FPL.

POWERING TODAY.
EMPOWERING TOMORROW.®

AUG 26 2009

L-2009-195
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Supplemental Information Needed for Acceptance of Requested Licensing Action
Re: Alternate Source Term Amendment Request (TAC NOS. ME1624 and ME 1625)

By letter L-2009-133 dated June 25, 2009, Florida Power and Light (FPL) requested to amend Facility Operating Licenses DPR-31 and DPR-41 and revise the Turkey Point Units 3 and 4 Technical Specifications. The proposed amendments revise the Technical Specifications to adopt the alternative source term (AST) as allowed in 10 CFR 50.67.

Additional information was requested by the NRC staff by letter dated August 18, 2009 (ML092020529). The attachment to this letter provides the FPL response to the questions from the NRC staff.

In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the State Designee of Florida.

This supplement does not alter the significant hazards consideration or the environmental assessment previously submitted by FPL letter L-2009-133.

This letter contains no new commitments and no revisions to existing commitments.

Should you have any questions regarding this submittal, please contact Mr. Robert J. Tomonto, Licensing Manager, at (305) 246-7327.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 26, 2009.

Very truly yours,

Michael Kiley
Site Vice President
Turkey Point Nuclear Plant

A001
NRR

Attachment:
Summary of Structural Design Criteria for AST Modifications

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Resident Inspector, Turkey Point Nuclear Plant
Mr. W. A. Passetti, Florida Department of Health

Attachment

Summary of Structural Design Criteria for AST Modifications

Response to Request for Additional Information

The following information is provided by Florida Power and Light (FPL) in response to the Nuclear Regulatory Commission's (NRC) request for additional information dated August 18, 2009 (Reference 1). These questions were provided by email on August 5, 2009 and a conference call was held between FPL and the NRC reviewer on August 7, 2009 to clarify the intent of the questions. Based on this follow up discussion with the staff, additional information is provided regarding the formation of chemical precipitates from materials exposed to post-accident containment sump fluid and examples of precedence for other licensees using passive stainless steel pH baskets for containment sump pH control. The initial request is documented below with the applicable FPL response including additional clarifying information requested from the conference call.

1. ***Florida Power & Light (FPL) stated on page 33 of 40 of Enclosure 1 to the letter that the Control Room Ventilation System emergency air intakes will be relocated to different parts of the auxiliary building. The relocated intakes and associated duct work will be designed to seismic criteria, protected from environmental effects, and will meet the requirements of Title 10, Code of Federal Regulations, Part 50 Appendix A, General Design Criteria 19. Provide detailed information regarding the structural design and analysis of the emergency air intakes and the associated duct work under design basis seismic and potential tornado loads, other design loads and load combinations and the corresponding design acceptance criteria and margins.***

The guidance contained in Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants" Section 3.3.2 was used to determine the atmospheric dispersion factor (χ/Q) values used to calculate dose consequences for the alternate source term (AST) analysis. Regulatory Guide 1.194 allows credit for a dual intake system, where each intake is located in a separate wind direction window, to reduce the χ/Q values. To satisfy this requirement, the inlet for the emergency air intakes will be relocated into separate wind direction windows.

As such, the technical specification bases markup, Attachment 2, page 18 of 20, provided the requirements for the modification to the Control Room Emergency Ventilation System (CREVS) stating that to remain operable "both emergency air intake flow paths are available with parallel dampers ensuring outside makeup air can be drawn through both intake locations during a design basis accident and a single active failure" (Reference 4). The CREVS was extensively upgraded to keep operator exposures below the limits of General Design Criteria (GDC) 19. As part of the TMI action plan, modifications were completed so that the Turkey Point Control Room would meet the requirements of GDC 4, 5, and 19 (Reference 3 & 10). Consistent with this correspondence as approved by the staff, the control room intake modification will comply with current licensing basis of the plant which includes 10 CFR 50 Appendix A GDC 4 and 19 designed to single-failure criterion, missile protection, seismic criteria, and operability under loss-of-offsite AC power conditions (Reference 11). The control room and the associated support systems are common to both units, therefore a shared system according to GDC 5. The GDC 5 criterion, however does not include structural design criteria, therefore, was not included as a design criteria for the new intakes.

