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A year’s subscription of this report consists of four quarterly issues.
Licensee Contractor and Vendor Inspection Status Report

Quarterly Report
January – March 1999

Manuscript Completed: October 1999
Date Published: October 1999

Division of Inspection Program Management
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
This periodical covers the results of inspections performed by the NRC's Quality Assurance, Vendor Inspection, Maintenance and Allegations Branch, that have been distributed to the inspected organizations during the period from January through March 1999.
ABSTRACT

This periodical covers the results of inspections performed between January 1999 and March 1999 by the NRC's Quality Assurance, Vendor Inspection, Maintenance and Allegations Branch that have been distributed to the inspected organizations.
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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 NRC 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 NRC 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. This report lists selected bulletins, generic letters, and information notices, and include copies of other pertinent correspondence involving vendor issues.
INSPECTION REPORTS
Mr. Dwaine A. Godfrey, Sr., President
Trentec, Incorporated
4600 East Tech Drive
Cincinnati, Ohio 45245

SUBJECT: NRC INSPECTION REPORT NO. 99901338/1999201

Dear Mr. Godfrey:

On November 4 and 5, 1998, NRC inspectors K. Naidu, S. Alexander, and J. Petrosino of this office conducted an inspection at your facility and at Power Distribution Services (PDS), Inc. The inspection was to review Trentec's 10 CFR Part 50, Appendix B, quality assurance program and its implementation in support of Trentec's contract with Illinois Power Company to refurbish several Westinghouse Type DHP, medium-voltage (4.16-kV) circuit breakers from the Clinton Power Station (Clinton).

On February 2-4, 1999, NRC inspectors S. Alexander and F. Talbot continued the inspection of Trentec, at the PDS facility. This second part of the inspection was intended primarily for direct observation of Trentec and PDS refurbishing the current group of Clinton DHP circuit breakers which had not been started at the time of the first visit. The inspection consisted of a review of selected documentation, interviews with your staff, examination of equipment and observation of work in progress. Details of the inspectors' findings are discussed in the enclosed inspection report.

During the two visits, the inspectors found Trentec/PDS breaker overhaul practices and procedures to be generally acceptable except that some conditions adverse to quality identified by Illinois Power had not been thoroughly or promptly corrected. In addition, on the second visit, the inspectors discovered an auxiliary switch reinstalled incorrectly on one of the Trentec/PDS-refurbished breakers which prompted some improvements in the breaker overhaul procedure and oversight. The inspectors also examined some incorrectly sized and assembled components from DHP breakers built in Canada that Illinois Power discovered after it had purchased the breakers from Commonwealth Edison for use at Clinton. It is not clear whether the manufacturer or a third party was responsible for the deficiencies, but Trentec and PDS were refurbishing these breakers as well to ensure they met specifications. The NRC will continue to follow these issues.

The inspectors also identified weaknesses in Trentec's procedures adopted pursuant to Part 21, "Reporting of Defects and Noncompliances," of Title 10 of the Code of Federal Regulations. The weaknesses were cited as a minor violation of 10 CFR 21.21(a) as discussed in the enclosed inspection report.
In accordance with 10 CFR Part 2.790 of the NRC "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC's Public Document Room.

Should you have any questions concerning this inspection, please contact Mr. Kamal Naidu at 301-415-2980/krn@nrc.gov or Mr. Stephen Alexander at 301-415-2995/sda@nrc.gov.

Sincerely,

Richard P. Correia, Acting Chief
Quality Assurance, Vendor Inspection and Maintenance Branch
Division of Inspection Program Management
Office of Nuclear Reactor Regulation

Enclosure: Inspection Report No. 99901338/1999201
U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Report No.: 99901338/1999201

Organization: Trentec, Incorporated
4600 East Tech Drive
Cincinnati, Ohio 45245

Contact: D. W. Mowrey Sr., Manager, Quality Assurance
(513) 528-7900

Nuclear Industry: Circuit breaker refurbishment and conversion services
Activity

Dates: November 4-5, 1998, February 2-4, 1999

Inspectors:
Kamalakar R. Naidu, Senior Reactor Engineer
Stephen D. Alexander, Reactor Engineer
Joseph J. Petrosino, Quality Assurance Specialist
Francis X. Talbot, Reactor Engineer

Approved by: Gregory C. Cwalina, Acting Chief
Reliability and Maintenance Section
Quality Assurance, Vendor Inspection, and Maintenance Branch
Division of Inspection Program Management

Enclosure
1.0 INSPECTION SUMMARY

On November 4 and 5, 1998, NRC inspectors conducted an inspection at Trentec, Inc., and Power Distribution Services (PDS), Inc., both located in Cincinnati, Ohio. The inspection was performed to review Trentec's quality assurance program and its implementation in support of Trentec's contract with Illinois Power Company to refurbish several Westinghouse Type DHP, medium-voltage (4.16-kV) circuit breakers from the Clinton Power Station (Clinton). Trentec subcontracted with PDS to perform the actual refurbishment work on Clinton's DHP breakers.

PDS was purported to have the requisite technical capability, but did not have its own 10 CFR Part 50, Appendix B, quality assurance program. Therefore, Trentec (which recently purchased the nuclear replacement parts and services business of the former Farwell & Hendricks, Inc.) was to provide nuclear Quality Assurance (QA) oversight of the PDS refurbishment work and also to perform the necessary dedication (with technical support from PDS) of commercial-grade items procured in support of the refurbishments.

On February 2-4, 1999, the NRC inspectors continued the inspection of Trentec, and its subcontractor, PDS at the PDS facility. This second part of the inspection was to directly observe Trentec and PDS refurbishing the current group of Clinton DHP circuit breakers which had not been started at the time of the first visit.

The inspection Bases were


- 10 CFR Part 21, "Reporting of Defects and Noncompliances"

During the two visits, the inspectors found Trentec/PDS breaker overhaul practices and procedures to be generally acceptable except that some conditions adverse to quality identified by Illinois Power had not been thoroughly or promptly corrected. In addition, on the second visit, the inspectors discovered an auxiliary switch reinstalled incorrectly on one of the Trentec/PDS-refurbished breakers which prompted some improvements in the breaker overhaul procedure and oversight. The inspectors also examined some incorrectly sized and assembled components from DHP breakers built in Canada that Illinois Power discovered after it had purchased the breakers from Commonwealth Edison for use at Clinton. It is not clear whether the manufacturer or a third party was responsible for the deficiencies, but Trentec and PDS were refurbishing these breakers as well to ensure they met specifications. The NRC will continue to follow these issues.

The inspectors also identified weaknesses in Trentec's procedures adopted pursuant to 10 CFR Part 21. The weaknesses were cited as a minor violation of 10 CFR 21.21(a) as discussed in Section 3.1 of this inspection report.
2.0 *Status of Previous Inspection Findings.*

This was the first inspection conducted at this facility.

3.0 *INSPECTION FINDINGS AND OTHER COMMENTS.*

3.1 **Implementation of 10 CFR Part 21**

a. **Inspection Scope**

The team evaluated the latest effective revision of Trentec Procedure A-QAP-2, "Identification and Evaluation of 10CFR21," adopted by Trentec to implement the requirements of 10 CFR Part 21. The team also examined Trentec's postings pursuant to 10 CFR 21.6.

b. **Observations and Findings**

b.1 **10 CFR Part 21 Procedure**

Revision 1 of Trentec Procedure A-QAP-2, dated April 16, 1996, did not satisfy the requirements of 10 CFR Part 21 because it contained certain deficiencies. The following deficiencies were discussed with the Trentec QA Manager:

Paragraph 1.0, "Scope," stated that the procedure "...is applicable to all items/materials procured, fabricated, constructed, or sold which by customer purchase order or contract requires the provisions of 10CFR21 to apply." The inspectors noted that while 10 CFR Part 21 usually does apply when the purchaser so states in procurement documents (as the purchaser is required to by 10 CFR 21.31), the regulation states that supplier is subject to 10 CFR Part 21 to the extent that it supplies basic components as defined in 10 CFR 21.3. It does not state that a supplier is subject to the regulation to the extent that procurement documents state that 10 CFR Part 21 is applicable. This means that even if the purchaser failed to include the required statement of 10 CFR Part 21 applicability in procurement documents for a basic component, the supplier of that basic component would still be technically responsible under Part 21 and would be held accountable for complying with Part 21 if the NRC were to determine that the supplier had actual knowledge that the items or services supplied were, in fact, basic components. The inspectors also observed that the scope of the procedure did not use the term basic component, which was defined in the procedure as it is in Part 21. It also did not include services related to basic components which are explicitly included within the definition of basic components, and which are routinely provided by Trentec. Therefore, even though a statement of scope is not required by 10 CFR 21.21(a) to be included in procedures adopted pursuant to the regulation, Paragraph 1.0 of A-QAP-2, if adhered to strictly as worded, could lead to situations in which Trentec may be in violation of 10 CFR Part 21.
Paragraph 21.21(a)(1) of 10 CFR Part 21 requires that each entity subject to the regulation adopt procedures to provide for the evaluation of deviations and failures to comply in order to identify defects and to identify failures to comply associated with substantial safety hazards. Paragraph 2.1, the only paragraph in Section 2.0, "Responsibility," read as follows: "Each individual is responsible to report to a responsible officer of the company any known violation or defect which could reasonably indicate a substantial safety hazard for which 10CFR21 applies."

This assignment of responsibility statement effectively established an inappropriate threshold for reporting and was not conducive to meaningful compliance by all employees. Although 10 CFR 21.21(a)(3) requires that defects be reported to a director or responsible officer, the inspectors were concerned that employees would not be expected to be able to determine what a violation, defect or substantial safety hazard was, or whether Part 21 applied. In effect, the procedure assumed that workers would have sufficient knowledge of NRC regulations and of the nuclear plant application of the affected item to evaluate the effect of the so-called "known violation" or defect on the safety of the plant. In most cases, with exception of the, nuclear power unit designer, the plant architect engineer, or the licensee itself, vendor organizations as a whole would not be expected to have the capability to perform such an evaluation. Most fundamentally, the procedure failed to require that deviations and failures to comply be identified so that they may be evaluated or, more appropriately for most vendors, so that they can be reported to affected licensees or purchasers. Paragraph 4.1 had similar deficiencies.

