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October 14, 2008

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"
Arkansas Nuclear One, Units 1 and 2
Docket Nos. 50-313, 50-368, and 72-13 (ISFSI)
License Nos. DPR-51 and NPF-6

REFERENCE:

1. Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems", dated January 11, 2008 (0CNA010801)
2. Entergy letter dated April 10, 2008, "Request for Extension to the 3 Month Response to Generic Letter 2008-01" (0CAN040802)
3. Entergy Letter dated May 8, 2008, "Three Month Response to Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems'" (0CAN050802)
4. Entergy Letter dated June 30, 2008, "Supplement to Three Month Response to Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems'" (0CAN060801)
5. NRC Letter dated September 12, 2008, "Arkansas Nuclear One, Units 1 and 2 – Request for Additional Information Regarding Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal and Containment Spray Systems,' and Proposed Alternative Course of Action (TAC NOS. MD7793 and MD7794" (0CNA090806)

Dear Sir or Madam,

The U. S. 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 or Shutdown Cooling (SDC) 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 information summarized below:

(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,

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

In summary, Entergy Operations, Inc. (Entergy) has concluded that the subject systems/functions at the Arkansas Nuclear One, Units 1 and 2 (ANO-1&2) are in compliance with the TS definition of Operability, i.e., capable of performing their intended safety function and that ANO-1&2 are currently 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/functions. As committed in Reference 3, ANO-1&2 will complete its assessments of those inaccessible portions of these systems/functions during the next refueling outage for each unit (Fall 2008 for ANO-1 and Fall 2009 for ANO-2) and provide a supplement to this report with those results within 90 days from startup of that outage as clarified in Reference 4.

Attachments 1 and 2 to this letter contain the nine-month response to NRC GL 2008-01 for ANO-1 and 2, respectively.

It should be noted that there are related issues that the nuclear industry is currently considering with respect to the overall performance of these systems (e.g., GSI-193). Consistent with discussions in SECY 2008-108, resolution of these related issues would be addressed independent of this GL and will not be addressed herein.

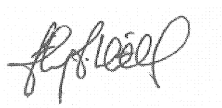
In Reference 5, the NRC stated they had reviewed the ANO-1&2 proposed alternative courses of action and the associated basis for acceptance and concluded that, with the exception of the clarifications and associated requests discussed in the enclosure, they were acceptable. The clarifications were associated with the content of the nine-month submittal and a 90-day post-outage supplement to the nine-month submittal. These clarifications were made in Reference 4. As noted above, this submittal is the nine-month submittal required by Reference 1 and it does address the information and discussion provided in the GL using the guidance provided by NEI. ANO-1&2 previously committed to making the 90-day supplemental responses after each of the next refueling outages. This commitment has not been altered.

This submittal contains several new commitments that are summarized in Attachment 3 to this submittal.

If you have any questions or require additional information, please contact Dale James at 479 858 4619.

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 14, 2008.

Sincerely,



Timothy G. Mitchell

TGM/rwc

Attachments:
1. Arkansas Nuclear One – Unit 1 Nine-Month Response to Generic Letter 2008-01
2. Arkansas Nuclear One – Unit 2 Nine-Month Response to Generic Letter 2008-01
3. List of Regulatory Commitments

cc: Mr. Elmo E. Collins
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U. S. Nuclear Regulatory Commission
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Attachment 1 to

0CAN100801

Arkansas Nuclear One – Unit 1

Nine-Month Response to
Generic Letter 2008-01

Arkansas Nuclear One - Unit 1
Nine Month Response to GL 2008-01

This Attachment contains the Arkansas Nuclear One, Unit 1 (ANO-1) nine-month response to NRC 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 (see Section A of this Attachment),

b) A description of the 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 subject systems (see Section B of this Attachment), and

c) A statement regarding which corrective actions have been completed, the schedule for the corrective actions not yet complete, and the basis for that schedule (see Section C of this Attachment).

The following systems were determined to be in the scope of GL 2008-01 for ANO-1:

- High Pressure Injection System (HPI)
- Decay Heat Removal / Low Pressure Injection System (DH/LPI)
- Core Flood (CF)
- Containment Spray System (BS)

A. EVALUATION RESULTS

Summary Statement

Based on a review of the licensing and design basis documents, procedures and testing, the HPI, DH, CF, and BS systems are considered operable. In response to GL 2008-01, field walk downs of piping systems outside the Reactor Building were performed including verification of vent locations and piping slopes followed by Ultrasonic Testing (UT) to validate no voids were present in the subject systems. Specifically, UT was performed following field verification on the ECCS/BS suction headers and suction lines to individual ECCS and BS pumps and no voids were identified. However, two small voids were identified in two 4" pipes in the Sodium Hydroxide (NaOH) System which is connected to the ECCS/BS pump suction piping. These voids were documented in the corrective action program and determined not to jeopardize operability of any plant system or component. Ultrasonic testing (UT) examinations are also performed periodically on HPI piping to ensure that no voids are present at the examined locations.

DH and BS are designed with full flow capability and these features ensure the affected piping is maintained water solid. After performing essential maintenance, ANO-1 performs full flow testing before returning the affected equipment to service. This ensures these systems are water solid. The HPI system is used for RCS makeup and seal injection and is in service continuously. This operation includes train swaps that further demonstrate equipment functions and that the flow loops are water solid. Stagnant HPI areas were verified to be at elevated pressures which minimize the potential for gas void formation. Operating experience on HPI since 1990 has not identified any water hammers events.

Licensing Basis Evaluation

The ANO-1 licensing basis was reviewed with respect to gas accumulation in the HPI, DH/LPI, CF and BS systems. This review included the Technical Specifications (TS), TS Bases, Safety Analysis Report (SAR), the Technical Requirements Manual (TRM) and TRM Bases, responses to NRC generic communications, regulatory commitments, and Operating License conditions.

1. Summarization of Licensing Basis Review Results:

The above documents and regulatory commitments were evaluated for compliance with applicable regulatory requirements. The evaluation was performed in such a manner as to ensure that all applicable licensing basis documents and commitments associated with gas accumulation in the HPI, DH/LPI, CF, and BS systems were identified and reviewed for compliance. Licensing basis documents and commitments were reviewed to ensure that no conflicts with any system or component function or testing methodologies existed.

The review determined that there were no weaknesses or deficiencies in any licensing basis documents.

2. Summarization of Changes to Licensing Basis Documents:

Entergy Operations, Inc. (Entergy) is not proposing changes to the ANO-1 licensing bases documents at this time. The level of detail in current ANO-1 licensing bases documents, as it relates to gas intrusion, is consistent with the current industry level of detail. However, Entergy is monitoring industry activities for developing TS changes (Refer to the response to Licensing Basis Question 3).

3. List of Items not Completed, Schedule for Completion, and Basis for Schedule:

TS improvements are being addressed by the Technical Specifications Task Force (TSTF) to provide an approved TSTF Traveler for making changes to individual licensee's TS related to the potential for unacceptable gas accumulation. The development of the TSTF Traveler relies on the results of the evaluations of a large number of licensees to address the various plant designs. Entergy 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. Within 90 days following NRC publication of the Notice of Availability of the TSTF Traveler, Entergy will evaluate its applicability to ANO-1, and evaluate adopting the Traveler to either supplement or replace the current TS requirements.

Design Evaluation

The ANO-1 design basis was reviewed with respect to gas accumulation in the Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems. This review included Design Basis Documents, Calculations, Engineering Evaluations, and Vendor Technical Manuals.

1. Discussion of Design Basis Documents Review:

This design review included but was not limited to applicable design basis documents, drawings, calculations, engineering evaluations, and vendor technical documents. Design drawings provide sufficient detail and accuracy regarding locations of vent, drain, and test connections for fill and vent operations. The design change process includes independent verification in accordance with the requirements of the design change procedure. Enhancements to the design change process were recommended as a result of this review and an action has been issued in the Entergy Corrective Action Program (CAP) to revise the design change checklist utilized when developing engineering changes to prevent the introduction of new gas intrusion concerns.

There are no “Keep Fill” systems installed on the ANO Unit 1 ECCS systems (DH/LPI, HPI, BS, or CF). The design of the subject systems does not include specific voided piping as part of the system design except for discharge BS piping downstream of the containment isolation valves to the spray riser, header, and ring inside the Reactor Building (RB). The BS piping that is void by design was evaluated regarding fill time and potential water hammer impacts with no concerns since water level is maintained at the Borated Water Storage Tank (BWST) level which is above the inside containment isolation check valves when required by ANO-1 TS. There are no existing water hammer analyses for the subject systems but no analyses are considered necessary as there are no expected amounts of air significant enough to challenge system piping operability.

There are no system periodic venting requirements established for the BS, CF or HPI system piping. Venting as necessary for the DH/LPI lines is proceduralized to occur when the lines reach approximately 40 to 60 psig with supporting calculations that confirm allowable volumes of air have not been exceeded.

