CRBRP STEAM GENERATOR MODELING TECHNIQUES FOR PRESSURE EXCURSIONS GENERATED BY SODIUM/WATER REACTIONS

G. S. SHIMOZONO

Atomics International,
8900 De Soto Avenue, Canoga Park, California 91304, U.S.A.

SUMMARY

The CRBRP steam generator modules contain interfaces between sodium and water. A potential exists for violent sodium/water reactions at these interfaces. Should an accident occur and produce a sodium/water reaction, large pressures would be generated in the sodium system. It is, therefore, important for design purposes that pressures be predicted for possible sodium/water accidents. The techniques used to develop the sodium system model are discussed in this paper. System pressure and velocity response can be predicted for sodium/water reactions by use of this model and the TRANSWRAP computer code. Results of the analyses are also discussed.

The system under consideration is comprised of two evaporator modules, a superheater module, and the system piping. Consideration was given in the model to the magnitude of the water leak, the initial sodium conditions, and the effect of internal components on the hydraulics of the system.

All factors of the model were analyzed with a computer code. The output of the analysis were pressure and velocity histories at all points in the system. It should be noted that the time frame with which this type of analysis is concerned covers periods of the order of several hundred milliseconds. In this period of time, pressures are observed to peak and decay.