The statement of responsibility would have been an appropriate place to explain the 10 CFR Part 21 policy of Trentec, as it actually relates to the company's expectation of employees. As it was explained to the inspectors, Trentec employees are expected and trained to identify, document, and report to their supervisor, QA manager, Quality Control (QC) inspector, project engineer, or other person in authority as appropriate, all problems, or failures to meet specifications or acceptance criteria of any nuclear safety-related equipment, components or parts (i.e., basic components) of which they become aware.

A-QAP-2 did not explain that the person in authority receiving such a report should then determine whether the problem falls within the scope of 10 CFR Part 21, that is, whether it constituted a deviation or failure to comply as defined in 10 CFR Part 21, whether it involved a basic component, and whether a similar or similarly affected basic component has ever been shipped or offered for use at an NRC-licensed facility. If the problem were determined to be a deviation (i.e., a departure from the technical requirements in a procurement document), or a failure to comply (i.e., noncompliance with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order or license of the NRC, including technical specifications), it would then need an evaluation as required by Paragraph 21.21(a)(1) to determine if the deviation was a defect or if the failure to comply was related to a substantial safety hazard. Explanations of responsibilities in the procedures adopted pursuant to 10 CFR Part 21 that include the elements just described would be conducive to effective evaluation of deviations and failures to comply to identify defects and failures to comply associated with substantial safety hazards.
The statement of responsibility would also have been an appropriate place to express the policy that Trentec normally would not undertake to perform 10 CFR 21.21(a)(1) evaluations, but would, in most cases instead, inform affected licensees or purchasers of deviations or failures to comply as required by Paragraph 21.21(b) and as briefly mentioned in Paragraph 4.2 of the procedure. However, it should be emphasized that nothing in the regulation or the procedure should be construed to prohibit making a 10 CFR Part 21 report to the NRC if deemed warranted, even without a formal evaluation of the deviation or failure to comply.

The list of definitions (Section 3.0 of the procedure) did not include the definition of a failure to comply. The inspectors recognized that 10 CFR 21.3 also does not define a failure to comply, but Section 21.1 lists the things with which a basic component may fail to comply that would require evaluation or reporting to affected licensees or purchasers. Part 21 Section 21.21(a), which states the requirements for 10 CFR Part 21 procedures, does not require a list of definitions, let alone a definition of a particular term. However, if only the procedure were referred to in dealing with matters pertaining to 10 CFR Part 21, and deviations were mentioned but not failures to comply, the inspectors were concerned that a failure to comply that should be evaluated or reported to affected licensees or purchasers might not be recognized as such.

Paragraph 4.1 simply restated Paragraph 2.1, again used the terms "violation" and defect and again, in effect, set the reporting threshold too high. The term "violation" has been used in some procedures to mean a failure to comply, but a definition of a violation was not given either.

Paragraph 4.2 first required that an evaluation be performed to determine if the "identified condition" is or could be a safety hazard, but the procedure did not define identified condition nor did it define a safety hazard. The procedure did define a "substantial safety hazard" as in 10 CFR Part 21, but, as stated previously, a vendor would seldom have sufficient knowledge of the application of the affected basic component or the effect of its "violation or defect" on a nuclear plant to be able to determine whether a substantial safety hazard could be created. More importantly, this statement did not require that deviations, as explained above, be evaluated, nor did it require that failures to comply be evaluated.

Paragraph 4.2 then went on to require that, "If Trentec does not have the capability to perform the evaluation, if a defect exists, the responsible officer will inform the affected licensee or purchaser within five (5) working days..." This statement was probably the most important one in the procedure in terms of compliance with Part 21, but misstated the requirement of the regulation. It was similar to Paragraph 21.21(b), but implied as written that the affected licensee was to be informed if a defect, as opposed to a deviation or failure to comply, exists; whereas the existence of a defect is what is supposed to be determined by the evaluation. It also did not explain from what point in time the five working days were to be counted. The paragraph further failed to establish that the vendor must inform all affected licensees or purchasers of whom the vendor may be aware, not just the one first identified as being affected.
Note that the provisions of 10 CFR 21.21(b) are not, at the present time, specifically required by Section 21.21(a) to be included in the procedures adopted pursuant to the regulation, yet Paragraph 21.21(b) is the most important one for most vendors. Therefore, the inspectors observed that it is prudent to include the requirements of Paragraph 21.21(b) in the procedures. However, if included, but incorrectly worded, they may lead the vendor to fail to comply with 10 CFR Part 21. After the inspectors discussed this finding with Trentec's QA Manager, the QA manager stated that he intended to revise this paragraph (among others) appropriately.

Paragraph 4.3 stated that the notification to the NRC required by 10 CFR 21.21 is not required if the “responsible officer has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.” The inspectors observed that the regulation does not use the word “adequately” in this provision, but it does require that in order to be excused from an otherwise required report, the entity subject to the regulation would have to have actual knowledge that the Commission had been informed “in writing.” Therefore, while appearing to use stricter language than the regulation, the procedure actually missed a specific requirement. This could lead Trentec to fail to make a report that was required on the erroneous basis of believing the NRC had been “adequately” informed, but without actual knowledge that the NRC had been informed “in writing” as required by 10 CFR 21.21(d)(2).

A-QAP-2, Section 5.0, “Summarization of the Sequence of Events for Notification,” was apparently intended to be a summary of the time requirements in 10 CFR Part 21. However, the inspectors observed that it was inconsistent with 10 CFR Part 21 and some other provisions of the procedure as follows: (1) The start time for the time requirements was not given, yet they are not self evident and not all the same, (2) the section was supposed to be a sequence of events, but the events and their associated time requirements were out of chronological sequence, and (3) the time given for the evaluation results to be reported to the responsible officer was 65 days; whereas, Paragraph 4.3 of the procedure required the evaluation results to be reported to the responsible officer within five working days of the evaluation. The regulation, in Paragraph 21(a)(3), requires that the existence of a failure to comply associated with a substantial safety hazard or a defect, as determined by the evaluation, be reported to a director or responsible officer within five working days of the completion of the evaluation, not five days from the end of the maximum allowed time. However, should Trentec complete an evaluation in less than 60 days from discovery, and if the summary in Section 5.0 of the procedure should be solely consulted without referring to the procedural requirements or to the regulation itself, the summary could result in Trentec violating 10 CFR 21.21(a)(3) by allowing the company to wait until 65 days from discovery to report the results to the responsible officer instead of within five working days of completion of the evaluation, as required.

During the second part of this inspection conducted in February 1999 at the PDS facility, the inspectors discussed these findings with the Trentec QA manager and reviewed a preliminary revision to A-QAP-2 that the QA manager had prepared during the period following the first part of the inspection in November 1998. The revision addressed some of the inspectors’ observations but the procedure needed further revisions to
address all of the concerns. During the second visit, the inspectors also observed that Trentec nonconformance report (NCR) forms as well as corrective action request/report (CAR) forms inappropriately addressed potential 10 CFR Part 21 reportability instead of providing a means of documenting a much more pertinent preliminary assessment to determine if the problem discussed in the NCR or CAR constituted a deviation or failure to comply in a basic component that had been shipped to an NRC-licensed facility, and thus to determine whether Part 21 was even applicable to the situation.

b.2 10 CFR 21.6 Posting

The postings pursuant to 10 CFR 21.6 at both the PDS and Trentec facilities were found to be in accordance with the provisions of the regulation. The inspectors observed that the postings at both facilities were conspicuously located, and included the documents required by §21.6(a), i.e., Section 206 of the Energy Reorganization Act of 1974, a current copy of 10 CFR Part 21 itself and the Trentec procedures adopted pursuant to the regulation.

c. Conclusion

The inspectors concluded that the weaknesses found in the Trentec 10 CFR Part 21 procedure, A-QAP-2, taken in the aggregate tended to render the procedure ineffective in ensuring that all deviations or failures to comply as defined in Part 21 would be evaluated as required by 10 CFR 21.21(a) or otherwise handled in accordance with the regulation. Therefore, the inspectors further concluded that these weaknesses constituted a minor violation of 10 CFR Part 21. In accordance with the NRC's enforcement policy as promulgated in NUREG-1600, Revision 1, no notice of violation will be issued for this minor violation.

3.2 Procurement and Receipt of Parts Used in Breaker Refurbishment

a. Inspection Scope

The inspectors evaluated Trentec's procurement and commercial-grade dedication program and its implementation for adequacy to provide reasonable assurance that commercial-grade items procured and dedicated by Trentec will perform their safety functions. The inspectors reviewed procurement and dedication procedures and selected records, interviewed key personnel and examined parts and equipment being dedicated.

b. Observations and Findings

Trentec's procurement process in support of supplying dedicated Westinghouse type circuit breakers, or spare parts for those breakers to be used by PDS for breaker refurbishment, begins with review of the incoming nuclear plant customer purchase order (PO) and translating its provisions into its own PO which Trentec places on PDS. PDS in turn issues a PO to Westinghouse Electric Supply Company (WESCo) to supply breakers or parts for the Westinghouse type breakers. WESCo issues its own PO called
a general order or "GO" to the Aftermarket Product Center (APC) of Eaton/Cutler-Hammer (ECH) in Greenwood, South Carolina. ECH has manufactured Westinghouse type circuit breakers since 1994 when it bought several of the Westinghouse low- and medium-voltage power circuit breaker product lines.

It was Trentec's standard practice to have ECH ship breaker components directly to Trentec for receipt inspection and dedication. However, the inspectors found a few instances in which this did not occur. In some cases, PDS explained that certain parts which Trentec and PDS had reason to suspect might not be correct were shipped first to PDS in order for PDS to verify that the parts were correct before Trentec expended the effort and resources to dedicate them. In other cases, parts were inadvertently shipped from ECH directly to PDS, but according to PDS and Trentec, they were returned to Trentec for receipt inspection and dedication before being used by PDS.