The HPI, DH/LPI and BS systems initially take suction from the BWST during design basis events. Design features, water level set points, and operating procedures, control the potential for introducing air into the system during design basis events. The CF system contains no pumps and relies on a pressurized nitrogen cover as the motive force for discharging the volume of the CF tanks to the reactor vessel following a Loss of Coolant Accident (LOCA). The reactor core has been evaluated for the injection of 2400 cubic feet of nitrogen following post-LOCA CF tank injection which bounds any minor gas voids in the system piping which could be injected into the core during CF tank injection. (The entire DH/LPI RB piping has a volume of less than 200 cubic feet.) Additionally, no credit is taken for the volume of water in the CF piping relative to the amount of water assumed in the CF system available for post-LOCA injection.

ECCS realignments during design basis have been evaluated to be acceptable for system operability with systems kept sufficiently full of water. Containment sump performance has also been evaluated as provided by ANO in the response to GL 2004-02 which concluded that adequate protection against vortices exist for the sump strainer.

During refueling outages, the CF tanks are discharged to the core for check valve stroke testing. The velocity of the water in the CF piping during the check valve testing is sufficient to flush any gas voids from the system. During the test, the water in the CF tanks is lowered to a level which does not drain any system piping and therefore does not introduce any additional gas voids in the system.

2. Discussion of Interim Allowable (new applicable) Gas Volume Acceptance Criteria, Corrective Action Summarization, Including Schedule:

a) Pump Suction Piping

The interim allowable gas accumulation in the pump suction piping is based on limiting the gas entrainment to the pump after a pump start. A joint owners group program established interim pump gas ingestion limits to be employed by the member utilities. The interim criteria address pump mechanical integrity only and are as follows:

	Single-Stage	***Multi-Stage***	***Multi-Stage***
		Stiff Shaft	Flexible Shaft
Steady-State	2%	2%	2%
Transient*	5% for 20 sec.	20% for 20 sec.	10% for 5 sec.
$Q_{B.E.P.}$ Range	70%-120%	70%-140%	70%-120%
Pump Type (transient data)	WDF	CA	RLIJ, JHF
The transient criteria are based on pump test data and vendor supplied information. (Note that the ANO LPI and BS pumps are single-stage pumps and HPI pumps are multi-stage)			

The ANO-1 goal for gas voiding in the HPI, DH/LPI, CF, and BS systems is 0% by volume. HPI and DH/LPI Auxiliary Building (AB) non-destructive examination (NDE) checks identified no gas voids. Except for two acceptable voids in the NaOH suction piping, the remaining BS piping was found to have no gas voids. The NaOH piping gas voids flow toward the DH and BS pumps and mix with those flows prior to entering those pumps.

If future voids are identified, limits developed by the owners group or other equipment specific information will be applied for initial operability. The generic limit of 2% by volume continuously, will be applied and subsequent analysis performed, based on the void size and location, to assess system operability.

ANO-1 procedures, full flow tests (DH/BS) / continuous operation (HPI), and NDE checks for GL 2008-01 provide assurance that the volume of gas in the pump suction piping for HPI, DH/LPI, and BS systems is limited such that pump gas ingestion is minimized. Except for the NaOH piping gas voids, there were no additional gas voids found on any HPI, DH/LPI, or BS suction piping in the ANO-1 AB.

b) Pump discharge piping which is susceptible to pressure pulsation after a pump start.

A joint owner's group program evaluated pump discharge piping gas accumulation. Gas accumulation in the piping downstream of the pump to the first closed isolation valve or the RCS pressure boundary isolation valves will result in amplified pressure pulsations after a pump start. The subsequent pressure pulsation may cause relief valves in the subject systems to lift, or result in unacceptable pipe loads, i.e., axial forces that are greater than the design rating of the axial restraint(s). The joint owners group program establishes a method to determine the limit for discharge line gas accumulation to be utilized by the member utilities.

ANO-1 has not currently implemented this methodology. In general, no voids are allowed in the HPI, DH/LPI and BS systems. Condition reports (CRs) are procedurally generated when voids are identified. CRs are the mechanism by which issues are entered into the CAP system. This ensures that operability is assessed and provides assurance that any substantive gas void in the system discharge piping is eliminated, if present.

All the ANO-1 AB HPI, DH/LPI, and BS discharge piping was verified water solid. As such, the current systems are not susceptible to pressure pulsations after a pump start. The HPI pump discharge is not directly protected with a relief valve. The only discharge side relief is installed in the combined pumps' recirculation line downstream of the pressure reduction orifices. Otherwise, continuous flow for seal injection and makeup are expected to dampen any gas void pulsations until such time as the void was compressed from the assumed rise in pressure. This would occur due to the HPI motor operated valves (MOVs) having open stroke times on the order of 10 to 14 seconds versus closure times of 17 to 18 seconds on the makeup flow isolation valves and 19 seconds on the seal injection isolation valve. As such, for a short time period there is still makeup and seal injection flow as HPI flow is initiated. In addition, based on pressures taken downstream of the HPI MOVs and upstream of the last check valve toward the RCS, typical pressures are 2150 psig. Therefore, any additional gas void compression is minimized as pressure is already high.

The DH/LPI discharge is periodically full flow tested. This maintains the system water solid in the test loop. NDE checks for this GL at the highest point in the DH/LPI system verified water solid upstream and downstream of the LPI isolation valves. Since periodic depressurization is performed on both DH trains downstream of the LPI isolation valves, the potential void size is assessed relative to the amount of time it takes to perform these blow downs.

The BS discharge is periodically full flow tested. This maintains the system water solid in the test loop. NDE checks for this GL at the highest point in the AB BS system verified the system is water solid upstream and downstream of the BS RB isolation valves. Documentation was identified that refers to a simple and extremely conservative analysis that found if the BWST elevation head is maintained in the BS discharge lines inside the RB above the last check valves, that no water hammer problems would be expected. This elevation head is applied quarterly during stroke tests of the BS RB isolation valves which require the BWST level to be at least 30 feet. As such, water is assured to be above the check valves, eliminating any water hammer concern.

The CF system is a passive system with no pumps. The CF tank elevation head with a 600 psig over pressure is applied whenever the CF system is TS required. This prevents any gas voids except those due to improperly sloped pipe or an improper fill and vent. The CF tanks are discharged to the reactor vessel during refueling outages which dynamically vents any gas voids in the system piping. The system piping is not normally drained during refueling outages.

c) Pump discharge piping which is not susceptible to water hammer or pressure pulsation following a pump start.

A joint owner's group program evaluated pump discharge piping gas accumulation. Gas accumulation in the piping downstream of the pump to the first closed isolation valve or the RCS pressure boundary isolation valves will result in amplified pressure pulsations after a pump start. The subsequent pressure pulsation may cause relief valves in the subject systems to lift, or result in unacceptable pipe loads, i.e., axial forces that are greater than the design rating of the axial restraint(s). The joint owner's group program establishes a method to determine the limit for discharge line gas accumulation to be utilized by the member utilities.

The joint owners group program provides methodologies that can be used to evaluate the piping response in the presence of accumulated gas for: 1) The Containment Spray piping downstream of the isolation valve that is normally closed during power operation as the riser and spray header are filled, and 2) The hot leg injection piping downstream of the isolation valve that is normally closed during power operation and opened following switchover to this injection location.

a. The BS system is designed with an open discharge header via the spray nozzles. As such, certain sections of the discharge piping are designed to be air filled. The system is seismically qualified which would give inherent capability to withstand a mild water hammer event as a result of the air water interface.

b. A joint owners group methodology has been developed to assess when a significant gas-water water hammer could occur during switchover to hot leg injection. The methodology concludes that: If the upstream valve has an opening time of approximately 10 seconds and the downstream path to the RCS is only restricted by check valve(s), no significant water hammer would occur, i.e., none of the relief valves in the subject systems would lift, or none of the piping restraints would be damaged.

   ANO-1 is of a B&W design and does not utilize hot leg injection and instead utilizes HPI injection through the cold legs.

Since consistent fill and vent methodologies are applied to the HPI, DH/LPI, and BS piping in the RB, it is expected that similar results for gas voids will be found, i.e. there will be no gas voids or any potential voids would be of an acceptable size.

As noted above, the HPI system pressures downstream of the MOVs are at approximately RCS pressure. This would compress any gas void initially present to a small fraction of its original volume. When combined with flow pulsations being dampened by makeup and seal injection, it is highly unlikely that sufficient forces would be generated to damage the HPI piping or supports.

Since periodic depressurization is performed on both DH trains downstream of the LPI isolation valves, the potential void size is assessed relative to the amount of time it takes to perform these blow downs. As such, this monitoring ensures that excessive gas voids are not present.

BS reactor building gas voids will be assessed relative to the previous discussion that if the water level is maintained above the last check valves, there will be no adverse water hammer due to the BS pump operation. Again, the BS water level is appropriately maintained above the last check valves and is refilled every quarter.

d) RCS Allowable Gas Ingestion

As demonstrated by the ANO-1 AB data and considering that there were no gas voids identified, it is readily concluded that the associated reactor building piping is similarly maintained. Therefore, it is reasonable to conclude that any gas voids present are relatively small. Even if there were voids in some long runs of RB pipe, their volume would be relatively small compared to the nitrogen volume assumed to be injected into the RCS by the CF tanks. Therefore, it is qualitatively concluded that the small volumes possibly in the HPI, DH/LPI, and BS systems are readily bounded by the CF tank analysis for nitrogen entry into the RCS during a LOCA with respect to the effect on post-LOCA core cooling.

