

ORGANIZATION: BROWN BOVERI ELECTRIC, INC., DISTRIBUTION APPARATUS DIVISION
HORSHAM, PENNSYLVANIA

REPORT NO.: 99900743/81-02	INSPECTION DATE(S): 10/27-30/81	INSPECTION ON-SITE HOURS: 14.5
CORRESPONDENCE ADDRESS: Brown Boveri Electric, Inc. Distribution Apparatus Division ATTN: Mr. D. D. Duvall Vice President and General Manager Switchgear Systems Division Norristown Road and Route 309 Spring House, PA 19477		
ORGANIZATION CONTACT: Mr. E. W. Rhoads, Manager-Quality Assurance TELEPHONE: (215) 628-7660		
PRINCIPAL PRODUCT: Protective Relay Devices and Circuit Breakers		
NUCLEAR INDUSTRY ACTIVITY: Did not obtain total activity during this inspection.		
ASSIGNED INSPECTOR: <u>I. Barnes</u> for W. E. Foster, Reactive Inspection Section (RIS)		<u>12-18-81</u> Date
OTHER INSPECTOR(S):		
APPROVED BY: <u>I. Barnes</u> I. Barnes, Chief, RIS		<u>12-18-81</u> Date
INSPECTION BASES AND SCOPE:		
A. <u>BASES:</u> 10 CFR Part 50, Appendix B; and 10 CFR Part 21.		
B. <u>SCOPE:</u> This inspection was made as a result of the documented notification of problems with: (1) 480 volt switchgear trip units at the V. C. Summer Nuclear Power Plant, Unit No. 1; (2) insufficient clearance of components in K-1600S and K-2000S circuit breakers at the Catawba Nuclear Power Plant, Unit Nos. 1 and 2; (3) cracking of movable arcing contacts in K-600S, K-1600S and K-2000S circuit breakers at the Catawba Nuclear Power Plant, Unit No. 2; (4) wire termination in K-600, K-1600, and possibly K-3000 circuit breakers at the Rancho Seco Nuclear Power Plant; (5) grease on contacts of 480 volt switchgear circuit breakers at the V. C. Summer Nuclear Power Plant, Unit No. 1; (6) charging spring motor wire in 480 volt circuit breakers at the San Onofre Nuclear Power Plant, Unit Nos. 2 and 3; and (7) Series ITE-50D and ITE-50H overcurrent relays supplied to numerous Nuclear Power Plants.		
8201260320 820106 PDR GA999 EMVBBC 99900743 PDR		DESIGNATED ORIGINAL <u>Sheanne Jouts</u> Certified By

REPORT NO.: 99900743/81-02

INSPECTION RESULTS:

PAGE 2 of 5

INSPECTION BASES AND SCOPE: (cont.)

Other areas inspected were: (1) follow up on a previously identified nonconformance; and (2) follow up on a previously identified unresolved item.

A. VIOLATIONS:

None

B. NONCONFORMANCE:

Contrary to Brown Boveri Electric, Incorporated, Switchgear Systems Division's corrective action response letter dated April 8, 1981, the revised organization chart had not become effective April 1, 1981; as evidenced by an undated organization chart incorporated into the QA Manual and QA Procedure. The incorporated organization chart does not depict a block identified as "Final Test," as depicted in the chart provided with the corrective action response letter.

C. UNRESOLVED ITEMS:

Follow up on Regional Requests - The NRC inspector observed that the movable control contact assembly (control block) touches, or very nearly touches, the surface of the ball-bearing conveyor as the K-1600S circuit breaker is hoisted from its handling carriage to facilitate preparation for shipment. If touching does occur, dependent upon the force of contact, breakage of the movable control contact assembly could result.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (31-01): Personnel performing quality assurance functions did not have the organizational freedom from cost and schedule, inasmuch as they reported directly to manufacturing management and not to the QA Manager.

The NRC inspector verified that a revised organization chart depicts personnel reporting directly to the QA Manager. However, the chart differs from the one supplied with the corrective action response letter inasmuch as it did not depict a block identified as "Final Test."

2. (Resolved) Unresolved Item (81-01): It was not apparent to the NRC inspector that identification of purchased parts was accomplished at receiving inspection.

Interview with the Receiving Inspector provided assurance that identification of purchased parts is accomplished. Further, the Quality Assurance Manager, Switchgear Systems Division, assured the NRC inspector that a characteristic for identification would be added to the Inspection Record Card.

