ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
ELECTRO-MECHANICAL DIVISION
CHESWICK, PENNSYLVANIA

REPORT NO: 99900033/82-01	INSPECTION DATE(S) June 7-11, 1982	INSPECTION ON-SITE HOURS: 30

CORRESPONDENCE ADDRESS: Westinghouse Electric Corporation
Electro-Mechanical Division
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Cheswick Avenue
Cheswick, PA 15204

ORGANIZATION CONTACT: Mr. C. E. Owens, Product Assurance Manager
TELEPHONE NUMBER: (412) 963-5326

PRINCIPAL PRODUCT: Pumps, Control Rod Drives, and Valves

NUCLEAR INDUSTRY ACTIVITY: Approximately 40% of the sales.

ASSIGNED INSPECTOR: J. T. Conway / 7-30-82
W. M. McNeill, Reactive & Components Program Section, (R&CPS) — Date

OTHER INSPECTOR(S):

APPROVED BY: J. T. Conway / 7-30-82
I. Barnes, Chief, R&CPS — Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and Westinghouse Topical Report WCAP-8370, Revision 9A.

B. SCOPE: This inspection was made as a result of the issuance of a Preliminary Notification (PNO-II-82-49) to the NRC of failures of reactor coolant pump bolts at the Robinson Unit 2 facility of Carolina Power and Light Company. The diffuser adaptor cap screws were found to have the heads broken off. In addition, followup was performed on the potential failure of valves to close under high differential pressures which has been identified in 10 CFR 50.55(e) reports by various sites. The QA programmatic area of training and status of previous inspection findings were also inspected.

PLANT SITE APPLICABILITY:

H. B. Robinson (50-261)

DESIGNATED ORIGINAL
Certified By Rheanne Toth

ORGANIZATION: WESTINGHOUSE ELECTRIC CORPORATION
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A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Section 5.0 of the Topical Report and Product Assurance Instructions PAI 410, ECT 869076 was observed attached to an end closure, Part 5053D73, serial number 1855, one of a lot of three on Shop Order 1S80402 and not to the applicable serial number 1868. It was additionally noted that serial number 1844 of this lot had been reworked for removal of an impression stamping without documentation of this nonconforming condition on an ECT or Material Review Report.

2. Contrary to Section 5.0 of the Topical Report and Interdepartmental Procedure Q-2, the reactor coolant pump's diffuser adaptor cap screw failures at Carolina Power and Light were reported to the WRD Safety Review Committee but were not documented on form AEQA-1460.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (81-02): Internal audit procedures did not require preaudit and postaudit conferences. Procedure PAI 412 has been revised to address all ANSI requirements for conferences. A review of the first quarter's audits found the procedure fully implemented.

2. (Closed) Nonconformance (81-02): Nonconforming parts were not being properly identified, in that a part was found with an incorrect Material Review Report (MRR) referenced. The procedure has been revised. The MRR in question was investigated by Westinghouse and the error corrected. However, a review of nonconforming material found a similar problem dealing with Error Correction Tags (ECT). (See nonconformance B.1)

   It was also noted that an ECT was written on the stamping of the words "Store-handling screws here" (reference drawing no. 5053D73, Rev.14). It was not clear if the stamping was to be on the top side or bottom side of the part. Two parts had the stamping on the top, and one had the stamping on the bottom.

3. (Closed) Nonconformance (81-02): There was no evidence of QA approval of the deletion of an inspection step. A training seminar was held October 27, 1981, on the implementation of the procedure in question. A review of shop routings found no further problems in this area. The deleted inspection operation was found to have been an unnecessary inspection step.

4. (Closed) Nonconformance (81-02): A plug gage was accepted even though it was outside the specified calibration band. The gage in question was reviewed by Westinghouse, and its undersize condition had no effect on its function. The gage procedure has been reiterated to the Gage Lab personnel. A review of gages on Material Review Reports found no further problems in this area.

