Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

FPL

October 14, 2008

L-2008-221
10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

References:

1. NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" dated January 11, 2008.
2. NRC Generic Letter 1988-17, "Loss of Decay Heat Removal," dated October 17, 1988.
3. NRC Generic Letter 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps," dated October 7, 1997.
4. NUREG-0897, "Containment Emergency Sump Performance-Technical Findings Related to USI A-43," dated October 1985.
5. FPL Letter L-2008-070, Three Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated May 12, 2008.
6. NRC Letter St. Lucie Plant, Units 1 and 2 - Generic Letter (GL) 2008-01, "Managing Gas Accumulation In Emergency Core Cooling, Decay Heat Removal, And Containment Spray Systems," Proposed Alternative Course Of Action" dated September 24, 2008.
7. FPL Teleconference with NRC on September 30, 2008.

Attachments: NRC Generic Letter 2008-01 Requested Information for a 9-month Response

The Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2008-01 (Reference 1) to request that each licensee evaluate the licensing basis, design, testing, and corrective action programs for the Emergency Core Cooling Systems (ECCS), Decay Heat Removal (DHR) system, and Containment Spray system, to ensure that gas accumulation is maintained less than the amount that challenges operability of these systems, and that appropriate action is taken when conditions adverse to quality are identified.

GL 2008-01 requested each licensee to submit a written response in accordance with 10 CFR 50.54(f) within nine months of the date of the GL to provide the following information:

(a) A description of the results of evaluations that were performed pursuant to the requested actions;

(b) A description of all corrective actions, including plant, programmatic, procedure, and licensing basis modifications that were determined to be necessary to assure compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50 and the licensing basis and operating license as those requirements apply to the subject systems; and,

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(c) A statement regarding which corrective actions were completed, the schedule for completing the remaining corrective actions, and the basis for that schedule."

On September 24, 2008, FPL received a letter from the NRC (Ref. 6) discussing certain aspects of FPL Letter L-2008-070. Specifically, concern was expressed over FPL's 3-month letter indicating walkdowns would be completed for Unit 1 after the 9-month response date. During a teleconference on September 30, 2008, the St. Lucie outage schedule was discussed and NRC accepted FPL's decision to perform UT inspection after the 9-month response date. UT for accessible and inaccessible areas of St. Lucie Unit 1 will be coordinated with outage activities and the results of the UT inspections will be included in the Unit 1 GL 2008-01 closeout letter that will be submitted within 90 days of the completion of the refueling outage.

In summary, FPL has concluded that the subject systems and functions at St. Lucie Units 1 and 2 are capable of performing their intended safety function and that they are in compliance with 10 CFR 50 Appendix B, Criterion III, V, XI, XVI, and XVII, with respect to the concerns outlined in GL 2008-01 regarding gas accumulation in the accessible portions of these systems.

The attachment to this letter contains the Florida Power & Light Company nine month response to NRC GL 2008-01 and completes Commitment 1 below.

GL 2008-01 Commitments:

Commitments 1 through 3 were provided in FPL 120-day response Letter L-2008-070 dated May 12, 2008.

1. FPL will provide an initial GL 2008-01 submittal by October 14, 2008, that includes the evaluation results for the completed licensing and design basis reviews, the operating and test procedure reviews, and the Unit 2 readily accessible GL piping section walkdowns and design reviews as well as the schedule for any corrective actions that may be required based on these evaluations. This 9-month response letter satisfies this commitment.

2. FPL will provide a complete Unit 1 GL 2008-01 submittal 90 days after the end of the fall 2008 refueling outage. This submittal will complete the design evaluation review as well as provide the schedule and basis for any corrective actions that may be required based on the detailed readily accessible and inaccessible GL piping section walkdowns performed.

3. FPL will provide a complete Unit 2 GL 2008-01 submittal 90 days after the end of the spring 2009 refueling outage. This submittal will complete the design evaluation review as well as provide the schedule and basis for any corrective actions that may be required based on the detailed inaccessible GL piping section walkdowns performed during the outage.

Commitments 4 and 5 are new commitments.

4. FPL is continuing to support the industry and NEI Gas Accumulation Management Team activities regarding the resolution of generic TS changes via the Technical Specification Task Force (TSTF) traveler process. FPL will evaluate the resolution of TS issues with respect to the changes contained in the TSTF traveler following NRC approval and the Consolidated Line Item Improvement Process (CLIIP) Notice of Availability of the TSTF traveler in the Federal Register. Based upon the results of the evaluation, an appropriate license amendment request will be filed with the NRC within 180 days following NRC approval of the TSTF. The appropriate Bases changes associated with the potential Technical Specification will also be made.

5. FPL will develop a Gas Void Management Program by 12/15/2009 to support planned TS changes.

Please contact Ken Frehafer at (772) 467-7748 if you have further questions regarding this matter.

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

Executed on October 14, 2008.

Very truly yours,

Gordon L. Johnston
Site Vice President
St. Lucie Nuclear Plant

GLJ/KWF
Attachment

Nine Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

This attachment contains the St. Lucie Unit 1 and 2 nine-month response to Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated January 11, 2008. In GL 2008-01, the NRC requested "that each addressee evaluate its ECCS, DHR system, and containment spray system licensing basis, design, testing, and corrective actions to ensure that gas accumulation is maintained less than the amount that challenges operability of these systems, and that appropriate action is taken when conditions adverse to quality are identified."

The following information is provided in this response:

a) A description of the results of evaluations that were performed pursuant to the requested actions,
b) A description of all corrective actions determined necessary to assure compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50 and the licensing basis and operating license with respect to the systems, and
c) A statement regarding which corrective actions have been completed, the schedule for completing the corrective actions not yet complete, and the basis for that schedule.

The following systems were determined to be in the scope of GL 2008-01 for St. Lucie:

- High Pressure Safety Injection (HPSI)
- Low Pressure Safety Injection (LPSI)
- Containment Spray (CS)
- Shutdown Cooling (SDC)
- Charging System (CVCS) - Unit 1 SBLOCA analysis credits flow of one charging pump

A. EVALUATION RESULTS

Licensing Basis Evaluation

The St. Lucie Unit 1 and Unit 2 licensing bases were reviewed with respect to gas accumulation in the Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems. This review included the Technical Specifications (TS), TS Bases, the Operations policy on Technical Specification Guidance, the Updated Final Safety Analysis Report (UFSAR), the Technical Requirements Manual (TRM), responses to NRC generic communications, NRC Commitments, and License Conditions.

1. Summary of the Review of Licensing Basis Documents

Because the licensing basis is different for each unit, a summary of the results of the license basis review will be discussed on a unit specific basis.

- St. Lucie, Unit 1

The Technical Specifications were reviewed to determine how the impact of gas voiding, gas intrusion and dynamic effects are addressed in the operating license:

a) Technical Specifications 3/4.1.2, "Boration Systems"; 3/4.5.2, "ECCS Subsystems - Operating"; 3/4.5.3, "ECCS Subsystems – Shutdown"; 3/4.6.2, "Containment Spray and Cooling Systems"; and 3/4.9.8, "Shutdown Cooling and Coolant Circulation" apply to the subject Unit 1 systems.
b) Specification 3.1.2.1, "Reactivity Control Systems, Flow Paths – Shut Down," requires "at least one of the following boron injection flow paths shall be OPERABLE..." Specification 3.1.2.2, "Reactivity Control Systems, Flow Paths – Operating," requires "at least two of the following three boron injection flow paths shall be OPERABLE..."
c) Specification 3.5.2.c states that each of the two required subsystems will be comprised of "An independent OPERABLE flowpath..." Specification 3.5.3.a requires "...one OPERABLE flow path..."
d) Specification 3.6.2.1 provides the number of operable containment spray trains required for various modes of operation.
e) Specifications 3.9.8.1 and 3.9.8.2 state the requirements for operable and operating Shutdown Cooling loops.