E. OTHER FINDINGS OR COMMENTS:

1. Follow up on Regional Requests

- a. The defective 480 volt switchgear trip units, Serial Nos. 34049 and 32385 were tested upon receipt from South Carolina Electric and Gas Company. Both tested satisfactorily. Upon disassembly, the latter revealed slight damage that had no effect upon its function; however, the former exhibited broken solder connections on the long time and short time printed circuit boards, which were repaired. The entire control board of the latter unit was replaced as a precautionary measure. Both were returned to South Carolina Electric and Gas Company.

Corrective measures were adequate and preventive measures were not required inasmuch as it appears that the damage occurred after initial delivery of the units.

- b. Duke Power Company reported that a clearance problem existed between the: (1) magnetic latch lever and the right pole current sensor coil; and (2) current sensor coil and the lower terminal current stud directly behind it. This was observed in some K-1600S and K-2000S circuit breakers at the Catawba Nuclear Station, Unit Nos. 1 and 2. The second problem appears to be restricted to the K-2000S circuit breaker. Corrective actions include: (1) modification of magnetic latch levers; and (2) addition of insulating tape between the current sensor coil and the lower terminal current stud directly behind it. Instructions for accomplishment of this activity were distributed in October 1981, to all purchasers that have K-1600S and K-2000S circuit breakers, delivered prior to June 1981. Preventive measures include: (1) revision of drawings for the magnetic latch lever and current sensor; and (2) revision of assembly and inspection procedures. Corrective actions and preventive measures are adequate.
- c. Duke Power Company reported the following problems related to K-600S, K-1600S and K-2000S circuit breakers located at Catawba Nuclear Station, Unit Nos. 1 and 2: (1) several moving arcing contacts were found cracked during initial inspection; and (2) some secondary control blocks were found broken when uncrated.

Reviewed records indicate that there was an awareness in early 1979 of cracking arcing contacts, movable and stationary. Further, interviews indicated that there was an awareness in 1978.

An evaluation was conducted in 1979 to determine the effect cracked arcing contacts had upon the life of the K-1600 circuit breaker. The report provided the following conclusion: "The contacts did not crack during circuit breaker operation unless they were pre-cracked. When cracks existed, they migrated and became larger, but did not separate or fall off the assembly." As a result of the investigation, it was recommended that the K-1600 circuit breakers supplied for Susquehanna Steam Electric Station be inspected for cracks and cracked contact assemblies be replaced. Preventive measures were taken with the supplier of the contacts who reportedly, modified his procedures. The circuit breakers were supplied on a purchase order (Bechtel Power Corp. No. 8856-E-117-AC, Rev. 11, dated March 6, 1978) which invoked 10 CFR Part 21; however, the supplier of the circuit breakers determined the defect non-reportable.

Defective arcing contact assemblies from Catawba Nuclear Station are in the process of being returned to Brown Boveri Electric for rework. Contacts are no longer purchased as separate items to be brazed onto the next assembly, rather, arcing contact arm assemblies are purchased. Broken control blocks were also observed in 1979. It was determined that breakage occurred during shipping and improved packing was instituted. As with the arcing contacts, broken control blocks are being replaced for Catawba Nuclear Station. The NRC inspector observed the handling procedure for a K-1600S circuit breaker during preparation for shipment and questions the adequacy of the preventive measures.

- d. South Carolina Electric and Gas Company reported that grease was on contacts of 480 volt switchgear circuit breakers received from the manufacturer. Prior to the inspection, the NRC inspector contacted the Inspection and Enforcement Office, Region II to determine what reports were available. The NRC inspector was informed that this item was closed; however, he elected to verify that lubrication was a controlled activity at the manufacturing facility. No problems were observed.
- e. Bechtel Power Corporation, Norwalk, California, reported that the insulation had worn away on the wire to the charging spring motor resulting in a grounded condition of the 480 volt load center switchgear. This condition was observed at the San Onofre Nuclear

Generating Station, Unit Nos. 2 and 3. Corrective action taken was securing the wire to the frame of the circuit breaker with tie wrap; this applied to all delivered hardware manufactured prior to May 1981. Preventive measures include: (1) keeping the wire encased in spiral wrap until it has passed the point of interference with the racking gear; and (2) 100 percent inspection for compliance with this requirement.

2. Follow up on IE Information Notice No. 81-06:

The notice addressed the incompatibility of a conductor/lug combination on the shunt trip device of a K-600 circuit breaker located at the Rancho Seco Nuclear Station. Corrective Action is being initiated by Rancho Seco.

The NRC inspector was informed that numerous customers had contacted Brown Boveri Electric and none have experienced the problem. The NRC inspector reviewed the assembly and inspection procedures and observed terminal lugs at the wiring station, all appeared satisfactory.

