

DEC 23 1976

Docket No. 50-220

Niagara Mohawk Power Corporation
ATTN: Mr. Gerald K. Rhode
Vice President - Engineering
300 Erie Boulevard West
Syracuse, New York 13202

Gentlemen:

RE: NINE MILE POINT NUCLEAR STATION UNIT NO. 1

We have completed our preliminary review of the "Mark I Containment Program Action Plan" which was submitted on behalf of the Mark I Owners Group by the General Electric Company on October 29, 1976, and which you subsequently endorsed in your letter to the NRC dated November 3, 1976. At the present time the Program Action Plan (PAP) serves as our primary source of information regarding the Mark I Containment Long Term Program (LTP). Although the PAP provides information relating to the interaction and scheduling of specific tasks in the LTP, its documentation of the LTP task objectives and descriptions is too general and lacks sufficient detail to permit a determination of the adequacy of the specific LTP tasks. As they are now presented, many of the task descriptions only augment the statement of task objectives rather than delineate the methods that will be utilized to accomplish each objective. Consequently, we believe that the PAP should be revised to describe, in detail, the objectives and associated methods to achieve each LTP task. Additional comments, for use in preparation of a revision to the PAP, are presented in Enclosure 1.

We have also found that the schedules for those tasks relating to the definition of steam loads and to the identification of potential load mitigating devices are poorly defined in the PAP. While we realize that this situation reflects the ongoing efforts of the Mark I Owners Group to develop an effective program to accomplish these tasks, we believe that you should make every effort to establish a commitment to a well-defined program in as timely a manner as is practicable. Therefore, we request that you be prepared to discuss the details of these tasks and their schedules for completion at meetings between the Mark I Owners Group and the NRC staff during the week of January 24,

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1977. Moreover, we request that you provide documentation of the details of these programs in a revision to the Mark I Containment Program Action Plan to be submitted to the NRC no later than January 31, 1977.

Sincerely,

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:

1. NRC Staff Comments on Program Action Plan
2. NRC Load Verification Requirements for the Mark I Containment Long Term Program
3. Load Verification Requirements Not Adequately Addressed

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NRC STAFF COMMENTS ON THE MARK I CONTAINMENT
PROGRAM ACTION PLAN (PAP)

1. The Program Action Plan does not contain sufficient information relating to the program for development of the Long Term Program (LTP) structural acceptance criteria. A detailed description of each sub-task in this program and its associated schedule is required.
2. The Program Action Plan does not provide sufficient information on the programs intended to address NRC staff concerns on hydrodynamic/structural interaction resulting from safety-relief valve and LOCA loads.
3. The Program Action Plan does not include a program for establishing general guidelines for the Plant Unique Structural Analysis following the Load Definition Report. As a minimum, guidelines should be provided to cover items such as load combinations, methods of analysis, components to be addressed, and any plant unique actions (i.e., modifications) should the acceptance criteria not be met.
4. During the course of the Short Term Program (STP), the NRC staff identified specific load verification requirements to be resolved in the LTP (see attached Enclosure 2); most of these requirements have previously been identified to the Mark I Owners Group in meetings and in NRC letters of August 11-13, 1976. The PAP task descriptions should contain sufficient detail to provide assurance that each of these requirements will be adequately addressed in the LTP.
5. In addition to the general comment of item 4 above, several load verification requirements identified in the attached Enclosure 3 have not been adequately addressed and/or require additional clarification. The PAP should be revised to address these concerns.
6. We require that you commit to utilize the LLL test results, when available, as part of your program to confirm the validity of the pool swell analytical model described in Task 5.9 of the PAP.