3. Summarization of Design Basis Documents Changes, including Schedule for Changes:

There are no required changes to the ANO-1 design basis documents as a result of GL 2008-01.

4. Discussion of System P&ID and Isometric Drawing Reviews Results:

Based on a review of the isometric drawings for the suction, discharge, and recirculation flow paths as applicable, HPI, DH/LPI, and BS composite drawings were created to ease field walk down data collection and documentation. In general, vent valve locations were verified to exist at the locations indicated on the drawings. These composite drawings were used to gauge where slope checks needed to be performed, document the approximate location of each data point, and to document any follow-up NDE locations and results.

5. Identification of New Vent Valve Locations, Modifications to Existing Vent Valves, or Utilization of Existing Vent Valves Based on Drawing Review:

Except for the previously identified two NaOH piping gas voids in the BS system, there were no new vent valves deemed necessary as a result of these GL 2008-01 walk downs and drawing reviews for the HPI, DH/LPI, CF and remaining part of the BS system.

6. Discussion of System Confirmation Walk down Results:

ANO-1 pipe slope checks were performed using a ZIP Level, PRO-2000, elevation measurement system, or carpenter levels.

Walk downs of the HPI, DH/LPI, and BS systems were conducted within the ANO-1 AB to verify vents, potential gas accumulation areas, and to determine the scope of data required on accessible piping. Subsequently, pipe slopes were measured, reviewed, and gas accumulation areas needing NDE were determined. Subsequently, UT was performed at the selected locations and no gas voids were identified except for the two NaOH piping locations. The DH BWST suction line insulation was removed to ensure these critical areas were thoroughly inspected. UT examinations on system high spots with insulated horizontal piping runs were performed in lieu of slope checks to minimize dose. More than 400 locations were measured to assess pipe slope with the Zip Level on the HPI, DH/LPI, and BS systems. More than 160 NDE UT checks were performed to verify that high spots were water solid.

7. Identification of New Vent Valve Locations, Modifications to Existing Vent Valves, or Utilization of Existing Vent Valves Based on Confirmatory Walk downs. Identification of Remaining Walk downs:

There were no new vent valve locations or modifications to existing vent valves identified as a result of the walk downs on the AB HPI, DH/LPI and BS piping. The two gas voids found downstream of the NaOH tank outlet isolation valves are being addressed in the ANO CAP system.

The CF system will be walked down during 1R21 since all system piping is located in the RB. The system is dynamically vented each refueling outage during check valve stroke testing by discharging the CF tanks to the reactor vessel / refueling canal via a 60-70 psig overpressure in the CF tanks. The 1R21 walk downs are not anticipated to result in the need for any new vent valves for the CF system.

8. Discussion of Fill and Vent Activities and Procedure Review Results:

There were two issues noted on HPI for fill and vent activities. The first issue is a weakness with not having flow times or flow rates specified for filling the HPI discharge lines. The second is that there are unventable local high spots in the BWST suction lines to the HPI pumps. In consideration of the measured HPI header pressures and no gas voids on the BWST HPI suction lines, the current HPI fill methodology is acceptable but can be improved.

There were no new procedure enhancements identified for DH/LPI as a result of the fill and vent procedure reviews.

Except for potential procedure enhancements due to the NaOH piping gas voids noted previously, there were no new BS procedure changes required based on the GL 2008-01 reviews.

The CF system piping is dynamically vented each refueling outage during check valve stroke testing by discharging the CF tanks to the reactor vessel / refueling canal via a 60-70 psig overpressure in the CF tanks. The fluid velocity during the performance of these tests is sufficient to vent any gas voids in the system piping.

Venting of all the systems is sequentially completed from the lowest point up to the highest point in the system. If the pumps are drained, Engineering is contacted and the pump suction and discharge lines are inspected with UT equipment prior to returning to service. Additionally, compression fittings on the pump mechanical seals are loosened to vent the pump seals. ANO-1 does not employ any vacuum fill systems in the HPI, DH/LPI, CF, or BS systems.

9. Identification of Procedure Revisions, or New Procedures Resulting from Fill and Vent Activities and Procedure Reviews. Summarization of Associated Corrective Actions and Associated Schedule:

There are currently no required procedure revisions or new procedures in process due to the GL 2008-01 investigations on the AB HPI, DH/LPI and CF system equipment at ANO-1.

Except for potential procedure enhancements due to the NaOH piping gas voids noted previously, there are currently no procedure revisions or new procedures required, based on the GL 2008-01 investigations on the AB BS system equipment at ANO-1.

10. Discussion of Potential Gas Intrusion Mechanisms:

General

Vortex flows out of the BWST are a potential source of air for the DH and BS pumps. Since the BWST has a vortex breaker installed to prevent such concerns, the suction for the DH and BS pumps is not subject to vortices from the BWST.

Vent or drain valve in-leakage due to low ECCS system pressures cannot occur because all these lines are at pressures above atmospheric which would result in external leakage.

ANO-1 depends on the tagging process to control draining and filling evolutions and the work order process to have the necessary instructions for ECCS system work. Place keeping techniques and the stop, think, act and review process are also utilized to minimize human errors.

HPI

Gas formation due to reductions in pressure can occur in the HPI system at the RCS to HPI interface and potentially in the P-36C pump discharge from the CF tank over pressure or from the nitrogen system. The RCS to HPI boundary will be void checked in 1R21 on at least three of the four HPI lines. The fourth line has continuous flow through it and is not scheduled for the GL 2008-01 checks. Pressure checks were performed downstream of the MOV's to assess the potential for gas voids in each HPI line. The results of these pressure checks identified that each HPI line is at an elevated pressure. As such, there would be little or no gas voiding expected in these lines due to pressure reductions. The potential for gas voiding due to nitrogen leakage into the P-36C pump discharge is considered unlikely due to the following; 1) periodic HPI train swaps which would compress and sweep said voids into the RCS, and 2) typical train to train valve leakage keeps the P-36C pump discharge line pressurized as documented in surveillance testing.

High temperatures are present in the HPI system that could possibly reach the saturation temperature. These areas are at the HPI lines to the RCS back to the first check valves off the RCS. These areas are at the same pressure as the RCS at all times and would not be subject to saturation voiding under normal conditions.

The current issue with gas voids in the NaOH lines is being investigated via the CAP process. The BWST take off to the HPI pump suction are well upstream of the tie in to the DH and BS systems and are isolated from this flow if that train is not in service.

DH/LPI Gas formation due to reductions in pressure can occur in the DH/LPI system at the RCS to LPI interface and at the CF to LPI interface. This area by design sees the CF tank over pressure of approximately 600 psig. As such, this piping would not be expected to have much gas coming out of solution. The pressure upstream of DH-13A/B, DH-17, and DH-18, is maintained as low as possible due to Operations actions to depressurize these lines when pressure reaches approximately 40 to 60 psig (or lower based on operator work load, etc.). Calculations have been performed, based on a maximum void size of 0.175 cubic feet in the LPI lines, as to how long it would take to depressurize these volumes of piping. This information is noted in the Operations logs and to date, the current procedural limits have not been exceeded. This indicates there are no unacceptable voids in the LPI piping.

High temperatures are present in the DH/LPI system that could possibly reach the saturation temperature. These areas are at the LPI lines to the RCS back to the first check valves off the RCS, i.e. DH-14A/B. These areas are at the same pressure as the RCS at all times and would not be subject to saturation voiding under normal conditions.

The current issue with NaOH piping gas voids is being investigated via the CAP process. The noted voids are approximately 0.1 and 0.52 cubic feet of air. This results in about 0.75 and 3.88 gallons of air that mixes at a rate of 140 gpm through a 4" schedule 10S pipe with up to 4360 gpm (4500 – 140 = 4360) in a 14" pipe. This results in a concentration of air of 3% by volume for 0.32 seconds for the 0.75 gallon volume and 3% by volume for 1.66 seconds for the 3.88 gallon volume. Based on industry information that indicates that transient air flows up to 5% by volume for 20 seconds can be tolerated by a single stage pump, these short durations and small air volumes for the noted gas voids will have no adverse impact on the downstream DH or BS pumps.

BS The BS system has no high to low pressure interfaces. As such, there are no concerns with gas coming out of solution and creating voids. Vortex flows out of the BWST are potential sources of air for the BS pumps. Since the BWST has a vortex breaker installed to prevent such concerns, the suction for the BS pumps is not subject to vortices from the BWST. High temperatures are not present in the BS system that could possibly reach the saturation temperature. Therefore, there are no concerns with this type of voiding on the BS system.

CF The only high pressure source which interfaces with the CF system piping is the RCS, which is addressed below. The Makeup and Purification system and CF Tank Recirculation system is used to fill the CF tanks; however, since the fluid in the tanks and piping is essentially stagnant, any gasses from these higher pressure systems will remain in the CF tanks if entrained gasses (i.e. hydrogen) come out of solution after entering the lower pressure CF Tanks.

The CF tanks are pressurized with nitrogen to a nominal pressure of 600 psig. Since the system is maintained at a fairly constant pressure, no significant contribution to gas voiding is anticipated from nitrogen coming out of solution during normal plant operations. When tank pressure is reduced to 60-70 psig during refueling outages to facilitate the discharge of the tanks to the reactor vessel during check valve stroke tests, any nitrogen which may come out of solution as pressure is lowered will be swept to the reactor vessel and refueling canal during the noted testing.

