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L-2009-176
10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

RE: Florida Power & Light Company
Turkey Point Unit 3
Docket No. 50-250

Subject: Response in Support of Turkey Point Unit 3 Extension Request - Alternative Approach for Demonstrating Turkey Point Unit 3 Compliance with Generic Letter (GL) 2004-02 Using Turkey Point Unit 4 Integrated Test Data

References:

(1) Letter L-2008-226 from W. Jefferson, Jr., (FPL) to U. S. Nuclear Regulatory Commission, "Request for Extension of Completion Date of the Turkey Point Unit 3 Generic Letter 2004-02 Actions," dated October 31, 2008 (ML083190054)

(2) Letter L-2008-138 from W. Jefferson, Jr., (FPL) to U. S. Nuclear Regulatory Commission "Supplemental Response to NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated June 30, 2008 (ML081960386)

(3) Letter from B. L. Mozafari (U. S. Nuclear Regulatory Commission) to J. A. Stall (FPL), "Turkey Point Nuclear Plant, Unit 3 – Request for Additional Information (RAI) Related to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," September 17, 2008 (ML082610705)

(4) Letter L-2008-160 from W. Jefferson, Jr., (FPL) to U. S. Nuclear Regulatory Commission "Updated Supplemental Response to NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated August 11, 2008 (ML082380244)

This submittal provides the Florida Power and Light Company's (FPL) committed response to the U. S. Nuclear Regulatory Commission (NRC) regarding an alternative approach for demonstrating that the Turkey Point Nuclear Plant, Unit 3 (UNIT3) sump strainers are bounded by integrated flume testing conducted on the Turkey Point Nuclear Plant, Unit 4 (UNIT4) sump strainers (Reference 1).

FPL submitted the final UNIT3 supplemental submittal for GL 2004-02 on June 30, 2008 (Reference 2). Plant specific strainer testing and analysis were reported for the new UNIT3 strainers when fully loaded with debris and when evaluated for potential chemical impacts based on results of the Alion Science and Technology chemical testing at the VUEZ facility.

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In a subsequent letter (Reference 3), the NRC stated that they had identified several critical issues with the test protocol used in the chemical effects testing at VUEZ. The NRC stated that an alternative approach to demonstrate adequate performance of the containment sump may be needed for UNIT3. The NRC stated that FPL will need to submit an extension request in accordance with the established processes of SECY 06-0078, and that a description of FPL's plans and schedule should be included in the extension request.

On October 3, 2008, a telephone conference was held between FPL and NRC representatives to discuss a UNIT3 alternative approach for demonstrating compliance with GL 2004-02. FPL stated that the UNIT3 ECCS sump strainer installation is similar to and bounded by the integrated testing results obtained for the UNIT4 ECCS sump strainer system. The UNIT4 strainers were flume tested by AREVA at Alden Labs which included integrated chemical effects testing, as discussed in the UNIT4 final supplemental response on GL 2004-02 (Reference 4).

Attachment 1 provides the alternative approach information comparing UNIT3 to the UNIT4 testing parameters that should resolve NRC concerns with the VUEZ chemical testing. FPL believes that this information continues to validate final GL 2004-02 compliance for Turkey Point Unit 3. The alternative approach shows that the pressure loss across the UNIT3 strainer system, under post-LOCA recirculation conditions, would be the same or lower than that of UNIT4.

This information is being provided in accordance with 10 CFR 50.54(f).

Please contact Robert J. Tomonto, at (305) 246-7327, if you have any questions regarding this response.

Executed on July 29, 2009.

Sincerely yours,

William Jefferson, Jr.
Site Vice President
Turkey Point Nuclear Plant
Attachment: (1)

cc: NRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant

ATTACHMENT 1

ALTERNATIVE APPROACH FOR DEMONSTRATING TURKEY POINT UNIT 3 COMPLIANCE WITH GENERIC LETTER (GL) 2004-02 USING TURKEY POINT UNIT 4 INTEGRATED TEST DATA

1.0 EXECUTIVE SUMMARY

Turkey Point Units 3 and 4 are duplicate nuclear units, and FPL can demonstrate that the Unit 3 ECCS sump strainer installation is similar to and bounded by the integrated testing results obtained for the Unit 4 ECCS sump strainer system. The Unit 4 strainers were flume tested by AREVA at Alden Labs, which included integrated chemical effects testing, and the results were provided in the Turkey Point Unit 4 final supplemental response on GL 2004-02.

An analytical demonstration comparing Turkey Point Unit 4 and Unit 3 parameters has been completed and is provided in the following pages of this attachment.

This alternative approach demonstrates that:

- Turkey Point Units 3 and 4 are duplicate Westinghouse three loop reactors with the same post-LOCA ECCS parameters, flows, procedures, etc.
- The Turkey Point Unit 3 and 4 strainers are of similar vertical plate design, hole size, and the modules are located outside of the biological shield wall,
- Turkey Point Unit 3 ECCS sump strainers have approximately 50% more effective flow area than Turkey Point Unit 4,
- The flume approach velocities for the Turkey Point Unit 3 sump strainer are bounded at all distances from the sump compared to the approach velocities used in the flume test for the Turkey Point Unit 4 strainer, and
- Turkey Point Unit 3 debris and chemical precipitates are less than or similar to those of Turkey Point Unit 4.