None of the surveillance requirements for the above listed specifications discuss the fill status of the piping or any venting or measurement of voids in the piping. Likewise, Procedure ADM-25.04, "Technical Specification Bases," does not discuss the fill status of the piping or any venting or measurement of voids in the piping with respect to system operability or surveillance testing. Operations Policy OPS-503, "Technical Specification Guidance," does not discuss the fill status of the piping or any venting or measurement of voids in the piping with respect to system operability or surveillance testing.

The UFSAR was reviewed to determine how the impact of gas voiding, gas intrusion and dynamic effects are addressed in the licensing basis:

f) UFSAR Sections 3.6.2, "Design Basis Piping Break Criteria" and 3.9.1.1, "Vibration Operational Testing" were reviewed to determine the licensing basis associated with the structural design requirements for installation and support of the subject systems' components and piping. It was determined that the current ECCS and CS system design does not consider the transient faulted condition of water hammer due to entrained gas. The dynamic effects of system equipment transients, such as check valve slam and relief valve operation, are considered.

g) UFSAR Section 6.2.2.2.1 discusses that for the ECCS recirculation suction strainer, flashing of water due to the differential pressure across the debris bed is not a credible concern based on containment conditions and strainer configuration. There is no discussion of the potential for vortex formation or other gas ingestion mechanisms beyond flashing across the postulated debris bed. The UFSAR discusses initiation of recirculation based on RWT level in several locations. However, there is no discussion on the margin between initiation of the Recirculation Actuation Signal (RAS) and the completion of the evolution with respect to the potential for vortex formation or air ingestion. Vortex formation is addressed in UFSAR Section 6.3.4.2.1.

h) UFSAR Section 6.3.3.7, "Water Hammer Due to Motor Operated Valve Closure in the HPSI System," briefly discusses an evaluation of the most limiting system configuration and valve opening characteristics with respect to water hammer. An evaluation was then performed to verify that this limiting case would not cause significant water hammer due to valve closure.

i) UFSAR Section 6.3.4.2.1 discusses that the recirculation strainers have been shown by the vendor to preclude vortex formation during recirculation at minimum flood level and maximum flow rate.

j) UFSAR Section 9.3.5.5, "Generic Letter 88-17 Commitments," discusses water level indication available and other precautions taken to reduce the potential for loss of decay heat removal events, but does not address minimum RCS water level to prevent potential vortexing.

The Unit 1 Technical Requirements Manual (TRM) was reviewed. No aspects of the Technical Specifications for the subject systems have been transferred to the TRM.

The Unit 1 licensing basis was reviewed with respect to commitments to NRC regulatory Guidance.

k) Unit 1 has committed to USAEC Safety Guide 1 (Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pump Systems) which notes that if NPSH is not sufficient then pump cavitation can occur. It further states that cavitation may significantly reduce the capability of the system to accomplish its safety functions. Safety Guide 1 states that ECCS should be designed such that there is adequate NPSH under worst case conditions. Safety Guide 1 does not state that cavitation is unacceptable.

l) Unit 1 has not committed to Standard Review Plan, Section 6.2.2 (Containment Heat Removal Systems).

m) Unit 1 is not committed to Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," for system or pump operation.

n) A review of LERs at Unit 1 was completed and three issues (LER 82-50, 95-007, and 97-011) addressed by GL 2008-01 were identified. LER corrective actions to resolve these issues resulted in re-calibrated instrumentation, procedure revisions and additional training, and corrected the RWT set point and procedures.

- St. Lucie, Unit 2

The Technical Specifications were reviewed to determine how the impact of gas voiding, gas intrusion and dynamic effects are addressed in the operating license:

a) Technical Specifications 3/4.5.2, "ECCS Subsystems - Operating"; 3/4.5.3, "ECCS Subsystems – Shutdown"; 3/4.6.2, "Containment Spray and Cooling Systems"; and 3/4.9.8, "Shutdown Cooling and Coolant Circulation" apply to the subject Unit 2 systems.
b) Specification 3.5.2.c states that each of the two required subsystems will be comprised of "An independent OPERABLE flowpath..." Specification 3.5.3.b requires "...one OPERABLE flow path..."
c) Specification 3.6.2.1 provides the number of operable containment spray trains required for various modes of operation.
d) Specifications 3.9.8.1 and 3.9.8.2 state the requirements for operable and operating Shutdown Cooling loops.
e) Surveillance Requirement (SR) 4.5.2.c states that each ECCS subsystem shall be verified operable "By verifying that the ECCS piping is full of water by venting the accessible piping high points following maintenance, shutdown cooling system operation and/or any other activity which could cause the introduction of air into the system." The SR does not provide any criteria to define "full of water," nor does it address the fill status of inaccessible piping. SR 4.5.3 refers to SR 4.5.2 to verify operability. SR 4.6.2.1, 4.9.8.1 and 4.9.8.2 do not discuss the fill status of the piping or any venting or measurement of voids in the piping. Procedure ADM-25.04, "Technical Specification Bases," does not define "accessible piping" and does not discuss the fill status of the piping or any venting or measurement of voids in the piping with respect to system operability or surveillance testing. Operations Policy OPS-503, "Technical Specification Guidance," does not discuss the fill status of the piping or any venting or measurement of voids in the piping with respect to system operability or surveillance testing.

The UFSAR was reviewed to determine how the impact of gas voiding, gas intrusion and dynamic effects are addressed in the licensing basis:

f) UFSAR Section 3.9.1.1, "Mechanical Systems and Components, Special Topics for Mechanical Components, Design Transients" was reviewed to determine the licensing basis associated with the structural design requirements for installation and support of the subject systems' components and piping. It was determined that the current ECCS and CS system design does not consider the transient faulted condition of water hammer due to entrained gas. The dynamic effects of system equipment transients, such as check valve slam and relief valve operation, are considered. This basis is consistent with past and current design Codes and Standards.

g) UFSAR Sections 6.2.2.2.1, "Containment Spray System" and 6.3.2.2.4, "Refueling Water Tank" provide discussions on the process of switchover from the RWT to the containment sump using the Recirculation Actuation Signal (RAS). It states that enough water is maintained below the low level point in the RWT to maintain supply throughout the closure of the RWT isolation valves, assuming the failure of both LPSI pumps to trip. Should one of the RWT valves fail to close, the water seal created by the difference in elevation between the containment sump water level and RWT level would prevent air from being drawn into the system. However, the discussions do not address the potential for vortex formation due to low water levels in the RWT.

h) UFSAR Section 6.2.2.2.3, "Containment Sump Design" discusses containment sump design. It states that the Unit 2 containment sump strainer design precludes the formation of vortices. The combination of a low Froude Number and lack of an air entrainment mechanism (i.e. vortex formation) in conjunction with the complete submergence of the strainer results in a design where air ingestion is not expected to occur.

i) UFSAR Section 6.3.4.2.1, "System Tests" states that the required system testing is defined in the Surveillance Requirements of the Technical Specifications.

j) UFSAR Section 5.4.7.5, "Branch Technical Position RSB 5-1" Item B, "RHR System Isolation Requirements" discusses that the (SDC) suction cross-tie valve, V3545, may be closed to ensure separation of SDC trains under certain conditions. In addition, it states that "At times when a rapid loss of RCS level could cause air ingestion into the SDC system, such as operation at hot leg mid-loop level, the closed cross-tie valve could preclude the failure of both trains and allow continuation of, or expeditious recovery of, the SDC function."

k) UFSAR Section 5.1.4, "Generic Letter 88-17 Commitments" discusses water level indication available and other precautions taken to reduce the potential for loss of decay heat removal events, but does not specifically address minimum RCS water level to prevent potential vortexing.

