ORGANIZATION: SQUARE D COMPANY
CEDAR RAPIDS, IOWA 52404

REPORT NO.: 99901146/89-01	INSPECTION DATE: 3/27 - 3/30/89	INSPECTION ON-SITE HOURS: 48

CORRESPONDENCE ADDRESS: Square D Company
Barbara Sines, Plant Manager
3700 6th Street South West
Cedar Rapids, Iowa 52404

ORGANIZATIONAL CONTACT: Mr. M. Douglas, QC Manager
TELEPHONE NUMBER: 319-365-4631

NUCLEAR INDUSTRY ACTIVITY: Molded case circuit breakers

ASSIGNED INSPECTOR: _____ 6/6/89
K. R. Naidu, Reactor Inspection Section No.1 (RIS-1), VIB, DRIS, NRR — Date

OTHER INSPECTOR(S): H. M. Wescott, Special Projects Section, VIB, DRIS, NRR

APPROVED BY: _____ 6/6/89
for E. T. Baker, Chief, RIS-1, Vendor Inspection Branch, DRIS, NRR — Date

INSPECTION BASES AND SCOPE:

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

B. SCOPE: Review the implementation of the quality assurance program in selected areas; observed the manufacture and testing of circuit breakers; observed rated short circuit tests performed on a refurbished and a normal molded case circuit breaker.

PLANT SITE APPLICABILITY: Potentially all reactor sites.

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A. VIOLATIONS:

None

B. NONCONFORMANCES:

None

C. STATUS OF PREVIOUS INSPECTION FINDINGS:

Two unresolved items pertaining to the Square D (SD), Cedar Rapids, Iowa, plant were identified during a routine inspection at the SD Peru, Indiana, plant. These two unresolved items are documented in NRC Inspection Report No. 99900367/88-01.

These items could not be resolved in a timely manner prior to the conclusion of the inspection and remain open.

D. OTHER FINDINGS AND COMMENTS:

1. Background Information

Commercial grade molded case circuit breakers (CBs) between the ranges of 3 amperes (A) to 4000 A are manufactured at the Cedar Rapids plant under a quality assurance program compatible in many aspects with the 10 CFR 50 Appendix B requirements. The CBs are furnished to the SD plant located in Peru, Indiana, where the CBs are dedicated for Class 1E applications. SD, Peru, also assembles motor control centers and furnishes them as Class 1E equipment. Spare CBs furnished by SD, Cedar Rapids are dedicated at the SD, Peru facility and supplied as Class 1E equipment. To date, all purchase orders for spare CBs have been issued to SD, Peru, who in turn obtained the CBs as commercial grade items with certificates of conformance from SD, Cedar Rapids. Other SD facilities manufacturing components utilized in nuclear power plants are:

SD Monroe, North Carolina: Transformers up to 5000 kVA with up to 34.5 KV maximum primary voltage

SD Raleigh, North Carolina: Electrical contactors and motor starters

SD Raleigh, North Carolina: Electrical relays

SD Ashville, North Carolina: Electrical relays

The SD Cedar Rapids, Iowa, plant utilizes approximately 26,000 square feet and employes 800 persons. This facility has its own electrical generator to produce the necessary voltage and current to conduct short circuit tests on low and medium voltage CBs.

2. Plant Tour

The inspectors, accompanied by SD personnel, toured the manufacturing facility and observed the following:

a. In-process inspections were conducted by individuals manufacturing components. Procedures, with acceptance criteria, were available at each workstation.

b. Every CB was subjected to final tests.

c. Materials received from vendors were properly identified and the status of receipt inspections were readily discernable.

d. All items stored were adequately identified.

3. Review of Control of Purchased Material

Material supplied by vendors receive a "transaction" number upon receipt. The transaction number is the link to trace all the subsequent relevant records. The inspectors observed that all materials at the receiving area were identified with either transaction numbers, receipt inspection reports or red tags denoting incomplete information to perform receipt inspection. The inspectors noted the relevant information on the following components and subsequently reviewed the relevant documents.

a. SD Purchase Order (PO) 6002279, dated January 31, 1989, to Kreider Corporation, Springfield, Ohio, for the supply of switch actuators identified as Part No. 48117-096-04, Transaction No. 9081139. The items had been inspected and determined acceptable.

b. SD PO 6002408, dated February 1, 1989, to Mohawk Springs, Shiller Park, Illinois, for the supply of silver springs to

Drawing No. 48030-314-04. No problems were identified on these springs.

c. SD PO 6001732, dated January 19, 1989, to American Coil Spring Company, Muskegon, Michigan, for the supply of trip lever springs to Drawing No. 48030-261-01, Revision ECN 234.

