AECL ECCS Strainers – Testing for Dominion and SCEG

2006 August 24

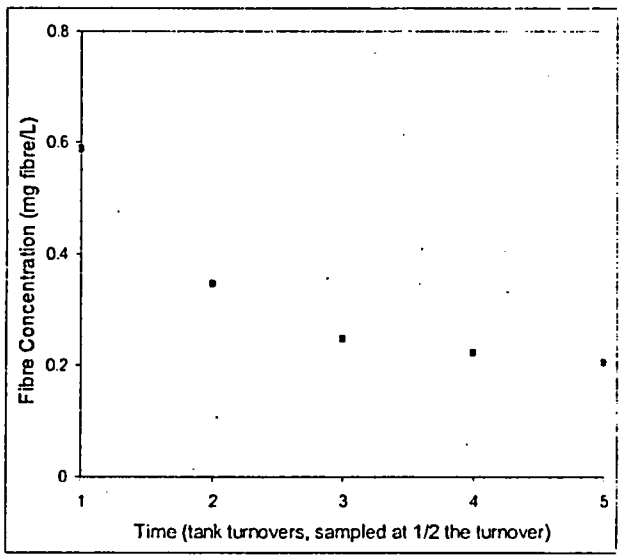
AECL

Outline

- Overview
- Scaling Methodology
- Debris Preparation Methodology
- Debris Introduction Methodology
- Head Loss due to Chemical Effects
- Screen Bypass Testing
- Termination Criteria
- Reduced-Scale Results
- Large-Scale Results

Screen Bypass Testing

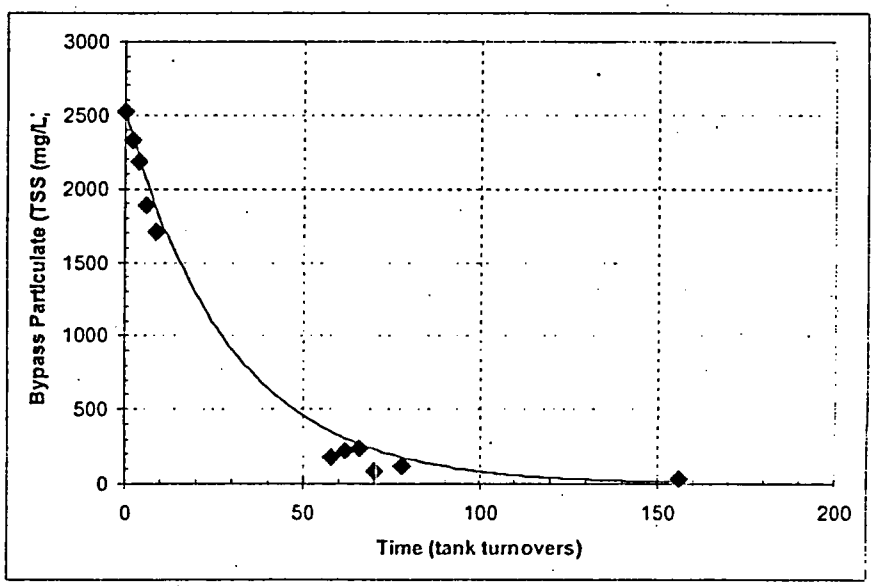
Millstone 2 Fiber Bypass Results



Fiber Concentration with Time

Screen Bypass Testing

Millstone 2 Particulate Bypass Results



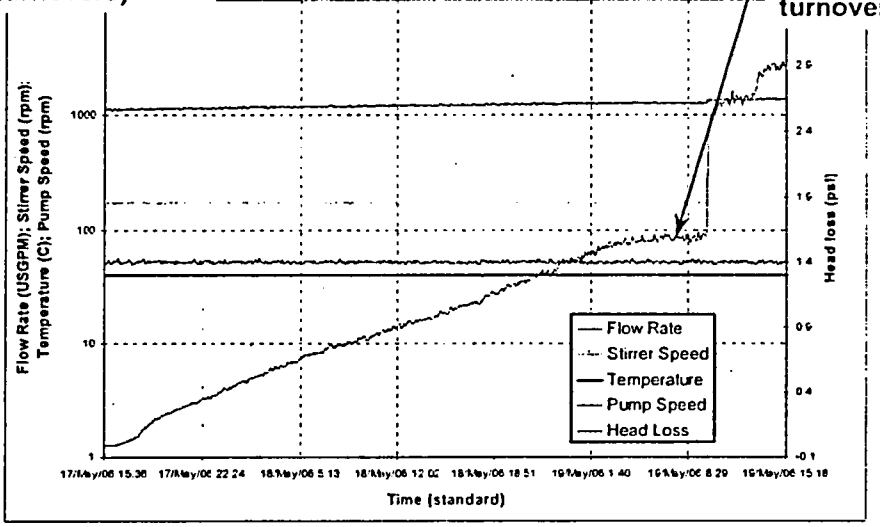
Particulate Concentration with Time

Termination Criteria

Surry Thin-Bed Test

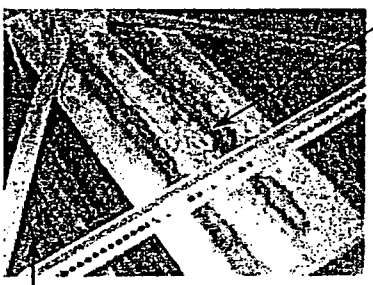
Stability = < 5% change and no general increasing trend within 3 tank turnovers (~1.5 h)