There is approximately 50 feet of piping and fittings between CF discharge check valve CF-1A/B and the reactor vessel. Any back leakage through both DH-14A/B and CF-1A/B under normal conditions would be small. Due to the length of piping between the valves and the reactor vessel, the back leakage though CF-1A/B would be expected to be at or near RB ambient temperature. As such, the formation of steam pockets in the CF piping upstream of check valves CF-1A/B would not be expected.

In order to develop hydrogen gas pockets in the CF piping upstream of CF-1A/B, back leakage would have to occur through check valves DH-14A/B and CF-1A/B. Operations check the pressure upstream of DH-14A/B once per shift and verify that the pressure is between 575 and 625 psig. These elevated pressures will minimize gas void formation. The CF Tank level and pressure are also measured each shift and verified to be between 12.7 & 13.3 feet and 580 & 620 psig, respectively. Checks of the Operations Logs and plant computer trends indicate that the pressure upstream of DH-14A/B during the current operating cycle has correlated closely with CF tank pressures. It is noted that the pressure upstream of DH/LPI check valves DH-13A/B & DH-17/18 is also checked once per shift and the pressure is bled off to 0 psig if the pressure approaches 75 psig. During the current cycle, the pressure upstream of these check valves has been bled off frequently, indicating that DH/LPI check valves are experiencing slight back leakage from either the RCS or CF system. Based on Cycle 21 CF tank level trends and the need to frequently bleed off the piping upstream of DH-13A/B and DH-17/18, it is concluded that 1) any leakage through valves CF-1A/B is forward through the valve as DH-13A/B and/or DH-17/18 back leakage occurs, or 2) the back leakage through DH-13A/B and/or DH-17/18 is being fed from DH-14A/B back leakage. In either case, the specified depressurization time limits have not been exceeded, indicating the void analysis for the RB DH/LPI piping remains bounding.

11. Ongoing Industry Programs

Ongoing industry programs are planned to obtain additional information concerning gas intrusion mechanisms and a pump's tolerance for gas ingestion. The results of these activities will be monitored and implemented as appropriate for the HPI, DH/LPI, BS, and CF systems at ANO-1 outside of the GL 2008-01 process.

12. Detailed List of Items that have Not Been Completed, a Schedule for their Completion, and the Basis for that Schedule:

RB walk downs will be performed on applicable sections of the HPI, DH/LPI, BS, and CF systems in 1R21. Applicable reviews will be performed and submitted to the NRC within 90 days after Unit 1 restart from 1R21. With ANO-1 currently at 100% power, access to the RB area is prohibited due to dose. As such, the GL 2008-01 walk downs, applicable slope checks, and follow-up NDE will not be possible until 1R21, scheduled to begin in October, 2008.

Testing Evaluation

1. Discussion of Periodic Venting or Gas Accumulation Surveillance Procedure Review Results:

There is no TS required periodic venting of the HPI, DH/LPI, BS or CF systems at ANO-1. There are no surveillance procedures for gas accumulation in the HPI, DH/LPI, BS or CF systems at ANO-1.

2. Identification of Procedure Revisions or New Procedures:

There are no required ANO-1 procedure revisions resulting from periodic venting or gas accumulation surveillance procedures that need revision or development.

3. Discussion on How Procedures Adequately Address the Manual Operation of the RHR System in its Decay Heat Removal Mode of Operation:

The operating procedure for the DH system describes the operator actions to place the DH system in service for plant cooldown, startup, and decay heat removal. In general, operators monitor plant parameters and adjust DH flows via bypass or throttle valves to obtain the desired cooldown rate or maintain the desired RCS temperature. In addition, adjustments of the service water flows are allowed when the RCS temperature is below 200º F.

There are multiple notes, cautions, and steps that alert the operator to fill and vent the system(s) per applicable sections of the procedure prior to pump starts for plant cooldown, defueled operation, BWST recirculation for temporary activities, and quarterly surveillances. These steps ensure the DH system is not started without being filled and vented since the HPI pumps can vapor bind if the piggyback lines are not filled and vented.

Following DH pump starts for decay heat removal operation, flows are immediately adjusted to less than or equal to 3500 gpm with a pump discharge pressure less than 400 psig. Subsequently, the DH "motor" vortex alarms are adjusted by the operator around the initial "current" value so that changes are immediately noticed by the operators. These alarms are functionally checked during quarterly DH pump surveillances.

DH flow, pressure, and temperatures are typically monitored by the control room to assess equipment operation. In addition, field walk downs are performed by operators and the system engineers to gauge equipment health.

ANO-1 does not "vent" the DH system prior to starting a pump unless it was drained for maintenance and then it is part of the post maintenance restoration. Based on years of operation, continuing procedural improvements, no recent DH/LPI water hammer events, full flow surveillances, conservative operational decisions, and no gas voids being found on any DH/LPI auxiliary building piping, the current fill, vent, and operating methodology appears acceptable in minimizing gas voids.

4. Summarization of Procedure Review Results to Determine that Gas Intrusion Does Not Occur as a Result of Inadvertent Draining:

The tagging process at ANO drains the system or system section for Maintenance and subsequently fills and vents the system. This process uses trained/qualified Operations personnel to determine the appropriate sequence and locations for draining, filling, and venting. In addition, post maintenance tests are performed to verify the system operates with the appropriate flows, stroke times, etc. without unusual noises or observations (such as water hammer or smoke). If atypical response is noted, the CAP is utilized to investigate further and determine the cause. These processes, in conjunction with Operating procedures, minimize the human error aspect of gas intrusion events.

5. Description as to How Gas Voids are Documented and Trended, if Found:

The CAP is used to document equipment issues related to gas voiding or accumulation. There are only two NaOH piping gas voids identified during recent ANO-1 ultrasonic tests (UT) conducted by engineering. Other equipment concerns such as high vibration, unusual flow noises, reduced pump performance, and water hammer events are investigated and resolved through the CAP. Except for the two NaOH piping gas voids previously identified, there were no additional gas voids identified at any of the NDE locations on the HPI, DH/LPI, and BS systems in the ANO-1 Auxiliary Building. In consideration of the information obtained for this GL response, future drain, fill, and venting activities can be quickly assessed from an Engineering perspective via UT, dynamic flushing (using system flows to flush voids), or enhanced vent or flow times to remove future voids.

Any condition adverse to quality, nuclear safety, or personnel safety will be entered into the CAP at ANO. Depending on the significance of the described condition, the CR is categorized and assigned to a department for additional review and evaluation. Due to the small number of gas void issues at ANO-1, there are no acceptance criteria for gas voids, they are dispositioned on a case by case basis. Typically, if a gas void is found, the void will be quantified to support system operability determination. Follow-up actions could include any of the following: void size monitoring; void venting; void flushing; temporary modifications, vent addition (minor modification), pipe reconfigurations, and possibly major system modifications.

6. Detailed List of Items that have Not Been Completed, a Schedule for their Completion, and the Basis for that Schedule:

The HPI, DH/LPI, BS and CF system GL 2008-01 walk downs in the RB will be completed during the upcoming outage, 1R21, in the Fall of 2008. A supplemental GL 2008-01 response will be submitted 90 days after the end of 1R21. The HPI, DH/LPI, BS and CF systems walk downs in the AB are complete. Except for the two NaOH piping gas voids previously identified, there were no gas voids identified at any of the measured locations. RB walk downs could not be completed due to ANO-1 being at full power operation.

<u>Corrective Actions Evaluation</u>

1. Summarization of Review Results of How Gas Accumulation has been Addressed:

The CAP is used to address gas intrusion/accumulation issues at ANO-1. The ANO-1 goal is to have no gas voids in any of the ECCS piping (except for the BS headers). There is currently no site procedure that evaluates generic gas void sizes for use in specific sized pipe or as operability acceptance criteria. Each condition is evaluated on a case by case basis. In consideration of the finding for the HPI, DH/LPI, and BS systems in the ANO-1 AB, the current fill and vent and operating methodology has proven itself to maintain these systems with minimum gas voiding.

2. Detailed List of Items that have Not Been Completed, a Schedule for their Completion, and the Basis for that Schedule:

The HPI, DH/LPI, BS and CF system GL 2008-01 walk downs in the RB will be completed during the upcoming outage, 1R21, in the Fall of 2008. A supplemental GL 2008-01 response will be submitted 90 days after the end of 1R21. The HPI, DH/LPI, BS and CF systems walk downs in the AB are complete. There were no gas voids identified at any of the measured locations. RB walk downs could not be completed due to ANO-1 being at full power operation.

Conclusion

Based upon the above, Entergy has concluded that ANO-1 is in conformance with its commitments to 10 CFR 50, Appendix B, Criterion III, V, XI, XVI, and XVII, as described in the Entergy Quality Assurance Program Manual (QAPM). Any identified deviations that have not been corrected are entered into the ANO CAP for tracking and final resolution, as described in Sections B and C of this attachment.

B. DESCRIPTION OF NECESSARY CORRECTIVE ACTIONS

The only corrective actions required to support the ANO-1 response to GL 2008-01 is to perform walk downs of the HPI, DH/LPI, BS and CF systems located in the RB during the 1R21 refueling outage (Fall 2008) and to provide the supplement GL 2008-01 response 90 days after the completion of 1R21.

