Results Obtained from Static Pneumatic Pressure Experiments on Models of a Generic Steel Containment Building

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The Containment Integrity Program is described by Blejwas, von Riesemann and Costello [1]. This paper and the accompanying presentation describe the results obtained to date. At the time of this writing only a scheduled practice test had been conducted. Therefore, this paper will only briefly summarize the data expected to be published. The oral presentation will include the latest available results. It is expected that a series of three experiments will have been completed by August 1, 1983. Soon after completion of these experiments a complete report will be available, first in the form of a Nuclear Regulatory Commission publication and then with appropriate extracts developed in the open literature.

The data base which will be constructed for this program by that time is to include strains and displacements measured at numerous locations on the models. The models and the techniques for obtaining the data are discussed in by Woodfin and Dennis [2]. An attempt was made to configure the instrumentation so as to make strain gradients available in critical regions where possible. However, a more fundamental requirement was that a good understanding of the local directions of principal strains in each area be maintained. The latter requirement required the use of numerous strain gage rosettes. The use of rosettes was also indicated by the high strains being measured, since large errors are introduced by failure to include cross-axis strain corrections.

Both strain and displacement measurements are made along several generators and in several horizontal planes to permit detection of asymmetries and production of descriptions of the deformed shapes. Strains are determined from gage measurements with corrections for temperature, lead wire resistance, and cross-axis sensitivity. Listings of all strains and displacements are available as functions of pressure.

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Plots and listings display principal strains and angle-of-principal -strains. Displacement plots include deformed shapes in different planes and also include volume as a function of pressure.

The volume is needed during the experiments which include leakage estimates. These estimates are not reported for the small steel models since they have no modeled leak paths. The estimates during these experiments are made only for technology development.

Several important limitations inherent in these experiments are discussed by Woodfin and Dennis [2]. They should be recognized before any use is made of the data base.

References

1. Blejwas, T. E.; von Riesemann, W. A.; and Costello, J. F., "The NRC Containment Integrity Program", Proceedings Seventh Intl. Conference on Structural Mechanics in Reactor Technology, Chicago, IL, USA, August 22-26, 1983, Paper J1/1.

2. Woodfin, R. L. and Dennis, A. W., "Techniques Used in Static Pneumatic Pressure Experiments on Models of a Generic Steel Containment Building," Proceedings Seventh Intl. Conference on Structural Mechanics in Reactor Technology, Chicago, IL, USA, August 22-26, 1983, Paper J6/2.