3. Follow up on 10 CFR Part 21 Reports:

Brown Boveri Electric, Inc., Switchgear Systems Division, filed a 10 CFR Part 21 report regarding a potential problem with Series ITE-50D and ITE-50H overcurrent relays. The potential problem was identified as failure of the relay to drop out when its input current drops below 98 percent of the pick up setting. The cause has been identified as an integrated circuit on the drawout printed circuit board. Progress is underway in modifying the printed circuit boards of delivered relays. To prevent recurrence, drawings have been revised to incorporate a more reliable integrated circuit. The inspector observed that boards are being manufactured with the more reliable integrated circuit.

BROWN BOVERT ELECTRIC, INC.

Dates 10/27-30/81

Inspector W. E. Foster

Page 1 of 1

ORGANIZATION(Please Print)

Manager

Engineering & Development

*M. Franchi

Manager

Quality Control

H. Hinch

Supervisor

Testing

Attended Exit Interview. The following persons from the Switchgear Systems Division were also in attendance:

W. E. Lambach

Director

Engineering

D. W. Pratt

Engineer

Quality Assurance

E. W. Rhoads

Manager

Quality Assurance

Inspector W. E. FosterDocket No. 99900743
Report No. 81-02
Page 1 of 4Scope/Module Follow up on Regional RequestsDOCUMENTS EXAMINED

Item No.	Type	TITLE/SUBJECT	Date	Revision
1	2	Possible Interference of Magnetic Latch & Current Sensor on K-1600's & K-2000's	10/12/81	
2	3	No. 209734-TS - Lower Midy & Sensor Assy - Single Pole Shale Trip K1600's...	6/81	16
3	2	Test and Inspection - Sensor Assembly	6/81	1
4	1	No. 710614 - Trip Lever Assembly, Magnetic Latch	3/19/81	1
5	1	No. 609200 - Phase Sensors	4/9/81	16
6	1	No. 609299 - Sensor Cone	2/11/81	16
7	6	Evaluation Report - K1600 Moving Arcing Contacts	8/30/79	
8	6	Pennsylvania Power & Light Co Shop Ord No. 33-50196 & 33-50197	6/19/79	
9	6	704655-A	8/3/79	
10	6	Evaluation Reports K1600 Moving Arcing Contact, K-2000 Arc Chute...	9/6/79	
11	6	Broken Control Contacts on K-1600 & K-2000 Amp. Breakers	8/9/79	
12	7	Duke Power Co, Charlotte, N.C., To: BBE, Inc., Charlotte, N.C. - Catawba ... 600V ... Breakers	2/27/81	
13	7	BBE, Inc., Charlotte, N.C., To: Duke Power Co, Charlotte, N.C. - Catawba ... 600V ... Switchgear	2/2/81	
14	6	K-1600 Cracked Arcing Contacts Catawba Nuclear Station 33-50583	1/26/81	
15	7	BBE, Inc., To: South Carolina Electric & Gas Co. - Addresser grease on contacts	12/16/80	
16	5	Mill - Power Supply Co. No. A-99530	9/10/75	

Document Types:

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|------------------|---------------------------------|
| 1. Drawing | 5. Purchase Order |
| 2. Specification | 6. Internal Memo |
| 3. Procedure | 7. Letter |
| 4. QA Manual | 8. Other (Specify-if necessary) |

Columns:

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| 1. Sequential Item Number |
| 2. Type of Document |
| 3. Date of Document |
| 4. Revision (If applicable) |

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Inspector W. E. Foster

Scope/Module Follow up on 10 C.I.R Pt 21 Report DOCUMENTS EXAMINED

Docket No. 99900743
Report No. 81-02
Page 3 of 4

Item No.	Type	TITLE/SUBJECT	Date	Revision
23	7	Brown Boveri Electric, To; Mill-Power Supply Co.- P.O. No. E-54898-7c	6/25/81	
24	7	" " " " " " - ITE-50H & ITE-50D Relay	10/5/81	
25	7	" " " " Duquesne Light Co.- " " " " circuit "	6/23/81	
26	1	No. 605-254-COS/MOS Low Power ... Multivibrator	8/29/80	2
27	1	-- -- " " " " " " --	6/10/80	1
SCCPE/MODULE		- Follow up on IE Bulletin		
28	7	Brown Boveri Electric, To; USNRC - Washington, D.C.	8/12/81	
29	8	Crimping Tool Calibration Records		
30	2	#208600 - Control Wiring (Test and Inspection)	4/30/81	1

Document Types:

1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchase Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

POLYMER

1. Sequential Item Number
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3. Date of Document
4. Revision (If applicable)