When components arrive at Trentec or PDS, Trentec quality control inspectors perform a receiving inspection against basic PO technical and quality requirements (e.g., part number/description, quantity, documentation, etc.) and for shipping damage. After the initial receiving inspection is completed, the CGIs are put into a QC holding area. Then QC inspectors perform comprehensive inspections in accordance with Trentec's procedures and instructions that delineate the critical characteristics that must be verified. After those tests and inspections, the parts are moved into individual job staging bins/areas. The inspectors noted that Trentec also used color-coded bins, sections, file folders and other containers for keeping its CGIs, safety-related and ASME components properly segregated.

Receipt inspection reports (RIRs) documented part number, the Trentec-assigned inspection sample number (ISN), date, quantity-received, description, traceability information, shipping damage, newness (new, used, or altered), and compliance with the purchase order. Trentec tags or bags all components with the ISN and stores them in an access-controlled area. The inspectors noted few adverse findings documented in receiving reports. Trentec explained that was because receiving reports are meant for documenting shipping damage, incorrect quantities or part numbers received, etc., which problems, Trentec stated are relatively less frequent than the material deficiencies identified in the parts on the basis of detailed receipt inspection and dedication.

The inspectors observed that Trentec documented numerous adverse findings in Nonconformance Reports (NCRs). Material Rejection and Disposition Reports (MRDRs) had been used for this purpose until February 1998 by Farwell & Hendricks before it was bought by Trentec. The inspectors noted that Trentec used its procedure QAP-23, "Identifying Substandard or Fraudulent Items During Receipt Inspection," dated April 14, 1993, which provided specific attributes on various types of parts for use in identifying fraudulent or substandard parts and/or fraudulent documentation. The inspectors sampled training records of receipt inspectors and did not identify any concerns in this area.
c. **Conclusion**

The team identified no adverse findings in the implementation of Trentec's quality assurance program for receiving and control of purchased components.

3.3 **Review of Nonconformance Reports**

a. **Inspection Scope**

To determine the adequacy of Trentec's implementation of its quality assurance program relative to documenting nonconforming conditions, the inspectors reviewed several MRDRs and NCRs generated during November 1997 and April 1998.

b. **Observations and Findings**

The inspectors determined that the majority of the NCRs pertained to purchased parts. The documents indicated that most of the unacceptable items were returned to the respective vendors. In some instances, the components were identified to be used in commercial-grade applications only, and in a few cases, items with inconsequential nonconformances were dispositioned to be used as-is when engineering determined that the deficiencies would not prevent the component from performing its intended safety function. The following are examples of MRDRs and NCRs reviewed:

MRDR 03, dated October 10, 1997 indicated that ECH supplied 15 torsion springs (663A731H01) to Trentec. Trentec rejected them because there was a sharp bend on the long leg which would weaken the spring. On January 16, 1998, Trentec identified that replacement springs had the same deficiency and rejected them the second time. Trentec received acceptable replacement springs on June 26, 1998.

MRDR 04, dated October 28, 1997, identified that ECH supplied a motor shaft adapter (PO 9775 305) which was observed to be "used, rusted, and there was visual indication that a hardness test had been performed on the shaft." Receipt inspectors also observed that the shaft appeared to have been ground. The shaft was rejected and returned to ECH.

MRDR 05, dated October 28, 1997, identified a pole shaft with its slotted holes misaligned. The pole shaft was rejected and returned to ECH.

MRDR 06, dated November 5, 1997, documented adverse findings on torsion springs identified as 663A926H02, that were supplied by ECH. One spring had a bent leg and another had a loose coil. These springs were part of a kit 6426C70G01 which contained several other springs. Trentec rejected and returned the unacceptable springs to ECH.

MRDR 07, dated December 8, 1997, indicated that Trentec received 100 3/8"-diameter, 3.75"-long, hexagonal, Grade 5 cap screws and 200 1/2"-diameter, 7/8"-long, hexagonal,
Grade 5 cap crews from Energy Process Corporation (PO 9775310). Trentec rejected the fasteners because of suspicious markings.

NCR 98-08, dated February 4, 1998, identified “significant structural differences” between the arc chute supports on Clinton’s original breakers and the replacement supports supplied by Eaton/Cutler-Hammer (ECH). The arc chute supports are primary insulating components as well as structural. The original style arch chute supports consisted of porcelain posts mounted (with what appeared to be epoxy potting) in cast aluminum alloy bases which are bolted to the breaker chassis. The arc chutes are fastened to the top of the supports with bolts set into the top of the porcelain posts.

The first set of replacement arc chute supports received at PDS, presumably ready for installation on the breakers, were made entirely of a new material (not porcelain) that ECH calls “PolyKoram®,” including the base and its molded bolting flange. In addition, PDS later learned that the upper mounting bolt is set into the insulating post much shallower such that the installation has considerably less lateral strength.

Part of the problem documented in this NCR was that the replacement arc chute supports were received at PDS before the differences from the old ones had been fully evaluated. The differences and their significance had not been identified through the Trentec receipt and dedication process before, due to a miscommunication, the parts were sent to PDS for installation in Clinton breakers. When samples of the new supports were tested on a sample breaker they passed a seismic test, but failed in more strenuous fragility testing when the bolting flange tabs broke off under lateral loading at much lower forces than the originals. Some damage at the upper mounting bolt was evident as well, due apparently to the shallow depth that the bolt penetrated. The resolution of this issue agreed upon by Trentec and Illinois Power was that after arrival at Clinton, the supports would be replaced with old style supports available in the Clinton warehouse. The disposition of the remaining replacement supports was to scrap them and purchase them in the future as safety-related from Westinghouse. Trentec also instituted measures to prevent not fully dedicated material from getting to PDS or being used at PDS on safety-related breakers (including being clearly identified with a “risk release”) until all dedication and/or qualification issues have been resolved or all data have been obtained.

Trentec also performed some testing on a modified replacement arc chute support design from ECH which was the PolyKoram post set into a cast aluminum base, but this design still suffered from the weaker insulating material and the weak upper mounting bolt attachment.

NCR 98-12, dated February 9, 1998, identified that a replacement stationary arcing contact assembly on one breaker failed to maintain proper gap and alignment after only a few test operations. The replacement contacts had been dedicated in part using hardness as a critical characteristic. Hardness had been verified on a sample basis and apparently the particular assembly in question had not been checked. However it was found to be significantly softer than the rest of the contacts. Trentec and PDS believed the soft contact had lost its temper through some heating process, probably the hot dip
plating, that annealed the copper. Corrective action was to revise the dedication plan to check hardness on all items (100% sampling) and to require extra cycling of the breaker followed by rechecking the arcing contacts gaps and alignments. An additional problem with the ECH replacement contacts was that the hot dipped plating covered the contact surfaces. PDS had to burnish the excess silver off the contact surfaces to prevent silver dust produced during switching from degrading the arch chutes.

NCR 98-11, also dated February 9, 1998, identified problems with the replacement moving contact arm bumper pads from ECH. The original pads from Westinghouse appeared to be molded resin and fiber material. Trentec testing showed that the fibers were matted for multidirectional toughness because they are subject to repeated impact loading when they strike the so-called “kickout” springs in the stationary pole bases. However, the ECH replacement design appeared to be fabricated by sawing sections of an extrusion of resin and unidirectional fibers such that the fibers were all aligned and oriented in the weakest direction which rendered the bumper pads highly susceptible to fracture under their shock loading service conditions. According to information provided to Illinois Power by Westinghouse, the new pads (with the same part number as the old style) supplied by ECH since 1995 are inferior and should be scrapped or returned to ECH. A destructive test designed by Trentec using breaker components to simulate service conditions showed the new pads to be less than half the strength of the old ones in this application, apparently due to the unidirectional grain structure of the extruded material. Pads for the Clinton breakers of the old style were to be obtained from Clinton stock and/or from Westinghouse as safety-related material instead of using the substandard ones from ECH.

NCR 98-20, dated February 19, 1998, indicated that ECH supplied 283 cotter pins (PO97753). Trentec inspectors identified that the cotter pins were discolored (rusty), and appeared to have been used. Trentec rejected all of them.

c. Conclusion

Trentec rejected components supplied by ECH on several occasions. Sometimes, ECH shipped to Trentec components that it had previously rejected. Trentec again rejected the nonconforming material. The team identified no adverse findings in Trentec's implementation of its quality assurance program relative to identifying nonconforming conditions, and taking adequate actions to correct them or prevent the use of nonconforming material in safety-related equipment.

3.4 Review of Quality Assurance Records

a. Inspection Scope

The team reviewed selected dedication procedures and quality assurance records of parts and components purchased for use in refurbishing safety-related circuit breakers.
b. **Findings and Observations**

Trentec purchased commercial-grade auxiliary switches from ECH and which Trentec personnel dedicated for use in safety related applications. The QA records documenting the dedication of a commercial-grade auxiliary switch identified as part number 46A9047G16 included the following:

- Customer PO and change orders, line item No.
- Certificate of Compliance, dated April 29, 1998
- Project Definition and Evaluation data sheet in which outlines the specific requirements for dedication, specify the critical characteristics and the verification method
- QA requirements
- Similarity Analyses
- Conclusion of review and dedication results

Also associated with this document package was NCR 98-0,1 dated April 28, 1998, which indicated that Trentec changed the contact positions to match the drawing (i.e., normally closed contacts were changed to normally open and vice versa).

c. **Conclusion**

The inspectors had no findings in this area and concluded that Trentec's QA records pertaining to items purchased for use in refurbishing safety-related circuit breakers were reasonably complete and well maintained.

3.5 **Observation of Refurbishment Work**

a. **Inspection Scope**

During the second visit of this inspection (conducted entirely at PDS), the inspectors reviewed the Trentec/PDS DHP breaker overhaul/refurbishment procedure and observed work in progress.

b. **Findings and Observations**

The refurbishment procedure, Trentec Document 97753.0, Revision 3, dated November 24, 1998, was comprehensive and generally acceptable. However, the inspectors noted that some of the applied test voltage values and the acceptance criteria for insulation resistance testing were not consistent with the recommended values in the National Electrical Testing Association Switchgear Maintenance and Testing Specifications, MTS-1989. Specifically, the acceptance value (corrected to 20°C) for primary pole insulation resistance for 4.16-kV and 6.9-kV breakers was ≥ 100 megohms; whereas, MTS-1989 recommends ≥ 1000 megohms. Also, the procedure specified measuring insulation resistance on a 6.9-kV breaker at 5000 volts; whereas, MTS-1989 only recommends 2500 volts. For control circuits, the procedure specified insulation resistance of at least
100 megohms; whereas, for circuit rated between 0-250 volts, MTS-1989 only recommends an acceptance value of at least 50 megohms.

