

May 30, 2001

MEMORANDUM TO: Jack R. Strosnider, Jr., Director
Division of Engineering
Office of Nuclear Reactor Regulation

FROM: Michael E. Mayfield, Director Original signed by Sher Bahadur for
Division of Engineering Technology
Office of Nuclear Regulatory Research

SUBJECT: TRANSMITTAL OF NUREG/CR-6707, "SEISMIC ANALYSIS OF A
REINFORCED CONCRETE CONTAINMENT VESSEL MODEL"

This memorandum transmits the subject report, NUREG/CR-6707, "Seismic Analysis of a Reinforced Concrete Containment Vessel Model," which is also listed as SNL Report SAND 2001/0022P and Anatech Report ANA-00-0303, April 2001, for your use. The research results described in the report are part of an ongoing program entitled, "Collaboration on Seismic Proving Tests of Concrete Containment Vessels." This program has been self-endorsed by RES and involved testing large scale models of both prestressed and reinforced concrete containment vessels.

NUREG/CR-6707 is the Sandia National Laboratory's final report on a seismic proving test of a 1/8 scale model of a reinforced concrete containment vessel (RCCV) conducted in 1998 and 1999 on the high performance shaking table at the Tadotsu Engineering Center of the Nuclear Power Engineering Corporation (NUPEC). (NUPEC functions in a mode very similar to a US national laboratory for the Japanese Ministry of Economy, Trade and Industry (METI).)

Under the collaborative agreement between NRC and METI, NUPEC was responsible for the design, scaling, fabrication, construction, seismic analysis, and dynamic testing of the RCCV model. The NRC contribution to the collaboration through its contractor, SNL, and the SNL subcontractor, Anatech Corp., included independent pre- and post-test three-dimensional finite element analyses of the RCCV model and evaluation of the test results.

The NRC's objectives are to evaluate the maturity of the finite element analysis methods for predicting the time dependent behavior of concrete containments subjected to design-level and failure-level seismic excitation and to identify improvement to the methods, as warranted.

In general, the analysis results indicate reasonably good agreement between the calculated time histories and the measured data with some variability as would be expected. Much better agreement was obtained for global measures of response than those directly affected by local concrete conditions such as changes in geometry or reinforcement. Considering the degree of details involved in the modeling and analyses of such complex tests, the level of agreement between the test data and the predictions indicates that the current analysis capabilities can be relied upon to predict the dynamic behavior of concrete containment structures. Also the tests

Jack R. Strosnider, Jr.

- 2 -

and analytical predictions have provided better understanding of failure mechanisms of reactor containment structures under seismic loads, and moreover contributed to the improvement of the general state of the art of concrete structural modeling.

These interim research results are intended to provide your staff validated structural analysis codes to aid in the resolution of structural capacity issues that might arise during the operation of NPPs.

As mentioned above, this report is one product of this collaborative program. NUREG/CR-6639 entitled, "Seismic Analysis of a Prestressed Concrete Containment Vessel Model," was published in June 1999. Two additional reports are planned on the evaluation of typical U.S. containments based on what has been learned from the tests and analyses of the scaled models; a report on the application to a prestressed concrete containment will be published within six months and the one on a reinforced concrete containment within twelve months.

If you have any questions, please call me (415-5678) or Andrew Murphy (415-6011) of my staff. Dr. Murphy has been the Program Manager (PM) for this effort for about a year; Dr. Nilesh Chokshi was the initial Project Manager.

cc: A. Thadani, RES
R. Zimmerman, RES
D. Berry, SNL
E. Klamerus, SNL

Distribution:

MFields
ERAB r/f

DOCUMENT NAME: C:\Transmittal Memo for CR-6707.wpd

OAR in ADAMS? (Y or N) Y ADAMS ACCESSION NO.: _____ TEMPLATE NO. RES- 06

Publicly Available? (Y or N) Y DATE OF RELEASE TO PUBLIC _____ SENSITIVE? N

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures

"N" = No copy

OFFICE	ERAB/DET/RES	ERAB/DET/RES	D/DET/RES			
NAME	A.Murphy	S.Bahadur	M.Mayfield			
DATE	5/29/01	5/30/01	5/29/01			

OFFICIAL RECORD COPY