



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

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JAN 27 1978

MEMORANDUM FOR: H. Kuo, Structural Engineering Branch, DSS  
A. Hafiz, Structural Engineering Branch, DSS  
FROM: C. Anderson, Containment Systems Branch, DSS  
T. Su, Containment Systems Branch, DSS  
SUBJECT: FLUID STRUCTURE INTERACTIONS FOR MARK II POOL  
DYNAMIC LOADS

The Mark II owner's group recently provided us with a revised schedule for their supporting program. This review schedule is attached. Based on this schedule and recent discussions with the owners it is apparent that they are proceeding on the basis that Fluid Structure Interaction, FSI, effects for chugging and SRV load are secondary considerations. They have moved all of their FSI programs to the long term program as confirmatory efforts. Thus, they are asking us to accept the current loads specified in the Short Term Program, STP, (i.e., SRV, chugging - pool boundary and chugging - downcomer lateral loads) based on information we have received to date. All of the Mark II FSI tasks are considered by them as confirmatory.

I ask that you provide me your evaluation of their position as soon as possible. If you agree with their position then I will assume that you do not anticipate any difficulty in providing an acceptable evaluation for FSI affects for Mark II pool dynamic loads on a schedule consistent with our current A-8 and A-39 review schedules (i.e., April 24, 1978). An acceptance of their position implies no increase in the Short Term Program chugging, SRV or downcomer lateral loads to account for load uncertainties due the FSI effects arising from test or plant unique considerations.

If you do not agree with their position, then I see the following as alternatives to their position.

- We recommend a load that we would find acceptable, where the recommended load is sufficiently conservative to account for load uncertainties resulting from FSI affects.

Contact:  
C. Anderson, CSB  
492-7711

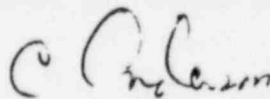
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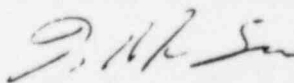
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- The A-8 and A-39 review schedules are slipped to reflect the slips in the Mark II owner schedules for receipt of documents related to FSI. Their current schedule for completion of FSI documents is as follows.
  - 4T FSI report 1 Q 78
  - Single Vent Lateral Loads 2 Q 78
  - Monticello FSI 2 Q 78
  - SRV and chugging FSI 1 Q 78 (method for plant applications)
- We outline the minimum information requirements for the lead plants, to be followed by additional confirmatory information in the Long Term Program.

It is important that I get some written response from you indicating an acceptable FSI approach prior to February 9, 1978. This information is needed so that our review schedule can be modified if necessary, and the programmatic deficiencies be identified to the Mark II owners to avoid future delays. I have also asked our consultants to provide me with this evaluation.



C. Anderson, Task Manager  
Containment Systems Branch  
Division of Systems Branch



T. Su, Task Manager  
Containment Systems Branch  
Division of Systems Safety

Enclosure:  
As Stated

cc: R. Mattson  
R. Tedesco  
J. Knight  
I. Sihweil  
D. Jeng  
I. Peltier  
J. Kudrick  
J. Glynn  
J. Guibert  
R. Stuart

TABLE 1  
MARK II CONTAINMENT - SUPPORTING PROGRAM  
LOCA - RELATED TASKS

<u>TASK NUMBER</u>	<u>ACTIVITY</u>	<u>ACTIVITY TYPE</u>	<u>TARGET COMPLETION</u>	<u>DOCUMENTATION</u>	<u>REMARKS</u>
A.1	"4T" PHASES I, II, III	Phase I Test Report Phase I Appl Memo Phase II & III Tests Application Memorandum	Completed Completed Completed Completed	NEDO/NEDE 13442P-01 - 5/76 Application Memo - 6/76 NEDO/NEDE 13468P - 12/76 NEDE 23678 - 1/77	Lead Plant SER Lead Plant SER Lead Plant SER Lead Plant SER
A.2	POOL SWELL MODEL REPORT	Model Report	Completed	NEDO/NEDE 21544P - 12/76	Lead Plant SER
A.3	IMPACT TESTS	PSTF 1/3 Scale Tests Mark I 1/12 Scale Tests	Completed Completed	NEDE 13426P - 8/75 NEDE 20989-2P - 9/75	Lead Plant SER Lead Plant SER
A.4	IMPACT MODEL	PSTF 1/3 Scale Tests Mark I 1/12 Scale Tests	Completed Completed	NEDE 13426P - 8/75 NEDE 20989-2P - 9/75	Lead Plant SER Lead Plant SER
-	EPRI 1/13 SCALE TESTS	EPRI Report	Completed	EPRI NP-441 - 4/77	Lead Plant SER*
A.5	LOADS ON SUBMERGED STRUCTURES	LOCA/RH Air Bubble Model LOCA/RH Water Jet Model Applications Methods Quenc. Air Bubble Model Quenc. Water Jet Model Steam Condensation Model Appl. Memo. Supp. Simple Geometry Tests 1/4 Scaling Tests Model/Data Eval.	1/78 1/78 1/78 2Q 78 2Q 78 2Q 78 2Q 78 2Q 78 2Q 78 2Q 78 3Q 78	NEDE 21471 NEDE 21472 NEDE 21730 NEDE 21570 NEDE 23539 NEDE 23610 NEDE 21730 Supplements Report Report Report	Lead Plant SER Lead Plant SER Lead Plant SER
A.6	CHUGGING ANALYSIS AND TESTING	Single Cell Report Multivent Model 4T FSI Report	Completed 1/78 1Q 78	NEDE 23703-P - 11/77 NEDE 21669P NEDE 23710-P	Lead Plant SER
A.7	CHUGGING SINGLE VENT	CREARE Report	1Q 78	Report	
A.9	EPRI TEST EVALUATION	EPRI-4T Comparison	Completed	NEDO 21657 - 8/77	Lead Plant SER*

