

January 3, 1983

Docket No. 50-206
LS05-82-01-002

Mr. R. Dietch, Vice President
Nuclear Engineering and Operations
Southern California Edison Company
2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770

Dear Mr. Dietch:

SUBJECT: SAN ONOFRE UNIT 1 - MASONRY WALL TEST PROGRAM REVIEW

The enclosures to this letter forward review questions and comments regarding the masonry wall test program for San Onofre Unit 1. Enclosure 1 contains questions from the staff's consultant, Franklin Research Center. Enclosure 2 provides staff comments.

Your response to these questions is needed in order for the staff to complete its review of your masonry wall seismic analysis.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Walt Paulson, Project Manager
Operating Reactors Branch #5
Division of Licensing

SE01

Enclosures:
As stated

cc w/enclosures:
See next page

DSU use(08)

ADD:

E. McKenna

8301060053 830103
PDR ADOCK 05000206
P PDR

1/3/83

OFFICE	SEPB:DL	SEPB:DL	SEPB:DL	ORB#5:PM	ORB#5:BC	
SURNAME	EMcKenna:dk	GGrimes	WRussell	WPaulson	DCrutchfield	
DATE	12/29/82	12/30/82	12/31/82	1/03/83	12/31/82	

ENCLOSURE 1

REVIEW OF SAN ONOFRE ADDITIONAL INFORMATION ON THE TEST PROGRAM

- Q.1: Details of Turbine Building wall (not only at top but also at the sides) should be checked to show that they provide free boundaries in such a way so as to prevent in-plane loading
- Q.2: Due to the connection details between the wall and footing some rotational restraint could be developed. This could be amplified by the rigidity of the concrete footing and testing instrumentation attached. Therefore, the test wall may not behave as simply supported at the base as assumed in the analysis. Possibility of crack formation and steel yielding should be considered. Monitoring base deformation during testing is recommended. This information could be very helpful in the correlation between the analytical model and test results.
- Q.3: In generating the response spectra, a nonlinear analysis is used for the Fuel Storage Building whereas a linear analysis is used for the Turbine Building. Why are different analyses used?
- Q.4: In the pre-test prediction analysis the tensile strength of masonry joints prior to the formation of cracking will be included. How will the tensile strength values be obtained if flexural tests are not considered? It has to be stated that there is no documented information available in the literature to predict the flexural strength of masonry in terms of the properties of the constituent materials.
- Q.5: The number and locations of strain gauges mounted on the rebars are not specified. It is important to provide enough gauges to adequately determine the extent of yielding and the length of the plastic hinge. This parameter is very significant in the analytical model.
- Q.6: LVDT's have been successfully used at Drexel University and other experimental studies to measure masonry face strains. It is recommended to directly measure longitudinal strain in the masonry face shells using LVDT's at critical sections. This is because of the fact that compressive strain is one of the major criteria in evaluating the analytical model.
- Q.7: It is stated that an attempt will be made to match cracking for precracked walls and walls tested with full intensity. This statement seems contradictory with the last statement in the response pointing out the difficulty in marking the cracks. At any rate, attempt should be made to locate cracks and mark them. The number of cracked joints, as shown from the parametric study of the model could have a considerable effect on the results.

Q.8: A value of $1.5 I_{cr}$ is used based on matching the model results with the MacKintosh and Dickey's test results. First, it is only one test program. Second, the test panels were partially fixed at the base whereas analysis considers a pin support.

- How was the correlation between the load-deflection curves resulting from the model and ACI equations?
- In case of an inadequate correlation between model and experiments, a more refined model will be necessary. This may require additional information about wall stiffness and $I_{effective}$ which depends on cracking-moment. We feel that the flexural test provides valuable data which helps in a better understanding of wall response.

ENCLOSURE 2

ADDITIONAL NRC STAFF COMMENTS
MASONRY WALL TEST PROGRAM

1. Confirm that different input motions will be used at the actuators at top and bottom of the test wall.
2. Provide discussion why the 200 lbs. electrical conduits are not included as attachments to type 1 walls.
3. Confirm the submittal date(s) of the pretest prediction analysis and the schedule of the test program beyond the time the test program is approved by the NRC.