Consistent with the current safety classification of the CREVS, the new control room emergency intakes will be classified as Seismic Class I safety related components since Class I components are "designed so that there is no loss of capability to perform their safety function in the event of the maximum hypothetical seismic [event]... high winds, sudden barometric pressure changes, flooding, and other natural phenomena" (Reference 2, Section 1.3.1). The structural design criteria and applicable codes and standards for the qualification of the relocated CREVS ductwork intakes are defined in Updated Final Safety Analysis Report (UFSAR) Chapter 5 Appendix 5A "Seismic Classification and Design Basis for Structures, Systems and Equipment for Turkey Point" (Reference 2). In general, potential load combinations for the equipment located outside containment, as applicable to the CREVS are as follows:

Load Combination	Loads	Allowable Stress
LC1	D + L	1.0 S
LC2	D + L + E or W	0.8φ Y
LC3	D + L + E'	φ Y
LC4	D + P	Y

Where:

D dead weight load of the component
L applicable live load
E applicable operating basis earthquake (OBE) load or hurricane wind load (W), whichever is higher
E' applicable safe shutdown earthquake (SSE) load
P applicable differential pressure (1.5 psi bursting) between inside and outside of duct plus tornado wind load
S is the required section strength based on elastic design methods and allowable stresses
Y is the yield strength of the material
φ strength factor applicable to the material (e.g. concrete, steel, etc.)

Similarly, the external missile criteria for Class I structures, systems and components (SSCs) described in Appendix 5E of the Turkey Point UFSAR – Missile Protection Criteria – will be applicable to the extended CREVS ductwork. The following external missiles will be considered for specific segments of the equipment depending on the routing of the equipment.

a. Corrugated sheet of siding 4'x8', weighing 100 lbs and traveling at 225 mph
b. Wood decking 12'x4'x4", weighing 450 lbs and traveling at 200 mph

c. Passenger car on ground weighing 4,000 lbs and traveling at 50 mph

Protection for the CREVS will be provided by appropriate materials including concrete, steel enclosure or soil cover where applicable for underground portions.

The CREVS ductwork, of which a portion is located outdoors, is designed to maintain its elastic behavior when subjected to various combinations of sustained (i.e., deadweight, pressure), thermal, seismic (OBE/SSE), tornado wind and accident loads. Using the appropriate load combinations, the resulting ductwork and structural member/weld stresses are compared to the stress limits of the American Society of Mechanical Engineer's (ASME) code, American Institute of Steel Construction (AISC) and Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Manuals, as applicable. A proper allowable stress is determined based on the code most applicable to the type of component being considered (i.e. ductwork, supports, etc.).

2. ***FPL stated on page 14 of 20 of Attachment 2 to the letter that it intends to install 10 stainless steel wire mesh baskets (2 large and 8 small) containing NaTB in the containment basement, as a means of controlling the containment sump pH. These baskets contain a combined mass of 11,061 lbm of NaTB. Provide detailed information regarding the structural design and analysis of these baskets under normal operating and accident conditions, including the geometry, anchoring, the design loads and load combinations, and the corresponding design acceptance criteria and margins.***

The alternate source term analysis evaluated two basket sizes; two large baskets and eight small baskets. This modification will be designed consistent with the analysis and the associated design criteria in the UFSAR for structures installed in the containment building. Dimensional details of these two basket sizes have been provided in a supplementary response in L-2009-177 on page 4 of 6 of Attachment 1 (Reference 5). The baskets will be designed to preclude movement during a seismic event.

The AST license amendment request (LAR) proposes a new technical specification to control containment sump pH to 7.0 or greater at the onset of containment recirculation. Turkey Point currently controls sump pH by manually adding sodium tetraborate decahydrate (NaTB) via the chemical volume and control system, albeit a slower method, to minimize chloride induced stress corrosion cracking.