There was no requirement to use the values in MTS-1989, but establishing baseline data using MTS-1989 values would provide a basis that the licensee could use for trending insulation performance that is consistent with the guidance that is being adopted by the circuit breaker users groups sponsored by the Nuclear Maintenance Applications Center of the Electric Power Research Institute.

The actual work on the breaker observed by the inspectors was satisfactory with one exception. In the course of closely examining the termination of control wiring on the auxiliary switch which had just been installed, the inspectors questioned the configuration of the auxiliary switch contacts (which were visible through the openings in the switch frame from the front) with the breaker open. In response to the inspectors' concern, the Trentec project engineer consulted the applicable diagram in the procedure and confirmed the inspectors' suspicion that the moving contact barrels in the auxiliary switch were rotated 180 degrees out of position for the breaker being open. Upon further investigation, it became apparent that the technician, who had disassembled the switch for cleaning, had reassembled it looking at the back, whereas the procedure diagram shows the required configuration when the contacts are viewed from the front with the switch installed. In addition to removing and reassembling the switch correctly, Trentec's proposed corrective action was to revise the procedure with cautions about switch orientation, more control of reassembly steps, better placement of the diagrams for the different covered configurations, and a QC hold to verify proper contact orientation before the switch is mounted and wired. In addition, Trentec stated that the other technicians would be trained in this problem and all would be trained on the revision to the procedure.

c. Conclusion

The inspectors concluded that Trentec's proposed corrective action was adequate and appropriate for the incorrectly assembled auxiliary switch. The inspectors further concluded that with the increased attention to detail and the very close oversight by Illinois Power on this project, that Trentec and PDS should be able to accomplish the refurbishment of these Clinton breaker satisfactorily.
4.0 Partial List of Persons Contacted

**Trentec, Inc.**

+*Dwaine A. Godfrey, Sr., President
+*Keith A. Van Kerckhove, Project Engineer
+*Dudley W. Mowrey, Sr., Manager of Quality Assurance
+*Mark D. McClung, Quality Assurance Supervisor
+Ralph H. Rosselot
+Mike Wooldridge
+Mike Bell
+Brian Miracle, EQ Coordinator

**Power Distribution Services, Inc.**

+*Jay A. Helson, Manager, Quality Assurance
  *John P. McCloy, PE, Safety Director
  *Rob Burket, Breaker Technician
  *Sean TamBoar, Breaker Technician

**Illinois Power Company**

  *Rick Reding, Project Engineer
  *Rodney Jones, Quality Assurance

+Attended entrance meeting on November 4, 1998
*Attended the exit meeting on November 5, 1998
Mr. George W. Dillon, Manager  
Repair and Replacement Services  
Westinghouse Nuclear Services Division  
Energy Systems Business Unit  
Westinghouse Electric Corporation  
200 Cheswick Avenue  
Cheswick, Pennsylvania 15024-1358

SUBJECT: NRC INSPECTION REPORT NO. 99901043/98-01 AND NOTICE OF NONCONFORMANCE

Dear Mr. Dillon:

During the period of October 14-15, 1998, the U.S. Nuclear Regulatory Commission (NRC) performed an inspection at Eaton/Cutler-Hammer's (ECH's), Aftermarket Product Center (APC) in Greenwood, South Carolina, where Westinghouse Type DHP medium-voltage circuit breakers were manufactured for use at Illinois Power Corporation's Clinton Power Station (Clinton). On October 28 and 29, 1998, we performed an inspection at your Cheswick, Pennsylvania, facility. At ECH, the NRC inspectors observed the implementation of your quality assurance program during inspection, testing and repair of 4.16-kV Westinghouse Type 50DHP350, 1200-ampere, circuit breakers that ECH recently built as commercial-grade items, and which your organization dedicated and supplied to Clinton as basic components. At Cheswick, the inspectors selectively reviewed the implementation of the Repair and Replacement Services (RRS) 10 CFR Part 50, Appendix B, quality assurance program for refurbishment of low- and medium-voltage circuit breakers and dedication of commercial-grade items for resale and for use in the refurbishment of safety-related circuit breakers.

During this inspection, the NRC inspectors identified instances in which the implementation of the RRS QA program covering the manufacture and dedication of DHP type circuit breakers failed to meet certain NRC requirements. Inadequate implementation of your QA program resulted in numerous deficiencies that were identified at Clinton during receipt inspections of the Class 1E circuit breakers that you supplied. The specific nonconformances are cited in the enclosed Notice of Nonconformance and the details are discussed in the enclosed report.

The responses requested by this letter and the enclosed Notice of Nonconformance are not subject to the clearance procedures of Office of Management and Budget as required by the Paperwork Reduction Act of 1980, Public Law No. 96-511.
In accordance with 10 CFR Part 2.790 of the NRC “Rules of Practice,” a copy of this letter and its enclosures will be placed in the NRC’s Public Document Room.

Should you have any questions concerning this inspection, please contact Mr. Kamal Naidu at 301-415-2980/kmn@nrc.gov or Mr. Stephen Alexander at 301-415-2995/sda@nrc.gov.

Sincerely,

Richard P. Correia, Acting Chief
Quality Assurance, Vendor Inspection and Maintenance Branch
Division of Reactor Controls and Human Factors
Office of Nuclear Reactor Regulation

Enclosures: 1. Notice of Nonconformance
2. Inspection Report No. 99901043/98-01
NOTICE OF NONCONFORMANCE

Westinghouse Repair and Replacement Services (RRS) Docket No. 99901043
Cheswick, Pennsylvania Report No. 98-01

Based on the results of the Nuclear Regulatory Commission inspection conducted during October 14-15 and 28-29, 1998, of activities supporting the manufacture, rework and testing of DHP type medium-voltage Westinghouse circuit breakers, 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 10 CFR Part 50, Appendix B, states, in part, “Measures shall be established to assure that purchased material, equipment and services, whether purchased directly or through contractors or subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery.”

Criterion X, “Inspection,” of 10 CFR Part 50, Appendix B, states, in part, “A program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activities to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity....Examinations, measurements, or tests of material or products processed shall be performed for each work operation where necessary to ensure quality.”

Contrary to the above, RRS failed to perform adequate inspections at the subcontractor source to ensure conformance with procurement documents (e.g., improperly welded breaker chassis front panel subassemblies) and failed to perform adequate inspections of breakers and their subassemblies to ensure conformance with documented instructions, procedures and drawings during and after the manufacture of new Westinghouse Type DHP circuit breakers at Eaton/Cutler-Hammer that RRS supplied to Illinois Power Company’s Clinton Power Station. As a result, RRS failed to detect numerous deficiencies that were later identified at Clinton during receipt inspections. (98-01-01)

B. Criterion XVI, “Corrective Action,” of 10 CFR Part 50, Appendix B, states, in part, that 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.

Contrary to the above, RRS failed to ensure that material deficiencies (i.e., improperly welded breaker chassis front panel subassemblies) were properly corrected when first identified and RRS’s final corrective action, as documented in Corrective Action Report G98JD008, did not address two significant contributing causes of the problem (i.e., lack of adequate welding fixtures and not using shop travelers or other in-process control documentation) (98-01-02).
C. Criterion V, “Instructions, Procedures and Drawings,” of 10 CFR Part 50, Appendix B, states, in part, “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. Instructions, procedures or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

Contrary to the above, RRS Commercial Dedication Instruction (CDI) CEB 0503, Revision 2, for dedicating Westinghouse Type DHP circuit breakers manufactured by Eaton/Cutler-Hammer, was not appropriate to the circumstances in that (1) the CDI lacked sufficient provisions and detailed instructions for inspecting breakers and their subassemblies; (2) instructions in the CDI for serializing the breakers (by reference to Test Specification (TS) 710030) did not provide for inscribing the breakers with unique identifiers; (3) the sequence of events in the instructions for testing the breaker anti-pump relay was incorrect; and (4) the CDI referenced TS 710030 for contact resistance tests, but the TS contained inappropriate millivolt drop test acceptance criteria. (98-01-03)

Please provide 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, Quality Assurance, Vendor Inspection and Maintenance Branch, Division of Reactor Controls and Human Factors, Office of Nuclear Reactor Regulation, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a “Reply to a Notice of Nonconformance” and should include for each nonconformance: (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; and (3) the dates your corrective actions and preventive measures were or will be completed.