The Unit 2 Technical Requirements Manual (TRM) was reviewed. No aspects of the Technical Specifications for the subject systems have been transferred to the TRM.

The Unit 2 licensing basis was reviewed with respect to commitments to NRC regulatory Guidance.

l) Sections 6.2.2 (CHR System), Section 6.3.2 (ECCS, Evaluation), and Section 6.3.3 (ECCS, Testing) were all reviewed by the NRC and found acceptable.

m) PSL2 has committed to USNRC Regulatory Guide 1.1, Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps. Regulation Guide 1.1 notes that if NPSH is not sufficient then pump cavitation can occur. It further states that cavitation may significantly reduce the capability of the system to accomplish its safety functions. It also states that ECCS should be designed such that there is adequate NPSH under worst case conditions. However, it does not state that cavitation is unacceptable.

n) Unit 2 has committed to USNRC NUREG-0800 Standard Review Plan, Section 6.2.2 (Containment Heat Removal Systems). Therefore it is committed to containment spray operation "without pump cavitation occurring."

o) Unit 2 is not committed to Regulatory Guide 1.82 for system or pump operation. Unit 2 is committed to Regulatory Guide 1.82, Rev. 0 for ECCS recirculation sump performance.

p) A review of LERs at Unit 2 was completed and one issue (LER 95-001) addressed by GL 2008-01 was identified. This LER led to corrective actions which revised plant procedures to ensure adequate venting after surveillance testing.

2. Summary of Changes to the Licensing Basis Documents (Corrective Actions)

The five items listed below summarize the current and projected changes to licensing basis documents for Unit 1 and Unit 2. See Section C of this response for corrective actions and commitment dates regarding these items:

a) Technical Specification Changes

The information currently available is not adequate to support revisions of the existing Unit 1 and Unit 2 Technical Specifications or Surveillance Requirements for the subject systems. FPL will evaluate the Technical Specification Task Force (TSTF) traveler when it is complete (see Item 2d below). In the interim, standardized Prompt Operability Determinations (PODs) have been developed to allow the assessment of the acceptability of gas voids found in the subject systems' pump suction and discharge piping. See Item 2.b) below.

b) Administrative Controls

FPL reviewed the Technical Requirements Manual for Unit 1 and Unit 2 as a potential location for implementation of interim requirements for gas void acceptability with respect to the subject systems. FPL has determined that the addition of a technical requirement defining and providing a basis for operability of ECCS flowpaths is outside the scope of that document.

FPL has implemented interim PODs in accordance with the FPL nuclear fleet procedure for establishing the acceptability of continued operation for structures, systems or components that are suspected to be degraded, non-conforming, or in an unanalyzed condition. In concert with the existing technical specifications, the PODs will ensure that the potential effects of gas voiding are adequately addressed until a license amendment is processed. These PODs provide acceptance criteria for gas voids in the suction and discharge piping of ECCS and CS systems. FPL will revise the standardized prompt operability determinations as plant specific void acceptance criteria are developed and implemented.

c) Updated Final Safety Analysis Report

FPL processed an administrative change to each Unit's UFSAR indicating that a Gas Void Management Program is being developed in response to GL 2008-01 to assure system operability, and that in the interim, an engineering evaluation has been performed to define the scope of the program and provide prompt operability determinations to provide reasonable assurance of acceptable system performance.

FPL will submit revisions to the Unit 1 and Unit 2 UFSARs when the Gas Void Management Program has been implemented and assessment of the TSTF traveler (see Item 2.d) below) is completed.

d) Joint Industry/NRC Technical Specifications Task Force (TSTF)

FPL is continuing to support the industry and NEI Gas Accumulation Management Team activities regarding the resolution of generic TS changes via the TSTF traveler process. FPL will evaluate the resolution of TS issues with respect to the changes contained in the TSTF traveler following NRC approval and CLIIP Notice of Availability of the TSTF traveler in the Federal Register. Based upon the results of the evaluation, an appropriate license amendment request will be filed with the NRC within 180 days following NRC approval of the TSTF. The appropriate Bases changes associated with the potential Technical Specification will also be made.

e) Industry Testing and Analytical Efforts

FPL will monitor the results of industry testing and analytical programs related to gas accumulation. FPL will evaluate the results of industry testing and analytical efforts to determine if any additional changes to any licensing basis documents are required.

A. EVALUATION RESULTS (cont'd)

Design Evaluation

1. Design Basis Review

The St. Lucie design basis was reviewed with respect to gas accumulation in the Emergency Core Cooling (including CVCS/Charging at Unit 1), Decay Heat Removal, and Containment Spray Systems. This review included the Design Basis Documents, Calculations, Engineering Evaluations, and Vendor Technical Manuals. The review evaluated the current St. Lucie design basis against the technical considerations discussed in GL 2008-01 and the associated enclosure. The results of this review are provided below.

a) Gas Binding of Subject System Pumps

The criteria adopted by St. Lucie for the water supply sources to the ECCS and CS pumps provides a maximum of 2% continuous air entrainment at the pump suctions. The systems are designed to minimize vortex formation. The current design basis calculations do not evaluate the potential for air entrainment due to the presence of gas voids in the suction piping. However, to improve system performance, a modification package is being developed to improve the design of the Unit 2 RWT outlet to resist the formation of vortexing at the point of switchover.

Containment sump strainer performance at both units, including debris laden suction geometry, vortexing and flashing, has been evaluated and was provided to the NRC under separate correspondence as part of the response to Generic Letter 2004-02.

All vendor manuals for the ECCS/CS pumps state that they should be primed and vented prior to use. The ECCS and CS pumps are periodically vented to ensure that they remain full with water. The PWROG has begun a project to perform pump testing to provide a basis for industry criteria (see Licensing Bases item 2.e)).

The Unit 1 charging pumps were evaluated for potential gas binding. The suction piping was found to be self venting. The discharge piping was evaluated. Enhancements to minimize potential for gas binding were identified and entered into the Corrective Action Program.

St. Lucie has been proactive in attempting to minimize the potential for air binding of the ECCS/CS pumps. Several plant modifications and procedural revisions have been implemented at both Units. Examples include:

- Added vents on Boric Acid Makeup Tank suction lines to charging pumps.
- Increased periodic venting frequency of ECCS/CS pumps. See the "Testing Evaluation" section for periodic monitoring actions.
- Equalizing pressure across SDC returns from RCS during system startup.

b) Water Hammer/Pressure Pulsation

The design bases for the ECCS and CS delivery systems specify load combinations for ECCS/CS performance. The Unit 1 and Unit 2 ECCS/CS piping is designed to withstand the expected transients associated with plant operations and dynamic loading associated with upset or faulted conditions. These load cases account for certain dynamic effects such as fast valve closure and relief valve operation. However, these cases do not account for dynamic loading associated with water hammer due to gas void collapse or transport.