The NaTB basket design will include the following considerations:

- Avoid seismic interaction with safety related structures and components.
- Avoid placement in close proximity to high-energy piping.
- Provide licensing precedent for post-accident containment sump pH control

The NaTB baskets will be part of recirculation pH control system designed to maintain pH during the sump recirculation phase of a design basis loss-of-coolant accident (LOCA). The structural design criteria for the qualification of these baskets are defined in Appendix 5A of the UFSAR and in approved design specifications which comply with Generic Letter 87-02 "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors (USI A-46)." The NaTB baskets will be designed such that movement and overturning effects are precluded during a seismic event. The NaTB baskets will be rigidly constructed of stainless steel structural shapes, wire mesh and fasteners to withstand applicable Class III loads and load combinations due to dead weight, live and seismic loads, ensuring that the baskets will not interact with other Class I SSCs or collapse creating undesirable sump debris. The basket's design qualification will utilize basic elastic stress equations and allowable stress limits from the ASME code, and the AISC Manual, as applicable. A further consideration in the design is to ensure that the baskets will remain in place when subjected to hydraulic flow through the baskets during a design basis accident to preclude interaction with any adjacent SSC's.

The proposed locations for the NaTB baskets will be on the 14 foot elevation of the Unit 3 and 4 containment buildings. Final confirmation of their actual locations will be made when the containment becomes accessible during a future refueling outage. In general, the baskets will be strategically located away from High Energy Line Break (HELB) regions of influence and the containment sumps to eliminate the HELB's dynamic effects on them and preclude adverse interactions with the containment sump strainers.

Additionally, the stainless steel construction will render them impervious to corrosive attack from exposure to borated water and containment atmosphere to minimize maintenance considerations.

Metal baskets used to hold buffering agents to control the post accident containment sump fluid pH is a well established approach. St. Lucie Unit 2 currently uses solid trisodium phosphate dodecahydrate (TSP) located in stainless steel mesh baskets located in the vicinity of the sump. The NRC's Standard Technical Specifications also includes a specification for baskets containing TSP (Reference 6). Additionally, Beaver Valley Unit 2 received a license amendment in April 2009 to replace sodium hydroxide (NaOH) with NaTB stainless steel baskets to adjust sump pH (References 9 and 12).

3. ***FPL stated on page 30 of 40 of Enclosure 1 that it will replace the aluminum fins on the normal containment coolers with copper fins to generate less chemical debris. Provide detailed information regarding the evaluation of potential structural effects on the coolers as a result of this replacement.***

Currently, the normal containment cooler (NCC) coils are classified as Seismic Class I safety related system to passively maintain the component cooling water system pressure boundary. As such, the structural design criteria and applicable codes and standards for the qualification of the NCC coils are defined in Appendix 5A of the UFSAR.

In general, potential load combinations for the equipment located inside containment, as applicable to Class I piping is as follows (Reference 13):

Load Combination	Loads	Allowable Stress
LC1	D + L + T	1.0 S
LC2	D + L + T + E	1.33 S
LC3	D + L + T + E'	1.5 S
LC4	D + L + T + P + J + R	Y

Where:

D is the dead weight load component
L is any applicable live load
T is any applicable thermal load
E is any applicable OBE load
E' is any applicable SSE load
P is any differential pressure where applicable
J is the jet impingement force where applicable
R is the pipe rupture load where applicable
S is the required section strength based on elastic design methods and allowable stresses
Y is the yield strength of the material

The fin material design for the replacement NCCs will be changed from aluminum to copper. The new copper radiator fins, which are non-pressure boundary components of the NCCs, have comparable or better mechanical properties to the replaced aluminum fins and will be designed to maintain its elastic behavior when subjected to various combinations of sustained, seismic (OBE/SSE) and accident loads. Using the appropriate load combinations, the resulting elastic stresses will becompared to the stress limits of codes such as the ASME code, and the AISC Manual, as applicable.

Some additional questions were raised by the NRC during the conference call held on August 7th 2009. The subsequent information about the chemical interactions, sump debris and the relationship between these has been included to provide a background for the NCC modification. In general terms, this additional information will provide the foundation for replacing the NCC with a copper material in lieu of the existing NCC containing aluminum fins.

The pressurized water reactor post-loss of coolant accident (LOCA) environment creates several challenges to material integrity due to temperature, chemical reactions, and effects from sprayed and pooled water. During a LOCA, materials in the zone of influence of the break can become debris that may transport to the sump area, where spray solution, spilled reactor coolant and borated water from other safety injection sources are accumulating. The combination of spray chemicals, insulation, corroding metals, and submerged materials creates a potential condition for the formation of chemical substances that may impede the flow of water through the sump strainers or affect downstream components in the emergency core cooling or reactor coolant systems (Reference 7).