C. CORRECTIVE ACTION SCHEDULE

1. Summarization of the Corrective Actions that Have Been Completed as a Result of the Evaluations Discussed Above:

Walk downs of HPI, DH/LPI, and BS have been performed to address the GL 2008-01 gas accumulation concerns for ANO-1. Selected slope checks were performed to determine potential gas voiding areas and NDE (UT) was subsequently performed to determine if gas voids were present. Except for two gas voids noted in the NaOH piping, there were no additional voids identified on the HPI, DH/LPI, and BS system piping in the ANO-1 AB.

2. Summarization of the Corrective Actions to be Completed:

Perform walk downs of the HPI, DH/LPI, BS and CF systems located in the RB during the 1R21 refueling outage (Fall 2008) and to provide the supplement GL 2008-01 response 90 days after the completion of 1R21.

CONCLUSION

Entergy has evaluated the accessible portions of those ANO-1 systems that perform the functions described in this GL and has concluded that these systems are operable, as defined in the ANO-1 TS and are in conformance to Entergy's commitments to the applicable General Design Criteria (GDC), as stated in the ANO-1 SAR.

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 4 of the cover letter, Entergy will complete its evaluation of the inaccessible portions of these systems by startup from the next refuel outage at ANO-1 and will provide a supplement to this response within 90 days thereafter.

Attachment 2 to

0CAN100801

Arkansas Nuclear One – Unit 2

Nine-Month Response to
Generic Letter 2008-01

Arkansas Nuclear One – Unit 2
Nine Month Response to GL 2008-01

This Attachment contains the Arkansas Nuclear One, Unit 2 (ANO-2) nine-month response to NRC 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 (see Section A of this Attachment),

b) A description of the 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 subject systems (see Section B of this Attachment), and

c) A statement regarding which corrective actions have been completed, the schedule for the corrective actions not yet complete, and the basis for that schedule (see Section C of this Attachment).

The following systems were determined to be in the scope of GL 2008-01 for ANO-2:

- High Pressure Safety Injection System (HPSI)
- Low Pressure Safety Injection System (LPSI)
- Containment Spray System (CSS)
- Shutdown Cooling System (SDC)

A. EVALUATION RESULTS

Summary Statement

Based on licensing basis, design basis, physical walk downs and testing evaluations, the HPSI, LPSI and CSS systems are operable. Ultrasonic testing (UT) examinations are performed quarterly on HPSI and LPSI piping to ensure that no voids are present at the examined locations. In response to this GL field walk downs were conducted on horizontal piping segments located in the Auxiliary Building (AB) to verify vent placement and determine pipe slope information. UT examinations were also performed during these walk downs on ECCS/CSS suction headers and all suction lines to individual ECCS and CSS pumps and no voids were identified. Prior to the current walk down efforts, repairs to the ECCS isolation check valves and installation of the HPSI Pressurization System (HPS) have been completed. The HPS maintains HPSI header pressures above Safety Injection Tank (SIT) pressures and since its installation no voids have been identified in either the HPSI or LPSI systems. ANO-2 actively pursues the identification of any voids. When voids are identified, a Condition Report (CR) is issued to evaluate operability and address the condition.

Potential vulnerabilities were identified during this review in the ability to effectively vent certain horizontal piping segments as well as vulnerabilities in venting procedures. Corrective Action Program (CAP) actions were assigned to complete the recommended courses of action. However as discussed above, UT examinations were performed on the effected portions of piping and no voids were identified and all subject piping is considered operable. The following sections provide a more detailed description of the evaluations performed for ANO-2.

Licensing Basis Evaluation

The ANO-2 licensing basis was reviewed with respect to gas accumulation in the HPSI, LPSI and CSS systems. This review included the Technical Specifications (TS), TS Bases, Safety Analysis Report (SAR), the Technical Requirements Manual (TRM) and TRM Bases, responses to NRC generic communications, regulatory commitments, and Operating License conditions.

1. Summarization of Licensing Basis Review Results:

The above documents and regulatory commitments were evaluated for compliance with applicable regulatory requirements. The evaluation was performed in such a manner as to ensure that all applicable licensing basis documents and commitments associated with gas accumulation in the HPSI, LPSI, and CSS systems were identified and reviewed for compliance. Licensing basis documents and commitments were reviewed to ensure that no conflicts with any system or component function or testing methodologies existed.

The review determined that there were no weaknesses or deficiencies in any licensing basis documents.

2. Summarization of Changes to Licensing Basis Documents:

Entergy Operations, Inc. (Entergy) is not proposing changes to the ANO-2 licensing bases documents at this time. The level of detail in current ANO-2 licensing bases documents as it relates to gas intrusion is consistent with the current industry level of detail. However, Entergy is monitoring industry activities for developing TS changes (Refer to the response to Licensing Basis Question 3).

3. List of Items not Completed, Schedule for Completion, and Basis for Schedule:

TS improvements are being addressed by the Technical Specifications Task Force (TSTF) to provide an approved TSTF Traveler for making changes to individual licensee's TS related to the potential for unacceptable gas accumulation. The development of the TSTF Traveler relies on the results of the evaluations of a large number of licensees to address the various plant designs. Entergy 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. Within 90 days following NRC publication of the Notice of Availability of the TSTF Traveler, Entergy will evaluate its applicability to ANO-2, and evaluate adopting the Traveler to either supplement or replace the current TS requirements.

Design Evaluation

The ANO-2 design basis was reviewed with respect to gas accumulation in the Emergency Core Cooling, Shutdown Cooling, and Containment Spray Systems.

1. Discussion of Design Basis Documents Review:

This review included applicable design basis documents, design drawings, calculations, engineering evaluations and design change packages. Isometric drawings provide vent and drain locations for proper system fill and vent operations and all vent locations outside of containment on the HPSI, LPSI and CSS systems were verified by field walk downs. All design changes issued for modification of the plant are independently verified to meet the requirements of the applicable design standards and the design change procedure. Enhancements to the design change process and calculation process were identified as a result of this review and an action was issued under the Entergy CAP to revise the configuration checklist utilized in developing calculations and modifications to prevent the introduction of new gas intrusion concerns.

ANO-2 utilizes a “Keep Fill” HPS to maintain the HPSI header pressure above the pressure of the SITs to prevent the intrusion of nitrogen enriched SIT fluid from entering the HPSI headers. The HPS system is a non-safety related system except for the four isolation boundary check valves which have a safety related function to isolate the HPS system from the HPSI system upon failure of the HPS system. Should the HPS system not be in service, SIT levels are monitored and should level decrease, additional UT examinations are performed, as appropriate, to ensure that gas voids are not present.

Since installing the HPS system SIT levels have generally slowly increased with occasional drops in level as required by TS due to removing inventory to lower tank levels. The HPS system was installed as an alternate method for filling the SITs while limiting the number of HPSI pump starts. This small sustained water addition provides a high confidence of water solid conditions.

The residual heat removal (RHR) function for ANO-2 is accomplished by the CSS system in the Engineering Safeguards (ES) configuration. The CSS pumps are normally aligned to the SDC heat exchangers with the LPSI pump discharge to the SDC heat exchangers isolated by a manual valve and with discharge aligned to the LPSI injection headers. In the event of a LOCA, LPSI will inject fluid to the core after the RCS pressure has dropped to ~150 psig and will continue injection until a Recirculation Actuation Signal (RAS) is received (RWT level ~ 6%) that automatically secures the LPSI pumps and isolates their recirculation valves. The LPSI pumps will remain secured until manually initiated for normal (non ES) SDC system operation. The CSS pumps automatically start when they receive a Containment Spray Actuation Signal (CSAS) and will draw suction from the RWT until a RAS is received, after which suction will be automatically switched to the sump. Following RAS initiation, core cooling is provided by HPSI drawing suction from the sump and injecting into the core, and by CSS drawing suction from the sump, discharging through the SDC heat exchangers and then discharging through the RB spray headers.

There are no “Keep Full Systems” employed on either the LPSI or CSS systems and the design of all the subject systems does not include any allowable void size included as part of the system design basis; however, operability limits have been established. Quarterly inspections are conducted on HPSI and LPSI piping utilizing UT equipment under a standard work order. Since installation of the HPS modification, there have been no voids identified on either the HPSI or the LPSI system. Both trains of CSS piping are dynamically flushed under full flow conditions on a quarterly basis as directed by the CSS operating procedure. The CSS isolation valves are maintained closed during these quarterly surveillances; therefore the actual CSS headers are not flushed in order to prevent an unintended discharge into the Containment Building. However, the piping downstream of the isolation valves is open to the Containment Building and is protected by expansion loops. This limits the impact of potential transient system water hammer.

The HPSI, LPSI and CSS Systems initially take suction from the Refueling Water Tank (RWT) during safety system actuation. The RWT is maintained at a level to ensure proper volume for safety system injection per TS 3.5.4. At a low level within the RWT, a RAS is initiated causing the HPSI and CSS pump suction to transfer to the containment sump as its source while the LPSI pumps are secured with recirculation paths isolated to ensure gas is not ingested through the RWT suction path. The LPSI system remains secured for the duration of the event or until the SDC system is manually initiated by starting a LPSI pump on recirculation, slightly opening a single LPSI injection valve, and slightly opening a SDC Heat Exchanger throttle valve.

