NRC FORM 366 (4-95)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104

EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4)

Emergency Diesel Generator Piping Analysis Questioned Due to Partial Penetration Welds

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	30	97	97	-- 030 --	00	09	29	97	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
POWER LEVEL (10)	000	20.2201(b)	20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
R. G. Joshi, MP2 Regulatory Compliance Manager	(860) 440-2080

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On August 30, 1997, during the investigation of a piping leak, it was determined that the "A" and "B" Emergency Diesel Generators (EDG) skid mounted piping and tubing may not maintain structural integrity during EDG operation. Portions of these systems had partial penetration welds. Evaluation of the welds show that piping with partial penetration welds, when exposed to excessive vibration, are susceptible to failure by vibration induced fatigue. The "B" EDG was not operating at the time of the event and was conservatively declared inoperable.

The cause of this cond.. on was non-conforming partial penetration tubing welds. The original vendor supplied EDG skid mounted piping and tubing did not fully comply with the design drawing requirement for full penetration welds.

As a result of this condition, large bore piping and tubing with partial penetration welds, on both Emergency Diesel Generators, will be reworked and restored to code acceptable full penetration welds.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. Description of Event

On August 30, 1997, during the investigation of a piping leak, it was determined that the "A" and "B" Emergency Diesel Generators (EDG) [EK] skid mounted piping and tubing may not maintain structural integrity during EDG operation. Portions of these systems had partial penetration welds. Evaluation of the welds show that piping with partial penetration welds, when exposed to excessive vibration, are susceptible to failure by vibration induced fatigue. The "B" EDG was not operating at the time of the event and was conservatively declared inoperable. At the time of discovery the unit was defueled.

On August 2, 1997, oil was reported leaking from a cracked weld in the "A" EDG lube oil tubing with the system in service. The EDG was shutdown and repaired by replacing the defective section of tubing. Subsequent examination of the tubing removed from the "A" EDG revealed that the failed weld was a partial penetration, not a full penetration weld as required by the EDG vendor drawings. An evaluation was made on the effect of partial penetration welds on skid mounted piping system structural integrity. EDG lubricating oil [LA], jacket cooling water [LB] and air [LC] cooling water piping was included in the evaluation. The results of the evaluation show that the piping with partial penetration welds have stresses within code allowable, but portions which are exposed to excessive vibration are susceptible to failure by vibration induced fatigue. The section of the lube oil line which failed on the "A" EDG was replaced with heavier walled piping using full penetration welds. The vibration level of 2.0 inches per second measured after the repair was significantly reduced from that measured prior to failure. The vibration level measured on the corresponding tubing section of the "B" EDG was 1.9 inches per second.

A prompt report was issued on August 30, 1997 pursuant to 10 CFR 50.72(b)(2)(iii)(A), a condition that alone could prevent fulfillment of a safety function. Further analysis indicates it would more properly be classified as a condition that was outside the design basis of the plant.

This condition is being reported in accordance with 10 CFR 50.73(a)(2)(ii)(B), a condition that was outside of the design basis of the plant.

II. Cause of Event

The cause of this condition was non-conforming partial penetration tubing welds. The original vendor supplied EDG skid mounted piping and tubing did not fully comply with the design drawing requirement for full penetration welds.

III. Analysis of Event

The EDGs provides emergency AC power to the safety related 1E 4160 volt and 480 volt electrical buses in the event of a loss of normal power. The EDGs are normally maintained operable in a standby condition.

The failure mode of the "A" EDG lube oil tubing weld was engine-driven vibration induced fatigue, resulting in cracking of the partial penetration weld. The vendor's design drawing required full penetration welds for skid mounted lube oil, air cooling and jacket cooling water system piping and tubing. Additional inspection of skid mounted piping and tubing indicated other locations where lack of full penetration welds existed on the "A" EDG.

The tubing weld failure occurred on the "A" EDG rendering it inoperable. On August 30, after receiving additional information from the vendor, the "B" EDG was conservatively declared inoperable. The "B" EDG's piping systems maintained structural integrity and the "B" EDG remained functional. No weld failures have occurred on the "B"

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

EDG. A walk down of the "A" and "B" EDG piping did not reveal any additional weld failures. The EDG vendor evaluated and determined the skid mounted piping acceptable based on original shop hydrostatic testing and a lack of in-service pipe failure history. The results of the piping stress analysis shows the piping with partial penetration welds has stresses within code allowable, but portions which are exposed to excessive vibration are susceptible to failure by vibration induced fatigue. The piping sections on each EDG with the highest apparent vibration levels are portions of the lube oil line and the air cooling water supply line. Vibration levels on the "B" EDG lube oil line and the air cooling water supply line on each EDG are lower than the failed line. In general, vibration levels on the "B" EDG are less than the "A" EDG. Therefore, based on a review of the vibration data, inspections of the available pipe welds and successful code stress analysis, failure of the "B" EDG skid mounted piping coincident with the "A" EDG is not considered credible. The "B" EDG safety function was not affected by this condition.

The failed section of "A" EDG lube oil tubing has been repaired. The "A" EDG is operable but is not yet fully qualified, pending completion of the corrective actions.

Based on the above, this condition is considered to not be safety significant.

IV. Corrective Action

As a result of this condition, large bore piping and tubing with partial penetration welds, on both Emergency Diesel Generators, will be reworked and restored to code acceptable full penetration welds prior to entering Mode 4 from the current outage.

V. Additional Information

Similar Events

There are no similar events involving failed welds on EDGs.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].