It is concluded that the Turkey Point Unit 3 ECCS sump strainer head loss is bounded by the Turkey Point Unit 4 ECCS sump strainer test program and would be less than the 0.628 ft. strainer head loss that was measured during the Turkey Point Unit 4 integrated flume testing.

2.0 COMPARISON OF TURKEY POINT UNIT 3 AND UNIT 4 DESIGN PARAMETERS AND IMPLEMENTATION RESULTS OF GL 2004-02

Turkey Point Units 3 and 4 are the same design and have identical post-LOCA accident parameters. The installation of similar ECCS sump strainers and the similarity of the amount of debris and chemical precipitates that reach the sump strainers make the comparison /demonstration of potential head losses at the sump strainers practical. The following discussion provides a comparison of the plant designs, post-ECCS sump strainer debris removal strategies. The following examination of these parameters and the Turkey Point Unit 4 test data demonstrates that the potential post-ECCS recirculation head loss at the Unit 3 ECCS sump strainers would be even less than that tested and demonstrated for Turkey Point Unit 4 in the large flume test at Alden Research Laboratory.

2.1 TURKEY POINT UNITS 3 AND 4 ARE DUPLICATE WESTINGHOUSE PLANTS

Turkey Point Units 3 and 4 are duplicate Westinghouse three loop pressurized water reactors. Design and emergency operating parameters are virtually identical with regards to emergency post-LOCA sump recirculation and include:

- Identical Refueling Water Storage Tank (RWST) volumes and post-LOCA containment re-flood elevations
- Identical Technical Specifications and the same emergency operating procedures for the post-LOCA injection phase and recirculation phases
- Both plants use Sodium Tetraborate Decahydrate as the buffer for post-LOCA pH control
- Both units have similar amounts of aluminum mass and areas above and below the post-LOCA containment re-flood level
- The location for the ECCS sump strainers are at the same 14 foot elevation
- Both units employ a common ECCS sump strainer system located outside of the biological shield wall which precludes potential impact from postulated reactor coolant pipe breaks, and minimizes the number of in-containment sump strainer assemblies.
- On either unit, the maximum ECCS recirculation flow through the sump strainers within 24 hours of a LOCA is 2697 gpm, and the maximum after 24 hours is 3750 gpm.

It is noted that FPL is re-analyzing Emergency Core Cooling System (ECCS) flowpaths in support of Extended Power Uprate (EPU) work activities. Evaluations related to sump screen performance and ECCS flow are tracked in the Corrective Action Program