The intent of this sequence is to ensure that the LPSI pump and piping are not subjected to an adverse temperature change by slowly exposing the system to the current RCS temperature; however, this action also ensures that any entrained gas in the SDC lines is dynamically flushed to the RCS in a controlled manner. For information regarding ingestion of gas into the RCS, see section (d) under “Gas Volume Acceptance Criteria” below.

The RWT and Containment sump are designed with vortex breakers to ensure that air entrainment does not occur at low RWT or sump levels. Actual full scale modeling was performed which determined that the vortex breakers were acceptable for the containment sump. Acceptable operation and ability to prevent vortexing during design basis conditions has been documented. The suction line is procedurally filled and vented. The CSS discharge line is maintained at the 505 foot elevation per TS 4.6.2.1. The maximum design flow from the containment sump flow path is 3532.5 gpm (2632.5 gpm spray pump and 900 gpm HPSI). The sump strainers are essentially submerged during RAS. Acceptable NPSH for the sump flow path to the CSS pumps and acceptable operation with debris laden strainers has been documented.

2. Discussion of Interim Allowable (new applicable) Gas Volume Acceptance Criteria, Corrective Action Summarization, Including Schedule:

a) Pump Suction Piping

UT data was taken in the RWT suction paths, Containment Building sump suction paths, the ECCS common headers and individual pump suctions and no voids were identified. Additionally, a joint owners group program established interim gas ingestion limits to be employed by the member utilities. The interim allowable gas accumulation in the pump suction piping is based on limiting the gas entrainment to the pump after a pump start. The interim criteria address pump mechanical integrity only and are as follows:

	Single-Stage	***Multi-Stage***	***Multi-Stage***
		Stiff Shaft	Flexible Shaft
Steady-State	2%	2%	2%
Transient*	5% for 20 sec.	20% for 20 sec.	10% for 5 sec.
$Q_{B.E.P.}$ Range	70%-120%	70%-140%	70%-120%
Pump Type (transient data)	WDF	CA	RLIJ, JHF
* The transient criteria are based on pump test data and vendor supplied information. (Note that the ANO LPSI and CSS pumps are single-stage pumps and the HPSI pumps are multi-stage)			

ANO-2 procedures provide assurance that the volume of gas in the pump suction piping for the subject systems is limited such that pump gas ingestion is within the above established interim criteria.

The CSS suction piping was also evaluated based on conservative assumptions which included assuming that the suction line valve bonnets on large piping were completely full of air. The GE / Hitachi methodology considering a 10% void fraction for no greater than 5 seconds was used as the limiting void acceptance criteria. The results supported the conclusion that under worst case conditions the system will perform its function.

b) Pump discharge piping which is susceptible to pressure pulsation after a pump start.

A joint owners group program evaluated pump discharge piping gas accumulation. Gas accumulation in the piping downstream of the pump to the first closed isolation valve or the RCS pressure boundary isolation valves will result in amplified pressure pulsations after a pump start. The subsequent pressure pulsation may cause relief valves in the subject systems to lift, or result in unacceptable pipe loads, i.e., axial forces that are greater than the design rating of the axial restraint(s). The joint owners group program establishes a method to determine the limit for discharge line gas accumulation to be utilized by the member utilities.

The method uses plant specific information for piping restraints and relief valve set points in the subject systems to determine the acceptable gas volume accumulation such that relief valve lifting in the subject systems does not occur and pipe loading is within acceptable limits, i.e., axial forces that are less than the design rating of the axial restraint(s).

ANO-2 has not currently implemented this methodology but has established allowable values for operability (see below). In general, no voids are allowed in the HPSI and LPSI systems. CRs are procedurally generated as voids are identified. CRs are the mechanism by which issues are entered into the CAP system. This provides assurance that any substantive gas void in the subject system discharge piping is eliminated, if present.

Pipe Type and Size	Limit
Discharge Piping > 2 inch	0.5 ft^3
Discharge < 2 inch and all Recirc piping	0.2 ft^3
Suction Piping 20/24 inches	1.5 ft^3
Suction Piping < 20/24 inches	0.0 ft^3

The CSS discharge piping was evaluated based on calculations that prove pipe flow velocities are significantly large to sweep any air voids out of the system as part of the initial fill and vent procedures. Additionally, air entrainment in the discharge header up to 36 gallons as an acceptable limit for operation has been evaluated.

c) Pump discharge piping which is not susceptible to water hammer or pressure pulsation following a pump start.

A joint owners group program evaluated pump discharge piping gas accumulation. Gas accumulation in the piping downstream of the pump to the first closed isolation valve or the RCS pressure boundary isolation valves will result in amplified pressure pulsations after pump start. The subsequent pressure pulsation may cause relief valves in the subject systems to lift, or result in unacceptable pipe loads, i.e., axial forces that are greater than the design rating of the axial restraint(s). The joint owners group program establishes a method to determine the limit for discharge line accumulation to be utilized by the member utilities.

The joint owners group program provides methodologies that can be used to evaluate the piping response in the presence of accumulated gas for: 1) The CSS piping downstream of the isolation valve that is normally closed during power operation as the riser and spray header are filled, and 2) the hot leg injection piping downstream of the isolation valve that is normally closed during power operation and opened following switchover to this injection location.

1. The CSS is designed with an open discharge header via the spray nozzles. As such, certain sections of the discharge piping are designed

to be air filled (e.g., vertical spray header risers and spray rings). The system is seismically qualified which would give inherent capability to withstand a mild water hammer event as a result of the air water interface. This condition was entered into the CAP system and it was determined that air entrainment of up to 36 gallons was acceptable for operation.

2. A joint owners group methodology has been developed to assess when a significant gas-water water hammer could occur during switchover to hot leg injection. The methodology concludes that: If the upstream valve has an opening time of approximately 10 seconds and the downstream path to the RCS is only restricted by check valve(s), no significant water hammer would occur, i.e., none of the relief valves in the subject systems would lift, or none of the piping restraints would be damaged.

   The ANO-2 ECCS flow path for switchover to hot leg injection has upstream valves with opening stroke times greater than 20 seconds and a downstream path to the RCS restricted only by check valves. Therefore, consistent with the methodology described, no significant water hammer will occur i.e., none of the relief valves in the subject systems would lift, or none of the piping restraints would be damaged.

d) RCS Allowable Gas Ingestion

The joint owners group qualitatively evaluated the impact of non-condensable gases entering the RCS on the ability on the post-accident core cooling functions of the RCS. This evaluation assumed that 5 cubic feet of non-condensable gas at 400 psig was present in the ECCS discharge piping concurrent with 5 cubic feet of non-condensable gas at 100 psig in the CSS discharge piping. The qualitative evaluation concluded that the assumed quantities of gas will not prevent the ECCS from performing its core cooling function.

3. Summarization of Design Basis Documents Changes, including Schedule for Changes:

There are no changes to the existing Design Basis documents required as a result of this review.

4. Discussion of System P&ID and Isometric Drawing Reviews Results:

ANO reviewed plant isometric drawings of the HPSI, LPSI, CSS and SDC systems. Based on a review of the isometric drawings, vulnerabilities in the system configuration were identified on the common RWT suction line and the “C” HPSI discharge cross-over line. Both areas contained non-ventable high points that represent a potential location for gas voids to collect. Based of the isometric drawing reviews, vents in all other piping locations are properly located.

Walk downs of the HPSI, LPSI, SDC and CSS piping in the ANO-2 AB were conducted. Over 600 data points involving pipe slope information were taken and vent valve locations were verified during the field walk downs. All vent valves in the AB were located as per the isometric drawings. Line slope data was not taken for the recirculation path due to its design.

ANO-2 utilizes a common recirculation path for the HPSI and LPSI system and this common recirculation path ties into the master RWT test loop which empties into the RWT and is used by the CSS system for quarterly full flow tests. The flow through these lines during quarterly HPSI surveillances results in a Froude number greater than 1.0. Per a Westinghouse report, this Froude number should wash any existing voids through the recirculation path, to the RWT and then vented to atmosphere. The HPSI pumps also have a second recirculation path that can only be isolated using manual valves in order to protect the HPSI pumps from overheating should the pumps be running during the initiation of RAS condition. Likewise, similar to the above discussion, Froude numbers for these lines when utilized are in excess of 1.0. Additionally, the recirculation piping is checked quarterly for gas intrusion from the SITs and the lines are protected by the HPS that maintains HPSI header pressure above SIT injection pressures to ensure that leakage from the SITs does not enter the HPSI headers.

Localized high points within the HPSI, LPSI, SDC and CSS systems were identified and UT examinations were performed (where possible) to ensure that the associated piping was full. Of the 35 locations identified as potential localized high points, UT examinations were performed on 24 of them prior to October 11, 2008. No voids were identified in these piping segments. The remaining 11 locations involve insulation on piping located in the overhead that will require scaffolding to be built in order to remove insulation and UT the lines. Six of these 11 locations are on the CSS path that receives full flow testing on a quarterly basis and are therefore dynamically flushed. Two of the 11 locations are on the SDC path which is dynamically flushed during the initiation of SDC operation. The remaining three locations involve minor rises on small sections of the LPSI injection piping. During quarterly UT inspections, examinations are performed at the base of the injection valves and at the Containment Building penetrations with no voids found. As a matter of prudence, scaffolding to the piping will be erected, insulation removed and UT examinations performed. This activity should be completed online prior to the next Unit 2 refueling outage (2R20, Fall 2009). All piping is considered operable based on review of available plant documents and walk down data.