E. OTHER FINDINGS OR COMMENTS:

1. Reactor Coolant Pump Bolt Failures - During disassembly of the "B" reactor coolant pump of the Robinson Unit 2 plant for the 10-year inservice inspection, the heads of 4 of the 16 stainless steel diffuser adaptor cap screws (or bolts) broke off. These chrome plated bolts, 4.5 inches in length and 5/8 inch in diameter, hold the diffuser adaptor to the casing adaptor. A review of the original release of the pump cases indicated that the case, diffuser adaptor and bolts were supplied to Westinghouse Electro-Mechanical Division (WEMD) by Essco Company of Portland, Oregon. It was reported that these items were shipped directly to the site for assembly. The internals were fabricated at the Cheswick plant. This pump is an early generation pump, Model 93. R. E. Ginna Nuclear Plant, Turkey Point Plant, Units 3 and 4; Indian Point Station, Units 2 and 3; Point Beach Nuclear Plant, Units 1 and 2; and H. B. Robinson Plant all have Model 93 pumps. The Essco releases indicate that the pump cases were fabricated in late 1966 through 1968. The drawings and specifications call for the bolts to be stainless steel type 302, 304, 305 or 316 and the thread lubricant to be Neolube. The Neolube was specified by WEMD to contain a maximum of 200 ppm chlorine. A letter of compliance was required on the bolts to identify the material used. WEMD could not find this record in its files. Since original purchase order to Essco could not be retrieved during the inspection, it was not clear if the bolts were procured by Essco or supplied to Essco by WEMD.

   Late in 1968, a tolerance stack-up problem was identified which caused a possible interference fit between the pump case and pump internals. A repair/fix program was begun. The repair/fix involved the removal of 13/32 of an inch from the diffuser adaptor. This resulted in a length reduction for the bolts from 4.5 inches to 4.0 inches.

During this inspection, WEMD could not find documentation of this repair/fix that would show where the remilling of the diffuser adaptor and bolts was done. The bolts also may have been replaced, but no records were found to support this conclusion.

Disassembly of the "B" pump for inservice inspection identified four failed, eight cracked, and four sound diffuser adaptor bolts. Subsequent disassembly and examination of the remaining reactor coolant pumps showed that the "A" pump had 7 failed, 3 cracked, and 6 sound and the "C" pump had 16 sound diffuser adaptor bolts. The trip reports to the Harris Environment Center, Raleigh, North Carolina, were reviewed where the failed bolts from "B" pump were studied. The scanning electron microscope found the cracks to be transgranular multibranching cracks starting at the surface in the thread root. About 400 ppm of chloride was found to be leachable from cracked surfaces. After leaching, the metal sample of the cracked surfaces was found to have between 400 and 2700 ppm chloride. A second test found a total of 800 ppm chlorides on the cracked surfaces. Later testing found 600 and 2600 ppm of chloride. The casing adapter bolts were inspected. These are about 22 inches downstream from the diffuser adaptor bolts. These casing adapter bolts were found to be sound. WEMD has concluded from the results of the failure analysis, that chloride induced stress corrosion cracking was the responsible failure mechanism. The absence of fabrication records, including the repair/fix of the diffuser adaptor and its bolting, precludes positive identification of the source of the chlorides. WEMD believes, however, that the chloride contamination is limited to the H. B. Robinson Unit 2 plant. This is partially supported by the fact that four of eight sites with Model 93 pumps have had 10-year inservice inspection; namely, R. E. Ginna Nuclear Plant, Turkey Point Plant, Unit 3; Indian Point Station, Unit 2; and Point Beach Nuclear Plant. No bolt failures were noted during the same disassembly.

The Water Reactor Division's Safety Review Committee was notified by phone and is reviewing this failure as a potential Part 21 report. WEMD did not fully implement its Part 21 procedure. (see nonconformance B.2)

2. Potential Failures of Valves to Close Under High Differential Pressures - Inspection Report 99900033/81-02 addressed the potential failure of WEMD valves. WEMD had completed its closure testing program, and the results are documented in report EM5683, Revision 1. An Average Valve Factor (VF) has been determined from testing, and design assumptions established for the closings of various size valves. The determined VF should resolve the underpredicting of stem thrust required to close the valve against high differential pressures. The effect of temperature and other variables have been identified.