Issued this, the 1st day of January, 1999 at Rockville, Maryland

2 Enclosure
Docket/Report No.: 99901043/98-01

Organization: Repair and Replacement Services (RRS)
Westinghouse Nuclear Services Division (WNSD)
Energy Systems Business Unit
Westinghouse Electric Corporation
2000 Cheswick Avenue
Cheswick, Pennsylvania 15024-1358

Contact: D.P. Adomaitis, Manager, Engineering
(724) 275-3552

Nuclear Industry Activity: Repair, refurbishment and replacement services for Westinghouse electrical equipment

October 28-29, 1998 at RRS, Cheswick, PA

Lead Inspector: Kamalakar R. Naidu, Senior Reactor Engineer
Quality Assurance, Vendor Inspection,
and Maintenance Branch (HQMB)

Inspectors: Gregory C. Cwalina, Senior Operations Engineer, HQMB
Stephen D. Alexander, Reactor Engineer, HQMB
Joseph J. Petrosino, Quality Assurance Specialist, HQMB
Zelig Falevitz, Reactor Inspector, RIII

Approved by: Gregory C. Cwalina, Acting Chief
Reliability and Maintenance Section, HQMB
Division of Reactor Controls and Human Factors
Office of Nuclear Reactor Regulation
1.0 INSPECTION SUMMARY

On October 14-15, 1998, NRC inspectors observed inspection, testing and repair/rework of six 4.16-kV Westinghouse (W) Type 50DHP350, 1200-ampere, circuit breakers of the ten recently built by Eaton/Cutler-Hammer's (ECH's) Aftermarket Product Center (APC) in Greenwood, South Carolina, for Illinois Power Company's (IPC's) Clinton Power Station (Clinton). IPC had returned the breakers to the ECH Greenwood factory (the APC) for evaluation and correction of material deficiencies in the breakers identified during receipt inspection at Clinton. On October 28-29, 1998, the inspectors reviewed the commercial grade dedication program and its implementation at the Westinghouse Nuclear Services Division (WNSD) Repair and Replacement Services (RRS) facility located in the Westinghouse Electro-Mechanical Division complex in Cheswick, Pennsylvania. The inspection bases were:

- 10 CFR Part 21, “Reporting of Defects and Noncompliances”

The inspectors found that the RRS practices in dedicating Type DHP breakers contained weaknesses, including inadequate inspection and corrective action, which allowed deviations in the breakers to remain undetected until identified at Clinton. Accordingly, Nonconformances 98-01-01 and -02 were cited (See Sections 3.1 and 3.4 respectively). For weaknesses in the commercial dedication instruction used to dedicate the DHP breakers, Nonconformance 98-01-03 was cited (See Section 3.2). In addition, Unresolved Item 98-01-04 was identified regarding the proper gage of control wiring and termination size on the Clinton DHP breakers (See Section 3.1.b.2). The program and its implementation at the RRS facility in Cheswick for dedication of commercial-grade items for resale and for use in repairing and refurbishing breakers at Cheswick and at the RRS Lansing, Illinois, facility was generally acceptable.

2.0 STATUS of PREVIOUS INSPECTION FINDINGS

Unresolved Item (URI) 99900404/98-01-02 (redesignated to the RRS docket number: 99901043/98-01-05) (Open): RRS was to complete tests to confirm that minimum trip bar force for W Type DB-50 low-voltage circuit breakers is 14 ounces. RRS was also to determine how (or if) the removal of the so-called “trip pads” on breaker trip bars and the overwound trip pan return spring, found on one or two breakers at Indian Point Station, Unit 2, could affect the operation of the breaker or its seismic qualification. During this inspection, RRS stated that they had completed the tests, but still had to analyze the data. RRS informed the NRC on November 19, 1998, in response to our followup inquiry, that now more testing would be required to confirm the first set of test results. RRS stated that they would inform the NRC when the final, analyzed results are published.
In response to reports from IPC Company's Clinton Power Station that there was inadequate clearance between the rear arc horns/arc chute contact fingers and the molded cases of the arc chutes (supplied by RRS) on several W Type 50DHP350, 1200-ampere-rated breakers, RRS was to complete tests to establish the minimum clearances. IPC reported the concern to the NRC under 10 CFR Part 21. The inspectors determined that IPC and RRS resolved the clearance problem and that it was not generic. No further action was required. In addition, review of the applicable factory instruction book, IB 32-253-4B, resolved concerns about its adequacy in this regard.

3.0 INSPECTION FINDINGS AND OTHER COMMENTS.

3.1 Evaluation and Repair of Clinton Breakers at ECH

a. Inspection Scope

At the ECH Greenwood Aftermarket Product Center (APC), the inspectors observed evaluation and correction of material deficiencies which were identified in six W Type 50DHP350 breakers during receipt inspection at Clinton. The six deficient breakers were among ten new breakers purchased by IPC from RRS, but manufactured at the ECH APC. The inspectors reviewed relevant procurement, manufacturing, inspection and test documents, examined some of the affected breakers and parts, observed breaker inspection and testing, and interviewed personnel involved, including technical and quality assurance personnel from Clinton, engineering and quality assurance personnel from RRS and engineering and manufacturing personnel from ECH.

b. Findings and Observations

The inspectors determined that IPC had issued Purchase Order (PO) No. 705316, dated August 8, 1997 (and Change Notice 001 of August 26, 1997), to RRS Repair and Replacement Services for six new Type 50DHP350, 4.16-kV, 1200-ampere breakers; three Type 75DHP500, 6.9-kV, 1200-ampere breakers and one Type 75DHP500, 6.9-kV, 2000-ampere breaker, all of which were designated for safety-related (Class 1E) service (and for Class 1E spares) at Clinton. PO 705316 specified that all breakers should be built to the specifications of the original equipment supplied for Clinton's Division I and II 4-kV electrical power distribution systems (including the specific requirement that the control wiring be the same as the original). The PO then referenced the original W East Pittsburgh factory shop order (SO) numbers, but added the exception that the breakers should be fitted with levering-in devices of the current design. The order also included one 50DHP250 breaker for non-Class 1E service, but with the same technical requirements.

In response to this customer order, RRS created its internal General Order (GO) ST30867 and issued its PO MB51470D, dated September 8, 1997, to Westinghouse Electric Supply Company (WESCO) for this equipment. WESCO in turn issued its PO 336551470, dated September 11, 1997 (with Change Notice 003, dated January 29,
1998) to ECH to build and supply the equipment. The inspectors determined that the conditions stipulated by RRS and passed on to ECH were as follows:

- All items furnished were to be new and unused.
- RRS would furnish the control or "Y" (anti-pump) relay (a W Type NBFD44S).
- The vendor (ECH) was to supply a certificate of conformance stating that the equipment supplied was in accordance with the requirements of the PO.
- A certified test report and an instruction book (IB 32-253-4B) was to be supplied with each breaker.
- The name plate serial numbers of the breakers designated for safety-related service were to have the suffix "-1E" ["Class 1E" is the designation of the Institute of Electrical and Electronic Engineers (IEEE) for nuclear safety-related electrical systems and equipment].
- The breakers were to be packaged in accordance with the intent of American National Standards Institute (ANSI) Standard N45.2.2, Level B. The shipping containers were to be labeled "Shock Watch," "Do Not Tilt," "Fragile" and have arrows indicating which end must remain up.
- ECH was to notify RRS if shelf life applied to any item in the order, which required that a minimum of 80% of shelf life remain at the time of shipment.

The NRC inspectors determined that receipt inspectors at Clinton documented adverse findings on breakers shipped directly from ECH in a Receipt Inspection Discrepancy Report (RIDR) for each breaker. Clinton used a "Receipt Inspection Checklist [RIC] for New Westinghouse Circuit Breakers" to inspect the circuit breakers. According to the RIDRs, the six safety-related breakers with deficiencies were identified by the following serial numbers: APC/98/026-1E, APC/98/027-1E, APC/98/028-1E, APC/98/029-1E, APC/98/030-1E, and APC/98/031-1E. The inspectors determined that most of the corrective actions by ECH and RRS for the below-listed deficiencies identified at Clinton were satisfactory with some exceptions as discussed for each deficiency where applicable:

1. Clinton inspectors could not see any sign of the prescribed graphite grease (W Specification 53701AN) on the main and arcing contact surfaces on 3 breakers. The NRC inspectors noted that Clinton was particularly sensitive to this issue because lack of contact lubrication (and removal of factory-applied lubrication) was a principal cause of two failures of 50DHP350 breakers to open at Clinton during the summer of 1997. ECH stated that the contacts had been lubricated at the factory in accordance with the process prescribed in IB 32-253-4B, which calls for applying graphite grease to the contacts, rubbing the lubricant in and wiping off the excess. Nevertheless, ECH technicians at the APC relubricated the contacts after the tests were completed.
2. Breaker control wiring had nicked insulation. The crimp barrels on ring tongue terminals were three American Wire Gage (AWG) sizes too large (AWG 14) for the AWG 22 breaker control wire. RRS stated that they had performed pull tests on samples of these terminations and determined that they were tight, despite being mismatched. RRS explained that the oversized terminals had been used because they had been used on the original breakers according to the shop orders and the breakers had been specified to be built in accordance with those original shop orders as stated above. In fact, Technical Requirement 3 in the procurement documents specified that the control wiring should be the same as the original control wiring. Nevertheless, Clinton personnel decided to replace and/or reterminate the wiring themselves.

The NRC inspectors noted that this represented a breakdown in communications between the licensee and vendor. RRS and ECH should have recognized and questioned the apparent mismatch in the size of the wire and the terminals and verified what was appropriate for the application, not to mention what was specified in design drawings. If the original shop orders specified terminals for AWG 14 wire, then AWG 14 wire should have been used as well. It was not clear whether ECH had subsequently reduced the wire size, but had not changed the crimp barrel size of the terminals accordingly. The NRC inspectors determined that if the original specifications allowed the terminal-wire size mismatch (although this was viewed as unlikely), it would be necessary to verify, or have the licensee verify, the correct control wire terminations on existing breakers at Clinton, and perhaps elsewhere. For Clinton, this matter was referred to the cognizant staff in NRC Region III. However, in view of the satisfactory pull test results and that Clinton personnel were to reterminate the known affected control wiring, this potential problem was not considered to be of immediate operability or safety concern. Pending confirmation of the original requirements for the control wiring and the status of corrective actions, the issue for RRS of the original W design specifications for the control wiring and any subsequent changes to wire size and/or terminal size, if any, is designated Unresolved Item 99901043/98-01-04.

3. Main contact separation, latch check switch adjustment and the gap between the motor cutoff switch and its operating slide lever (which is also the closing spring charged indicator lever) on some of the breakers were out of specification. ECH technicians readjusted the affected components, but could not explain why they were found out of tolerance at Clinton other than that they might have become misadjusted during breaker handling and shipping.

4. Different types of screws had been used to attach the name plate to breaker APC/98/031-1E. This had no technical significance, but indicated a lack of attention to detail. ECH replaced the affected fasteners with the correct type.

5. A floor tripper screw was found rusted on one of the breakers. ECH replaced the screw, but had no satisfactory explanation for why it was rusted.
6. The gap on the crank shaft between one spacer and the closing cam on one breaker was measured to be 0.095". The RRS engineer determined that a gap of this amount was acceptable.