Test duration of 48 h (~96 turnovers)



Reduced-Scale Results

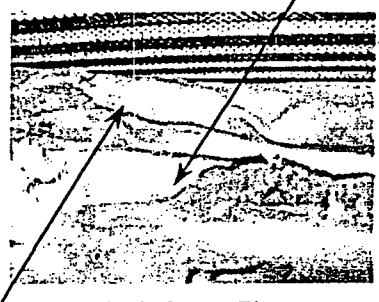
Surry Thin-Bed Test



Debris on Test Section

87% between fins

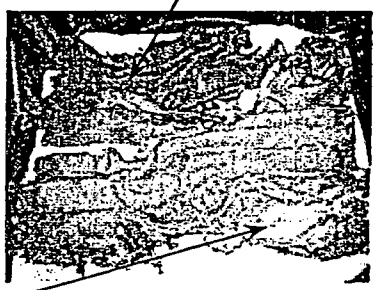
13% outside



Additional fiber deposit

Thin bed

Debris on Fins



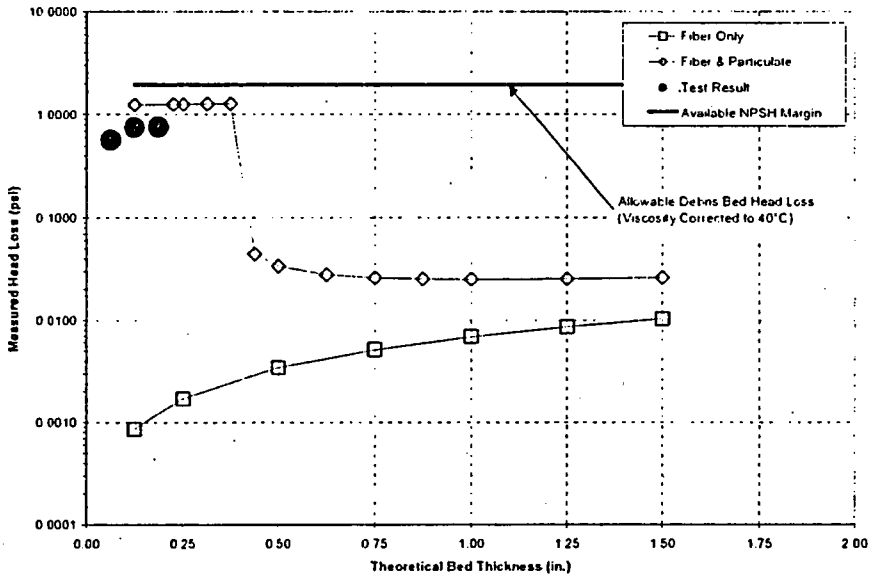
Bed on fin surface

Additional fiber on top of thin bed

Debris Bed

Reduced-Scale Results

Millstone 2 Thin-Bed Test



Reduced-Scale Results

Millstone 2 Full Debris Load Test

Debris on Test Section

Encapsulation on top of fins

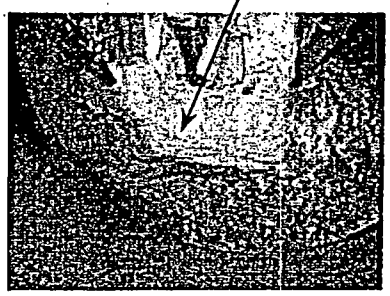
Packed between fins

Fluffy bed between and on top of fins

Thin layer on fin surface

Debris on Fins

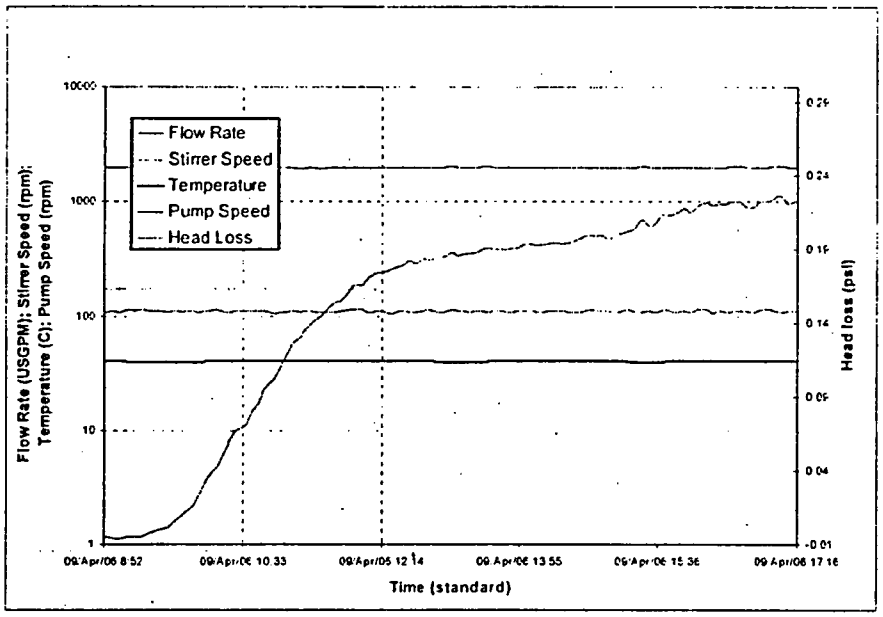
Debris allowed to accumulate in front of fins