Operating experience showed that SDC operations were the most significant cause of water hammer/pressure pulsation events at St. Lucie. During the previous SDC events, no evidence of damage was identified during the system walkdowns associated with these events. Plant modifications and procedural revisions have been implemented over the past several years to minimize the potential for hydraulic transients in the ECCS/CS/SDC systems. Examples include:

- Adding vent lines on ECCS lines.
- Flushing and Venting of SDC after shutdown of system.
- Venting of portions of ECCS/CS systems following surveillance tests.

c) Water Delivery Time Delay

The design basis for the UFSAR Chapter 15 transient analyses assume delay times for delivery of the various ECCS subsystems and the CS system. Calculations have been performed to determine the maximum delay time for the subject systems based on current component design and instrument settings. These delay time calculations do not assess any delay time associated with potential gas voids.

Review of the pump start transient determined that the allowed gas void volumes downstream of the CS and LPSI pumps would collapse during this transient period before pump flow is credited in the analysis. While the HPSI pump review did not result in full collapse during the pump start transient, the delay time was less than a second and bounded by the analysis design margin. Delay times associated with the allowable void volumes presented in the PODs are bounded by the design and operating margins for the analyses.

Full flow surveillance procedures are performed on the subject systems during refueling outages to ensure that interactions and delay times are within allowable tolerances. Valve stroke times are also tested to ensure that delay times remain within allowable tolerances.

d) Effects of Entrained Gas on Core Heat Removal

A PWROG evaluation reviewed the effect of injecting non-condensable voids within the ECCS piping into the RCS. It was concluded that there would be no impact on the Chapter 15 analyses for LOCA or non-LOCA events (steamline, feedline, and SGT ruptures).

e) Effects of Entrained Gas on RCS Heat Removal

A PWROG evaluation reviewed the potential impact of gas transported to the RCS from the ECCS system on the fluid dynamics of natural circulation. The evaluation shows the volume of the reactor vessel head is much larger than the expected volume of gas voids that can be tolerated in the ECCS based on other limitations. Any gas that is transported to the RCS is likely to migrate to the reactor vessel head and as a result will have no impact in natural circulation flow. Likewise, the allowable ECCS gas void volume is a small fraction of the SG U-tube volume and the dynamics of the transport, based on prototypical testing, indicates that only outer periphery tubes would be potentially blocked by a gas bubble. Thus, it will not interfere with the ability of the steam generator to establish and maintain natural circulation flow. The PWROG evaluation also shows that the allowable volume of gas that could be transferred on startup of the SDC system to the RCS would be much smaller than the volume of the RV head. Therefore, SDC operations will not be impacted by the transfer of accumulated gas.

2. Gas Volume Acceptance Criteria

Specific acceptance criteria for void volumes and/or gas entrainment (void fraction) have not yet been established for all locations and conditions involving the subject systems' piping and equipment. Plant specific acceptance criteria are being developed and will be incorporated into the Gas Void Management Program (see Item 3.b)). Until these values have been confirmed by plant specific analyses, interim criteria have been established in standardized Prompt Operability Determinations to assess the operability of the subject systems (See "Licensing Basis Evaluation," Item 2.b)). These criteria are summarized in the following sub-sections.

a) Suction Piping

Until pump specific criteria are identified, St. Lucie Unit 1 and Unit 2 will use a 2% continuous void fraction limit for pump suction and suction piping as shown below. This value is based on industry guidance provided by the PWROG, agrees with the current design basis, and is consistent with industry and NRC references.

The transient limits below are considered average values to be met over the stated transient intervals. Peak transient values for shorter durations are permissible provided the average transient value over the transient period remains in accordance with the criteria.

Pump Suction	Continuous		Transient		Q_{BEP} Range
Pump	Void Fraction	Duration	Void Fraction	Duration	
LPSI	≤ 2%	Steady State	≤ 5%	≤ 20 sec	70%-120%
CS	≤ 2%	Steady State	≤ 5%	≤ 20 sec	70%-120%
HPSI	≤ 2%	Steady State	≤ 10%	≤ 5 sec	70%-120%
Charging	undetectable	N/A	undetectable	N/A	N/A

To ensure the pump suction criteria are met, the standardized PODs require that ECCS/CS pump suction void volumes are maintained below a value that could result in 2% void fraction at each pump's suction.

The St. Lucie Unit 1 charging pump suction piping is self-venting. Therefore, a limit on acceptable void fraction and void volume within the charging pump suction path is not required for operability. To provide design margin and consistency within the void management initiatives, a 2% screening limit void fraction in any piping segment will be recommended for UT inspections.

If the limits of the standardized PODs are exceeded, the associated piping systems as defined by their respective technical specification(s) are considered inoperable until either:

- the piping has been vented such that the gas void volumes are below the specified limit, or
- a specific evaluation is performed that concludes that the current condition is acceptable.

b) Discharge Piping

Until specific calculations have been performed, the discharge pipe void fraction limit is established at 10% for all pump trains. This volume is based on guidance found in industry documents and has been placed in the PODs.

Until specific calculations are performed, total allowable gas void volumes have been established for the HPSI, LPSI and CS discharge piping (the Unit 1 charging pump discharge piping is in constant operation, thus a limit on void volume is not required). The basis for these values were determined through assessments considering delay time, pressure pulses causing relief valve operation, and effects on instrumentation. The standardized PODs contain the detailed information for the bases for these values.

If the above limits of the standardized PODs are exceeded, the associated piping systems as defined by their respective technical specification(s) are considered inoperable until either:

- the piping has been vented such that the gas void volumes are below the specified limit, or
- a specific evaluation is performed that concludes that the current condition is acceptable.

c) Pump Discharge Piping Not Susceptible to Water Hammer or Pressure Pulsation Following Pump Start

The PWROG has developed a method of analysis to exempt gas-water hydraulic transient analyses requested by the NRC on specific line sections such as hot leg injection (HLI) piping and CS piping downstream of the normally closed isolation valves. The premise of the work is that the slow stroke of the injection valves would mitigate any downstream

hydraulic transients. This situation also applies to the St. Lucie normal cold leg injection paths as the MOVs are normally closed and stroke open as the pumps start on SIAS.

The PODs conclude that the slow response time of the valves will result in relatively minor dynamic loads which, when combined with the stiff, heavy walled pipe for ECCS systems, are not likely to significantly challenge the downstream piping or hangers. For the CS system, the piping downstream of the valves is designed to be in a voided state prior to CS system actuation and the system fill transient has been accounted for in design calculations.

d) RCS Allowable Gas Ingestion

The PWROG qualitatively evaluated the impact of non-condensable gasses entering the RCS. The evaluation assumed gas void volumes that are larger than those established in the standardized PODs. This qualitative evaluation concluded that the quantities of gas will not prevent the ECCS from performing its core cooling function, or adversely affect natural circulation or SDC operation. Thus, the St. Lucie Unit 1 and Unit 2 PODs provide assurance that the gas accumulation in any section of HPSI or LPSI piping will be less than volumes of non-condensable gas assumed in the study, and the conclusions of the study are considered valid for St. Lucie Unit 1 and Unit 2.

