NRC FORM 366 (7-77)

"UPDATE REPORT - PREVIOUS REPORT DATED 9/16/81"

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1	M I D C C 1 (2) LICENSEE CODE	0 0 - 0 0 0 0 0 - 0 0 (3) LICENSE NUMBER	4 1 1 1 1 (4) LICENSE TYPE	CAT (5)	
CON'T 0 1	REPORT SOURCE L (6)	0 5 0 0 0 3 1 5 (7) DOCKET NUMBER	1 0 1 4 8 1 (8) EVENT DATE	1 1 1 1 8 1 (9) REPORT DATE	

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 DURING VERIFICATION OF SEISMIC CLASS I SAFETY RELATED PIPING SYSTEMS, PERFORMED TO
0 3 COMPLY WITH THE REQUIREMENTS OF NRC IE BULLETIN 79-14, SIGNIFICANT DISCREPANCIES
0 4 WERE NOTED ON VARIOUS SAFETY RELATED PIPING SYSTEMS. THESE OVERSTRESS CONDITIONS
0 5 WERE UNCOVERED DURING THE REVIEW OF PACKETS COMPILED DURING THE IE BULLETIN 79-14
0 6 PROGRAM WHICH IS BEING PERFORMED AS PART OF OUR INTERNAL RESPONSE TO MR. I. T. YIN'S
0 7 AUDIT OF AEPSC ACTIVITIES ON THE BULLETIN. THE ATTACHMENT SUMMARIZES THE PREVIOUSLY
0 8 REPORTED PROBLEM AND THE ADDITIONAL PROBLEMS IDENTIFIED TO DATE.

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
0 9	Z Z (11)	B (12)	A (13)	Z Z Z Z Z Z (14)	Z (15)	Z (16)

(17) LER/RO REPORT NUMBER	EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
	8 1	—	0 4 4	/	0 3	X	—	1

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
F (18)	Z (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	N (24)	Z (25)	Z 9 9 9 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 TO ALLEVIATE THE OVERSTRESS CONDITIONS SUPPORTS WERE EITHER ADDED, MODIFIED,
1 1 RELOCATED OR REMOVED. AFTER REANALYSIS THE STRESSES IN THE PIPING SYSTEMS WERE FOUND
1 2 TO BE WITHIN ALLOWABLE FSAR STRESS LIMITS. THE MODIFICATION HAS BEEN COMPLETED.
1 3
1 4

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
1 5	E (28)	1 0 0 (29)	N.A.	D (31)	IE BULLETIN 79-14 ACTION

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
1 6	Z (33)	Z (34)	N.A.	N/A

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
1 7	0 0 0 (37)	Z (38)	N.A.

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
1 8	0 0 0 (40)	N.A.

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
1 9	Z (42)	N.A.

PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
2 0	N (44)	N.A.	

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NAME OF PREPARER B. A. Svensson PHONE 616/465-5901

GPO 917-926

ATTACHMENT TO LER #81-044/03X-1

EVENT DESCRIPTION AND PROBABLY CONSEQUENCES

Following is a list of Class I piping systems which were identified as being overstressed for a postulated Earthquake Load during a reevaluation done as per IE Bulletin 79-14. Some of the piping systems were overstressed during a OBE event and some of them were overstressed during a DBE event. Accordingly they have been separated into three groups (as defined later).

Group I

Problem No.	System
1-239	CCW-piping from #2 RCP oil cooler to Containment Penetration Sleeve.

Group II

Problem No.	System
1-126	Component Cooling Water System
1-020	RHR Pump Discharge System
1-248/248x	Containment Spray System
1-115	Essential Service Water System
1-247	Containment Spray System

Group III

Problem No.	System
1-215	RCP Seal Water Return Piping Inside Containment
1-245/262	Safety Injection System
1-403	RWST Discharge Piping

Safety Evaluation

In reviewing the overall safety of the seismic design and the operability of the systems involved, a description of the conservatism inherent in the seismic analysis assumptions is pertinent.

a) The input forcing function for the DBE case was taken as twice OBE rather than the actual DBE forces, this is a conservative choice.

b) Whenever the stress due to earthquake loads was above the code allowable limit, but below the yield limit, the elastic behavior of the pipe system was assured.

c) Provisions for higher allowable stress limits stated in ASME Section III Code were not used.

d) Whenever the stresses were higher than the yield limit, the result was based on elastic analyses, without considering the Factor of Safety available in a limit analysis.

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e) For a linear elastic analysis, it can be reasonably assumed that the overstresses in passive components such as piping and supports would not result in a potential safety hazard until such overestresses exceeds the current limits of the ASME Code Section III, Appendix F.

f) DBE is a very unlikely event at the plant site (a preliminary estimate gives a probability of about 10^{-5} to 10^{-6} event per year).

g) The code yield stress values for stainless steel piping materials are not a finite limit for determining the failure mode.

In light of the above stated reasons the three groups of problems listed before are evaluated as follows: (σ ac is the actual pipe stress prior to the implementation of modifications).

Group I:

σ ac < σ allowable.
σ ac < σ yield. } OBE

σ ac > σ allowable
σ ac < σ yield } DBE

For problems in this group the stresses were above the code allowable during DBE event only and the calculated stresses were less than the yield stress of the pipe material. The operability of the system included in this group of problems was not jeopardized since at all times the stresses were equal to or below the yield limit.