To evaluate the effects of the debris transported to the sump screen after a LOCA, the chemical products which may form in a post-LOCA sump environment must be determined. Materials present in containment may dissolve or corrode when exposed to the reactor coolant and spray solutions. This behavior would result in oxide particulate corrosion products and the potential for the formation of precipitates due to changes in temperature and reactions with other dissolved materials. These chemical products become a source of debris loading to be considered in sump screen performance and downstream effects (Reference 8).

The materials present in containment were evaluated for their potential to cause chemical effects in the containment sump as part of the Generic Letter 2004-02 evaluations for Turkey Point Units 3 and 4. The containment materials were divided into fifteen (15) material classes based on their chemical composition. Ten (10) of these material classes were determined to have the potential to cause chemical effects in the containment sump: aluminum, aluminum silicate, calcium silicate, carbon steel, concrete, E-glass, amorphous silica, Interam E class insulation, mineral wool, and zinc (Reference 8).

Copper-containing alloys were a classification of materials that was also evaluated. As demonstrated in prior testing and based on published data, this material class is resistant to corrosion under expected post-accident conditions. Therefore, this material was not included in the Generic Letter 2004-02 chemical effects test program (Reference 8).

The current chemical precipitate analysis includes a surface area and mass of aluminum, both submerged and not-submerged post-accident. Aluminum and aluminum-based compounds form two material classes determined to have the potential to cause chemical effects in the containment sump. As demonstrated by test data, copper-containing alloys do not create chemically generated debris (Reference 8). The existing coils are fabricated from admiralty brass and the fins are fabricated from aluminum. Copper fins will be used to replace the aluminum on the NCC fins to ensure the chemical effects testing results remain valid. By removing admiralty brass coils and aluminum fins from the existing NCC and replacing them with copper alloy coils and copper fins, this modification reduces the aluminum surface area input parameter used in the Turkey Point chemical precipitate analysis.

References

1. B. Mozafari (NRC) to M. Nazar "Turkey Point Units 3 and 4 – Supplemental Information Needed for Acceptance of Requested Licensing Action RE: Alternate Source Term Amendment Request (LAR-196)(TAC Nos. ME1624 and ME1625)," Accession No. ML092020529, August 18, 2009
2. B. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2008-243), "Updated Final Safety Analysis Report – Unit 4 Cycle 23 Update," November 11, 2008.
3. R. Uhrig (FPL) to S. Varga (NRC) (L-83-441), "Post TMI Requirements Control Room Habitability NUREG-0737 Item III.D.3.4," August 9, 1983.
4. W. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2009-133), "License Amendment Request 196: Alternative Source Term and Conforming Amendment," Accession No. ML092050277, June 25, 2009.
5. W. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2009-177), "Supplement to License Amendment Request 196 (ADAMS Accession No. ML09050112) – Summary of Turkey Point Sump pH Calculation Inputs, Assumptions, Methodology, and Results," July 30, 2009.
6. NUREG-1432, Volume 1, Revision 3, Standard Technical Specifications Combustion Engineering Plants, June 2004.
7. NRC Staff Review Guidance Regarding Generic Letter 2004-02 Closure in the Area of Plant-Specific Chemical Effect Evaluations, March 2007.
8. WCAP-16530-NP, Revision 0, Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191, February 2006.
9. N. Morgan (NRC) to P. Sena III (FirstEnergy), "Beaver Valley Power Station, Unit Nos. 1 and 2 – Issuance of Amendments Re: Spray Additive System by Containment Sump pH Control (TAC Nos. MD9734 and MD9735)," Accession No. ML090780352, April 16, 2009.
10. E. Uhrig (FPL) to D. Eisenhut (NRC) (L-81-285), "Post TMI-Requirements Control Room Habitability," July 9, 1981.
11. S. Varga (NRC) to R. Uhrig (FPL), "NUREG-0737, Item III.D.3.4, 'Control Room Habitability' Turkey Point Plant Units 3 and 4," November 25, 1983.
12. P. Sena (FirstEnergy) to U.S. Nuclear Regulatory Commission, "License Amendment Request No. 08-006 Replacement of Beaver Valley Power Station Unit No. 2 Spray Additive System by Containment Sump pH Control System," Accession No. ML082730716, September 24, 2008.
13. W. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2008-160), "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'," August 11, 2008.