NRC LOAD VERIFICATION REQUIREMENTS FOR
MARK I CONTAINMENT LONG TERM PROGRAM

Item	Basis
1. Torus Downward and Upward Loads	
A. Additional 1/12 2D tests to refine torus downward load	Resolve downward load anomaly observed in January 1976 tests e.g., January load December load but December load was used in the plant Unique Analysis.
B. Confirm modeling parameters and scaling laws with 1/4 scale tests	No previous test data base with various scale tests to confirm model parameters and scaling laws
C. Error and uncertainty analysis required for LTP tests	STP tests did not include a comprehensive analysis of test errors and uncertainty
D. (1) Establish adequate data base for plant unique load determination.	The data base is needed to confirm the analytical model approach to the plant unique loads.
(2) Re-examine validity of individual sensitivity parameters (if STP sensitivity approach is used)	Insufficient test data base for several parameters e.g., STP question regarding validity of several sensitivity parameters not completely resolved.
E. Additional tests with different water level but same downcomer submergence.	Test data base to determine relation between dynamic pressure load and torus water level has not been provided.
F. Three Dimensional Testing	
(1) Confirm upward pressure loads	Confirmation of the 20% reduction factor assumed in STP based on estimated 3D effects is needed.
(2) Determine plant local downward loads	STP 2D tests measured average torus downward loads.
(3) Investigate effect of assymetric downcomer clearing and vent flow in net torus loads	No STP data base for this effect.

Item	Basis
G. Future tests should provide a more realistic simulation of drywell pressure and enthalpy flux history	STP did not provide a good simulation of these histories. An interpolation technique was necessary adding uncertainty to the result.
H. For future tests the following effects should be considered	
(1) Investigate increased transient mass and energy release for blowdown calculations and influence of loads	STP estimate of this effect is to increase drywell pressurization rate by 20%. This effect not considered directly in STP loads.
(2) Determine sensitivity of loads to vent system losses	Plant unique variation of this parameter may be significant. Plant unique differences were not directly considered in the STP
(3) Consider a postulated break in both the steam and recirculation line	Present analysis covers only recirculation line break, however, recent information indicates steam line break may be important.
2. Vertical Reaction Loads	
Additional tests to confirm the pool swell impact and drag loads on ringheader-downcomer assembly	STP basis is based on PSTF tests considering a best fit of data for plain cylinders. Results of future tests should include the actual vent system geometry.
3. Drag Loads on Submerged Components	
A. Consider effect of differential pressure across structure due to bubble propagation,	This is an unresolved generic concern common to Mk I, II and III containments.
B. Obtain 3D test data to confirm horizontal and vertical pool velocities for submerged structure drag loads	STP estimate of these parameters based on 2D tests is not based on an adequate test data base

Item	Basis
<p>4. Steam Loads</p> <p>(Downcomers, Submerged Structures, and Torus Boundary) Additional two-dimensional full scale testing</p>	<p>Confirmation of current test data used in the analysis is needed since the data is limited and is a reflection of a containment design quite different from Mark I.</p>
<p>5. SRV Loads</p> <p>A. Additional tests (Monticello tests) required</p> <p>B. Consider single active failure in the SRV system.</p>	<p>SRV loads not addressed during STP (fatigue concern). Inadequate data base for SRV loads.</p> <p>No current basis for excluding pool loads due to LOCA + (1) SRV as currently required for Mk II and III designs.</p>
<p>6. Seismic Slosh Loads</p> <p>Perform tests to determine load magnitude.</p>	<p>Definition of this load was deferred to the LTP.</p>
<p>7. Secondary Loads (Tests and/or Analyses)</p> <p>A. Vent System Thrust</p> <p>B. Froth and Fallback Effects</p> <p>C. Post Pool Swell Waves</p>	<p>Confirmation of the STP calculated loads in the header is needed</p> <p>GE 1/12 tests are not applicable beyond breakthrough point.</p> <p>Same as B</p>

NRC LOAD VERIFICATION REQUIREMENTS
WHICH ARE NOT ADEQUATELY ADDRESSED

We have compared the NRC staff load verification requirements for the Long Term Program (LTP), as identified during our review of the Short Term Program (STP), with the commitments obtained from the Mark I Owners in the Program Action Plan and in a letter from General Electric to the NRC (L. Sobon to V. Stello) dated August 25, 1976, both of which have been referenced on the docket by each Mark I Owner. From this comparison we have identified those requirements for which commitments from the Mark I Owners remain outstanding or need clarification. These requirements, described below, should be addressed in the PAP.