3. Corrective Actions Associated with Design Basis

a) Interim Actions

As discussed in "Licensing Basis," FPL has developed interim PODs to assure acceptable performance of the subject systems, pending completion of long term actions. Additional drawing reviews and system walkdowns are being performed in accordance with existing commitments (See Items 4 through 7 below). Operability issues identified as a function of those reviews will be addressed via the Corrective Action Program to ensure resolution in a timely manner.

b) Long Term Actions

In the long term, FPL will develop a Gas Void Management Program to establish and maintain the methodology for measuring, evaluating and trending gas voids/entrained gasses in safety related systems. This program will ensure continued long range operability of the subject systems and provide a platform for continued improvement in system performance. Specific issues that are envisioned to be addressed within the Gas Void Management Program include:

Limitations on Void Fraction and Cumulative Void Volume

- St. Lucie Unit 1 and 2 have adopted the PWROG interim criteria for air ingestion limits for the subject systems' pumps. FPL will obtain input on allowable void fraction for acceptable pump performance, including potential degradation of performance capabilities and/or increase in required Net Positive Suction Head (NPSH) within the allowable void fraction range. FPL will develop suction side dynamic gas transport calculations using a transient hydraulic analysis. The results of this analysis will be used in conjunction with pump vendor void fraction criteria to adjust void limits as required.
- Developing calculations to address water hammer for all ECCS, CS and SDC piping that was not screened as acceptable based on the recommendations of the PWROG gas void evaluation.
- Determining specific acceptable gas void volumes and transient hydraulic analyses to verify the forces the current system designs can accommodate. Any design limit issue identified by this review will be entered into the St. Lucie corrective action system.

Monitoring Locations

- Locations for gas accumulation monitoring will be established based on drawing reviews, system walkdowns, and ultrasonic testing for voids. These monitoring locations will also include areas where gas may accumulate due to leakage across and into the subject systems' boundaries.
- Trending the performance of high/low pressure interface boundary isolations and establishing criteria for implementing corrective actions as necessary to reduce leakage by repair or replacement if identified.

Procedure Updates

- Void trending procedures will be created to trend the quantity and location of gas voids in the subject systems, identify the source of the gas, and drive corrective actions to maintain and improve overall plant performance.
- Developing a consolidated set of surveillance procedures which will specify frequency, monitoring points, methods of measuring void volumes and acceptance criteria for the specific subject system. These procedures will be revised as necessary to maximize the effectiveness of the surveillance program, based on trend results.
- Revising fill and vent procedures as necessary during development of the Gas Void Management Program to control gas voids that may be introduced by maintenance and/or operational activities.
- Pending completion of the additional surveillance procedures, periodic UT inspections at identified locations in the subject systems will be directed through the Corrective Action Program.

Configuration Control and Training

- The Gas Void Management Program will include provisions for improving the condition of the subject piping systems and components when being returned to service

following maintenance. Trends will be monitored to determine the effectiveness of work practices and training with respect to gas void management.

In addition to the Gas Void Management Program, FPL will monitor the results of industry testing and analytical programs related to gas accumulation to determine if any additional changes to licensing or design basis documents are required.

4. Drawing Reviews

Reviews of the P&ID and isometric piping drawings for the subject systems were performed. The purpose of the drawing reviews was to provide a familiarity with the system layout, identify system interfaces with other systems, and to clarify the scope of the required walkdowns. The drawing review labeled each horizontal piping segment with one or more sequential numbers. This was done in order to facilitate data gathering during the walkdowns, to provide a common reference system for performing subsequent calculations for void acceptance criteria, and establishing the requisite procedures for governing a void surveillance program.

A database was developed for horizontal line sections, valves, and components based on drawing reviews. The database identifies system unvented high points. The review also identifies line segments where additional vent valves may be required due to certain system configurations, such as long horizontal runs or complex routing.

5. Corrective Actions Identified as a Result of Drawing Reviews

Walkdown results are necessary to identify the exact locations for installation of vent valves and UT monitoring. Therefore, all corrective actions associated with the drawing reviews are presented in Item 7. below, "Walkdown Results."

6. System Walkdowns

The purpose of the system walkdowns is to determine the true system high and low points for each horizontal run of piping in the subject systems (confirming the drawing reviews), determine the piping segment slopes, and identify locations where Ultrasonic Testing (UT) might be conducted to monitor void size. Potential vent valve locations are also developed from the walkdown reviews. The evaluations of the actual configuration of the GL related piping is broken into several phases.

1. Drawing reviews (refer to Item 4 above)
2. Physical walkdown scoping of piping
3. Laser scanning of GL related system piping
4. Data reduction of laser scanning results and transfer to station isometric drawings
5. Evaluation of laser scanning results and isometrics to identify critical and unvented sections of piping
6. Void determination via UT of piping

The Analysis of the impact to operability based on the UT results and the evaluation of unvented sections to determine the need for future vent valve installation and trending is addressed in other sections of this response.

As committed in Reference 5, walkdowns have been completed in the accessible areas of Unit 2 on the subject systems. For the Unit 1 2008 fall outage, the drawing reviews, walkdowns, laser scanning, data reduction, and evaluations of scanning results (items 1-5) have been completed for the accessible area piping and the drawing reviews (item 1) are completed for the inaccessible area piping. Because of the timing of the completion of this effort and as described in Reference 5, the system UTs, which finish the overall walkdown effort, will be completed just prior to and during the upcoming St Lucie, fall 2008 outage. The results of the UTs and any additional evaluations will be provided to the NRC 90 days after start up from the outage for both the accessible and inaccessible piping. Any walkdown findings will be evaluated by engineering and entered into the St. Lucie corrective action system in a timely manner as appropriate.

The walkdowns of the accessible areas of Unit 2 have been completed (Items 1 - 6). The Unit 2 inaccessible subject piping will be completed during the Unit 2 spring of 2009 refueling outage. The drawing reviews (Item 1) have been completed for the inaccessible Unit 2 piping. The results of the UTs and any additional evaluations will be provided to the NRC 90 days after start up from the outage.

Walkdown scope includes piping within the evaluation boundaries for the following systems:

- Emergency Core Cooling Systems (HPSI and LPSI Pumps)
- Shutdown Cooling (LPSI Pumps, including cross-ties to CVCS for SDC purification)
- Containment Spray (CS Pumps)
- Iodine Removal System (Unit 1 NaOH eductors, Unit 2 Hydrazine Pumps)
- Charging System (Unit 1 only)

Isometric drawing markups developed from the walkdowns were reviewed by Engineering to identify potential new vent locations and/or UT surveillance locations.

- Lines that were identified to be level without high or low points were screened as acceptable.
- Lines that were sloped to an existing vent or to a vent path (tank) were screened as acceptable.
- Lines that contain high points or are sloped away from vent paths were identified as unvented high points.
- Suction side valves containing high point cavities were identified as unvented high points.
- Line temperature was recorded to allow consideration of thermal movement.

7. Walkdown Results

Walkdowns of the accessible portions of the St. Lucie Unit 1 and Unit 2 systems were completed using laser scanning to determine pipe segment elevations. The accuracy of laser scanning with insulation installed was verified by test against the same piping section with insulation removed. Markups of isometric drawings showing elevations and unvented high point locations were produced. From the walkdowns, the following results were attained:

Unvented high points were identified; UT monitoring locations and potential vent valve installation points were established.

- Potential void sizes were quantified in terms of void volume and void fraction.
- Sequence of UT monitoring was prioritized based on location, potential trapped volume and void fraction for that segment of piping.
- Areas where the potential void volume was small were screened from requiring installation of vent valves or UT monitoring. Gas volumes in these locations are assumed to be the maximum possible value for the purpose of calculating total void volumes and void fractions when evaluating the subject systems for operability.
- Modification packages were developed to support future vent valve installations.