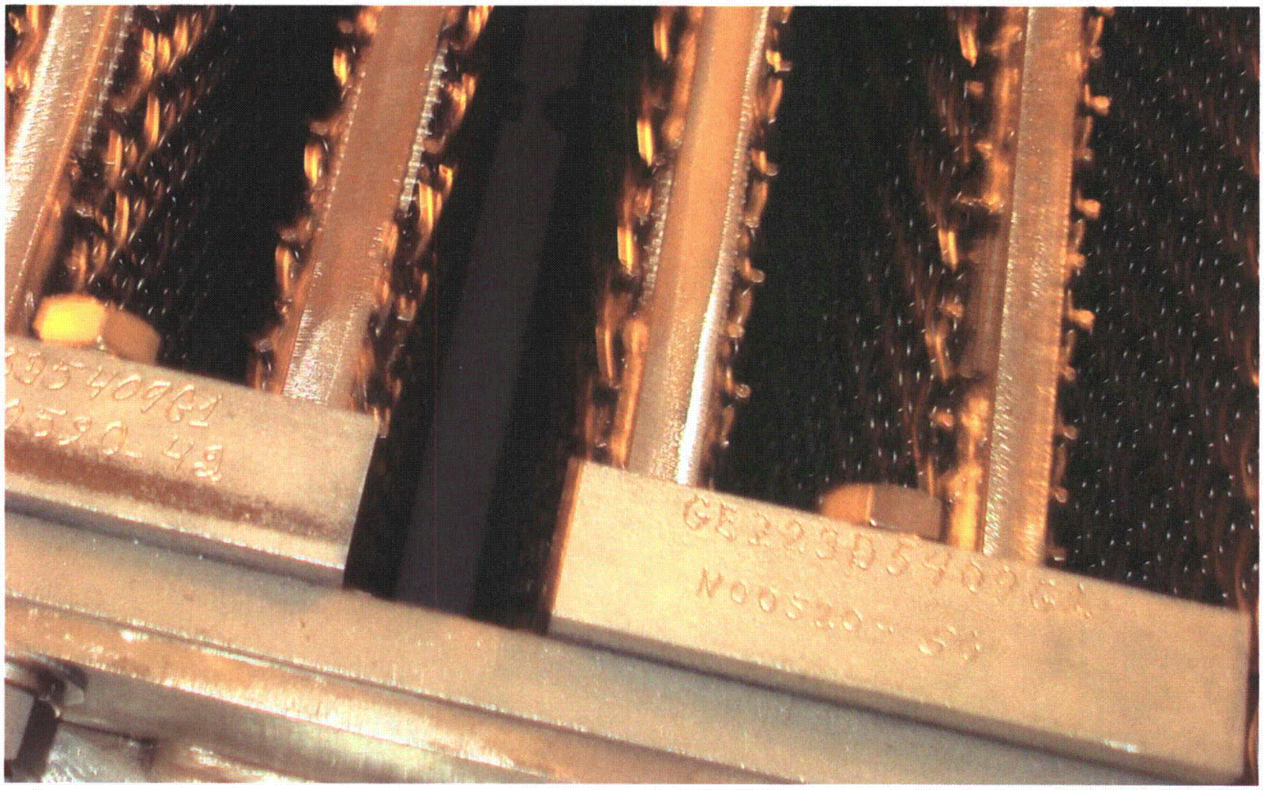
2.2 TURKEY POINT UNIT 3 AND 4 SUMP STRAINER DESIGN SIMILARITIES

FPL originally planned to use the same vendors to fabricate, test, and install the Turkey Pont Unit 3 and Unit 4 ECCS sump strainer systems. However, commercial considerations caused FPL to select alternate vendors for Turkey Point Unit 4.

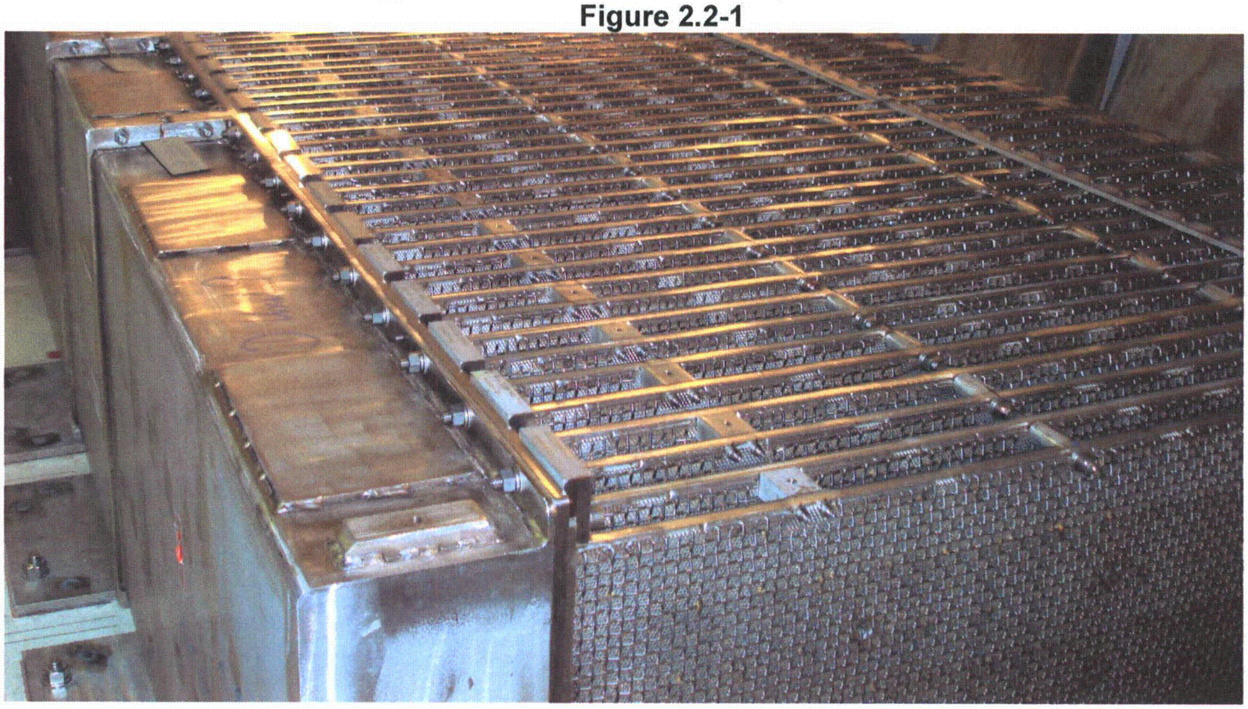
Like Turkey Point Unit 4 the Turkey Point Unit 3 ECCS sump strainers are located on a common header outside of the biological shield wall in the annulus. The strainers for each unit are vertical plate disc type and have 3/32 inch openings. Hence, there is no basis for expecting any significant performance differences in either the Turkey Point Unit 4 or Unit 3 strainer designs as a result of fabrication, construction or installation.

The primary difference in the Turkey Point Unit 3 and 4 ECCS strainer systems, is that the Turkey Point Unit 3 strainer system has approximately 5,500 ft^2 of strainer surface area and Unit 4 has approximately 3,600 ft^2 of strainer surface area. Thus, Turkey Point Unit 3 has approximately 50% more active sump strainer area. Also, the design basis fiber for Turkey Point 3 is only from latent debris.

