ECCS PWR Sump Screen Testing Information

Prepared for ACRS
August 23, 2006

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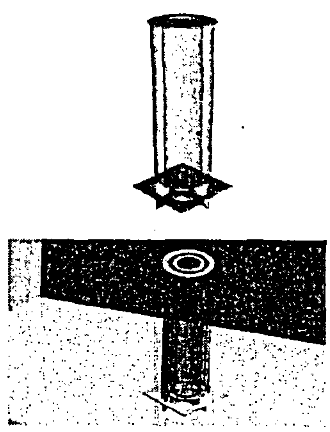
Outline of Information

- General Topics
  - Facility/Test description
  - Strainer design parameters
  - Licensees supported
- Specific Topics
  - Array Testing
  - Chemical Testing
  - By-Pass Testing



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Fiber Debris Bypass Testing

- Specific Fibrous Debris Bypass Testing
- Factors which contribute to debris bypass
  - Clean strainer surface area
  - Total strainer surface area
  - Average approach velocity
  - Perforated plate hole size
  - Differential pressure across the fibrous debris bed

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Fiber Debris Bypass Testing (cont.)

- Specific Fibrous Debris Bypass Testing
  - This test is not a debris head loss test
  - Fiberglass insulation debris prepared the same as used in head loss testing – no particulate
  - All down stream flow is passed through 5 micron bag filters.
  - Prepared fiber is introduce in small batches and allowed to accumulate on the strainer before next batch is added.
  - Fiber is added in small batches to eventually fully cover the strainer.
  - Flow rate is increased to increase head loss across fiber bed to the simulate the predicted fiber and particulate debris head loss.

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Fiber Debris Bypass Testing (cont.)

Fibrous Debris Traveling to the Top-Hat Strainer

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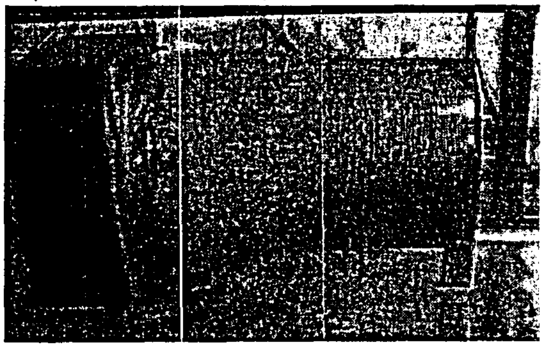
Fiber Debris Bypass Testing (cont.)



Half- inch Equivalent Fibrous Debris Loading

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Fiber Debris Bypass Testing (cont.)

- Fiber Bypass testing observations:
  - Most fiber bypass occurs when fiber debris first starts depositing on strainer surface
  - The fiber bypass becomes essentially zero once a fiber bed is formed over all the strainer surfaces
  - Quantity of bypass fiber proportional to
    - strainer area
    - approach velocity
  - Quantity of fiber bypass is significant

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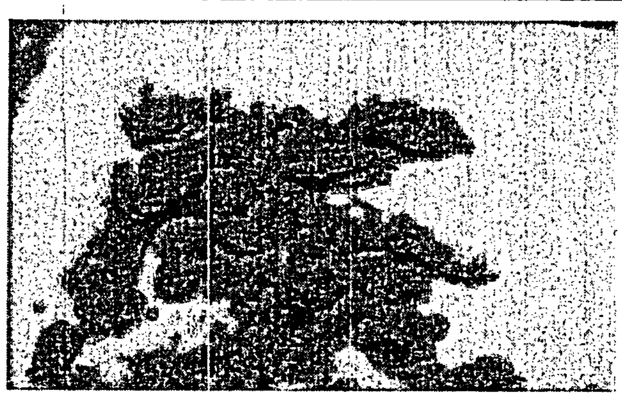
Fiber Debris Bypass Testing (cont.)

Fiber Collected Downstream of a Perforated Plate Strainer



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Fiber Debris Bypass Testing (cont.)

Enercon's Debris Bypass Eliminator *

- Knitted Wire Mesh Construction
- Inserted within the walls of Strainer Modules
- Porous media (approximately 98% porosity) that reduces the quantity and size of fibers bypassing perforated plate
- Minimal increase in clean strainer head loss due to the high porosity of wire mesh material

*Patent Pending

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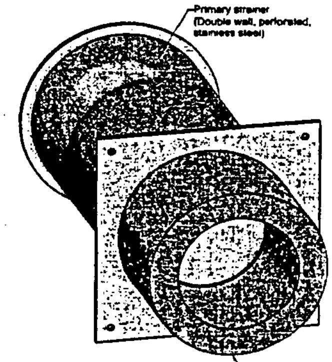
Fiber Debris Bypass Testing (cont.)

Enercon's

Debris Bypass Eliminator



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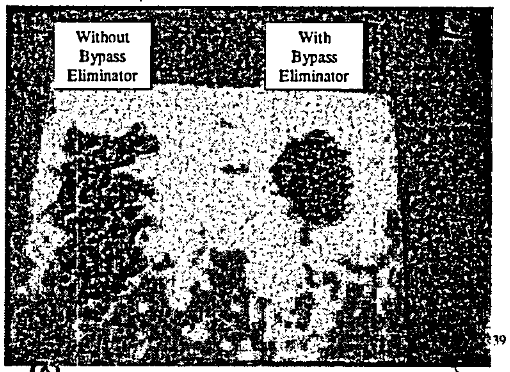
Fiber Debris Bypass Testing (cont.)

- **Fiber Debris Bypass Testing**
  - Significant reduction in the quantity of fiber bypass when the knitted wire mesh bypass eliminators were inserted into the strainer top hat modules



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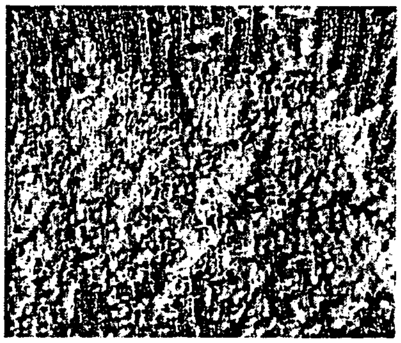
Fiber Debris Bypass Testing (cont.)

Debris Bypass Eliminator
Testing indicates that the fibers penetrating the strainer perforated plate openings exhibit a trapping effect on the surface of the wire mesh material



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Fiber Debris Bypass Testing (cont.)

Microscopic Examination of Fiber Bypass Length

- **Without the bypass eliminator**
  - Fibers at the edge of fiber balls ranged from 1000 - 3000 microns in length
  - Shorter fibers were observed inside the balls of fiber
  - Displayed fiber characteristics - clumping and bridging properties
- **With the bypass eliminator**
  - Eighty to ninety percent of fibers were shorter than 500 microns
  - Nearly all fibers were shorter than 1000 microns
  - Displayed particulate characteristics - dust like properties

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