As identified in ANO-2's 3-month response to NRC GL 2008-01, ANO-2 will perform walk downs of inaccessible portions of the ECCS and CSS located in the Containment Building during the 2R20 refueling outage (Fall 2009). Based on a current review of system isometric drawings, the ECCS lines located within the Containment Building appear to be properly vented and are considered operable. Concerning the CSS system, the potential for air entrapment within the Spray Header piping expansion loops has been identified. During the 2R19 outage (Spring 2008), the "A" Spray

Header expansion loop horizontal piping runs in the Containment Building were inspected for proper slope. The upper horizontal piping run was found to be sloped in the wrong direction which would result in an air pocket being left near the pipe elbow as the pipe is filled. This condition has been entered into the ANO CAP system. An operability evaluation was performed for this condition. The system is operable. Additional walk downs are scheduled for 2R20.

5. Identification of New Vent Valve Locations, Modifications to Existing Vent Valves, or Utilization of Existing Vent Valves Based on Drawing Review:

As a result of the drawing reviews and field walk downs all vents are properly located and provide adequate venting of the various portions of the systems with the exception of the three piping sections discussed below.

Vulnerabilities were identified on the RWT suction line and “C” HPSI discharge cross-over piping and the HPSI, LPSI and CSS pump seal cooler vents. The RWT suction has no vents installed on either the common header or the “A” or “B” ECCS Suction Headers. UT examinations were performed at piping high points and localized high points identified by field walk downs and no gas voids were identified. Similarly, UT examinations of the “C” HPSI cross-over piping were conducted and no gas voids were identified.

When the draining of the HPSI, LPSI and CSS pumps is required by maintenance activities, venting of the seal coolers is required along with UT examinations of the lines. This venting is typically accomplished by breaking the cooler line flanges and spraying RWT fluid out until a steady stream is flowing. However, proper venting is not fully verified until pump start during post maintenance testing (PMT) activities and prior to returning the pumps to active service. Starting the pumps with minor voids in the seal coolers and seals does not render the pump inoperable but can result in increased wear to the seals, thus decreasing their life.

Based on the above discussions installation of vents is not required but is considered as an enhancement activity and corrective actions have been issued through ANO’s CAP.

6. Discussion of System Confirmation Walk down Results:

Walk downs of the HPSI, LPSI, SDC and CSS systems were conducted within the AB in accordance with the ANO site procedure. As stated above walk downs in all areas within the AB involving the scoped systems were conducted. The equipment utilized for determining piping slope was the Zip Level system consisting of a base unit connected via oil filled tubing to a remote unit that measures elevation differences between the base unit and the remote unit.

As stated previously walk downs, utilizing the ZipLevel equipment were completed on all horizontal piping segments within the AB. Piping segments that were determined to be flat, within +/- 0.2 inches or slopped towards a vent location, met the criterion and were not further inspected. There were 35 piping segments that did not meet this criterion and were further examined utilizing UT equipment or were scheduled for UT examination. All areas within the HPSI systems that did not meet the criterion were inspected with UT equipment and were found to be absent of voids. Two minor voids were identified in the CSS bypass lines and it was determined through the CAP that the voids presented no challenge to the CSS operability. Portions of the main RWT header, the RWT suction to “B” ECCS, ECCS common headers (both RWT and sump paths) and both LPSI pump suction piping paths were inspected with UT equipment and no voids were identified. There were 11 potential high points on the LPSI, CSS and SDC systems that are located in the overheads, are insulated and require scaffolding to be erected in order to perform bare pipe UT examinations. Inspections of these piping segments are scheduled to occur prior to the next refueling outage and are being tracked. Reviews of these piping segments have been completed along with reviews of inaccessible portions of the subject systems within the Containment Building and all piping is considered operable.

7. Identification of New Vent Valve Locations, Modifications to Existing Vent Valves, or Utilization of Existing Vent Valves Based on Confirmatory Walk downs. Identification of Remaining Walk downs:

There were no additional new vents or modification to existing vents identified as being required by the system walk downs that haven’t been previously discussed in the design basis drawing review section.

8. Discussion of Fill and Vent Activities and Procedure Review Results:

Venting of the HPSI and LPSI systems is completed by venting the lowest part of the system first which is the HPSI pump casings. Venting is sequentially completed up to the highest point in the system, the vents located at the Containment Building penetration in the Upper South Piping Penetration Room. If the pumps are drained for maintenance, Engineering is contacted and the pump suction and discharge lines are inspected with UT equipment prior to returning to service. Additionally, fittings on the pump outboard and inboard mechanical seal cooling lines are broken to vent the pump seals which also vent the pump. Post evolutions that involve draining of the pumps and after UT results have been collected; the HPSI and LPSI pumps are operated on their respective recirculation paths in order to flush out any remaining voids. ANO does not employ any vacuum fill systems in the HPSI or LPSI system and, based on walk down results, there is no need for a vacuum fill system.

The procedures for filling and venting the CSS were reviewed for acceptability and proper sequencing. One procedure was identified as needing improvement in the sequencing of its steps and is being tracked.

9. Identification of Procedure Revisions, or New Procedures Resulting from Fill and Vent Activities and Procedure Reviews. Summarization of Associated Corrective Actions and Associated Schedule:

See the above discussion

10. Discussion of Potential Gas Intrusion Mechanisms:

<u>RCS leakage into ECCS systems</u>

The HPSI and LPSI headers combine with the SITs discharge header to enter each of the four RCS cold legs. The check valves provide the RCS pressure boundary. Potential leakage across these check valves could result in gas coming out of solution and forming bubbles. These valves are tested at each refueling outage as specified by the ANO-2 TS. The potential for gas intrusion due to this mechanism is mitigated by the HPS "Keep Full" system.

The HPSI hot leg injection lines are isolated from the RCS by two check valves in series, a normally closed MOV, and a third check valve. The check valves are tested at each refueling outage and corrective maintenance is performed if an acceptance criterion is not met.

Potential leakage and degassing at these locations is not considered significant enough to challenge HPSI and LPSI operation.

<u>Leakage from the SITs</u>

The water in the SITs is typically saturated with nitrogen due to the gas volume in the tank that pressurizes the SIT. The discharge piping is pressurized by the SIT pressure and is isolated from the RCS by check valves. The LPSI system and the HPSI system are also isolated by check valves. There are also solenoid and manual valves that connect to the Reactor Drain Tank (RDT).

As required in the ANO-2 TS, the LPSI and HPSI check valves are tested at each refueling outage. SIT tank leakage is trended during the cycle to monitor conditions in the SIT tank and discharge header.

Leakage past the check valves into the HPSI headers has been mitigated by the addition of the HPS that maintains the HPSI headers from the pump's discharge check valves to the SIT check valves at approximately the same pressure as the SIT. This prevents leakage across the check valves and minimizes degasification across the check valves and a buildup of gas voids in the HPSI system. Prior to installation of the HPS system, quarterly surveillances were performed using NDE techniques to verify no significant gas voids existed.

Leakage past the check valves into the LPSI headers has been verified to not be a problem by quarterly surveillances using NDE techniques to verify no significant gas voids exist.

Both the HPSI and LPSI pumps recirculate through a common recirculation header to the open air RWT and are capable of removing gas from the suction piping and recirculation lines during quarterly surveillances. (Note: Recirculation flow is not sufficiently large enough to remove voids in the suction lines, also LPSI at 100 gpm is not large enough to remove voids but HPSI using the same recirculation path, its flow is large enough.)

Gas accumulation in the high points of the HPSI and LPSI system from the SITs has not posed a significant problem for the ANO-2 ECCS systems. The SITs will discharge into the RCS in the event of a LOCA regardless of gas voids in the discharge headers.

Leakage into the Containment Spray System

The CSS is not directly connected to any high pressure systems that contain water saturated with gas. The accumulation of gas voids is not anticipated during normal operations if the system is correctly filled and vented at the start of an operating cycle. Like the HPSI and LPSI pumps, the CSS pumps are able to recirculate to the RWT during quarterly surveillances and could remove any postulated gas voids that could affect the pumps.

The shutdown cooling heat exchangers are vertically mounted u-tube heat exchangers that are flushed to remove air at the end of an outage. They are also located at the lowest portion of the CSS system.

Vortexing from the RWT

Upon low RWT level, a RAS automatically transfers the suction of the HPSI and CSS pumps from the RWT to the Containment Sump. The LPSI pumps are tripped off and do not continue to take suction from either source. Sufficient margin exists to ensure that the switchover is complete prior to drawing air into the suction of the HPSI and CSS pumps.

Vortexing from the Containment Sump

The ANO-2 sump has individual vortex breakers at the inlet of each pipe in the sump pit. The sump structure also acts as a vortex breaker by preventing the development of circulation in the volume around the sump. The flow velocities approaching the sump structure are also relatively low. There is a sufficient level of water available at the start of the RAS to prevent ingestion of air into the HPSI and CSS pumps.