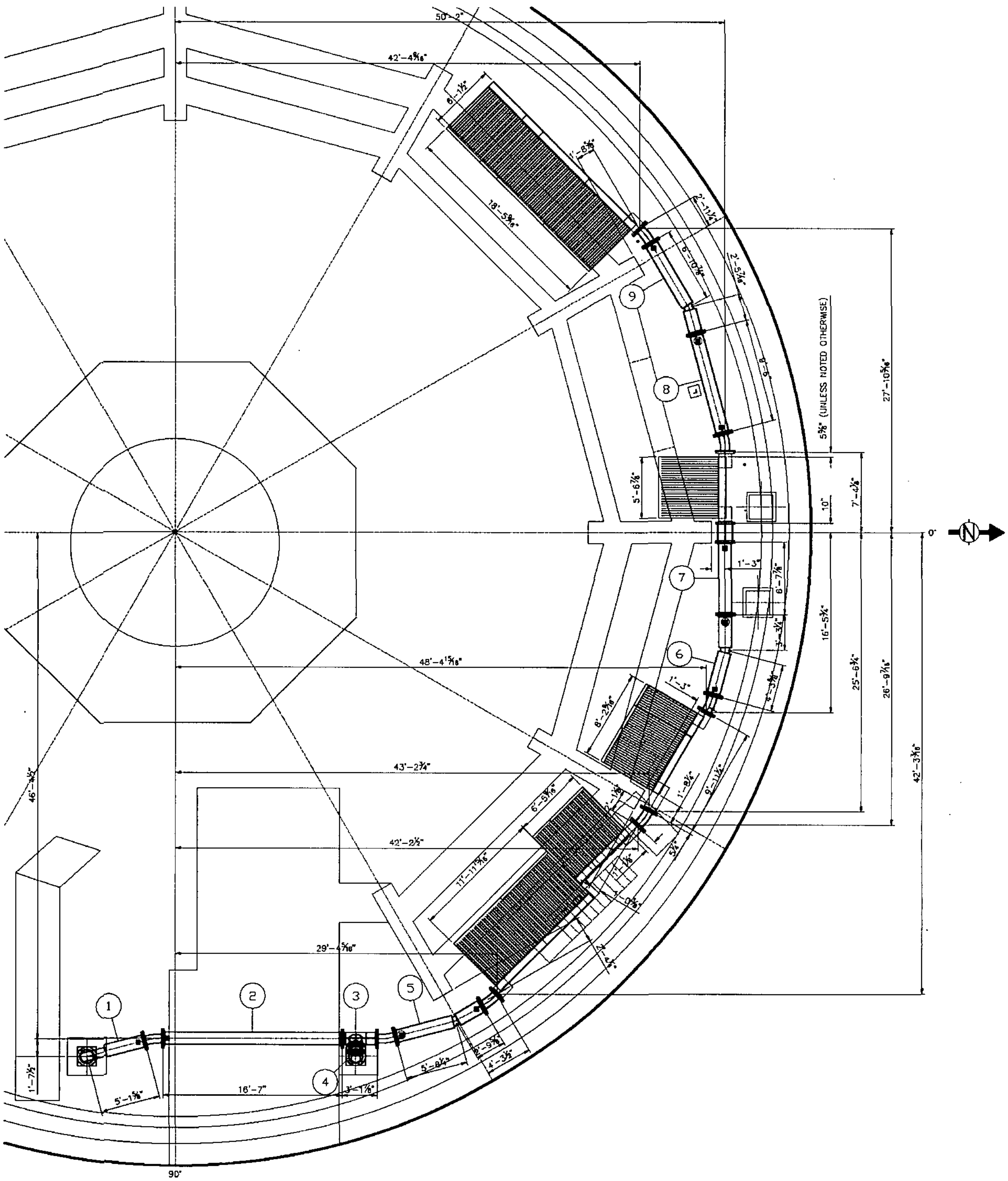
Some example photographs of typical Turkey Point Unit 3 strainer discs and spacing, Figure 2.2-1, a strainer module with the collection plenum, Figure 2.2-2, and a layout drawing of the strainers in the annulus, Figure 2.2-3, are shown below:



