B09005/18

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)
DISTRIBUTION FOR INCOMING MATERIAL 50-387/388

REC: GRIER B H ORG: CURTIS N W DOCDATE: 09/18/78
NRC PA PWR & LIGHT DATE RCVD: 09/22/78

DOCTYPE: LETTER NOTARIZED: NO COPIES RECEIVED
SUBJECT: LTR 1 ENCL 1
FORWARDING FINAL CONSTRUCTION DEFICIENCY REPT CONCERNING DEFICIENCY IN CARRIAGE BOLT FASTNERS USED ON 480 VOLT MOTOR CONTROL CENTER BUS SPLICES.

PLANT NAME: SUSQUEHANNA - UNIT 1 REVIEWER INITIAL: XJM
SUSQUEHANNA - UNIT 2 DISTRIBUTER INITIAL: JBM

********** DISTRIBUTION OF THIS MATERIAL IS AS FOLLOWS **********

NOTES:
SEND I&E 3CYS FSAR & ALL AMDTS

CONSTRUCTION DEFICIENCY REPORT (10CFR50.55E)
(DISTRIBUTION CODE B019)

FOR ACTION:	ASST DIR VASSALLO**W/ENCL	BR CHIEF LWR#3 BC**W/ENCL
	PROJ-MGR MINER**W/ENCL	LIC ASST LWR#3 LA**W/ENCL
INTERNAL:	REG FILE**W/ENCL	NRC PDR**W/ENCL
	I & E**W/2 ENCL	OELD**W/ENCL
	GOSSICK & STAFF**W/ENCL	MIPC**W/ENCL
	DIRECTOR DPM**W/ENCL	DEPUTY DIR DPM**W/ENCL
	QAB**W/ENCL	DIRECTOR DSS**W/ENCL
	AD FOR ENG**W/ENCL	AD FOR REAC SFTY**W/ENCL
	AD FOR PLANT SYSTEMS**W/ENCL	AD FOR SYS & PROJ**W/ENCL
	STANDARDS DEV. **W/ENCL	K SEYFRIT/IE**W/ENCL
	FERD DREHER/IE**W/ENCL	
EXTERNAL:	LPDR'S	
	WILKES BARRE, PA**W/ENCL	
	TERA**W/ENCL	
	NSIC**W/ENCL	
	ACRS CAT B**W/16 ENCL	

DISTRIBUTION: LTR 41 ENCL 41 CONTROL NBR: 780860144
SIZE: 2P+7P

********** THE END **********

PP&L

TWO NORTH NINTH STREET, ALLENTOWN, PA. 18101 PHONE: (215) 821-5151

NORMAN W. CURTIS
Vice President-Engineering & Construction
821-5381

AA

RETURN TO REACTOR DOCKET FILES

September 18, 1978

Mr. Boyce H. Grier
Director, Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 17406

SUSQUEHANNA STEAM ELECTRIC STATION
FINAL REPORT OF A DEFICIENCY IN CARRIAGE BOLT FASTENERS
USED ON 480 VOLT MOTOR CONTROL CENTER BUS SPLICES
DOCKET NOS: 50-387/50-388
LICENSE NOS: CPPR-101/CPPR-102
ERs 100450/100508 FILE 840-4
PLA-290

Dear Mr. Grier:

Attached is a Definitive Report of the subject deficiency as required by 10CFR50.55(e).

On August 8, 1978, J. D. Green, PP&L Resident Nuclear Quality Assurance Engineer, advised Mr. R. Gallo, Reactor Inspector, NRC Region I, that PP&L was in the process of evaluating the reportability of the subject deficiency.

Coincident with PP&L's verbal advisory to the Commission, Bechtel Quality Assurance issued MCAR-1-27 (Management Corrective Action Report) requesting that Bechtel Project Engineering make a determination regarding the reportability of the deficiency. The determination, affirming the reportability of the deficiency, was made on August 23, 1978 and is the basis for the attached final report.

The defective material is being controlled and will be corrected and closed out under the provisions of the Bechtel Quality Program.

Please advise should you require other information.

Very truly yours,

N. W. Curtis
Vice President-Engineering & Construction

ARS:mcb
Attachment

7808860144

Boiq
S/1

cc: Mr. J. G. Davis (15)
Acting Director-Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. G. McDonald, Director (1)
Office of Management Information & Program Control
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. Robert M. Gallo
U. S. Nuclear Regulatory Commission
P.O. Box 52
Shickshinny, Pennsylvania 18655

FINAL REPORT

OF

A DEFICIENCY IN

CARRIAGE BOLT FASTENERS

USED ON 480 VOLT MOTOR CONTROL CENTER

BUS SPLICES

FOR

THE SUSQUEHANNA STEAM ELECTRIC STATION

Prepared By: D. P. Parsons 9/19/78

D. P. Parsons
SSES Electrical Group Supvr.

Approved By: A M Male 9/19/78

A. M. Male
Supervising Engineer-Design-Susquehanna

Reviewed: A. R. Sabol 9/19/78

A. R. Sabol
Manager-Nuclear Quality Assurance

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN, PENNSYLVANIA
SEPTEMBER 18, 1978

FINAL REPORT

OF

CARRIAGE BOLT DEFICIENCY ON 480V MOTOR CONTROL CENTER BUS SPLICES - P.O. 8856-E-118 AC

FOR

SUSQUEHANNA STEAM ELECTRIC STATION

UNITS 1 & 2

TABLE OF CONTENTS

INTRODUCTION

This report is presented in accordance with the requirements of Title 10, Code of Federal Regulations, Part 50, Section 50.55(e).