d. SD PO 6097227, dated July 10, 1988, to Sons Tool & Engineering Company, Incorporated, Woodville, Wisconsin, for the supply of lower links to Drawing No. 48161-032-02-04.

e. SD PO 6003139 dated February 15, 1989, to Arden Industrial Products, Saint Paul, Minnesota, for the supply of inserts to Drawing No. 29407-00173, Revision 278. This material was initially identified with Transaction No. 9081126 on March 22, 1989. Receipt inspection identified that this material did not conform to Drawing No. 48030-314-04. Subsequent discussions and inspections conducted by the assigned engineer confirmed that the parts were to Drawing No. 29407-00173. The transaction tag was changed from 9081126 to 9087701 on March 28, 1989. The error was corrected electronically on the computer with the consent of the engineer and purchasing.

f. SD PO 6001573, dated January 17, 1989, to Dayton Rogers Manufacturing, Minneapolis, Minnesota, for the supply of 100 magnet slides to Drawing No. 48131-112-02-Y, Revision E718. One hundred thirty-two pieces were received on March 7, 1989. Receipt inspection observed that all the 132 pieces had dimensional problems and the parts were not formed properly. The receiving inspection report, for Transaction No. 9066057, with the adverse inspection findings, was forwarded to the cognizant engineer responsible for that part. After an evaluation, the cognizant engineer determined that the parts were usable as-is. It was also recommended that the vendor be notified of the deficiencies identified during the receipt, along with samples of the parts. SD notified the vendor on March 15, 1989, to correct the deficiencies before shipping any future orders.

The inspectors determined that the approved vendors are incorporated in the computer program to enable purchasing to buy only from vendors previously approved. However, if material is purchased from vendors

not identified in the computer program, then, first piece inspection is mandatory. The issuance of the received material is controlled until such time that the assigned engineer is satisfied that the supplied material is acceptable. The inspectors determined that the above activities were in compliance with Standard Practice Bulletin (SPB) 317 titled, "Vendor Selection for Productive Material," dated May 5, 1988, which establishes the guidelines to be used for selecting vendors and SPB 315 titled, "Issuance of Purchase Orders," dated May 4, 1988, which defines the requirements necessary for issuance of a PO.

4. Observation of In-Process Inspections

The inspectors, accompanied by SD personnel, observed the manufacture of components required to assemble FA type molded case CBs. Operators performing the work periodically inspected the work to procedures, which defined acceptance criteria. The applicable procedure was posted at the workstation. The inspectors examined the components and the inspections being performed on the components at the following workstations:

a. Contact being brazed to terminal identified as Part No. 48124-331-57. The requirement at this station was to determine the acceptability of the braze attaching the contact to the terminal. To accomplish this, five pieces were inspected every hour for the following attributes:

(1) Verify that the solder flow was adequate on three sides.

(2) The contact is brazed straight on the terminal.

(3) Go-no-go check to verify that the minimum contact height is 0.140 millimeter.

b. Cradle assembly being riveted to the mechanical housing. After riveting the cradle assembly to the mechanical housing the following attributes were verified:

(1) Check the grease on the subassembly.

(2) Proper roll on the rivets.

(3) Inspect the left housing for cut-off area.

c. Bi-metal/terminal assembly identified as Part No. 48124-356-50-54. At this operation, after the bi-metal is assembled to the terminal, the formed heights of the bi-metal on three specimens are measured with a gauge to determine that the formed heights are within the acceptable values stated on the procedure. The procedure specifies the values for a variety of assemblies depending on the CB rating.

d. The magnetic trip is calibrated on each pole of the CB and adjusted during a trip-trip-hold-trip-hold-trip cycle of operation.

e. The thermal overload trip on each CB is calibrated by an automated operation. The machine is programmed to test the CB and automatically adjust the calibration in two attempts. If the calibration cannot be adjusted to conform to the acceptable value in two attempts, then the CB is diverted to a different station. At this station, the thermal overload is calibrated manually, left for a specific period of time to cool the bi-metallic strip, and after the elapse of a predetermined time, the trip setting is finally verified.

The inspectors observed that the results of the in-process inspections were being documented on inspection reports. SD representatives stated that the in-process reports are collected and stored for at least six months.

5. Observations of Short Circuit Tests

On March 29, 1989, SD performed rated short circuit tests on two three-phase KHL 36225 type molded case CBs. One was a new one from the production lot. The rear cover on the second CB was replaced with a counterfeit cover to simulate a refurbished one. When subjected to 25,000 A, the new one tripped and was subsequently examined and determined operable. The tampered one experienced extensive damage. The line side terminal leads melted. It was postulated that the short circuit current tripped the CB. However, during the short circuit interruption, the ionized air caused by the high current, instead of escaping through the normal channels provided in the genuine CB, escaped through the top, causing a phase to phase short resulting in the destruction of the line side cable terminals of the CB.

