



# MISSISSIPPI POWER & LIGHT COMPANY

*Helping Build Mississippi*

P. O. BOX 1640, JACKSON, MISSISSIPPI 39205

NUCLEAR PRODUCTION DEPARTMENT

July 1, 1982

U. S. Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation  
Washington, D. C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

Subject: Grand Gulf Nuclear Station  
Units 1 and 2  
Docket Nos. 50-416 and 50-417  
File 0272/0756/L-860.0  
Hydrogen Control - Local  
Detonations and Drywell Head  
External Pressure Capacity  
AECM-82/315

In response to informally transmitted concerns of the Structural Engineering Branch Reviewer, Dr. C. P. Tan, Mississippi Power & Light Company is submitting information (Attachments 1 and 2) regarding local detonations and drywell head external pressure capacity. This letter supplements the information transmitted via AECM-82/118, dated March 31, 1982, and AECM-82/271, dated June 11, 1982, and confirms information provided to Dr. Tan on June 30, 1982.

If you have any further questions, please contact this office.

Yours truly,



L. F. Dale  
Manager of Nuclear Services

NSM/SHH/JDR:mm

Attachments

cc: Mr. N. L. Stampley  
Mr. G. B. Taylor  
Mr. R. B. McGehee  
Mr. T. B. Conner

Mr. Richard C. DeYoung, Director  
Office of Inspection & Enforcement  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

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Mr. J. P. O'Reilly, Regional Administrator  
Office of Inspection & Enforcement  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, N. W., Suite 3100  
Atlanta, Georgia 30303

## Attachment 1 to AECM-82/315

### Leakage through Containment Personnel Airlock

The lower containment personnel airlock has been analyzed for a local hydrogen detonation using the Sandia pressure-time curve. The results of the analysis indicate that the maximum lateral deformation of the door panel on the airlock will be small albeit with a ductility ratio of less than 2.5. For mid panel deformation of this magnitude, the performance of the inflatable seals at the periphery of the door will not be affected.

Considering the very short duration of the pressure pulse, it has been determined that there would be no leakage out of the containment when both doors on the airlock are in the closed position. Leakage through the interior door, even when the leak path is postulated to be extremely severe, will be insufficient to overcome the pressurized seal on the exterior door.

In summary, neither the response of the airlock door due to the postulated local hydrogen detonation nor the response of the seals to the same detonation will initiate leakage out of the containment.

## Attachment 2 to AECM-82/315

### Capacity of the Drywell Head under External Pressure

The buckling capacity of the drywell head, which is comprised of an elliptical shell and a circular cylinder, has been evaluated using a conservative formulation developed at the David Taylor Model Basin (DTMB).

The critical external pressure for the elliptical head was calculated using the method given in the DTMB Report 1757, "The Effect of Initial Imperfections on the Collapse Strength of Deep Spherical Shells." This method employs nominal dimensions and worst case deviations from nominal dimensions to determine the critical pressure, which was calculated to be 135 psi.

The critical external pressure for the cylinder was determined using the method given in the DTMB Report 1639, "Structural Analysis and Design Considerations for Cylindrical Pressure Hulls." This method also employs nominal dimensions and worst case deviations from nominal dimensions to determine the critical pressure. When the calculations were performed for a conservative out-of-roundness based on the out-of-roundness tolerance given on the manufacturing drawings, the minimum differential pressure capability of the cylinder was calculated to be 89 psi. However, when a best estimate of the out-of-roundness is used in the formulation, the minimum differential pressure was calculated to be 180 psi.

In summary, the buckling capacity of the drywell head has been evaluated using a formulation taking into account the effect of initial imperfections. The lower bound estimate of 89 psi for the buckling capacity of the drywell head is based on a conservative assumption regarding such initial imperfections.