UT for Unit 1 accessible and inaccessible areas will be coordinated with outage activities and the results of the UT inspections will be included in the GL 2008-01 closeout letter that will be submitted within 90 days of the completion of the Unit 1 refueling outage (See Section C, Item 2. for this open corrective action).

Ultrasonic Testing was conducted at unvented system high points for accessible areas at Unit 2. Two locations were found to have small voids with volumes that were within the acceptance criteria specified in the standardized PODs. No vent valve installations were required to establish operability. Additionally, four check valve bonnets were identified as locations where a void may exist. These locations were evaluated and determined to be acceptable.

Any gas voids identified by the UT inspections are documented in the Corrective Action Program, regardless of size, and evaluated to determine the impact on system operability. Additionally a review for periodic monitoring of these locations has been documented in the Corrective Action Program. The following describes the results of the walkdowns and UT inspections to date:

St. Lucie Unit 1 UT Results - Accessible Piping

	Suction Side				Discharge Side			
	UT Locations	UT Complete	Gas Found	CR	UT Locations	UT Complete	Gas Found	CR
ECCS	16	Sch'd for prior to and during SL1-22			13	Sch'd for prior to and during SL1-22		
SDC	7	Sch'd for prior to and during SL1-22			0	Sch'd for prior to and during SL1-22		
CS	3	Sch'd for prior to and during SL1-22			5	Sch'd for prior to and during SL1-22		

St. Lucie Unit 2 UT Results - Accessible Piping

	Suction Side				Discharge Side			
	UT Locations	UT Complete	Gas Found	CR	UT Locations	UT Complete	Gas Found	CR
ECCS	8	8	2	2008-30261 2008-30002	29[1, 2]	27	0	-
SDC	1	1	0	-	2	2	0	-
CS	0	0	0	-	4	4	0	-

[1] Because of coordination and scheduling challenges, line segment HB21 ("B" HPSI discharge to 2A2 RCS Loop) was not able to be monitored during the UT inspections of the unvented high points. This was evaluated and found to be acceptable. HB21 will be monitored in the Unit 2, 2009 spring outage.

[2] After completion of additional reviews of the system walkdown data, segment LB13 ("B" LPSI to the 2B2 RCS loop) was added as an additional UT location. UT monitoring is not yet completed for this segment. This was evaluated and FPL concluded that the LB13 segment would be gas free based on the adjacent segment (located at a higher elevation) being verified void free by UT. LB13 will be monitored in the Unit 2, 2009 spring outage.

FPL will evaluate the need for additional vent valves based on the results of periodic gas intrusion monitoring, and install them as necessary to maintain operability and/or enhance system performance or maintenance.

8. Review of Fill and Vent Procedures

The Unit 1 and Unit 2 fill and vent procedures were reviewed to determine whether additional guidance is necessary to ensure that the subject systems are adequately filled to support reliable system operation. The review found that fill and vent procedures are in place to ensure that the as-left condition of the subject systems will perform their intended functions. The procedures specify vent locations to support operations and maintenance activities, vent method and acceptance criteria for successful system venting. The procedures have historically been developed or revised as necessary to incorporate lessons learned from operating experience.

The fill and vent procedures were compared against several best practice benchmarks, including implementation of ultrasonic testing, specified venting duration, measurable acceptance criteria and recording/trending of unacceptable or unusual results. The comparison showed that the St. Lucie fill and vent procedures contained some, but not all of the benchmark attributes. Specifically, ultrasonic testing is not currently directed by the fill and vent procedures following venting to assure that system voids have been adequately removed, and minimum vent duration is not always specified. Additionally, certain activities, such as recording and trending of gas voids, are dependent on the context in which they are performed. At present, there is no distinction in the procedures between venting following maintenance and routine venting to assess/maintain system operability. This process will be established in the Gas Void Management Program (see "Design Evaluation" Item 3.b) above).

9. Corrective Actions Identified as a Result of Fill and Vent Procedure Reviews

FPL has determined that the current fill and vent procedures for the subject systems are adequate to assure acceptable system performance following maintenance or operational activities that could result in gas void formation. However, FPL recognizes that these procedures could be enhanced by the addition of directions to perform initial fill UT checks and post-maintenance fill UT checks of the subject systems to ensure that the piping is initially void free following those activities. Fill and vent procedures will be updated as necessary during development of the Gas Void Management Program to enhance the control of gas voids that may be introduced by maintenance and/or operational activities. These corrective actions will be accomplished as part of the Gas Void Management Program implementation as described in Section C. of this Attachment.

10. Gas Intrusion Pathways

The boundaries of the subject systems defined in the design basis review (Item 1) were examined to determine potential gas intrusion pathways. High/Low pressure interfaces, both within the subject systems and across the subject system boundaries were evaluated for potential leakage and subsequent void formation due to either direct leakage of gas into the subject systems or desorption of gas from saturated liquids leaking across the high/low

pressure interfaces. The high/low pressure interfaces that could result in gas intrusion were identified for incorporation into the Gas Void Management Program (Item 3) to ensure adequate monitoring.

The sources of water that are used in the subject systems were also evaluated for potential gas desorption during transient system operations. Procedures were reviewed to ensure that appropriate measures are in place to vent gasses that may come out of solution following system operation. Appropriate procedural guidance is in place to address identified gas desorption issues. For transient conditions where rapid system pressure changes could cause desorption, evaluations were performed to assess the amount of gas that could come out of solution and the impact on the downstream components. The subject systems were found to be designed to perform adequately under those circumstances.

Level instrumentation for tanks that supply fluids to the subject systems was evaluated to ensure that instrument failures and inaccuracies were adequately accounted for to prevent unanalyzed vortexing or gas entrainment. All tanks required to support the safety functions of the subject systems were found to have adequate instrumentation and appropriate setpoints to prevent gas intrusion.

As a result of the gas intrusion pathway review, the corrective actions listed below are planned as part of the Gas Void Management Program implementation. These corrective actions will be accomplished as part of the Gas Void Management Program implementation as described in Section C. of this Attachment:

- Inclusion of high/low pressure interface locations identified in the gas intrusion pathway review into the Gas Void Management Program to monitor for gas intrusion.
- Performance of periodic UT inspections or employment of alternate methods to monitor for leakage through high/low pressure interface boundaries.
- Evaluation of an additional vent installation on the SIT fill/drain header to allow header pressure to remain at atmospheric pressure.
- Completion of an Engineering Evaluation to review all safety related tanks and open fluid surface suction paths to ensure vortex requirements are appropriately documented.

11. Ongoing Industry Programs

Ongoing industry programs are planned in the following areas which may impact the conclusions reached during the St. Lucie Design Evaluation relative to gas accumulation. The activities will be monitored to determine if additional changes to the St. Lucie design may be require or desired to provide additional margin.

- Gas Transport in Pump Suction Piping

  The PWROG has initiated testing to provide additional knowledge relative to gas transport in large diameter piping. One program performed testing of gas transport in 6 inch and 8 inch piping. Another program will perform additional testing of gas transport in 4 inch and 12 inch low temperature systems and 4 inch high temperature systems. This program will also integrate the results of the 4 inch, 6 inch, 8 inch, and 12 inch testing.

- Pump Acceptance Criteria

  Long-term industry tasks were identified that will provide additional tools to address GL 2008-01 with respect to pump gas void ingestion tolerance limits.

