not report a condition associated with the relaxation of motor actuator spring packs.

Limitorque revised Quality Assurance Procedure (QAP) 13.2, "Reporting of Defects for Safety Related Equipment," on May 14, 1993, to require the use of Form L-345 to document future evaluations.

Limitorque Log No. 08 dated June 8, 1993, documented that the effect of spring evaluation was insignificant and so advised the industry with its Technical Update 93.02 of the same date.

Unresolved Item 99900100-91-01-07 (Closed). It was identified that Limitorque had committed to, but had not notified NRC or informed its customers by way of Maintenance Update as of May 14, 1993, of a possible defect concerning improper machining of actuator limit stop housings for HBC-1 actuators. Limitorque issued "Limitorque Maintenance Update 93-1," on August 31, 1993, to address this subject and inform its customers of the deviation.

3. INSPECTION FINDINGS AND OTHER COMMENTS

3.1 Introduction

In a letter dated January 23, 1997, Limitorque Corporation, pursuant to the reporting requirements of 10 CFR Part 21, informed the NRC that it had discovered the existence of a "counterfeit" component installed in a Limitorque actuator at a nuclear power plant. Limitorque discovered the discrepant worm shaft clutch gear in a SMB Size 1 actuator which failed to operate in a nonsafety-related application at GPU's Oyster Creek facility.

During this inspection, the NRC inspectors reviewed Limatorque's root cause analysis, inspected the worm shaft clutch gear and collected additional information to evaluate further action.

According to Oyster Creek's Deviation Report (DVR 96-870), the failed worm shaft clutch gear in question was supplied by Sigma, Inc. The gear was manufactured by C. I. Supply Company. The gear was purchased by Oyster Creek to replace a failed gear in a nonsafety-related actuator. Oyster Creek states that only parts and operators provided directly from Limatorque are used in safety-related applications, however, several nonsafety-related actuators could contain parts that were not provided by the Original Equipment Manufacturer (OEM).

DVR 96-870 indicates that Oyster Creek experienced two failures of nonsafety-related Limatorque operators due to worm shaft clutch gear problems. The operators had been procured from Power Equipment Supply Company. The first failure resulted in a replacement gear being installed with an original Limatorque gear from the Oyster Creek warehouse. The second failure caused Oyster Creek to purchase the gear in question from Sigma.

3.2 Limatorque Root Cause Analysis

a. Inspection Scope

Evaluate the root cause analysis performed by Limatorque on the worm shaft clutch gear that failed to operate at Oyster Creek. Determine the potential for other similar nonconforming parts to be installed in safety-related applications in the nuclear industry.

b. Observations and Findings

The inspectors reviewed the root cause analysis performed by Limatorque on the worm shaft clutch gear that failed at Oyster Creek (see figures 1 and 2). Limatorque subjected the gear to various examinations and determined that:

The motor clutch gear cam pin staking operation had been omitted.

The worm shaft clutch gear lugs were not heat treated.

The gear teeth were inappropriately shaped and not shaved.

There were a variety of other non-serious disparities in the geometry of the part.

Based on the above results, Limatorque determined that it had not manufactured the gear and that it was a "counterfeit."

During a plant tour, Limatorque personnel demonstrated the machinery used to hob and shave gear teeth and to precisely measure the resulting tooth profile. Limatorque personnel informed the inspectors that they do not use any subcontractors to manufacture the worm shaft clutch gear and stated that they had no information on other potentially "counterfeit" or nonconforming parts.

The inspectors observed that Limatorque utilized Procedure QAP 13.2, "Reporting of Defects for Safety Related Equipment," to document its evaluation on Form L-345; Limatorque concluded that the matter was not reportable to the NRC pursuant to Part 21. Even though it considered the matter was not reportable, Limatorque concluded that the worm shaft clutch gear assembly was inferior in design, was not suitable for the intended application, and that the non-OEM part would have a short service life terminating in failure with associated consequences depending upon the criticality of the application. Since the suspect worm shaft clutch gear can be used in Limatorque's SMB, SB, SBD, or HBC type actuators installed in safety-related applications, a substantial safety hazard could be created. Therefore, in a letter dated January 27, 1997, Limatorque informed the NRC.