Typical Strainer Discs - Turkey Point Unit 3
Figure 2.2-1

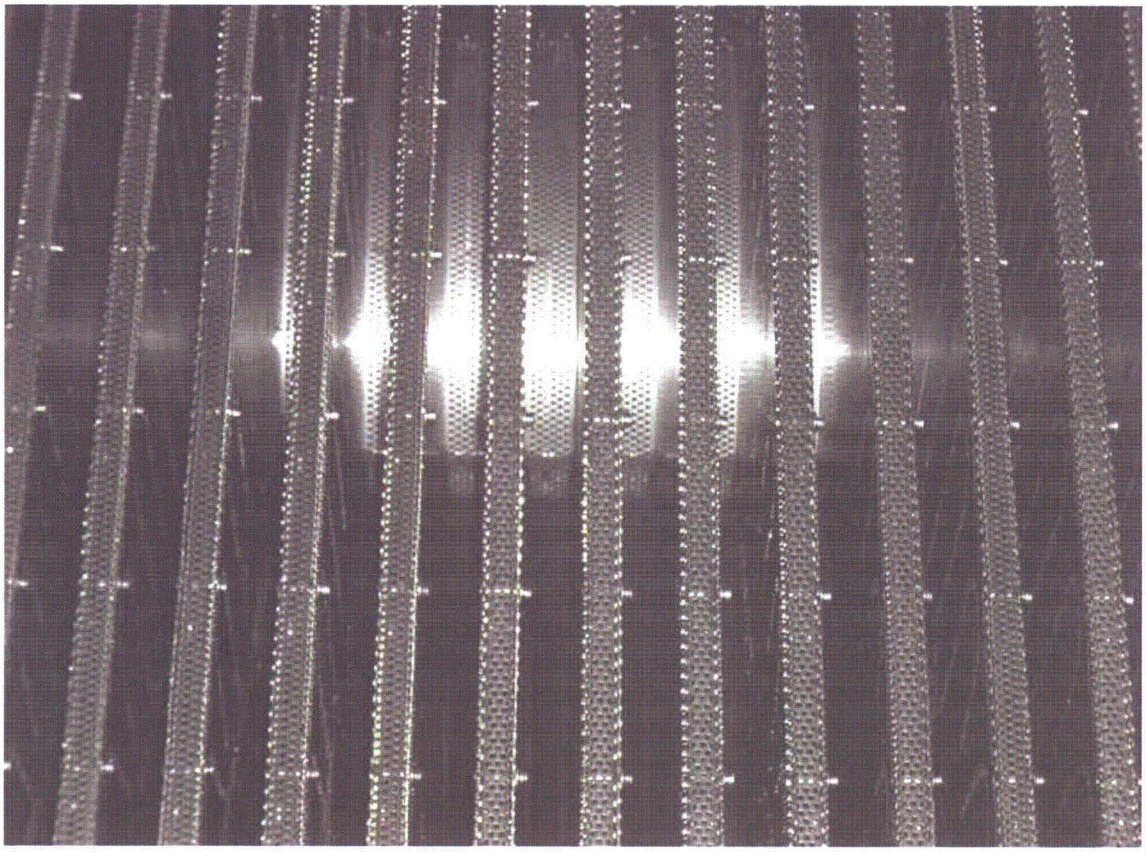


Strainer Module Showing Collection Plenum - Turkey Point Unit 3
Figure 2.2-2

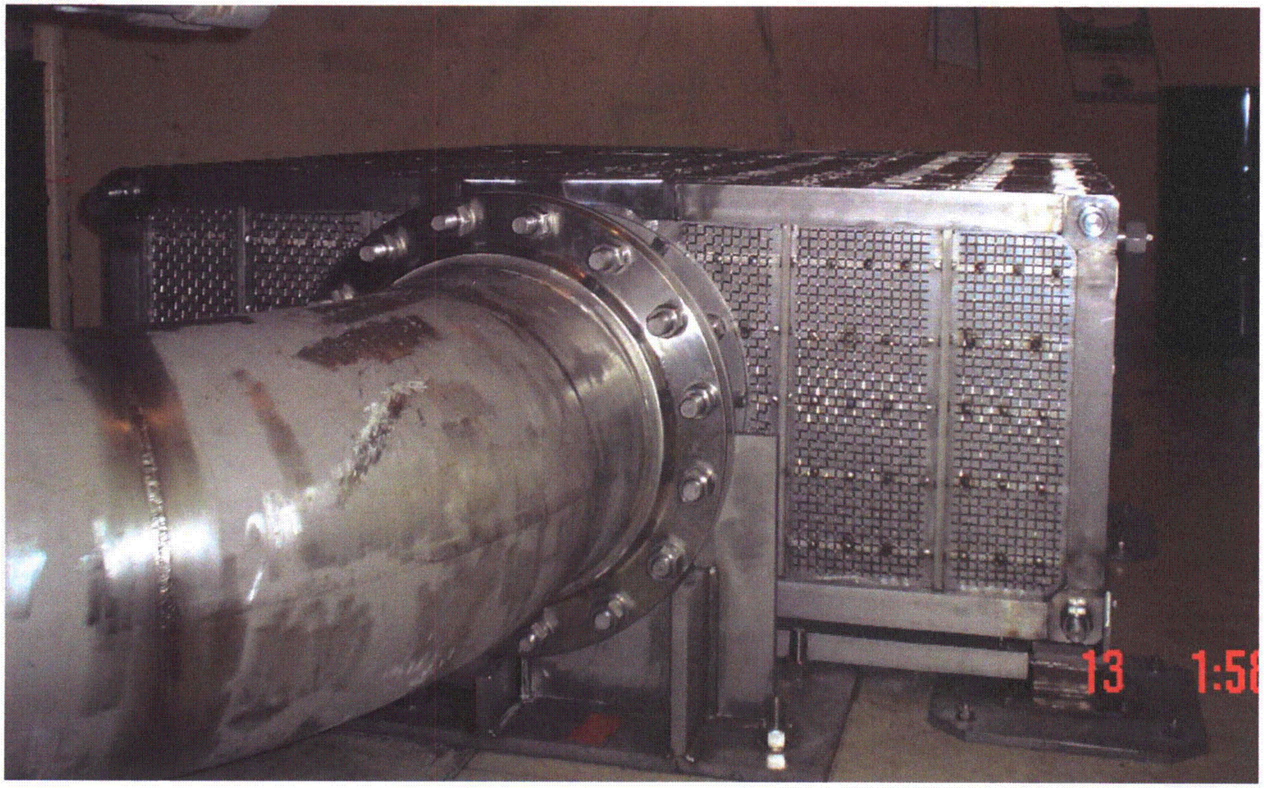


Layout of Strainers in the Outer Annulus - Turkey Point Unit 3
Figure 2.2-3

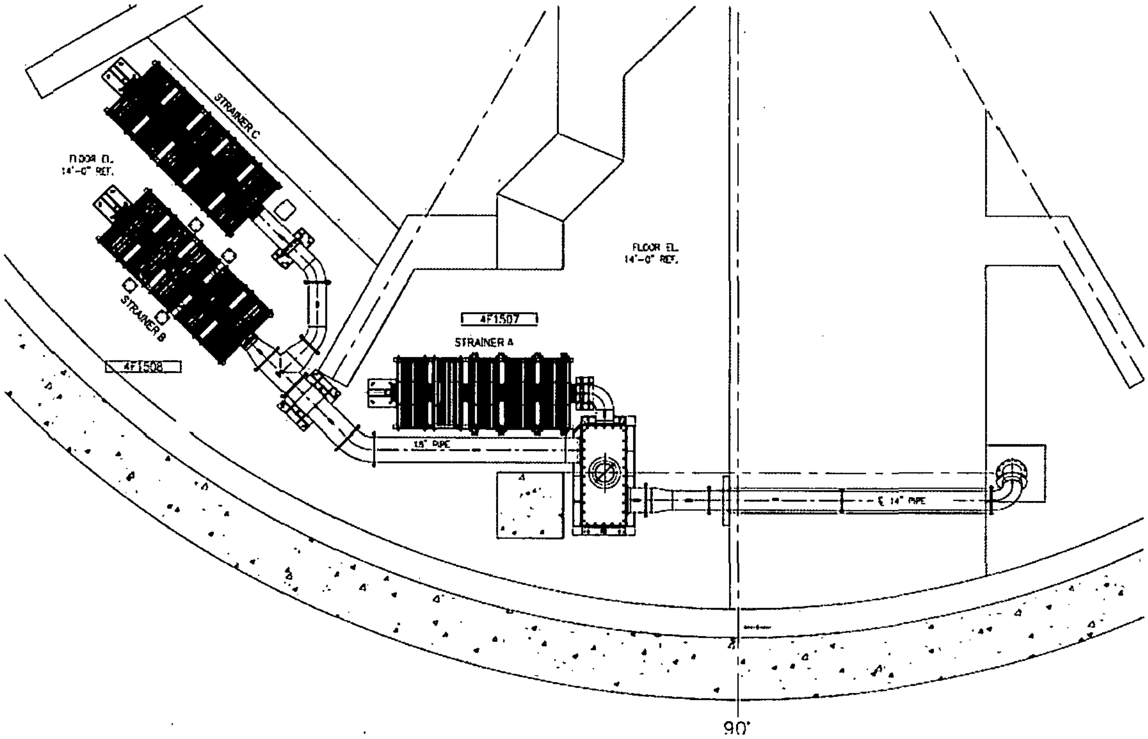
Some example photographs of typical Turkey Point Unit 4 strainer discs and spacing, Figure 2.2-4, a strainer module, 2.2-5, and a layout drawing of the strainers in the outer annulus, Figure 2.2-6 are shown below:



Typical Strainer Discs - Turkey Point Unit 4
Figure 2.2-4



End Strainer Module - Turkey Point Unit 4
Figure 2.2-5



Layout of Strainers in the Outer Annulus - Turkey Point Unit 4
Figure 2.2-6

The Turkey Point Unit 3 GL 2004-02 debris removal strategy included significant reductions in fibrous insulation within potential break zones in the Turkey Point Unit 3 containment as reported in the Turkey Point Unit 3 June 30, 2008, supplemental response for GL-2004-02 [Reference 2]. The existing RCS loops and majority of Steam Generators insulation was reflective metal insulation (RMI). In response to GL 2004-02, FPL

- Replaced the Pressurizer Surge Line insulation with RMI
- Replaced the Reactor Coolant Pumps insulation with RMI
- Removed the Calcium Silicate (Cal-Sil) insulation from the Pressurizer Relief Tank

This insulation replacement significantly reduced the amount of debris that could be generated in the event of a LOCA.

2.3 WORST CASE BREAKS, DEBRIS GENERATION, AND CHEMICAL PRECIPITATES

FPL provided final supplemental responses for both Turkey Point Unit 3 and Turkey Point Unit 4 via References 2 and 4, respectively.

These submittals provided the:

- worst case break location and debris generation, conservatively determined using NEI 04-07 break location criteria and referenced Zones of Influence (ZOI) determinations, and
- a determination of the amount of long term chemical precipitates using WCAP-16530 methodology without refinements.

