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

LICENSEE EVENT REPORT

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

01 M I D C C 2 (2) LICENSEE CODE | 0 0 - 0 0 0 0 0 - 0 0 (3) LICENSE NUMBER | 4 1 1 1 1 (4) LICENSE TYPE | (5) CAT

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EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

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

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
09	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	—	2

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)

10 TO ALLEVIATE THE OVERSTRESS CONDITIONS SUPPORTS WERE EITHER ADDED, MODIFIED, RELOCATED
11 OR REMOVED. AFTER REANALYSIS THE STRESSES IN THE PIPING SYSTEMS WERE FOUND TO BE
12 WITHIN ALLOWABLE FSAR STRESS LIMITS. THE MODIFICATION HAS BEEN COMPLETED.
13
14

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
15	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)
16	Z (33)	Z (34)	N.A.	N.A.

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
17	0 0 0 (37)	Z (38)	N.A.

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
18	0 0 0 (40)	N.A.

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
19	Z (42)	N.A.

PUBLICITY

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

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

ATTACHMENT TO LER # 81-044/03X-2

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
2-113	Essential Service Water System

Group II

Problem No.	System
2-068	Containment Spray System
2-088	Component Cooling Water
2-178	Essential Service Water
2-215	RCP Seal Water Return Piping

Group III

Problem No.	System
2-406	RWST Discharge Piping
2-154/154x	Chemical and Volume Control System

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.

e) For a linear elastic analsysis, 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 overstresses exceeds the current limits of the ASME Code Sections III, Appendix F.

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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: (σac 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 an OBE and the operability of the system is also credible. For one problem, 2-088, 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.

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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 2-215 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 a 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 condition by EDS Nuclear, indicated stresses above the FSAR allowable during both the OBE and DBE seismic events; more specifically, the stress was below yield during an Operations Basis Earthquake and above yield during a Design Basis Earthquake.

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 2-178 Essential Service Water to Control Room Air Conditioning Condenser 2W.

Four significant discrepancies were noted in as-built condition of a 3" Essential Service Water (ESW) line from the 12" ESW supply header to control room air conditioning condenser 2W. The discrepancies noted dimensional differences in pipe geometry, pipe support location and pipe size and schedule, used as computer input data from that on the math model and design drawings.

An analysis of the as-built condition was made by Teledyne Engineering Services. This analysis indicated stresses above the FSAR allowable during both OBE and DBE seismic events, more specifically, the stress was below yield during the OBE and above yield during a Design Basis Earthquake.

Failure of the subject ESW piping in a seismic event would have no significant adverse effect on the ability of the Cook Plant to achieve a safe shutdown condition following a design basis seismic event.

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Problem 2-154/154x Chemical Volume and Control System

This piping system is the 4" diameter line between the Volume Control Tank and the Centrifugal Charging Pump.

The stress analysis of the as-built piping indicated that the piping was overstressed for an earthquake loading condition in several locations. During the unlikely event of DBE the piping system could have failed to maintain its structural integrity, and would not have met the design criteria as described in the FSAR.

Problem 2-406 RWST Discharge Piping

Computer problem No. 2-406 involves portions of the RWST discharge piping to the various ECCS pumps and the safety injection-centrifugal charging cross-tie line. Review of the "as-built" analysis for these problems 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 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	2-113	I	18.0	27.0	15.46	29.96	10.95	17.65	1-8-80
2	2-068	II	19.86	29.8	25.1	41.8	17.3	28.3	1-19-80
3	2-088	II	18.0	27.0	17.8	33.7	10.8	20.3	10-1-80
4	2-178	II	18.0	27.0	21.7	40.78	6.37	10.45	2-21-80
5	2-215	II	19.2	28.8	21.92	42.52	15.03	28.75	7-27-81
6	2-406	III	22.5	33.75	34.28	54.95	14.88	28.74	8-5-81
7	2-154/154x	III	17.85	26.7	32.2	50.9	14.0	25.6	4-2-81