A deficiency in equipment supplied by Cutler-Hammer, Inc. was discovered during construction activities being performed at the Susquehanna Steam Electric Station (SSES).

PP&L's A/E-Constructor (Bechtel), in the course of installing carriage bolts which are used to splice bus sections at the shipping splits of 480 volt motor control center units, noted the occurrence of several cases of thread failures (stripped threads) while torquing the bolts.

The failures and their cause were assessed for their impact on the safety of the operation of the plant. Based upon an evaluation of the safety implications, Bechtel Engineering has concluded that the condition is reportable under 10CFR50.55(e) because, were it to have remained uncorrected, the condition could have adverse affects on the safe operation of the plant.

DESCRIPTION OF THE DEFICIENCY

The design of Susquehanna Units 1 & 2 provides for 28 safety related 480V motor control centers. During the installation of these 480V motor control center sections, it was noted that the 3/8" carriage bolts supplied for

fastening the 480V bus splice plates were experiencing random thread failures when torqued to approximately 18ft./lbs.

Investigation of these bolt failures revealed the following facts:

1. The 3/8" diameter carriage bolts supplied by Cutler-Hammer for use in the 480V bus splices were supplied as a mixed packet with 1/4" thick and 3/8" thick nuts.
2. The instruction manual furnished by Cutler-Hammer for the installation of the 480V MCC's did not specify the proper combination of fasteners to be used for the bus splices; thereby permitting 3/8" carriage bolts to be mated with 1/4" or 3/8" thick nuts. In addition, the instruction manual did not provide values for torquing the 3/8" carriage bolts.
3. All of the bolt thread failures which were detected occurred when a 1/4" thick nut was utilized in combination with a 3/8" diameter carriage bolt.

Cutler-Hammer was apprised of the above information, and they advised that the correct splice fastener was a 3/8" carriage bolt with a full 3/8" thick nut torqued to 18ft./lbs. The carriage bolt thread failure has been determined to have been caused by the undersized (1/4" thick) "jam" nuts.

ANALYSIS OF SAFETY IMPLICATIONS

The 480V motor control system design was reviewed and the following was concluded for the worst condition, including a postulated seismic event:

The deficiency, which involves the actual stripping of threads on some of the carriage bolts, is concealed by washers and the nuts used to fasten the bolts. If undetected, or uncorrected, this condition could permit the mating surfaces, of the bus and the bus splice plates to be loosely joined at a point which was designed to carry 600 amperes of load current.

Under load, such loose connections could develop arcing and overheating which could result in a fire or bus failure and the loss of the motor control center.

In those cases where actual thread stripping had not occurred, the undersized nuts may have, nonetheless, caused sufficient overstress on the carriage bolts that an incipient failure of the threads could exist. Added forces from a seismic event could cause overstressed bolts to fail, loosening the bus joint. Such events could result in the situation described in the preceeding paragraph.

Since thread stripping or incipient thread stripping of these carriage bolts is a random event and could occur in any or all of the safeguards motor control centers, the possibility of a common mode failure exists. The simultaneous loss of redundant motor control center feeds, which serve vital safety related loads, could result in a safety hazard to the operation of the plant.

CORRECTIVE ACTION TAKEN
TO CONTROL THE DEFICIENT ITEMS

Bechtel Quality Control issued Nonconformance Report No. 2855 on 8/2/78 to identify and control the 480V MCC's (twenty) presently on site for the carriage bolt deficiency being reported.

Bechtel QA generated Management Corrective Action Request No. 1-27 dated August 7, 1978 in order to obtain documented evidence of Bechtel Project

Engineering's evaluation of the cause of the condition, the corrective action required, and the condition's reportability under 10CFR50.55(e).

CORRECTIVE ACTION TO RESOLVE THE DEFICIENCY

Cutler-Hammer will replace all carriage bolts and nuts used for splicing links at shipping splits on MCCs with 3/8" bolts and 3/8" thickness nuts for all MCCs already installed, will replace 1/4" nuts with full nuts (3/8") for MCCs that are not yet installed, and will utilized 3/8" thick nuts for MCCs currently being manufactured. (This was documented in a TWX from Cutler-Hammer to Bechtel dated 8/28/78.) Cutler-Hammer has updated the 480V MCC instruction book to include the required torque values (18ft./lbs.) and has transmitted a revised instruction manual to the Bechtel field forces.

CONCLUSIONS

With the replacement of all 3/8" carriage bolts and nuts on all the bus splices of all motor control centers already delivered to the SSES site with correct 3/8" bolts and 3/8" thick nuts, with the correct torquing of these fasteners to 18 ft. lbs., and with all future motor control centers being supplied with correct hardware, the requirements of Specification 8856-E-118 Revision 6, Paragraph 9.2.1 will have been met; the deficiency will have been corrected; and the potential safety hazard will have been eliminated.

The Bechtel generated Nonconformance Report (NCR No. 2855) will not be closed until there is Quality Control verification that the 480V MCCs bus splices have been completed in accordance with the design and vendor requirements and the attendant inspections have been accomplished.