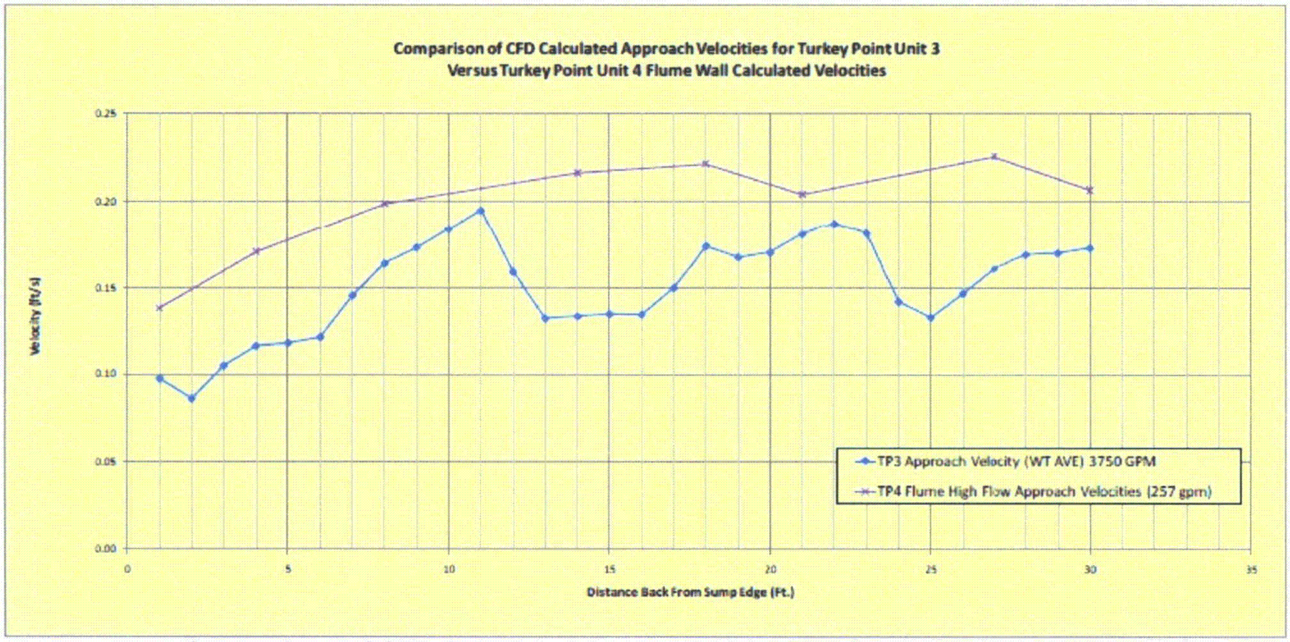
Turkey Point Unit 3 and Unit 4 worst case break locations were selected using the NEI 04-07 criteria with application of additional conservatisms in both assumptions and analysis.

2.4 COMPARISON OF TURKEY POINT UNIT 4 AND UNIT 3 SUMP STRAINER APPROACH VELOCITIES

Computational Fluid Dynamics (CFD) modeling was conducted for Turkey Point Unit 4 and reported in the August 11, 2008 supplemental response [Ref. 4]. As committed in FPL's extension letter of October 31, 2008 [Ref. 1], a CFD was conducted for the Turkey Point Unit 3 ECCS recirculation phase in order to compare Turkey Point Unit 3 and Unit 4 sump strainer approach velocities.

The Turkey Point Unit 3 CFD analysis was completed and used to compare the approach velocities from the Turkey Point Unit 4 CFD, and shows predicted approach velocities near the strainer surfaces for each unit. The predicted velocities near the Turkey Point Unit 3 strainers are less than the Turkey Point Unit 4 strainers. This demonstrates that the analytical work conducted to ensure the Unit 4 plant conditions are prototypically bounded by the test flume also envelopes Unit 3. That is, a flume configuration specifically developed for Unit 3 would be bounded by the tested configuration. Additionally, the lower screen velocities on Unit 3 would be expected to reduce the head loss providing further verification that the Unit 3 strainers have lower head loss than the Turkey Point Unit 4 strainers.

As shown in Figure 2.4-1, the approach velocities used in the flume for the Turkey Point Unit 4 strainer testing were conservatively higher, and the flume approach velocity for the Turkey Point Unit 3 strainer is bounded at all distances from the sump compared to the approach velocities used for the flume test for the Turkey Point Unit 4 strainer.



Comparison of CFD Calculated Approach Velocities for Turkey Point Unit 3 Versus Turkey Point Unit 4 Flume Wall Calculated Velocities (ft/sec)
Figure 2.4-1

2.5 COMPARISON OF TURKEY POINT UNIT 4 SUMP STRAINER TEST RESULTS TO TURKEY POINT UNIT 3 SUMP STRAINER PARAMETERS

Table 2.5-1 provides a summary comparison of the relevant factors affecting head loss across the Unit 3 and 4 sump strainers. The values provided for Turkey Point Unit 4 were those scaled in the integrated flume testing conducted at Alden Research Laboratory. The comparable parameters for Turkey Point Unit 3 are shown with corresponding notes regarding comparisons that demonstrate that the Turkey Point Unit 3 ECCS sump strainer head loss would be expected to be less than that demonstrated in the Turkey Point Unit 4 ECCS sump strainer testing. Table 2.5-2 tabularizes the conclusion that the Turkey Point Unit 4 strainer testing bounds the Turkey Point Unit 3 strainer system. Note that unless otherwise noted, the quantities represent total quantities. Because the Unit 3 strainers are much larger than Unit 4, the amount that would be put in the test flume (scaled quantity) would provide even more margin.