Group II:

σ ac > σ allowable
σ ac < σ yield } OBE

σ ac > σ allowable
σ ac > σ yield } DBE

Even though the calculated stresses in this group during OBE in the as-built condition were higher than code allowable limit still they were within the yield limit. As such the elastic behavior was maintained for the piping system during

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an OBE and the operability of the system is also credible. For two problems, 1-115 and 1-247, the OBE as-built stresses were less than both the allowable and yield limits.

However, for the DBE, stresses were higher than both the allowable and the yield limits. Considering the fact that DBE loads applied were (2xOBE), and that the DBE is a very unlikely event, the probability of the stress actually exceeding the yield limit was very low during the time span that it took to implement the modifications.

Group III: The as-built stress levels in this group of problems were as follows:

$$\left.\begin{array}{l} \sigma_{ac} > \sigma_{allowable} \\ > \sigma_{Yield} \end{array}\right\} \quad \text{For both OBE and DBE}$$

The actual stresses during both OBE and DBE loading cases in the piping systems were above the allowable and/or the yield limits. This condition makes the system inoperable in the unlikely event of an earthquake. These problems are evaluated below.

Problem 1-215 RCP Seal Water Return Piping Inside Containment - Chemical Volume and Control System.

Two significant discrepancies were noted in the as built condition of a 4" and 3" line from the reactor coolant pump seal water circuit to the volume control tank. The discrepancies indicated pipe support which was relocated from its design dimension and a difference in the schedule of piping between the math model and the fabricator's spool piece detail drawings.

The analysis of the as-built piping system indicated that the stresses in the piping were in excess of the allowable/yield limits of the pipe material during both the OBE and DBE seismic events.

Failure of the seal water return line in a seismic event would result in a small break LOCA well within the Cook Plant design bases. The seal water return line is automatically isolated on a safety injection signal and serves no safety functions during design basis LOCAs. Therefore, the discrepancy did not constitute a substantial degradation of plant safety and had no significant impact on the ability of the Cook Plant to safely mitigate a design basis accident.

Problem 1-245/262 Safety Injection Piping Inside Containment.

The stress analyses of the as-built piping system indicated that the stresses in the piping were in excess of the allowable yield limits of the pipe material for both OBE and DBE earthquakes. During a postulated DBE this piping system could have failed to sustain the earthquake loads and could have resulted at worst in a small pipe break event. This is the 1.5 inch diameter Boron Injection piping between the crane wall pipe sleeve and the containment penetration. There is a check valve between the crane wall pipe anchor and the primary piping which isolates the primary coolant pressure boundary, thus the pipe break event would not have resulted in a LOCA.

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Problem 1-403 RWST Discharge Piping.

Computer problem No. 1-403 involves portions of the RWST discharge piping to the various ECCS pumps. Review of the "as-built" analysis for this problem indicates that the stress levels at several points in the affected lines would have exceeded the FSAR allowable values under design basis earthquake conditions. Recognizing the conservative nature of the seismic calculations and the low probability of a seismic event, it is felt that the potential overstress conditions did not truly constitute a significant reduction in plant safety even though the piping systems would have been grossly overstressed during the DBE event.

CAUSE DESCRIPTION AND CORRECTIVE ACTION

For the rest of the problems in the list the attached stress summary sheet shows the results of the evaluation. The summary sheet shows the Piping System that was reanalyzed, the calculated stresses before and after the modifications, along with the FSAR allowable stress limits. The summary sheet also shows the dates when the modifications were completed in the plant. The discrepancies involved were mostly differences in the geometrical layout between the as-built configuration and the design drawings, or discrepancies in location of the supports. The analyses showed that at some locations of the pipe, the stresses would have exceeded the FSAR allowable limits. To alleviate this overstress condition, either some supports were modified, or removed. After the reanalysis, the stresses in the piping and the supports were found to be within the allowable stress limits prescribed in the FSAR.

DONALD C. COOK NUCLEAR PLANT

NRC IE BULLETIN 79-14 SAFETY RELATED PIPING SYSTEMS

No.	Problem No.	Group Number	FSAR Stress Limit KSI		As-Built Pipe Stress KSI		As Modified Pipe Stress KSI		Date Modification Completed
			OBE	DBE	OBE	DBE	OBE	DBE	
1	1-239	I	18.0	27.0	17.05	31.17	10.41	19.26	11-8-79
2	1-126	II	18.0	27.0	18.25	35.8	7.1	13.3	6-5-80
3	1-020	II	18.3	27.45	22.1	40.9	13.4	23.6	3-12-80
4	1-248/248x	II	16.3	24.5	17.4	32.4	14.6	21.1	7-30-81
5	1-115	II	18.0	27.0	17.91	33.83	10.57	20.0	6-14-80
6	1-247	II	19.86	29.8	19.0	31.7	15.5	29.7	7-22-80
7	1-215	III	19.86	29.8	102.2	176.0	18.1	20.7	1-14-80
8	1-245/262	III	19.8	29.8	43.8	82.0	19.1	29.6	6-23-80
9	1-403	III	20.12	30.19	37.8	69.4	12.11	21.17	6-12-80