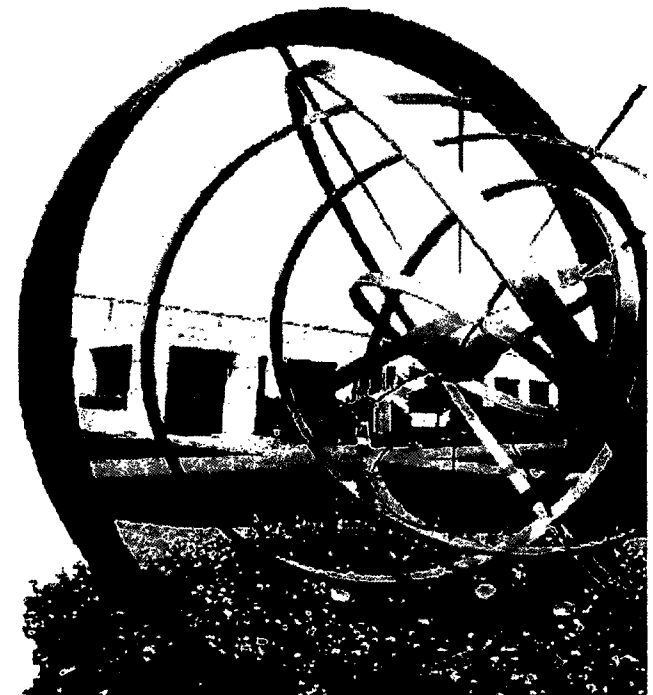




ECCS Suction Strainers Strainer Bypass Testing

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Purpose/Objective

- To determine the quantity and characteristics of debris passing through the sump strainer and become entrained in the reactor coolant.
- To develop this term with a range of generic testing
- To be used as a design input for the downstream effects evaluation for components and fuel blockage

BWR Fleet Survey

- 30 different fiber loadings (mass/unit area)
- 30 different pool concentrations
- 8 types of fibrous debris
- 4 strainer designs (including different hole sizes)
- Approach velocity from 0.0056 fps to 0.117 fps

Test Program Challenges

- Plant specific testing would require over 30 different tests
- Alternatively, individual variables can be evaluated to determine which impact bypass quantity.
- Reduce number of tests to focus on those attributes that affects bypass

Test Program Approach

Require plots of bypass quantity of fiber vs. mass of fiber transported to strainer for single variables.

Resulting test plots will be used in combination with plant design data to determine bypass quantity as a function of time.

Test Variables

1. Fiber Concentration
2. Fiber Type
3. Approach Velocity
4. Strainer Design
5. Screen Hole Size

Initial Test Matrix

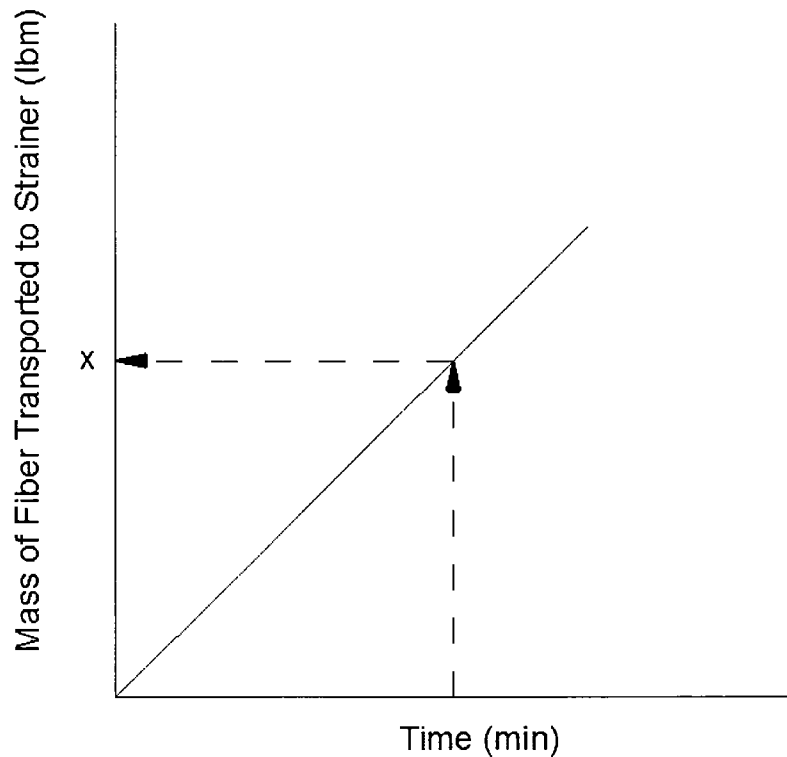
- To limit the number and duration of tests, variables must be selected to represent a range of conditions.
- Strainer design selections are limited to:
 - Complex geometry
 - Simple geometry
 - Fiber selections are limited to:
 - Low Density Fiberglass (i.e. NUKON)
 - Medium Density Fiber (i.e. Rockwool)
 - High Density Fiber (i.e. TempMat)
 - Approach velocities selected at 0.02 fps, 0.04 fps, 0.06 fps

