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SUBJECT: SUMMARY OF MEETING HELD ON NOVEMBER 29, 1977 WITH REPRESENTATIVES OF THE MARK I OWNERS GROUP

On November 29, 1977, a meeting was held in San Francisco, California with representatives of the Mark I Owners Group and the General Electric Company (GE). The purpose of the meeting was to discuss (1) the results and bases for the Long Term Program (LTP) Decision Point No. 3, (2) recent developments in the 1/4 scale pool swell test program, (3) the LTP structural acceptance criteria, and (4) submittals made by each of the Mark I Owners regarding the effects of multiple, subsequent safety/relief valve (SRV) actuations. Attendees at the meeting are listed in Enclosure 1. Enclosure 2 consists of the slides presented at the meeting.



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SUMMARY

B. Kohrs, GE, presented the results of Decision Point No. 3, (DP#3). The purpose of DP#3 was to select the specific load mitigation features that would be used in the development of the LTP Load Definition Report (LDR) which is currently scheduled to be issued in December 1978.

The Owner's Group had previously determined (DP#2) that the optimum program consisted of a combination of load mitigation and structural modifications. As a result of DP#3, the number of potential load mitigation features under consideration has been reduced to establish specific configurations for each of the testing programs. The SRV mitigation device had previously been selected (T-quencher) and its testing commenced at the Monticello plant approximately one week prior to the meeting. Based on the projected load magnitudes from the pool swell mitigation screening tests, the Owner's Group selected differential-pressure control, reduced submergence, and a vent header deflector device as the pool swell mitigation options to be provided for in the LDR. The results of the condensation oscillation studies indicate that the mid-range mass flux is a potentially higher load. However, the critical condensation oscillation loads appear to be much lower than originally expected. Therefore, the Owners Group has approved further analytical studies and model tests, but a mitigation device specifically for condensation oscillations will not be pursued.

J. Humphrey, GE, described the planned 1/4 scale LDR testing program. The program will consist of series of four test runs for each plant specific geometry (two-dimensional). The scale factor for each plant will be dictated by the torus diameter of the test facility. The torus diameter in the test facility is fixed (93 in.). However, all of the other principal dimensions can be varied. A total of 36 generic tests will be performed to determine load sensitivity parameters (e.g., drywell pressurization and submergence) for the reference plant design, and a total of 68 to 72 plant-unique tests will be performed to determine the base case pool swell loads for each plant in the LDR. Each utility will specify for GE the plant specific conditions to be tested. The pool swell analytical model will now serve as a backup to the 1/4 scale test program and will define submerged pool velocities for the drag loads.

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W. Cooper, Teledyne, described the changes to be made to the structural acceptance criteria (SAC) in response to comments made by the staff during previous meetings. The major changes included a reduction in the number of service level assignments and provisions for plant-unique conditions. Specific changes to the SAC are identified in Enclosure 2. The SAC have not yet been identified for the Brunswick plant (the only concrete containment); however, it is expected that the criteria will be the same as those for the other plants with the exception of the torus. Carolina Power & Light and United Engineers & Constructors are currently developing the criteria for the Brunswick torus.

A note on the loading table, Figure 1, indicates that no further evaluation will be required if the stress resulting from the pool swell loads is less than 10% of the allowable for a specific component. The purpose of this provision was to avoid reanalyzing the existing loading for an insignificant change. The 10% criteria was selected as a measure of insignificance, based on judgement. The staff expressed the concern that this criterion is vaguely expressed and, as a result, its application could neglect inadequate base analyses; e.g., design specifications for attached piping which did not consider torus motion. We indicated agreement with the logic behind the 10% criteria, but requested that the criteria be more explicitly stated and its application well documented.

The Owners Group indicated that the seismic loading will be that identified in the FSAR for each plant. The staff cautioned that the Systematic Evaluation Program may result in a redefinition of the seismic loads in the near future. Therefore, the Owners should consider the consequences of higher "g" values when performing the LTP plant-unique analyses.

The SAC have been modified to include an SRV discharge in conjunction with the design basis accident and the criteria for the "without differential pressure" case. These provisions were included in response to staff positions on SRV load combinations and the use of differential pressure control, respectively.

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A criterion was added (footnote 12 to figure 4 of Enclosure 2) which would provide a definition of a "local" region for the vent system analysis. The staff indicated that the proposed criterion was unacceptable and should be changed to define the local region in terms of diameter. The Owners Group has recently approved a new task with the Engineering Decision Analysis Company (EDAC). The results of this task may provide sufficient justification for the proposed approach, but that determination cannot be made until the work is completed. The EDAC task will be described in Revision 3 to the Program Action Plan, currently scheduled to be completed in February 1978.