7. The arc chute supports of several breakers had pin size depressions in the insulation material and another imperfection was on one support. RRS stated that neither the pin size depressions, nor the other imperfection, would reduce the insulation resistance of the arc chute supports which had been confirmed during production dielectric withstand tests. ECH reperformed those tests (with satisfactory results) as part of comprehensive retesting of the breakers at the Greenwood APC.

8. Some moving and stationary arcing contacts were worn and one appeared to be burned. RRS stated that the condition of the arcing contacts was not unusual for breakers that have gone through the normal course of production testing. However, ECH replaced the contacts in the interest of "customer satisfaction."

9. The closing spring retaining plate rubbed against the frame support on one breaker. ECH checked for this condition on all returned breakers and rotated the plate slightly on the affected breaker so that it no longer rubbed against the frame support.

10. The silver plating on the line (stationary) side of the main contacts was different from the plating on the load (moving) side. The RRS engineer found this condition acceptable.

11. The clearance between the closing latch roller and the closing trigger was found to be zero on two breaker(s). This clearance is supposed to be set between 0.010" and 0.030" to ensure that the closing latch will reliably reset. ECH claimed that the clearance was in specification when the breakers left the factory, but conceded that they might have been at the very low end of the tolerance band such that shock and vibration could conceivably cause them to go out of adjustment. ECH checked and/or readjusted the closing latch roller clearance on all the returned breakers and set them all to the middle of the band to avoid the problem.

12. The levering-in device safety interlock was not engaging in five of the six 50DHP350, 1200-ampere-rated breakers because the levering-in device support bracket assembly was welded to the rear of the breaker lower chassis front plate about 1/4-inch too low. This allowed the levering-in device crank handle to be turned beyond its design limit with the breaker closed. The inspectors determined that the initial action taken by ECH to correct the support bracket ring misalignment allowed insertion of the levering-in device shaft, but left the support bracket side plates improperly welded and positioned too low. After the breakers were returned to the APC, ECH replaced the lower chassis front plate assembly on all 5 affected breakers. The sixth breaker was manufactured at a different time and was not affected. ECH and RRS stated that the breakers in question
had all passed their mechanical tests (reportedly witnessed by the RRS representative) in the dummy test cubicle before leaving the factory. This issue resulted in a nonconformance as discussed further in Section 3.4.

13. The top right and bottom mounting screws on the Y-coil (anti-pump relay) were loose on one breaker. ECH technicians tightened them.

14. The main contact penetration was out of specification on two breakers. ECH technicians adjusted the penetration of the main moving contacts into the main stationary contacts.

15. The primary disconnect finger cluster was loose on one breaker. ECH technicians replaced the cluster.

16. On one breaker, the hook on the front end of the right-hand opening spring was not properly seated in the recess between the head and locknut of its 3/8-inch-diameter mounting bolt on the breaker frame. In fact, the spring had been found with its hook completely out of the recess, having worked its way up onto the head of its mounting bolt where only the small clearance between the mounting bolt and an adjacent plate kept the hook from coming off the bolt entirely. ECH technicians adjusted the spring, but the NRC inspectors observed that the recess was not wide enough to allow the spring hook to slip into it fully and rest on the threads of the bolt as it is supposed to. The NRC inspectors examined the applicable drawing and found that the width of the recess as well as the amount that the bolt protrudes from the plate in which it is installed was established on the drawing by a single dimension. The drawing simply showed that the bolt, which is screwed into a threaded hole in the plate, was to be adjusted and locked in place with its locknut such that the distance between the bottom of its head and the face of the plate will be 0.380". At the NRC inspectors' request, ECH technicians measured this dimension on the affected breaker and found that it was slightly greater than 0.380", yet the width of the recess was still too small for the wire diameter of the spring hook. The inspectors observed that the thickness of the locknut depicted on the drawing was not called out; and although it appeared to be a standard locknut (i.e., slightly thinner than a regular fastening nut and also chamfered on both sides), the nut actually being used as a locknut on the breaker was a regular fastening nut of standard thickness, not a locknut, and was clearly thicker, proportionally, than the locknut shown on the drawing. It appeared that during assembly of the breaker, ECH had substituted a regular fastening nut for the required locknut, thus negating the control of the width of the spring hook recess, defined only by the protruding length of the bolt. The inspectors noted that if the type and size of the locknut was not controlled, the 0.380" dimension was rendered useless for purposes of ensuring a wide enough spring hook recess and would only serve to set the amount of bolt protrusion. ECH agreed to correct this situation which could allow opening springs to come off their mounting bolts, but did not determine at that time whether to change the dimension, more closely control the size of the locknut, or both.
17. Screws on auxiliary switch contacts were found loose on one breaker. ECH technicians tightened the screws.

18. On two breakers, the trip latch roller clearance (i.e., clearance between the trip latch roller and the upper notch in the trip trigger) appeared to be zero. Although there is no generally published value for this clearance (as there is for the closing latch roller clearance), there is supposed to be a visible gap to ensure that the trip mechanism can positively reset. The lack of any visible gap prevented the trip latch on one of the breakers from positively resetting and caused the breaker to go trip free on one closure attempt; although it worked on several subsequent attempts. Clinton receipt inspectors confirmed that there was mechanical contact between the trip latch rollers and the trip triggers on the affected breakers because the trip latch rollers would not rotate freely by hand. Thus, while there was no visible gap and there was contact, it was light contact, i.e., the degree of misadjustment was not extreme so that very little force was exerted. This condition therefore would be consistent with the breaker only going trip free occasionally, but would nevertheless render the breaker unreliable. RRS and ECH stated that the trip latch clearances of all the breakers had been verified to be satisfactory before shipping. They could only speculate that the clearances had been lost somehow during shipping and handling. ECH technicians readjusted the trip latch roller clearances in accordance with the procedure in IB 32-253-4B and verified proper operation of the breakers.

The NRC inspectors noted that Clinton had experienced some difficulty in adjusting the trip latch roller clearance on its Type DVP breakers in 1987. In response to Clinton's request for assistance, RRS provided an alternative procedure in a letter dated January 4, 1987, on file at Clinton in the plant's DHP vendor manual binder. The alternate adjustment procedure, which the letter stated could also be used on DHP breakers, had been incorporated into Clinton's DHP preventive maintenance procedure, but had not been included by the Westinghouse DHP factory in its 1989 revision to IB 32-253-4, Revision B, which is the current revision. The alternate procedure provided a range of measurable values for trip latch roller clearance (similar to closing latch roller clearance) as opposed to starting with no gap and backing off on the trip cam adjusting screw one turn to obtain a visible gap as the standard procedure prescribes.

The NRC inspectors observed the work on several breakers and determined that ECH had completed the corrective action under the supervision of the RRS Quality Assurance engineer. The inspectors found the completed work acceptable.

c. Conclusions

RRS QA and dedication of the Clinton DHP breakers was unacceptable because RRS failed to conduct adequate assembly inspections to ensure, for example, that ECH welded the levering-in device bracket assemblies together and onto the front plates according to applicable drawings in five affected circuit breakers. The inspectors further concluded that RRS conducted inadequate final inspections which did not detect that the front plates were welded improperly and which did not identify the numerous other deficiencies cited above. Thus, failure to perform adequate inspections during and after
manufacture of the breakers and failure to perform adequate verification at the subcontractor source to ensure conformance with procurement documents was contrary to the requirements of Criteria VII and X, respectively, of 10 CFR Part 50, Appendix B. Accordingly, Nonconformance 99901043/98-01-01 was issued.

3.2 RRS Commercial Dedication Instructions

a. Inspection Scope

The inspectors reviewed the commercial dedication instruction (CDI), CEB 0503, Revision 2, dated December 9, 1997, developed for use by RRS personnel in dedicating Type DHP circuit breakers at the ECH switchgear factory (APC) in Greenwood, South Carolina. The inspectors also reviewed other selected CDIs used at the RRS facility in Cheswick, Pennsylvania, for dedicating replacement parts, mostly from ECH, to be used in repairs and refurbishments performed by RRS and for sale to nuclear utilities as basic components (dedicated commercial-grade items).

b. Findings and Observations

Section I.D of CDI CEB 0503 identified the critical characteristics to be verified in two categories: (1) product identification and (2) performance characteristics. The verification instructions, Section I.E of the CDI, required that Critical Characteristic 1, product identification, be verified on each breaker by inspection (per WCAP 12888, VII-1) in accordance with Section II of the CDI, “Inspection and Test Procedure.” Section II.C.1 called for verifying breaker nameplate data in accordance with Test Specification (TS) 710030, Section 2.1. However by referencing TS 710030 for verification of nameplate data, the CDI failed to accomplish its desired result of ensuring that each breaker was marked with a unique serial number because the revision of TS 710030, Revision G, in effect for Revision 2 of the CDI, did not specify a serial number as part of required nameplate information. Instead, it specified that a “style” or “shop order” number appear on the nameplate, as was previously the practice when the breakers were being built at the W East Pittsburgh factory. The style number is the drawing and group number of the breaker type, configuration and rating and is not a unique identifier of an individual breaker. The shop order number is also not a unique identifier, but typically identifies a group or series of breakers to be built with similar configuration and ratings. In addition, the CDI called for the breakers to be “serialized” by adding the “1E” suffix, which does not serialize them at all, but merely designates the whole group of breakers as being intended for Class 1E service. An additional discrepancy regarding nameplate data was that the previous revision (A), not the current revision (B) of W Instruction Book 32-253-4 was listed.