Debris in Front of Fins

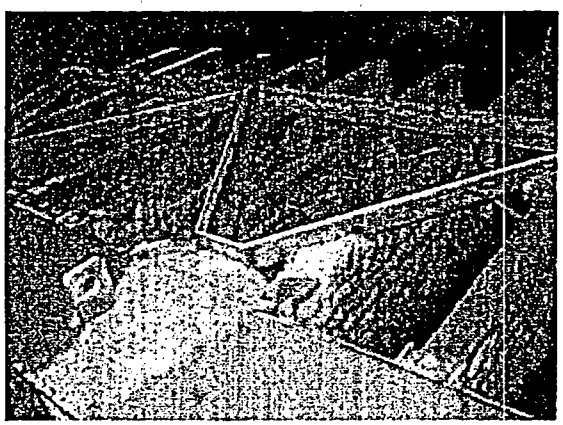
Reduced-Scale Results

Millstone 2 Full Debris Load Test



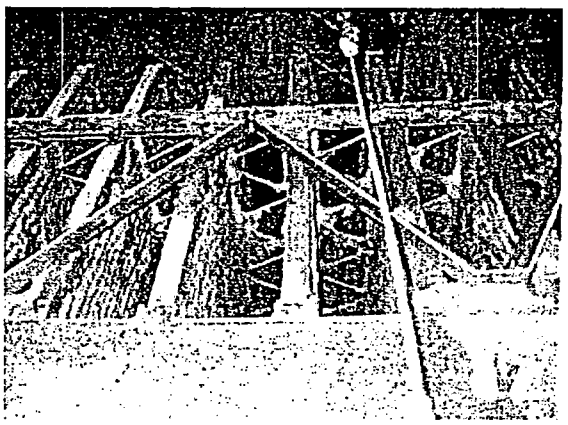
Large-Scale Results

Millstone 2 Thin Bed Test



Water Drained to ~12" Below Top of Fins

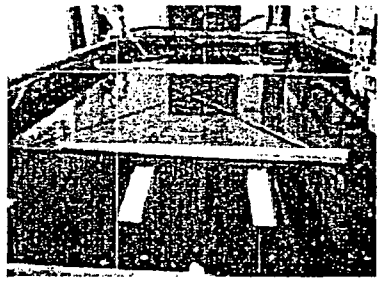
Water Drained Completely Below Fins



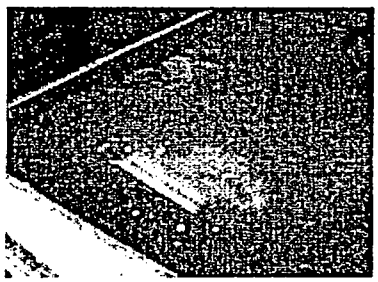
Large-Scale Results

Millstone 2 Full Debris Load Test

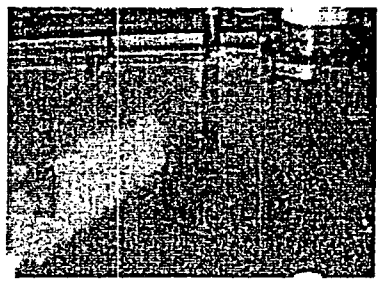
End of Test – Cover On



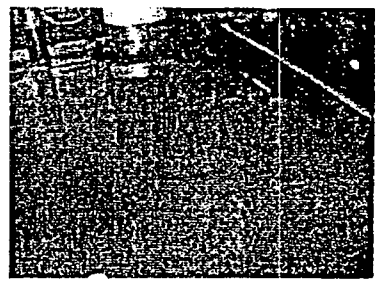
Cover Removed



Left



Centre



Right

Summary of Key Observations

- Strainer surface area determined by thin bed head loss
- Strainer pitch (hence, footprint) determined by encapsulation under full debris load
- Measured head loss is comparable to NUREG/CR-6224 predictions
- Theoretical bed thickness required to form thin bed increases with decreasing approach velocity

Summary of Key Observations

- Fiber bypass is composed of short fibers less than 0.08" (2 mm) long
- All particulate bypasses if no fiber bed present
- Once a fiber bed forms, particulate is slowly captured, resulting in decreasing particulate concentration but increasing head loss

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