Table 2.5-1

Summary of Factors Affecting Strainer Head Loss			
	Unit 3:	**Unit 4:**	**Notes:**
Debris:			
Fiber, ft^3:	0	37.8	Unit 3 replaced fibrous insulation with RMI to insure that strainer design basis fiber debris loads will not be exceeded.
RMI/Jacketing, ft^2	0	3903.13	Unit 3 applied the NUREG/CR-6808 methodology to conclude that RMI will not be transported to the strainer disks, and used the same logic to conclude that insulation jacketing will not be transported to the strainer disks. Unit 4 tested RMI/Jacketing material and concluded it would not transport to the strainer surface, and excluded the debris from further head loss testing.
Cal-Sil, ft^3	56.18	49.08	Unit 3 Cal-Sil amount exceeds the Unit 4 amount by a small quantity (~14%), because 100 % was originally assumed to transport to the strainers. Hence a debris transport run for Unit 3, would likely show that the amount of cal-sil on Unit 3 that reaches the strainers is less than that on Unit 4. Additionally, the amount used for testing on Unit 3 is approximately 25% less than Unit 4 when calculated on a per square foot basis.
Microtherm, ft^3	2.28	0	Unit 3 has some Microtherm in the worst case break area whereas, Unit 4 does not. This relatively small difference is overshadowed by the larger amounts of fiber and latent fiber on Unit 4 and would result in a negligible head loss difference.
Coatings, ft^3	9.06	9.06	
Latent Debris:			
Latent fiber, lbm:	11.58	13.0	On Unit 3, it was assumed that all of the latent debris fiber reached the strainers, as fines.
Latent particulate, lbm:	65.64	131.3	The amount of latent particulates was measured for Unit 3 and then a large correction factor applied in the Unit 4 analysis.

Summary of Factors Affecting Strainer Head Loss			
	Unit 3:	**Unit 4:**	**Notes:**
Foreign Material/Misc, ft^2	93.21	99.0	The foreign material/miscellaneous debris amounts were accounted for in testing by subtracting surface area from the design surface area of the strainers, and using the reduced strainer area for scaling the debris quantities and flow rates for testing. For Unit 3, 93 ft^2 was deducted before scaling, and for Unit 4, 100 ft^2 was deducted before scaling. Note that reducing the surface areas is conservative, because Unit 4 testing showed that his type of debris did not transport.
Chemical Precipitates:			
Sodium Aluminum Silicate ($NaAlSi_3OH_8$), kg	281.5	492.29	
Aluminum Oxyhydroxide (AlOOH), kg	737.9	689.97	
Total, kg:	1019.4	1182.27	Note, the total Unit 4 chemical precipitate load exceeds Unit 3 by ~16%.
Key Flow and Velocity Considerations			
Maximum Flow (limiting head loss condition), gpm:	3750	3750	
Strainer Size, ft^2:	5500	3600	Unit 3 has approximately 50% more active sump strainer area.
Average Screen Face Velocity, ft/sec:	0.0015	0.0023	Face velocities are less on Unit 3.

Table 2.5-2

Unit 4 Results and Unit 3 Conclusion		
Integrated Flume **Tested Head Loss** for the **Unit 4** ECCS Sump Strainer, ft.	0.628 ft.	Strainer head loss was determined by test by Alden Research Laboratory.
Comparable Head Loss for the **Unit 3** ECCS Sump Strainer, ft	<0.628 ft.	Conclusion is based on the lower Unit 3 strainer flow velocities, less debris and chemical precipitates than Unit 4, and the significantly greater strainer area.

3.0 CONCLUSIONS

This alternative approach evaluation highlights that:

- Turkey Point Units 3 and 4 are duplicate Westinghouse three loop reactors with the same post-LOCA ECCS parameters, flows, procedures, etc.
- The Turkey Point Units 3 and 4 strainers are of similar vertical plate design, hole size, and the modules are located outside of the biological shield wall,
- Turkey Point Unit 3 ECCS sump strainers have approximately 50% more effective flow area than Turkey Point Unit 4,
- The flume approach velocities for the Turkey Point Unit 3 sump strainer are bounded at all distances from the sump compared to the approach velocities used in the flume test for the Turkey Point Unit 4 strainer, and
- Turkey Point Unit 3 debris and chemical precipitates are less than or similar to those of Turkey Point Unit 4.

It is concluded that the Turkey Point Unit 3 ECCS sump strainer head loss is bounded by the Turkey Point Unit 4 ECCS sump strainer test program and would be less than the 0.628 ft. strainer head loss that was measured during the Turkey Point Unit 4 integrated flume testing.