6. Review of Control of Design Changes

The control of revisions to drawings, distribution of revised drawings and removing obsolete drawings from use are addressed in Paragraph 3.4.5 of the SD QA manual. Paragraph 3.4.5 states, "Changes to previously verified designs shall require verifications, including evaluations of the effects of those changes on other modules or components of the overall equipment." This procedure is complemented by an Engineering Procedure EP-2 titled, "Report Procedure for Design Documents," dated May 1987, which states, in part, in paragraph 11B, "The Existing Product Engineer shall be responsible for changes which affect the customer or other plants, such as, resolution of performance problems, product upgrades and design enhancements." The inspectors observed that drawings were revised after an Engineering Change Notice (ECN) was initiated describing the change to that component. The ECN is circulated to the cognizant engineer for review and approval. In the interim, while the review process is in progress, the original of the drawing is annotated to preclude inadvertent use of the drawing while the ECN was being reviewed. The inspectors selected five drawings, examined the control of ECNs and determined the following:

a. Revision H, dated October 10, 1988, to Drawing No. 48124-120 was accomplished with ECN F711. ECN F711, dated January 11, 1989, was initiated to change the load end venting of certain FA type CBs by using slotted load barriers.

b. Revision D, dated May 4, 1988, to Drawing NO. A48124 - 120 was accomplished with ECN U288. ECN U288 was initiated on April 13, 1988, to provide tolerances to the length of the line end barrier.

c. Revision C, dated November 11, 1988, to Drawing No. A8124-237 was accomplished with ECN F726, dated December 20, 1988. ECN F726 approved gold plated wire and switch assemblies.

d. Revision F, dated December 19, 1988, to Drawing No. A48117-024 was accomplished with ECN F733, dated February 3, 1989. ECN F733 increased the tolerance on the width of the handle shield for certain KA type CBs.

e. Revision A, dated December 19, 1988, to Drawing No. A4118-108 was accomplished with ECN F733, dated February 3, 1989. The ECN modified the drawings of the inner and outer visiblade handle shields so that handles intended for KCL and FA type CBs could be manufactured by using the same stamping.

7. Review of Calibration System

The inspectors reviewed Square D QA Manual Criterion XII, "Control of Measuring and Test Equipment" dated May 16, 1978. Review of calibration certificates established that standards used for calibration of electrical and mechanical instruments were traceable to the National Bureau of Standards. It was noted that the certification for the standard used to calibrate electrical meters (Fluke) did not have the calibration data sheets to substantiate the certificate. It is the inspectors understanding that the data sheets would be requested.

During a tour of the facility the inspector noted that two "mag boards" identified as FE No. 6423 and FE No. 6522, used to verify breaker trip times on overload, had not been calibrated before their due dates. The calibration card for FE No. 6423 indicated that the last calibration was performed February 6, 1987, and was due for calibration in August 1988, which had not been performed. The calibration card and records could not be located for FE No. 6522. Calibration of the two mag boards were performed during this inspection and determined to be within tolerance. No discrepancies were identified.

8. Review of Audits

The inspectors reviewed the corporate QA audit for 1988. Several findings were documented pertaining to calibration and storing of materials. Response to the findings indicated that action was being taken to correct the findings. Additionally, the inspectors reviewed the internal audit schedule, preparation of audit forms, conduct of audit, and review of the 1987 in-house audits which appeared to be satisfactory.

There was one customer audit of the SD facility performed by Virginia Electric Power Company approving the QA program by letter dated March 17, 1987. Normally customer audits are performed at SD's facility in Peru, Indiana.

The inspector reviewed the purchasing department "Vendor Evaluation/Certification Program" procedure describing the various ratings applied to vendors prior to becoming a certified vendor. The inspector also reviewed one "Vendor Certification/ Evaluation Report" of Data Metalcraft, Incorporated, dated, February 1989 and performed a review of the approved supplier list printout. No discrepancies were identified.

E. EXIT MEETING:

The inspectors met with individuals identified under persons contacted, explained the scope and purpose of the inspection and discussed the inspection findings.

F. PERSONS CONTACTED:

G. Q. Lofgren	Corporate Quality Manager
*B. Sines	Plant Manager
*M. Douglas	Quality Manager
L. Serbousek	Marketing Manager
*G. Gregory	Chief Engineer
*P. Zimmerman	Customer Service Supervisor
*P. Rainbow	Customer Service
*K. Chown	Manufacturing Manager
K. Slagle	Quality Engineer
D. Smith	Quality Assurance Technician

*Denotes those individuals who attended the exit interview on March 30, 1989.