Section II.E.2, in addition to prescribing performance of the electric operation tests per Section 5 of TS 710030, required an additional test to verify proper operation of the anti-pump or “Y” relay at minimum control voltage. The inspectors noted that the addition of the special anti-pump function test at reduced (minimum rated) control voltage was good engineering practice. However, the events in the description of the test were out of sequence because the closing spring was said to recharge after the breaker trips open instead of recharging immediately after closing as it is supposed to.
Section II.E also prescribed performance of pole resistance tests (contacts, joints, etc.) per Section 9.0 of TS 710030 using either a micro-ohmmeter or millivolt drop measurements while passing 100 amps minimum through the pole. However, the inspectors found that the acceptance criteria in the test specification, expressed in terms of maximum acceptable millivolt drops, did not correspond to the acceptance criteria expressed in terms of micro-ohms. The inspectors determined that the millivolt drop values listed were greater than millivolt drop values corresponding to the micro-ohm values for 100 amps of test current by factors of 12, 20, and 30 for the 1200, 2000, and 3000-amp-rated breakers respectively. Thus, it appeared that the millivolt drop values given were based on the rated full-load continuous current instead of the prescribed 100 amps test current which would allow far too large values of contact resistance to be accepted. The inspectors pointed out this discrepancy to the ECH engineers. After some research, ECH confirmed the inspectors’ suspicion regarding the basis for the millivolt drop values. ECH acknowledged the error in the test specification, but the inspectors observed that in practice, ECH performed this testing using a micro-ohmmeter that passed the prescribed 100 amps of test current and read out in micro-ohms directly, for which test method, the values in the test specification were appropriate.

Finally, the inspectors determined that the CDI lacked sufficient provisions and detailed instructions for inspection by RRS of the breakers and their subassemblies during manufacture to ensure that all components had been manufactured and assembled in accordance with design documents, manufacturing instructions and customer specifications.

c. Conclusions

The inspectors concluded that RRS Commercial Dedication Instruction (CDI) CEB 0503, Revision 2, for deducing Westinghouse Type DHP circuit breakers manufactured by Eaton/Cutler-Hammer, was not appropriate to the circumstances in that (1) the CDI lacked sufficient provisions and detailed instructions for inspecting the breaker and its subassemblies; (2) instructions for serializing the breakers (by reference to Test Specification (TS) 710030) provided for including style or shop order numbers on nameplates, and for adding a suffix to serial numbers to indicate designation for Class 1E service, but did not provide for inscribing serial numbers per se or other unique identifiers; and (3) the sequence of events in the instructions for testing the breaker anti-pump relay was incorrect. The CDI also referenced TS 710030 for contact resistance tests, but TS 710030 contained inappropriate millivolt drop test acceptance criteria. Accordingly, Nonconformance 99901043/98-01-03 with respect to Criterion V, “Instructions, Procedures and Drawings,” of 10 CFR Part 50, Appendix B, was issued.
3.3 **RRS Commercial-Grade Dedication Records**

a. **Inspection Scope**

The inspectors reviewed dedication records at the Cheswick facility to determine if RRS adequately dedicated selected commercial-grade components that ECH used to manufacture new 4.16-kV DHP breakers for Clinton. An example of one of these is discussed below.

b. **Findings and Observations**

RRS performed its overall dedication procedure on these breakers for use in Class 1E applications at Clinton. RRS maintained traceability of the parts used in each individual circuit breaker to their origin and to dedication records through identification slips stored in an envelope for that breaker. This practice is illustrated by the following example of cases reviewed: The identities and records of all the springs used to assemble a specific breaker were in such an envelope.

ECH purchased all the springs used to assemble DHP breakers from Diamond Wire Spring Company (Diamond). Diamond manufactured all the springs at its plants in Pittsburgh, Pennsylvania, and in Greenville, South Carolina. At the request of RRS, ECH had Diamond test all the springs. Records indicated that the Greenville Scale Company of Taylors, South Carolina, calibrated the equipment that Diamond used to test the various springs used to assemble the eleven Clinton circuit breakers. Each spring was uniquely identified with a tag. After a breaker was completely assembled, the tags attached to the springs used in that breaker were secured in an envelope and identified it with the breaker’s serial number. By comparison, the inspectors noted several packages of similarly tagged springs on the QA hold shelves at Cheswick that were either awaiting testing or that had been rejected.

RRS QA conducted surveillances to witness calibration of the test equipment that was used to test the springs. The inspectors reviewed the resultant RRS QA trip report, which documented that Greenville Scale Company had found Diamond’s test equipment “out of calibration.” However, the inspectors determined that the equipment was actually only overdue for calibration and that Greenville Scale Company’s calibration reports indicated that the equipment, although overdue for calibration, once calibrated, was found to be still within tolerance.

c. **Conclusions**

The inspectors concluded that the dedication records at Cheswick for the examples reviewed indicated generally acceptable dedication program and implementation.
3.4 **Review of Corrective Action Report (CAR) G98JD008**

a. **Inspection Scope**

To determine if RRS had documented adequate correct actions for the nonconforming conditions on the new Clinton breakers, the inspectors reviewed CAR G98JD008, dated October 13, 1998, which addressed the incorrectly welded levering-in device bracket assemblies on the front panels of five of the six Class 1E 50DHP350, 1200-ampere-rated breakers delivered to Clinton.

b. **Findings and Observations**

The CAR documented that the levering-in device safety interlock was not engaging in five of the six 50DHP350-1200 Class 1E breakers because the levering-in device support bracket assembly was welded to the rear of the breaker lower chassis front plate about 1/4-inch too low. As explained above, this allowed the levering-in device crank handle to be turned beyond its design limit with the breaker closed. The sixth breaker was manufactured at a different time and was not affected. Corrective actions taken after the breakers were returned from Clinton were to manufacture new front panels, verify that they met design drawings, and replace the deficient panel assemblies on the affected breakers. In addition, shop personnel underwent retraining, and ECH added the chassis front panel assembly to its critical parts list.

ECH and RRS stated that the breakers in question had all passed their mechanical tests (reportedly witnessed by the RRS representative) in the dummy test cubicle before leaving the factory. However, they had determined (and the IPC representatives agreed) that the levering-in device support was out of position just enough such that the interlock might have appeared to be functioning during the factory testing if only a light torque was applied once resistance from the apparently engaged interlock was encountered in attempting to turn the crank handle with the breaker closed in the connected position. Test technicians did not try to turn the crank harder because it was their practice to consider the interlock to be functioning satisfactorily if an apparent stop was encountered within about one half of a turn. They were, of course not aware at the time that the support bracket, which carries the interlock lever, was mispositioned. Apparently, the personnel at Clinton in testing the interlock themselves during receipt inspection, applied considerably more torque to the crank handle, which, with the support brackets out of position, was enough to force the crank past the interlock and allow more than up to about one-half turn of the crank, to which it is supposed to be limited by the interlock with the breaker closed in the connected position.

This condition would not affect plant safety because the levering-in device interlock is a backup measure to prevent challenging the floor tripper feature which will trip the breaker open if it is racked out more than about 1/8 inch from the fully connected position. This happens long before the primary disconnect fingers disengage from the cubicle studs at about 1-1/2 inch of travel. However, the condition effectively removes one personnel safety barrier and, more fundamentally, was another indication of poor quality control in the manufacturing process and inadequate corrective action by
ECH as well as inadequate quality assurance inspection and assurance of adequate corrective action by RRS.

However, through interviews with ECH engineers and factory workers (in particular the lead welder), the inspectors learned that during final assembly of the five affected breakers, the levering-in device tube and nut assemblies could be inserted through the hole in the front plate, but not through the two rings welded into the levering-in device support bracket on the rear of the front plate because the rings were apparently out of position. The inspectors determined that the five defective front plate assemblies were returned to the welding area to be reworked, but the problem was described simply as the rings being out of position. Rather than verify that the entire assembly was built in accordance with the drawing and manufacturing instructions, it appeared that the welder simply ground out the ring welds and rewelded the rings into the support brackets higher up without moving the brackets up as should have been done. The inspectors also noted that welds between the upper edge of the support brackets and the lip on the upper edge of the chassis front plate were missing because the brackets were positioned too low. The lead welder believed it was very likely that the initial mistake was that the welder who fabricated the defective assemblies used the wrong fit-up jig for the bracket assemblies such that the rings were in the wrong position relative to the side plates of the bracket to begin with. In addition, it was apparent that the welder did not use the mandrel (that the lead welder demonstrated the use of for the inspectors) to ensure that the ring holes are aligned with the hole in the front plate when welding the support bracket assembly to the front plate. While demonstrating the fit-up process to be used, the lead welder pointed out that because ECH did not have a bracket assembly-to-front plate fit-up fixture, it was necessary to use the mandrel to hold the bracket assembly to the front plate and align the holes, then take measurements on both sides of the bracket to ensure that the bracket was not rotated, but level with the top of the front plate, a very time consuming and imprecise method. The lead welder also told the inspectors that he had pointed this out to manufacturing supervisors and engineering explaining that it was very difficult for his welders to consistently meet the dimensional tolerances on the drawings using such primitive methods.

Finally, the inspectors noted that ECH had not used shop travelers or some other form of in-process control documentation during the manufacture of the breakers. Such a measure would help to prevent problems with use of incorrect tools and fixtures when multiple configurations (e.g., different subassembly drawing group numbers) of the breakers are being built. The inspectors determined that ECH not using such control documentation along with lack of certain welding fixtures were significant contributing causes, but that they were not addressed by RRS in CAR G98JD008.

c. Conclusion

The inspectors concluded that RRS QA oversight of the action taken by ECH to correct the nonconforming condition was not adequate because the original problem was not defined properly to ensure adequate corrective action, the rework instructions did not require review and verification that the new panel assemblies were built to drawing, the new panel assemblies were only functionally tested and not inspected against the
drawings, functional testing failed to detect the remaining interlock problem, and two significant contributing causes, i.e., not using shop travelers and the lack of adequate weld fit-up fixtures, were not identified, either when the levering-in device support bracket misalignment was first identified, or in the final corrective action, as documented in CAR G98JD008. Thus, in addition to RRS QA oversight deficiencies (i.e., inadequate inspection of breakers and their subassemblies as required by Criterion X of 10 CFR Part 50, Appendix B, and inadequate verification at the subcontractor source as required by Criterion VII), for which Nonconformance 98-01-01 was cited and discussed in Section 3.1 above, RRS did not assure that ECH took adequate corrective action when the incorrect position of the rings in the levering-in device bracket assembly was first identified. Further, RRS final corrective action did not address two significant contributing causes. These deficiencies were contrary to the requirements of Criterion XVI, "Corrective Action," of 10 CFR Part 50, Appendix B. Accordingly, Nonconformance 98-01-02 was cited.