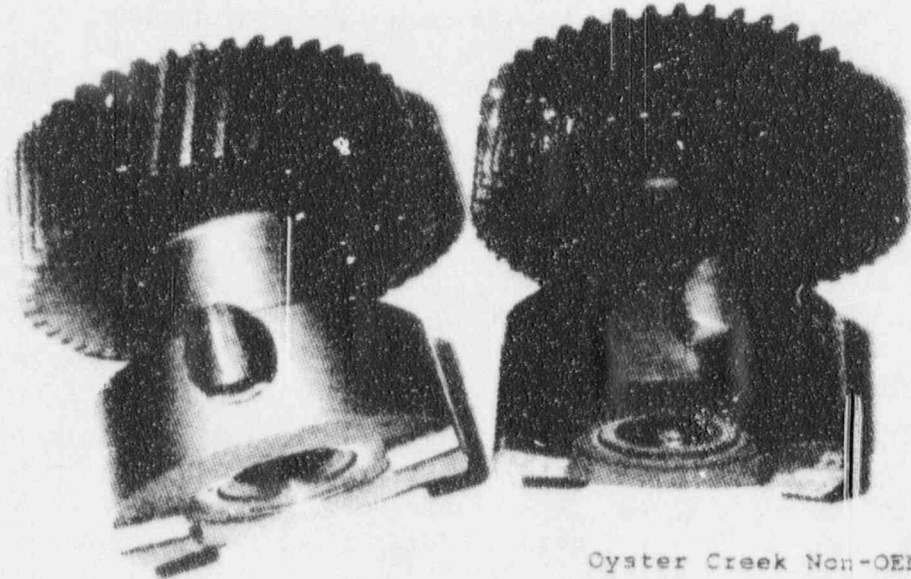
c. Conclusion

The root cause evaluation was well documented, complete and thorough. Although not required, in a letter dated January 27, 1997, Limatorque informed all nuclear power plants of the discovery of a potential condition concerning the suspect gear so that the plants could evaluate the issue for applicability to their plants.

4. PERSONS CONTACTED

- I. E. Wilkinson, Director, Engineering
- +R.D. Segen, Director, Quality Assurance
- +P.G. McQuillan, Manager, Special Projects
- +Wm. J. Miluszusky, Quality Assurance

- Denotes attendance at the entrance meeting on February 26, 1997.
- + Denotes attendance at the exit meeting on February 26, 1997.



Limatorque Original Part

Oyster Creek Non-OEM Gear

Figure 1 - Worm Shaft Clutch Gear (Plan View)

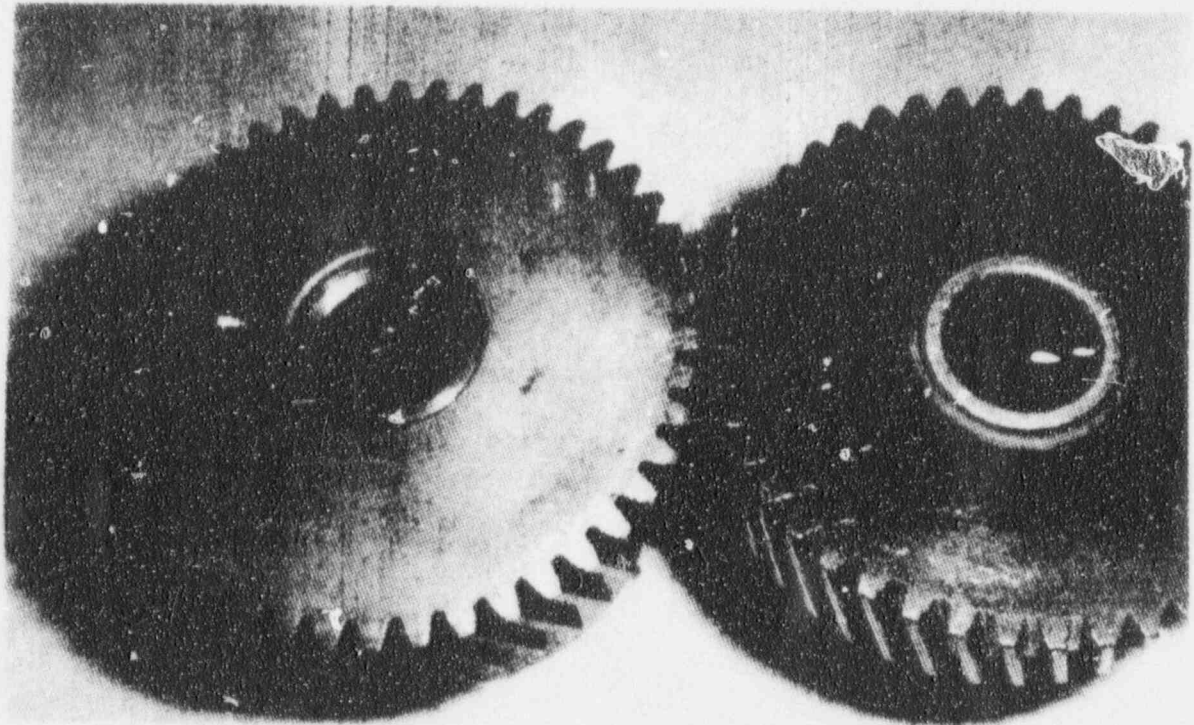


Figure 2 - Worm Shaft Clutch Gear (Gear Tooth)

Selected Generic Correspondence on the Adequacy of
Vendor Audits and the Quality of Vendor Products

<u>Identifier</u>	<u>Title</u>
Information Notice 97-8	Potential failures of General Electric Magne- Blast Circuit Breaker Subcomponents
Information Notice 97-12	Potential Armature Binding In General Electric Type HGA Relays

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

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Volume 21, No. 1

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**Division of Inspection and Support Programs
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001**

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Same as above

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

This periodical covers the results of inspections performed by the NRC's Special Inspection Branch, Vendor Inspection Section, that have been distributed to the inspected organizations during the period from January through March 1997.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Vendor Inspection

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