Based upon the above design review, FPL concludes that St. Lucie Units 1 and 2 are in conformance with its commitments to 10 CFR 50, Appendix B, Criterion III for Design Control, as described in the FPL Quality Assurance Topical Report (QATR) - FPL-1, Rev. 2. Any identified deviations that have not yet been corrected are entered into the St. Lucie Units 1 and 2 Corrective Action Program for tracking and final resolution, as described in Sections B and C of this attachment.

A. EVALUATION RESULTS (cont'd)

Testing Evaluation

1. Review of Surveillance Procedures

The Unit 1 and Unit 2 procedures were reviewed to determine whether current procedural guidance is adequate to ensure that the subject systems remain capable of performing their required safety functions. The review found that a combination of surveillance and periodic venting procedures are currently in place to monitor for the presence of voids in the subject systems. Control of the scheduling of these procedures is provided by the weekly surveillance test scheduling procedures.

These procedures direct the use of the appropriate surveillance test or periodic vent procedures to monitor for the presence of voids in key locations, including the:

- HPSI, LPSI, and CS pumps
- Suction piping from the containment sump to the ECCS/CS pumps
- LPSI/CS piping used during SDC operations

Operability of the Unit 1 charging pumps is assured by periodic equipment rotation. The locations monitored for voids are based on operating experience. The procedures specify vent locations to support monitoring activities, vent method and acceptance criteria for securing the vent process.

The periodic vent and surveillance procedures were compared against several best practice benchmarks, including implementation of ultrasonic testing, specified venting duration, measurable acceptance criteria and recording/trending of unacceptable or unusual results. The comparison showed that St. Lucie vent and surveillance procedures contained some, but not all of the benchmark attributes. Specifically, neither ultrasonic testing nor other means of quantifying the size of a gas void is currently directed by the vent/surveillance procedures and acceptable void size is not specified.

2. Corrective Actions Identified as a Result of Surveillance Procedure Reviews

FPL has determined that current vent and surveillance procedures for the subject systems are adequate to provide reasonable assurance of continued system operability. However, FPL recognizes that improvements can be made to align the St. Lucie vent and surveillance procedures in accordance with industry best practices.

a) Interim Actions

The Corrective Action Program will be used to direct the periodic ultrasonic testing as part of the interim operability assessment process. Any UT point where a void was detected was documented with a specific CR. The CR evaluation and subsequent actions through the process will determine the required frequency and trending requirements. Additionally, any existing venting point will be subject to UT and void volume trending once air is detected.

To augment the interim operability assessment process, procedure changes will be implemented to ensure acceptable performance until the long term actions discussed below have been completed. The procedures will specify that gas voids, if found, will be tracked by the Corrective Action Program for input to the Gas Void Management Program. The revisions will include:

- The requirement to perform UT inspection for gas void size and record results for operability and trending.
- The requirement to initiate internal corrective action reports should gas volumes exceed the acceptance criteria.
- Reference to the standing Prompt Operability Determinations for specific void acceptance criteria.

b) Long Term Actions

In concert with the development of the Gas Void Management Program (see "Design Evaluation" Item 3.b)), a consolidated set of surveillance procedures will be developed to specify frequency, monitoring points, methods of measuring void volumes and acceptance criteria for the specific subject system. These procedures will be revised as necessary to maximize the effectiveness of the surveillance program, based on trend results.

3. Review of Manual DHR Operation Procedures

St. Lucie has used operating experience to improve the SDC operating procedures to minimize the effects of gas voids that might collect due to gas desorption during operation or other mechanisms. To minimize transients due to gas voids, the SDC alignment procedure provides direction to pressurize the system piping to within 100 psi of RCS pressure before opening the suction isolation valves. A section has been provided in the procedures to flush, cool, and align the SDC loops for operation after the system has been secured. An appendix is provided for venting the SDC trains following maintenance or other activities that might lead to gas void formation in the SDC system.

Operations surveillance schedules are used to specify quarterly venting of sections of the LPSI and CS piping used for SDC operations to assure gas voids are not present in the event that SDC must be initiated unexpectedly.

4. Inadvertent Air Intrusion due to Incorrect Procedure Implementation

In addition to the Normal SDC operating procedures, specific procedures are provided for SDC operations at reduced inventory to minimize the potential for gas binding the LPSI pumps due to air ingestion or vortexing. These procedures provide direction on operability and agreement of required level indications, minimum indicated water levels, and maximum indicated flow rates. Both trains of SDC are required to be operable with only one in operation, and specific alignments are established to minimize the potential for component failure to increase system flow rate or cause gas binding of both trains of SDC. Personnel are stationed locally and in the control room to continuously monitor RCS level. The LPSI pump vent valves are pre-staged for rapid venting if required.

In the event that SDC is affected by gas binding due to low levels, Off-Normal Operating Procedures are provided to direct recovery actions. These procedures provide multiple options for recovering RCS level and restoring SDC to service. The actions directed by the procedures are sequenced to minimize the risk of gas binding the standby SDC train prior to operation.

Procedures have been revised in response to operating experience (both internal and external) to ensure that inadvertent draining or transfer of water does not occur due to valve manipulations specified in procedures. No improper draining or transfer of water due to system realignments was identified during system operating procedure reviews.

5. Documentation of Gas Voids

Gas voids will be tracked and documented under the Gas Void Management Program, using the gas void trending procedure as discussed in "Design Evaluation," Item 3.b). The program will specify monitoring points and criteria for entry into the Corrective Action Program.

In the interim, all voids, regardless of size, will be tracked via the Corrective Action Program. Discussion of location, void size with respect to POD acceptance criteria, and any additional corrective actions taken will be captured for each incidence.

Based upon the above, St. Lucie is in conformance with its commitments to 10 CFR 50, Appendix B, Criterion V and XI for performance testing and written procedures, respectively, and XVII for Record Retention of associated documents, as described in the FPL Quality Assurance Topical Report (QATR) - FPL-1, Rev. 2. Any identified deviations that have not yet been corrected are entered into the St. Lucie Units 1 and 2 Corrective Action Program for tracking and final resolution, as described in Sections B and C of this attachment.

A. EVALUATION RESULTS (cont'd)

Corrective Actions Evaluation

St. Lucie's Corrective Action Program is used to document identified gas intrusion/accumulation issues as potentially nonconforming conditions. A CR will be initiated if accumulated gas volumes are found during surveillance, maintenance, or testing. As part of St. Lucie's Corrective Action Program, CRs related to plant equipment are evaluated for potential impact on operability and reportability. Prompt Operability Determinations are made and any necessary follow-up actions are tracked in the system to completion to resolve any identified non-conformances or implement design/procedure enhancements in a timely manner. Management oversight is provided to assure that proper priority to achieve timely resolution is assigned.

Based upon the above, St. Lucie is in conformance with its commitments to 10 CFR 50, Appendix B, Criterion XVI for Corrective Actions, as described in the FPL Quality Assurance Topical Report (QATR) - FPL-1, Rev. 2.

B. DESCRIPTION OF NECESSARY CORRECTIVE ACTIONS

The following corrective actions were identified during the above-described evaluations to be necessary to evaluate system operability and to assure compliance with the applicable regulations and previous regulatory commitments:

1. Develop Model Prompt Operability Determinations (PODs)

   The information currently available is not adequate to support revisions of the existing Unit 1 and 2 Technical Specifications or surveillance requirements for the subject systems. In the interim, Model PODs will ensure that the potential effects of gas voiding are adequately addressed until a license amendment can be processed.