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A.11	MULTIVENT SUBSCALE TESTING AND ANALYSIS	Preliminary MV Prog Plan Complete		NEDO 23697 - 12/77	Lead Plant
		Phase I Scaling Anal.	1Q 78	Report	
		Phase I Scoping Tests	4Q 78	Report	
		Phase II MV Test & Final Prog. Plan	1Q 79	Report	
		Phase II MV Test Rept.	1Q 80	Report	
		MV Tests - Final Rept.	3Q 80	Report	
A.13	SINGLE VENT LATERAL LOADS	Analysis Report	2Q 78	Report	

\*Submitted in response to NRC questions.

TABLE 1

MARK II CONTAINMENT - SUPPORTING PROGRAM  
SRV - RELATED TASKS

<u>TASK NUMBER</u>	<u>ACTIVITY</u>	<u>ACTIVITY TYPE</u>	<u>TARGET COMPLETION</u>	<u>DOCUMENTATION</u>	<u>REMARKS</u>
B.1	QUENCHER MODEL	DFFR Model Confirmatory Tests	Completed 1Q 79	NEDO/NEDE 21061-P - 9/76 Report	
B.2	RAMSHEAD MODEL	Analysis	Completed	NEDO/NEDE 21061-P - 9/76	Lead Plant SER
B.3	MONTICELLO IN-PLANT S/RV TESTS	Preliminary Test Report Hydrodynamic Report	Completed Completed	NEDC 21465P - 12/76 NEDC 21581P - 8/77	Lead Plant SER
B.4	CONSECUTIVE ACTUATION TRANSIENT ANALYSIS	Analytical Models	2Q/78	Report	
B.5	S/RV QUENCHER IN-PLANT CAORSO TESTS	Test Plan Advance Test Report Final Report	Completed 2Q 78 4Q 78	NEDM 20988 - 12/76 Report Report	
B.6	THERMAL MIXING MODEL	Analytical Model	3/78	NEDC 23689	
B.10	MONTICELLO FSI	Analysis of FSI	2Q 78	Report	
B.11	DFFR RAMSHEAD MODEL COMPARISON TO MONTICELLO DATA	Data/Model Comparison	Completed	NSC-GEN 0394 - 10/77	
B.12	RAMSHEAD SRV METHODOLOGY SUMMARY	Analytical Methods	Completed	NEDO 24070 - 11/77	Lead Plant SER

TABLE 1

MARK II CONTAINMENT - SUPPORTING PROGRAM  
MISCELLANEOUS TASKS

TASK NUMBER	ACTIVITY	ACTIVITY TYPE	TARGET COMPLETION	DOCUMENTATION	REMARKS
C.1	DIFFER REV. 3	Revision	1Q 78	MEDO/NEDE 21061 Revision 3	
C.3	NRC ROUND 1 QUESTIONS	DIFFER Amendment 1 DIFFER Amendment 1 Supplement 1	Completed 2/78	MEDO/NEDE 21061 Amend. 1 - 12/76 MEDO/NEDE 21061 Amend. 1, Suppl. 1	Lead Plant SER*
C.5	SRSS JUSTIFICATION	SRSS Report	Completed	MEDO/NEDE 24010 - 7/77	Lead Plant SER*
C.6	NRC ROUND 2 QUESTIONS	DIFFER Amendment 2 DIFFER Amendment 2 Supplement 1	Completed Completed	MEDO/NEDE 21061 Amend. 2 - 6/77 MEDO/NEDE 21061 Amend. 2 Suppl. 1 - 8/77	Lead Plant SER*
C.7	JUSTIFICATION OF "4T" BOUNDING LOADS	DIFFER Amendment 2, Supplement 2 Supplement 3  Chugging Loads Justification	Completed 2/78  Complete Complete Complete Complete Complete	MEDO/NEDE 21061 Amend. 2 Suppl. 2 - 9/77 MEDO/NEDE 21061 Amend. 2, Suppl. 3  MEDO/NEDE 23617-P - 8/77 MEDO/NEDE 24013-P - 8/77 MEDO/NEDE 24014-P - 8/77 MEDO/NEDE 24015-P - 8/77 MEDO/NEDE 24016-P - 8/77 MEDO/NEDE 24017-P - 8/77 MEDO/NEDE 23627-P - 8/77	Lead Plant SER*
C.8	S/RV AND CHUGGING FSI	Prestressed Concrete Reinforced Concrete Steel	1Q 78	Report	

\* Submitted in response to NRC question.

CK-csc/IMI  
LHF 1/78