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FIRST FFTF LOCAL CLAD TEMPERATURE TESTS
WITH 7-PIN BUNDLES^(a)

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MASTER

FIRST FFTF LOCAL CLAD TEMPERATURE TESTS WITH 7-PIN BUNDLES

A series of three tests will be performed to evaluate:

- . Temperature gradients between wall and central coolant channels in an FFTF fuel assembly to assess thermal stress level in the pins.
- . The potential hot spot caused by the presence of a wire wrap spacer.

A single electrically-heated 7-pin fuel assembly model will be used to perform these tests. The configuration is summarized in Table I and the instrumentation in Figure I. Pins 1, 2, and 7, along with the local coolant thermocouples, characterize the central and outer channels. Pins 4 and 6 provide data on the hot spot under the spacer, while pin 3 (along with pin 2) provides data on the gradient across an outer row pin.

Tests will be performed in the following progression:

- . Test I will have an extremely small bundle to duct tolerance.
- . Test II, with a large bundle to duct spacing to examine the primary effect on edge row gradients.
- . Test II, with a large clearance and the bundle radially restrained to a tight configuration to examine potential geometrical dispersion effects.

The test conditions will cover two fold ranges of flow conditions centered around the flow range of the proposed orificed core. Besides the local temperature measurements, test assembly power, flow rates, bulk coolant temperatures and coolant purity (by plugging and direct sample analysis) will be measured and recorded.

The size of the test assembly represents a distortion of the temperature gradients in a 217 pin fuel assembly. However, the detailed temperature map provided by these tests will provide an absolute measure of the accuracy of the analytical models to predict the temperature profiles in the fuel assembly. Complementary water mixing tests will be performed with 7 pin and then 37-61 pin bundles modeling the same behavior to provide the capability of extrapolating the results to the full fuel assembly.

TABLE I

TEST ASSEMBLY FOR FIRST LOCAL CLAD TEMPERATURE TESTS

1. Number of heated pins -- 7
2. Configuration -- hexagonal array; 0.056 in. minimum distance between pins.
3. Pin diameter -- 0.23 in.
4. Heated length -- 36 in., uniform axial heat generation.
5. Spacers -- wire wrap; 0.056 in; spirally wound on 12 in. pitch.
6. Instrumentation -- 1 clad temperature thermocouple per pin; 2 local coolant temperature thermocouples in wire wrap.
7. Duct to bundle clearance -- 0.005 in. (Test I); 0.020 in. (Test II & III).
8. Radial restraint -- only in Test III.