1. During the STP we identified a need for additional test data to confirm the validity of the sensitivity parameters used to determine plant unique loads. These additional test data are required to confirm pool swell load variation over the range of plant unique conditions. The Mark I owners indicated in a meeting with the NRC staff on August 19th that the capability exists to obtain the required data by modification of the 1/4 scale 2D test facility to other geometries and test conditions. However, the Mark I Owners Group has not yet committed to provide a test data base over the range of the sensitivity parameters (i.e., plant conditions) identified in the STP.

An additional concern relates to confirmation of the validity of the selection process for the sensitivity parameters (e.g., vent area to pool area ratio) which were utilized in the STP. The set of sensitivity parameters utilized in the STP were selected on the basis of engineering judgement; however, further consideration indicates that some of the sensitivity parameters may interrelate with the scaling laws. Therefore, the appropriateness of the sensitivity parameters utilized in the STP must be reexamined and justified in the LTP.

Both of the above-mentioned requirements are applicable regardless of whether the plant unique loads in the LTP are determined from sensitivity parameters or from an analytical model, since the analytical code verification will probably be established using sensitivity factors. (Refer to item 1.D of enclosure 2)

2. In our August 19th meeting with the Owners Group, we discussed (a) a need for a closer match between the calculated and measured drywell pressurization and enthalpy flux in the LTP test programs, (b) consideration of the effects of mass and energy inventory, downstream of the flow restrictions, on the calculated blowdown, (c) consideration of the sensitivity of the pool dynamic load to the vent system losses, and (d) the effects of the type of break (i.e., main steam or recirculation) on the pool swell loads. Based on the material presented by the Mark I Owners Group, it is not

clear that the interrelationships between these concerns are being considered in the proper sequence. We believe that the Mark I Owners Group should first study the changes in the drywell pressurization and enthalpy flux rates as a function of changes in blowdown, vent system losses, and break type. Secondly, the revised drywell pressurization and enthalpy flux rates resulting from this study should be matched in the 1/4 2D scale and the 1/12 scale 3D test runs which are intended to improve the load data base.

This requirement does not apply to those direct comparison test runs which are intended to verify the scaling relationships. (Refer to item 1.H of enclosure 2)

3. On August 19th, the Owners Group agreed to perform a sensitivity study to compare the containment response for (1) a main steam line break and (2) a recirculation line break. The Program Action Plan (Task 2.5) includes a commitment to perform a single representative analysis to satisfy this requirement. The proposed use of a single analysis must be justified in the LTP. (Refer to item 1.H.3 of enclosure 2)
4. On August 19th, the Mark I Owners Group agreed to quantify horizontal and vertical pool velocities for submerged drag loads and also verbally referenced the Mark III pool dynamics evaluation with regard to the differential pressure loads resulting from bubble propagation. The Mark I Owners Group should commit to the adoption of the generic resolution of bubble propagation loads common to all GE designed BWR containments. (Refer to item 3.A of enclosure 2)
5. A new requirement for the LTP concerns the vent system thrust loads. In the STP, the vent system thrust loads were calculated with a "nominal" vent system loss coefficient and a mass flow rate which is conservative with respect to drywell pressurization. As discussed in item 2 above, the drywell pressurization will be reevaluated as part of the LTP. The Mark I Owners Group should similarly commit to reevaluate the vent system pressurization and thrust loads in the LTP considering the range of vent system losses and mass flow rates that are conservative with respect to the vent system. (Refer to item 7.A of enclosure 2)

