
Prototypical Head Loss Testing

Presented

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Purpose of the presentation

- Identify common issues related to industry's prototypical head loss testing
- Provide staff expectations
- Introduction to strainer vendor presentations



Background – Strainer Testing

Industry's approaches

- Prototypical head loss testing combined with near field transport
- *Prototypical head loss test without debris settlement upstream*
- *Plant specific head loss correlation development coupled with conservative debris distribution assumptions*

NRC Staff Responses

Pilot audits, audits and observation trips

Issues Identified

- Near field effect
- Scaling
- *Testing procedures*
- *Combined head loss testing and downstream bypass testing*



Testing Procedures - Common Issues

1. Debris surrogate material preparation

Staff concern

- Both industry and NRC confirmatory research confirmed that shredded fiber may cause significant different pressure drop across the bed due to different shredding processes

Staff expectation

- Vendors to identify the conservative method and perform test consistently following QA requirement.
- Assure the similitude of surrogate material in terms of settling, transport and head loss parameters



Testing Procedures - Common Issues

2. Scaling of Debris Circumferential Accumulation

Staff concern

- For high fiber/particulate case, when circumferential accumulation becomes significant, the scaled strainer section may experience lower head loss than that of the actual strainer module

Staff expectation

- Licensees to evaluate maximum debris loading case and the scaled circumferential velocity to determine the validity of the test results



Testing Procedures - Common Issues

3. Debris addition timing sequence

Staff concern

- The formation of the debris bed is sensitive to the debris introduction sequence

Staff expectation

- Licensees/vendors to evaluate the variation of the debris formation and apply conservative debris introduction methodology to determine the maximum head loss



Testing Procedures - Common Issues

4. Temperature dependency

Staff concern

- Room temperature head loss data is usually scaled to high temperature condition using proportional viscosity equation
$$\Delta P = F(\mu)$$
- Debris bed structure morphology may subject to change
- For a constant flow, the debris bed compression is subject to change
- “Bore Hole” phenomenon may introduce non-linear effect

Staff expectation

- Licensees to evaluate the technical basis of the use of room temperature head loss data



Testing Procedures - Common Issues

5. Integrated head loss and downstream bypass test

Staff concern

- Prototypical head loss tests were conducted to provide screen bypass debris concentration data
- Maximizing debris bed head loss may result in non-conservative debris bed filtration efficiency measurement

Staff expectation

- Licensee to provide technical basis to justify the conservatism of the measured debris bypass concentration



Strainer Vendor Presentations

Purpose

- Exchange information regarding the strainer vendor head loss testing
- Staff to understand the overall testing approaches and provide feedback