The corrective action planned for each site is a function of the plant requirements as determined by a review of each valve's application and location. These reviews have been performed for most sites, and Field Change Notices have been issued for valves in need of modification. Not all modifications and field inspections of modifications have been completed. Modifications and field inspections at operating plants are completed. Nonoperating plants (some 51 sites) are planned to be completed and inspected by mid-1983. An Engineering Memorandum (EM) will be issued for each site to address the review and modifications. For the nonoperating plants, the EM and site inspection will be followed during a later NRC inspection.

3. Training - The training records of several test and inspection personnel were reviewed. Eye examinations, check lists, and qualification/requalification reports were found to be in order.

PERSONS CONTACTED

Company Westinghouse

Docket/Report No. 99900033/82-01

Dates June 7-11

Inspector McNeill

	NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
*	R. ASSELTA	QA ENG.	(W) EMD
*	T. CORIALE	QA ENG MGR.	"
*	CE OWEN	P.A. MGR.	"
	AL DIETRICK	DESIGN ENG.	"
	KEN QUINN	" "	"
	E. OREHOWSKY	VALVE & CR-DM ENG. MGR.	"
	MA HERI	DESIGN ENG.	"
	R. MROZOSKI	CONSULT. ENG.	"
	P. PACELLI	QA ENG.	"
	M. ZUPAN	INSP. SUPV.	"
	W. VAN DYKE	VALVE CONTRACT ENG.	"
*	D. COLLIER	COMM. ENG MGR.	"
	R WIESMANN	REG. & LEGIST AFF. MGR.	(W) NTD
	J SANTORA	TEST FOREMAN	(W) EMD
	K QUINN	DESIGN ENG.	"
	L BROWN	" "	"
*	F BAKOS	GENERAL MANAGER	"
	* ATTENDED	EXIT MEETING	

Inspector McNeill

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Report No. 82-01

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DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
EM 5683	9	WESTINGHOUSE GATE VALVE CLOSURE TESTING PROGRAM	MARCH 31, 82	1
82-44	9	TRIP REPORT HARRIS ENVIRONMENTAL CENTER	4/25 & 26/82	–
618J743	1	GENERAL ASSEMBLY – SHAFT SEAL PUMP	3/27/69	4
S110-77A	8	COOLANT PUMP Model V1101-B1 H.B. Robinson #2 TECH MANUAL	July 69	
160A855	1	.625-11 UNC-2A or 3A Hex Soc. Hd. Cap Screw	–	4
160A858	1	1.000-8 " " "	–	5
1162E51	1	GENERAL ASSEMBLY SHAFT SEAL PUMP Model 93A	–	4
115E580	1	" " " Model 100	–	11
922A675 Hdq	1	LUBRICANT	–	6
160A849 Hdq	1	CAP SCREWS MODEL 93A		2
4939A76 4 Hdq	1	" " MODEL 100		1
EM 5700	9	VALVE FIELD MOD FOR RING HALS UNIT 4	MARCH 19 '82	–
	9	FIELD CHANGE NOTICE } CGE, CAE		
	9	FIELD ENG. TRIP REPOTS }		
	9	TRAINING RECORD QA PROGRAM REQ'TS	11/3/81	–
PAE 412	3	GUIDE FOR PERFORMING INTERNAL AUDITS	1/28/82	2
–	9	1981 1st Quator Audit File	–	–

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)
9. Report

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

Inspector W. McNeill

Docket No. 9990033
Report No. 82-01

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DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
-	9	ISI FIELD REPORTS	-	-
	8	DIRECT ORDER CONTRACTS FILE		
	9	RANDOM MRR's & ECT's found IN Shop		
	9	RANDOM Shop TRAVELERS		
PAI 105	3	TRAINING AND QUALIFICATION of INSPECTION PERSONNEL	7/10/80	0
EP MGO	3	DISPOSITION of NON-CONFORMANCES	-	0
IDP-QA	3	IDENT. AND REPORTING OF POTENTIAL... SAFETY QUES	9/1/80	-
WRD-OPR-39.0	3	IDEN'T. AND REPORTING OF SUBSTANTIAL... SAFETY QUES.	6/18/80	1
TOI-09	3	TRAINING & QUAL OF TEST PERSONNEL	5/25/82 1/14/82	~~DE~~

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1. Drawing
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