Test Results

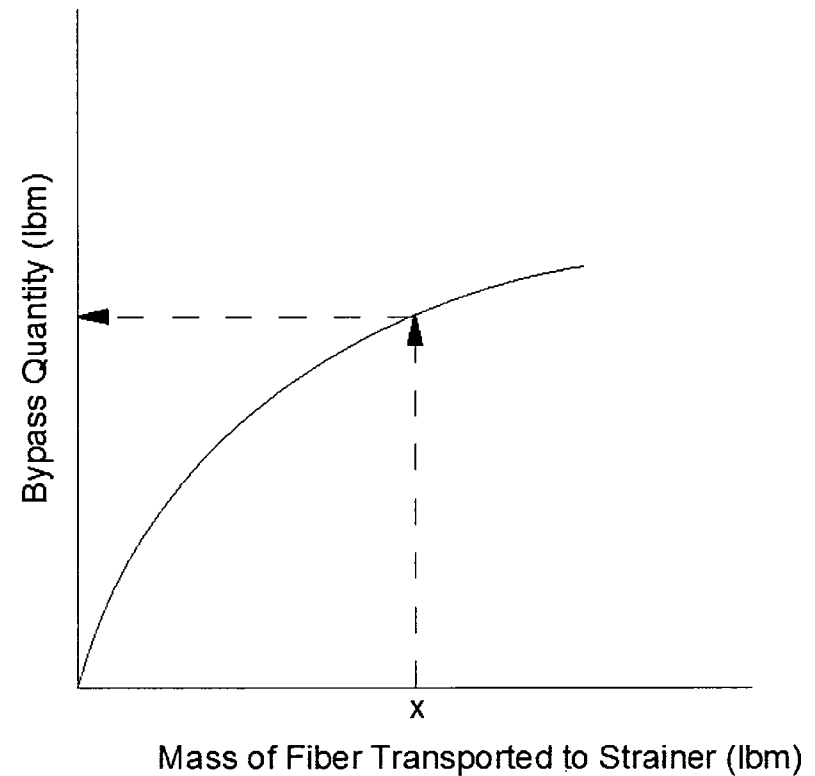
If results confirm that bypass quantity is exclusively dependent on the quantity of fiber that reaches the strainer over a given time interval, then the plot of bypass fiber vs. transported mass quantity will be used in combination with plant suppression pool and ECCS operating data as follows:

Test Results

Plot of Plant Conditions - Mass of Fiber Transported to Strainer vs. Time (based on pool concentration and ECCS flow)



Plot of Test Results - Bypass Quantity vs. Mass of Fiber Transported to Strainer



Test Results

- Multiple or combined dependencies will require additional testing.
- Individual dependencies (other than mass transported) will require application of most conservative result, or additional testing.
- Bypass will approach zero upon full coverage of screen (i.e. 1/2" thick bed results in no additional bypass). This limiting bed thickness will be verified during testing.
- A generic high energy phase will be modeled into the test tank. This phase will prevent the formation of a debris bed.

Summary

Goal of the program is to develop bypass source term as a function of time for each of the BWRs in the fleet.

Goal of the program is to provide some correlation on bypass results rather than can be applied to each plant conservatively.

Should program be unable to isolate variables as non-contributing, the program could move to plant specific testing. Plant specific bypass testing is always an option.

Program will be performed under a single protocol at a single facility to minimize variations in results.

Test Plan to be provided to the NRC for comment in September