3.5 Observation of Commercial-Grade Dedication Activities at Cheswick

a. Inspection Scope

Using the applicable CDI's as references, the inspectors observed RRS technicians perform dedications of selected low- and medium-voltage circuit breaker replacement parts at the Cheswick facility. The dedications observed were of parts purchased from ECH either for resale as basic components or for use by RRS in refurbishing and repairing low-voltage and medium-voltage circuit breakers. The inspectors examined test equipment, parts being dedicated, interviewed technicians and reviewed Material Deviation Reports (MDRs) in which adverse dedication findings were documented. The inspectors also inspected the segregated areas where RRS stores accepted and rejected components and examined dedicated and rejected items, their identifying tags and attached paperwork.

b. Findings and Observations

b.1 Material Deviation Report (MDR) 15710, Revision 0, dated May 8, 1998, documented the following adverse findings identified when RRS technicians inspected 50 levering-in device kits identified as Part (Style) No. 8068A62G02 that ECH supplied for use in DHP type circuit breakers. Technicians inspected the parts against Drawing 8068A62.

1. The parts received for the fifty kits were not sorted as kits.
2. Four Housings had defective plating.
3. There were areas in 25 tube-and-nut assemblies where the wall thickness was below the minimum wall thickness of 0.12".
4. The slots in seven shafts were too deep.
5. Five out of a sample of eight springs failed their initial load test.

6. The size of the threads in ten tube-and-nut assemblies was out of tolerance. All ten had light corrosion inside at the slot, except three which had grease inside.

7. The quantity of shafts received (49) was less than ordered (50).

8. Some of the shafts had uneven yellow zinc chromate treatment.

b.2 MDR 15710, Revision 1, dated October 5, 1998, documented the following findings regarding 50 more levering-in devices:

1. ECH reshipped two springs to RRS that RRS had previously rejected on May 8, 1998, during receipt inspection and returned to ECH.

2. Five shafts had oversize holes.

3. Nine tube-and-nut assemblies that had been previously rejected by RRS were resupplied by ECH.

4. One tube-and-nut assembly had severe weld burnthrough causing an obstruction in its interior that prevented complete insertion of the shaft.

5. One tube-and-nut assembly was removed from a previously assembled kit.

b.3 MDR 15926, dated August 13, 1998, documented the following adverse findings for a Type DHP breaker ratchet-and-cam assembly, Drawing No. 792A120, Revision 01, inspected under CDI CEB 0432, Revision 02:

1. One important dimension the motor pawl stop pin was out of tolerance.

2. The driving pawl plates were cracked.

3. Some dimensions of the manual ratchet lever pawl assembly were out of tolerance.

4. RRS receipt inspectors were unable to remove the hexagonal bolt in the ratchet-and-cam assembly.

5. Manual ratchet lever welds were deficient (e.g., short, undercut).

6. There was corrosion inside one manual ratchet lever on the spacer and stop and inside of the lever.

7. The hardness on one manual ratchet operating handle was not within tolerance.
c. **Conclusions**

The inspectors concluded that the RRS technicians were conducting thorough inspections in accordance with the applicable CDIs. The inspectors further concluded that receiving inspection findings were well documented and that the dispositions of the findings were appropriate.

3.6 **Dedication of DS-532 Breaker Replacement Mechanisms**

a. **Inspection Scope**

To determine the adequacy of dedicating the operating mechanisms for two DS-532 type, 480 volt circuit breakers, identified as Part No. 567F 759 G04, the inspectors reviewed the records in which RRS technicians documented the commercial dedication, using Procedure CDI CEB-0687, Revision 0, to dedicate them. The record review was supplemented by interviews with and demonstrations by technicians, observation of similar dedication work in progress and examination of representative components.

b. **Findings and Observations.**

Records indicated that RRS technicians performed the following operations on two refurbished operating mechanisms to dedicate them:

- Disassemble and clean all parts.
- Retrieve replacement parts from stock as required by the CDI.
- Inspect and document all worn, broken or damaged parts.
- Lubricate and reassemble.
- Inspect and replace fasteners as necessary.
- Reassemble, adjust, and test.
- Relabel and serialize the package.

c. **Conclusions**

On the basis of records, interviews with and demonstrations by technicians, observation of work in progress and examination of representative components, the inspectors concluded that RRS technicians followed the instructions in the CDI for the mechanisms in question and that the operating mechanism was adequately tested before shipment.

3.7 **Review of DB-25 Type Circuit Breaker Refurbishing Records**

a. **Inspection Scope**

The inspectors reviewed the RRS records which documented the refurbishment of two DB-25 circuit breakers by RRS, one of which recently failed to close and remain closed upon demand at Rochester Gas and Electric's (RG&E's) R.E. Ginna Nuclear Power
b. Findings and Observations

Section M2.1, "Refurbishment and Reinstallation of the A-Service Water (A-SW) Pump Circuit Breaker," of NRC Inspection Report 50-244/98-09 discussed RG&E actions to restore the failed A-SW pump breaker to service. The report stated that on August 4, 1998, RG&E sent the A-SW pump breaker to RRS in Cheswick following an in-service failure in which the breaker tripped open after momentarily closing upon a demand signal from the control room on July 30, 1998. The inspectors had been concerned with the high frequency of Westinghouse DB circuit breaker failures at Ginna, particularly in this instance, since neither RG&E nor RRS could determine a root cause for the failure.

The inspectors determined that RRS refurbished the breaker and returned it to Ginna on September 21, 1998. However, electrical maintenance technicians inspected the breaker at the station and noted the following deficiencies: (1) silver coating worn through on secondary contacts; (2) missing "E"-clip on the escutcheon plate assembly; and (3) binding trip mechanism, preventing it from resetting reliably. This condition could cause the breaker to "go trip free" (fail to latch closed) on the next closure attempt. On September 30, 1998, an RG&E system engineer accompanied the breaker to RRS in Cheswick for correction of these problems. RRS determined that the binding trip mechanism was caused by an oversized first toggle link. Following replacement of the toggle link and additional repairs, RRS returned the breaker to Ginna on October 6, 1998, where it was satisfactorily inspected and bench tested. The licensee reinstalled the breaker in its cubicle and returned it to service on October 14, 1998, following a satisfactory functional test. RRS indicated that the oversized toggle link would be evaluated for a potential 10 CFR Part 21 report.

During this inspection, records indicated that the values of the breaker trip load, distance traveled by the trip bar to trip, heights of the trip bar on the left and right, and the gap between the shunt trip lever and trip bar were documented before and after refurbishment. The probable cause of the failure was determined to be the first toggle link being oversized. This condition had been discovered during the incoming testing and inspection. The link was ground to meet the drawing dimensional tolerances during the rework of the breakers. RRS stated that no other customer had reported a similar problem and explained that their investigation had revealed that the breaker only became sensitive to the slightly oversized link when its factory applied lubrication wore off. RRS had determined that this lubrication had worn off prematurely at Ginna because of frequent manual operation of the breaker using excessive closing force on the maintenance closing handle. RRS had determined that for these reasons, only Ginna would be affected by the condition. Therefore, no further 10 CFR Part 21 evaluation or notification was required. The inspectors agreed.

Also during this inspection at Cheswick, the NRC inspectors determined that RG&E had issued its PO NQ-15877-C-JW to RRS to refurbish one safety-related circuit breaker,
Type DB-25, Serial No. 980.018-1. For this job, RRS issued GO SY01052. The breaker was manufactured under the original shop order, 24Y4712-BA9, and RRS had refurbished this breaker in 1992 under shop order 980.148. Ginna operated this breaker for some time and noticed that on the right-hand side of the housing, internal to the operating mechanism, the roller latch pin was missing. With the roller latch pin being out of the correct hole, the roller was at an angle. This affected the proper operation of the breaker.

The pin provides a stop for the mechanism linkage when the breaker is in the closed position. The missing pin did not prevent the breaker from closing, but did allow the closing coil and operating mechanism linkage to extend beyond the normal working positions. RRS concluded that wear marks on the circuit breaker where the pin would have made contact in service indicated the breaker had a pin when it was shipped in 1992 after refurbishing it and that the pin had remained in place for sometime before it apparently worked its way out. RRS confirmed that this pin was missing when they received the breaker and assured the NRC inspectors that it would be assembled correctly before the breaker is returned to Ginna. The inspectors reviewed the records in which RRS documented the refurbishment of the second breaker and identified no adverse findings.

c. Conclusions

RRS has revised the refurbishment procedure to add a line item to check the dimension of the first toggle link which caused the Ginna breakers to operate unsatisfactorily. The inspectors identified no adverse findings in this area.
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# ITEMS OPENED, CLOSED AND DISCUSSED

## Opened:

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<td>Inadequate QA oversight of ECH (Inspection and dedication)</td>
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| 99901043/98-01-02 | NON    | 10 CFR Part 50, Appendix B, Criterion XVI  
|                  |        | Inadequate corrective action                                                |
| 99901043/98-01-03 | NON    | 10 CFR Part 50, Appendix B, Criterion V  
|                  |        | Inadequate commercial dedication instruction                               |
| 99901043/98-01-04 | URI    | Potential 10 CFR Part 50, Appendix B, Criterion III  
|                  |        | Failure to maintain control of control wiring design                       |

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| 99901043/98-01-06 | URI    | (Redesignated from WNSD 99900404/98-01-03)  
|                  |        | Inadequate rear arc horn/arc chute clearance on Clinton DHP breakers         |

## Discussed:

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| 99901043/98-01-05 | URI    | (Redesignated from WNSD 99900404/98-01-02, Remains Open)  
<p>|                  |        | Testing of DB-50 breakers to determine minimum trip bar force, effects of trip pad removal, and overwound trip pan return spring (as found at IP2) |</p>
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<td>Deterioration of High-Efficiency Particulate Air Filters in a Pressurized Water Reactor Containment Fan Cooler Unit</td>
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2. TITLE AND SUBTITLE

5. AUTHOR(S)

8. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)
Division of Inspection Program Management Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Washington, D.C. 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)
Same as above

11. ABSTRACT (200 words or less)
This periodical covers the results of inspections performed by the NRC's Quality Assurance, Vendor Inspection, Maintenance and Allegations Branch, that have been distributed to the inspected organizations during the period from January through March 1999.

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