1.5 REQUIREMENTS FOR FURTHER TECHNICAL INFORMATION

One of the design bases for the Salem Generating Station has been to utilize well-developed and proven design concepts, systems, and equipment, in order to minimize the potential for cost and schedule overruns and to enhance the reliability of operation. As a consequence, there have been few requirements for research and development programs to confirm the adequacy of the design. Those programs identified for Salem have been satisfactorily completed, as described in Section 1.5.1. Other programs were identified as valuable to define margins of conservatism or possible design improvements. Relevant programs in this latter category are described in Section 1.5.2

1.5.1 17 x 17 Fuel Assembly

A comprehensive test program for the 17 x 17 assembly has been successfully completed by Westinghouse. Reference 1 contains a summary discussion of the program. The following sections present specific references documenting individual portions of the program.

1.5.1.1 Rod Cluster Control Spider Tests

Rod cluster control spider tests have been completed. For a further discussion of these tests, refer to Section 4.2.3.4.

1.5.1.2 Grid Tests

Verification tests of the structural adequacy of the grid design have been completed. Refer to Section 4.2.3.4 and Reference 2 for a discussion of these tests.

1.5.1.3 Fuel Assembly Structural Tests

Fuel assembly structural tests have been completed. Refer to References 2 and 3 for a discussion of these tests.

1.5.1.4 Guide Tube Tests

Verification tests of the structural adequacy of the guide tubes have been completed. Refer to References 3 and 4 for a discussion of these tests.

1.5.1.5 Prototype Assembly Tests

Verification tests of the integrated fuel assembly and rod cluster control performance have been completed. Refer to References 3 and 4 for a discussion of these tests.

1.5.1.6 Departure from Nucleate Boiling Tests

The test program for experimentally determining the effect of the fuel assembly geometry on the departure from nucleate boiling (DNB) heat flux has been completed. Refer to Reference 5 for a discussion of these tests.

1.5.1.7 Incore Flow Mixing

The experimental test program to determine the effects of the fuel assembly geometry on mixing has been completed. Refer to Reference 6 for a discussion of these tests.

1.5.2 Other Programs

1.5.2.1 Generic Programs of Westinghouse

Reference 7 summarizes ongoing safety-related research and development programs that are being carried out for, or by, or in conjunction with the Westinghouse Nuclear Energy System Division and that are applicable to Westinghouse pressurized water reactors.

1.5.2.2 LOCA Heat Transfer Tests

Experimental test programs to determine the thermal-hydraulic characteristics of 17 x 17 fuel assemblies and to obtain experimental reflooding transfer data under simulated loss-of-coolant accident (LOCA) conditions have been completed. Refer to Reference 8 for a discussion of these tests. A single rod burst test program to quantify the maximum assembly flow blockage which is assumed in the LOCA analyses has been completed. Refer to Reference 9 for a discussion of these tests. The results of these two test programs have been used in the Emergency Core Cooling System analyses in Chapter 15.

1.5.3 References for Section 1.5

1. Eggleston, F. T., "Safety-Related Research and Development for Westinghouse Pressurized Water Reactors, Program Summaries - Spring 1976," June 1976.

2. Gesinski, L. and Chiang, D., "Safety Analysis of the 17 x 17 Fuel Assembly for Combined Seismic and Loss-of-Coolant Accident," WCAP-8236 (Proprietary) and WCAP-8288 (Non-Proprietary), December 1973.

3. DeMario, E. E., "Hydraulic Flow Test of the 17 x 17 Fuel Assembly," WCAP-8278 (Proprietary) and WCAP-8279 (Non-Proprietary), February 1974.

4. Cooper, F. W., Jr., "17 x 17 Driveline Component Tests - Phase IB, II, III, D-Loop Drop and Deflection," WCAP-8446 (Proprietary) and WCAP-8449 (Non-Proprietary), December 1974.

5. Hill, K. W., et al., "Effects of 17 x 17 Fuel Assembly Geometry on DNB," WCAP-8296-P-A (Proprietary) and WCAP-8297-A (Non-Proprietary), February 1975.

6. Cadek, F. F.; Motley, F. E.; and Dominicis, D. P., "Effect of Axial Spacing on Interchannel Thermal Mixing with the R Mixing Vane Grid," WCAP-7941-P-A (Proprietary) and WCAP-7959-A (Non-Proprietary), January 1975.

7. Eggleston, F. T., "Safety-Related Research and Development for Westinghouse Pressurized Water Reactors, Program Summaries - Winter 1977 - Summer 1978," WCAP-8768, Revision 2, October 1978.

8. "Westinghouse ECCS Evaluation Model - October 1975 Version," WCAP-8622 (Proprietary) and WCAP-8623 (Non-Proprietary), November 1975.

9. Kuchirka, P. J., "17 x 17 Design Fuel Rod Behavior During Simulated Loss-of-Coolant Accident Conditions," WCAP-8289 (Proprietary) and WCAP-8290 (Non-Proprietary), November 1974.