A similar criterion was added (footnote 13 to figure 4 of Enclosure 2) which would permit the allowable stress S_{mc} to be replaced by S_y for the torus shell. This criterion was included based on the anticipated results of the ASME code case N197, which is supported by work performed by Constantino. The staff requested additional references on the Constantino work.

The loading combination technique for piping will also be addressed by a code case, since the code does not specifically require direct addition of primary and secondary stresses. The Mark I Owners indicated that this consideration is currently at the working group level.

The criteria will consider SSE in conjunction with the DBA for essential piping. The staff requested that terminology "essential" and "non-essential" be modified or clarified to avoid confusion. The example cited was SRV piping inside the drywell. The Owners Group has apparently verbally agreed to address this piping; however, they have not specifically identified where the criteria will be applied. The staff requested that this discrepancy be resolved.

The Owners Group requested that the staff provide the status of the request for approval of the use of the SRSS (square root of the sum of the squares) load combination philosophy. The staff indicated that a letter response was being prepared. However, there are significant problems related to the review of the Mark II SRSS report which is

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further complicated by the time necessary to assess a probabilistic basis. The staff conjectured that the SRSS philosophy could be found acceptable for application in the Mark I LTP, provided the application is limited to specific loading combinations supported by rigorous proof. The staff recommended that the Mark I Owners Group abandon the probabilistic basis and propose an acceptance criteria based on the statistical combination of random dynamic loads. The Owners Group requested that our letter be issued as soon as possible because of the time required for them to develop an approach. A conference call will be arranged following the issuance of the letter.

The staff discussed the preliminary results of its review of submittals made regarding the effects of multiple-consecutive SRV actuations and expressed its concern that the assessments made to date do not provide adequate support to the operating experience. This is principally the result of the judgement required in extrapolating the Monticello test results, which have a significant amount of data scatter. The proposed criteria for a reassessment of multiple-consecutive SRV effects were described. These criteria would permit the number of valves discharging to be based on a variation in SRV setpoints, provided the setpoint distribution is supported by test data. No other changes to the system transient analysis should be made. The proposed criteria further describes the manner by which extrapolation factors should be derived from structural response data. All of the criteria were characterized as a "most probable" estimate of the effects of the transient. In response to questions raised by the Owners Group, the staff indicated that plant specific data may be used if the data are provided and justified, and that a plant-unique assessment should be performed even if the transient analysis demonstrates that only a single valve subsequently actuates.

At the conclusion of the meeting a number of miscellaneous items were discussed, which included:

- (1) The Revision 3 to the Program Action Plan will identify the testing options for the Full Scale Test Facility, the 1/4 scale pool swell program changes, the phase 2 extension of the condensation oscillation evaluation, and the canceled mitigation testing tasks.

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- (2) Preliminary results of the reduced submergence assessment indicate a maximum drawdown of 18 inches occurring in approximately three to five minutes, and a maximum seismic slosh trough depth of approximately 10 inches.
- (3) Data from a foreign test program indicate a strong chugging load dependence with the downcomer frequency. The Owners Group indicated that, with a Mark I downcomer frequency of 5 to 8 Hertz, this should not be a concern. We requested that the Owners Group pursue this matter further.
- (4) The Owners Group has approved a new task to be performed by EDAC. This task is similar to the analytical effort being performed by the Lawrence Livermore Laboratory for the staff (i.e., fluid-structure interaction effects), and will be described in detail in Revision 3 to the Program Action Plan.
- (5) GE described the test matrix for the Monticello "T-quencher" testing program. The proposed matrix contains a number of optional test series to be performed in the event that a predefined data scatter is exceeded. The staff expressed concerns about the potential repeatability of the data, based on a lack of understanding of consecutive valve actuation effects and the data scatter exhibited in the Monticello ramshead tests. GE indicated that the scope of the test matrix is limited by the plant down-time, but the proposed matrix should provide sufficient repeatability. We indicated that the proposed matrix may not provide sufficient data to validate the quencher discharge analytical model.

C. I. Grimes

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Plant Systems Branch
Division of Operating Reactors

Enclosures:
As stated

cc: See page 7

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cc: Docket File (1 ea)
NRC PDR (1 ea)
L PDR (1 ea)
ORB-2 Reading File
ORB-2 Subject File
ORB-3 Reading File
ORB-3 Subject File
E. G. Case
V. Stello
K. Goller
T. Carter
D. Eisenhut
G. Lear
D. Ziemann
L. Shao
W. Butler
R. Clark
J. Hannon
V. Rooney
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