2. Develop a Gas Void Management Program

   FPL will develop a Gas Void Management Program to establish and maintain the methodology for measuring, evaluating and trending gas voids/entrained gasses in safety related systems. This program will ensure continued long range operability of the subject systems and provide a platform for continued improvement in system performance. In the interim, gas voids identified by periodic monitoring methods will be tracked using the Corrective Action Program.

3. Conduct Walkdowns to Determine Unvented High Points in Subject System Piping

   Walkdowns must be conducted, based on the system boundaries established by the design basis and system drawing reviews. Unvented high points will be identified for potential UT monitoring and/or vent valve installation.

4. Perform Ultrasonic Testing

   The unvented high points identified by the system walkdowns will be evaluated by ultrasonic testing to determine whether gas voids are present.

5. Install Required High Point Vent Valves

   Vent valves will be installed as necessary to mitigate voids that could challenge system operability. Additional vent valves may be installed at unvented high points that do not currently present an immediate operability concern. These valves will be prioritized and scheduled for installation within the work management system.

6. Conduct Periodic Monitoring of High Points for Gas Intrusion

   Periodic monitoring of high points in the subject systems will be performed to verify system operability as defined by the Corrective Action Program.

C. CORRECTIVE ACTION SCHEDULE

1. Completed Corrective Actions

a) FPL has completed an initial GL 2008-01 response evaluation that performs licensing and design basis reviews, an evaluation of gas intrusion pathways, operating and test procedure reviews, and documents interim gas void acceptance criteria for the subject systems. The evaluation also documents the results of the Unit 1 and 2 accessible GL piping section drawing and walkdown reviews, and the results of Ultrasonic Testing at unvented high points for accessible piping within Unit 2. The precepts for a Gas Void Management Program are outlined in this evaluation and a schedule is provided for developing the elements of the program along with other corrective actions required by the evaluation. These future actions have been entered into the Corrective Action Program for tracking to completion (Refer to item 2.c) below).

b) FPL has developed Standardized PODs to allow the assessment of the acceptability of gas voids found in the subject systems' pump suction and discharge piping to ensure that the potential effects of gas voiding are adequately addressed until a license amendment can be processed. FPL will revise the PODs as plant specific void acceptance criteria are developed and implemented. These PODs will provide assurance that the subject systems remain operable until gas volume acceptance criteria have been implemented within the Gas Void Management Program. The standardized PODs will be revised as necessary to reflect information obtained during the transition process.

c) FPL has reviewed the isometric piping drawings for the subject systems prior to conducting GL 2008-01 system walkdowns. A database was developed for horizontal line sections, valves, and components based on drawing reviews. The database identifies system high points and potential additional vent valve locations.

d) FPL has performed walkdowns of the accessible Unit 1 and 2 piping. Laser scanning of the accessible area Unit 1 and 2 piping has been completed. Based on the scan data results, isometric drawings were marked up to annotate slope and high/low point information for Unit 1 and Unit 2. This product forms the basis for the final UT selection points. Un-vented high points were identified.

e) FPL has conducted UTs at system high points for accessible Unit 2 GL affected piping. Two gas voids were identified during the inspection and entered into the Corrective Action Program. Based on evaluation of the identified voids, no vent valves were required to assure continued operability.

f) FPL has started the UTs for accessible areas of the Unit 1 GL affected and will continue thru the fall 2008 refueling outage. Based on the UTs completed to date, no gas voids were identified during the inspections.

2. Open Corrective Actions

   a) FPL will complete the walkdowns and laser scanning of the Unit 1 inaccessible area piping during the Unit 1 fall 2008 refueling outage. Based on the scan data results, isometric drawings will be marked up to annotate slope and high point information and potential unvented sections, and potential future UT sites will be selected. The laser scanning and the UTs will be completed and the results reported 90 days after the Unit 1 startup from the fall 2008 refueling outage.

   b) FPL will complete the walkdowns and laser scanning of the Unit 2 inaccessible piping during the spring 2009 refueling outage. Based on the scan data results, isometric drawings will be marked up to annotate slope and high point information and potential unvented sections, and potential future UT sites will be selected. The laser scanning and the UTs will be completed and the results reported 90 days after the Unit 2 startup from the spring 2009 refueling outage.

   c) FPL will initiate an interim process to monitor and trend voids. The process will focus on locations where voids are detected through the recent UTs, and where voids are detected through the current surveillance venting. This interim process will be implemented through the Corrective Action Program. This is currently in practice however some procedure revisions will be implemented to enhance the process by December 15, 2008.

   d) FPL will develop a Gas Void Management Program by December 15, 2009. Gas void acceptance criteria will be controlled by this program. This program will follow the development of the industry for pump testing and acceptance criteria development and incorporate new information as necessary.

   e) FPL will evaluate and install new vent valves as required to assure system operability. Additionally, FPL will consider the installation of vent valves as required to improve maintenance fill and vent practices. Each location will be evaluated on a case basis and tracked by the Corrective Action Program.

3. Basis for Corrective Action Schedule

   The following provides the basis for the schedule for the open corrective actions:

   a) Based on the GL evaluations requested, performed, and summarized above, FPL has concluded that the subject systems and functions at St. Lucie Units 1 and 2 are capable of performing their intended safety function and that they are in compliance with 10 CFR 50 Appendix B, Criterion III, V, XI, XVI, and XVII, with respect to the concerns outlined in GL 2008-01 regarding gas accumulation in the accessible portions of these systems.

   b) The UTs conducted to date, indicate that the St. Lucie existing design, procedures and programs provide reasonable assurance that gas voids will not exists to challenge operability of the Generic Letter affected systems.

   c) St. Lucie operating history has shown that the current design and corrective action process has been effective in assuring gas voids do not impact system operability.

Conclusion

FPL has evaluated the St. Lucie systems that perform the functions described in this Generic Letter and has concluded that these systems are operable, as defined in the St. Lucie TS and are in conformance with our commitments to the applicable General Design Criteria (GDC), as stated in the St. Lucie UFSAR.

The open actions cited above are considered to be enhancements to the existing programs/processes/procedures for assuring continued operability of these subject systems.

As committed in Reference 5:

1. FPL will provide a complete Unit 1 GL 2008-01 submittal 90 days after the end of the fall 2008 refueling outage. This submittal will complete the design evaluation review as well as provide the schedule and basis for any corrective actions that may be required based on the detailed readily accessible and inaccessible GL piping section walkdowns performed.

2. FPL will provide a complete Unit 2 GL 2008-01 submittal 90 days after the end of the spring 2009 refueling outage. This submittal will complete the design evaluation review as well as provide the schedule and basis for any corrective actions that may be required based on the detailed inaccessible GL piping section walkdowns performed during the outage.

Additionally:

3. FPL will continue to support the industry and NEI Gas Accumulation Management Team activities regarding the resolution of generic TS changes via the TSTF traveler process. FPL will evaluate the resolution of TS issues with respect to the changes contained in the TSTF traveler following NRC approval and CLIIP Notice of Availability of the TSTF traveler in the Federal Register. Based upon the results of the evaluation, an appropriate license amendment request will be filed with the NRC within 180 days of the NRC approval of the TSTF. The appropriate Bases changes associated with the potential Technical Specification will also be made.

4. FPL will develop a Gas Void Management Program by December 15, 2009 to support planned TS changes.