11. Ongoing Industry Programs

Ongoing industry programs are planned to obtain additional information concerning gas intrusion mechanisms and a pump's tolerance for gas ingestion. The results of these activities will be monitored and implemented as appropriate for the HPSI, LPSI, and CSS systems at ANO-2 outside of the GL 2008-01 process.

12. Detailed List of Items that have Not Been Completed, a Schedule for their Completion, and the Basis for that Schedule:

a. Walk downs of the piping within the Containment Building could not be completed prior to October 11, 2008. These walk downs will be completed during the next refueling outage, 2R20, currently scheduled for the fall of 2009.

b. UT examinations of the inaccessible portions of the SDC, LPSI and CSS system located within the Auxiliary Building are to be conducted online prior to 2R20. The subject piping is insulated and is located in the overheads. Scaffolding is required to be erected in order to perform the examinations.

<u>Testing Evaluation</u>

1. Discussion of Periodic Venting or Gas Accumulation Surveillance Procedure Review Results:

ANO-2 does not utilize periodic venting requirements. The HPSI, LPSI and CSS operating procedures contain steps for the proper system filling and venting post maintenance activities but do not contain periodic venting requirements. As a result of HPSI gas intrusion issues experienced during 2004, ANO-2 does utilize a quarterly UT Preventative Maintenance (PM) to perform UT surveillances of portions of the HPSI and LPSI piping. The areas inspected include the HPSI pump discharges, where the charging system enters HPSI header #1, the supply sides of the HPSI and LPSI injection motor operated valves (MOVs), the hot leg injection bypasses, and the injection lines for all HPSI, and LPSI entering the Containment Building penetrations. The penetrations represent the highest points for the HPSI and LPSI systems for both the Auxiliary and Containment side of the systems, and would be the natural place for any gas to collect if present. Should voids be identified, a CR is issued and the void vented. Actions taken under the CR typically include a determination of the cause, correcting the cause and increased monitoring intervals until it can be verified that the cause has been rectified. Since the LPSI system check valves have been repaired and the HPS system was installed, there have been no voids identified in the HPSI and LPSI systems.

The piping on the LPSI injection paths is insulated and is also fitted with easily accessible points so that UT data can be easily obtained. The insulation on the LPSI pump suction and discharge is more difficult to remove and UT examinations are not performed on this section of piping. However, upstream and downstream pressures for the pumps should be the same (after correcting for elevation head) and are checked as part of the surveillance to ensure that no gas pockets are present. CSS piping is not checked but the CSS pumps are operated at full flow during quarterly surveillances. This action dynamically flushes all CSS piping up to the header isolation valves which remain closed in order to prevent inadvertent spraying down of the Containment Building. The opposite side of these injection valves is open to the atmosphere at the spray headers and are periodically cracked open to provide makeup for evaporative losses at the spray headers.

2. Identification of Procedure Revisions or New Procedures:

There were no procedure revisions or the need for new procedures to address gas intrusion has been identified for ANO-2.

3. Discussion on How Procedures Adequately Address the Manual Operation of the RHR System in its Decay Heat Removal Mode of Operation:

ANO-2 is a Combustion Engineering design which utilizes CSS as its RHR function. In the ES configuration the CSS pumps are aligned to the SDC Heat Exchanger and the heat exchanger discharge is aligned to the CSS headers. The CSS is actuated by CSAS. The system initially takes suction from the RWT and switches to the sump upon receipt of a RAS. When a RAS has been initiated the LPSI pumps and recirculation valves are automatically secured and the RHR function is supplied by HPSI and CSS taking suction from the sump. RHR functions during normal operations can be provided by either the CSS pumps or the LPSI pumps, but is typically supplied by the LPSI pumps with injection through the LPSI injection path. This RHR function, also referred to as SDC, is manually initiated by starting a LPSI pump, cracking open one injection valve and one SDC heat exchanger throttle valve and allowing the system to slowly approach RCS temperatures to avoid thermal shock. This process also allows for a controlled dynamic venting of the SDC path thus effectively mitigating gas intrusion concerns for the SDC system during normal operations.

4. Summarization of Procedure Review Results to Determine that Gas Intrusion Does Not Occur as a Result of Inadvertent Draining:

Procedures related to the subject systems for operation, maintenance and testing were reviewed. This review did not identify potential valve manipulations that could result in inadvertent draining or gas intrusion.

5. Description as to How Gas Voids are Documented and Trended, if Found:

Quarterly UT examinations of the HPSI and LPSI discharge and injection piping are conducted. There are no established acceptance criteria for acceptable void size and the discovery of voids identified in the inspection areas results in issuance of a CR. Operability limits are established for certain pipe sizes and function as discussed above, but all attempts are made to characterize the void size and then vent any identified voids. Typically, void characterization is done utilizing the UT equipment; however, voids can also be captured by bladders at the vent locations to ascertain size. Trending would be preformed as part of the site's CAP; however, since the LPSI check valves were repaired and installation of the HPS modification, no voids has been identified.

6. Detailed List of Items that have Not Been Completed, a Schedule for their Completion, and the Basis for that Schedule:

Any corrective actions along with the schedule are listed below in the corrective actions section.

Corrective Actions Evaluation

1. Summarization of Review Results of How Gas Accumulation has been Addressed:

ANO-2's CAP is used to document gas intrusion/accumulation issues as potential nonconforming conditions. Existing PMs for the subject systems require a CR to be initiated, and the Operations Shift Manager or designee to be notified, if a gas void is identified. As part of ANO's CAP, CRs related to plant equipment are evaluated for potential impact on operability and reportability. Therefore, ANO's review concluded that issues involving gas intrusion/accumulation are properly prioritized and evaluated under the CAP.

2. Detailed List of Items that have Not Been Completed, a Schedule for their Completion, and the Basis for that Schedule:

The corrective actions required to support the ANO-2 response to GL 2008-01 is to perform walk downs of the ECCS and CSS piping located in Containment during the 2R20 refueling outage (Fall 2009) and to perform the UT examinations of the inaccessible portions of the SDC, LPSI and CSS system locations within the Auxiliary Building prior to 2R20.

In addition to the required action above, the following actions are recommended in order to address identified vulnerabilities and provide additional protection against any future gas intrusion concerns while optimizing plant venting effectiveness and repeatability. The following items are considered enhancement only and not commitments.

- Vent the "A" Train Spray header bypass line through vent valves. Flow should be allowed to pass through the bypass line valves as part of the vent process (scheduled prior to 11/18/2008).

- Vent the "B" Train Spray header bypass line through vent valves. Flow should be allowed to pass through the bypass line valves as part of the vent process (scheduled prior to 11/18/2008).

- Develop procedure guidance to perform the venting described above (scheduled for 10/17/2008).

- Develop a PM to periodically check the bypass line for gas voids for each containment spray header (scheduled for 12/21/2008).

- A Review of the Design screening review form was performed. The form does not specifically address gas accumulation. This action is issued to add gas accumulation review to the form (scheduled for 07/30/2009).

- The Containment Spray Pump Seal water coolers were identified as needing vent valves. This action is to address the condition via modifications or additional evaluations (scheduled for 10/22/2009).

- One CSS fill and vent procedure was identified as needing improvement in the sequencing of its steps. Develop and initiate the changes to improve the procedure (scheduled for 03/19/2009).

- Vent valves are recommended for the HPSI pump seal water coolers and the LPSI pump seal water coolers. Initiate modification process for installation of these enhancement vents (scheduled for 10/22/2009).

- There are no vents installed on the RWT suction piping and high points in the piping were identified at the common header split to each ECCS suction path and the “B” ECCS suction line. These areas were UT inspected and found to be full of water but vents in these locations are recommended. Initiate modification process for installation of these enhancement vents (scheduled for 10/22/2009).

- There are no vents installed on the “C” HPSI discharge cross-over piping which represents a local high point in the system that cannot be easily vented. This area was UT inspected and found to be full of water but a vent in this location is recommended. Initiate modification process for installation of these enhancement vents (scheduled for 10/22/2009).

- Erect scaffolding and perform UT examinations of the 11 sections of the LPSI, SDC and CSS that could not be previously UT inspected (scheduled for 03/19/2009).

Conclusion

Based upon the above, Entergy has concluded that ANO-2 is in conformance with its commitments to 10 CFR 50, Appendix B, Criterion III, V, XI, XVI, and XVII, as described in the Entergy Quality Assurance Program Manual (QAPM). Any identified deviations that have not been corrected are entered into the ANO CAP for tracking and final resolution, as described in Sections B and C of this attachment.

B. DESCRIPTION OF NECESSARY CORRECTIVE ACTIONS

The following corrective actions were determined to be necessary to assure compliance with the applicable regulations:

- Complete walk downs of inaccessible areas within the Containment Building and to provide the supplement GL 2008-01 response 90 days after the completion of 2R20.
- Install vents on the HPSI, LPSI and CSS pump seal cooling lines

C. CORRECTIVE ACTION SCHEDULE

1. Summarization of the Corrective Actions that Have Been Completed as a Result of the Evaluations Discussed Above:

There have been no corrective actions completed as a result of the evaluations beyond walk downs and evaluations of the piping located in the Auxiliary Building.

2. Summarization of the Corrective Actions to be Completed:

Walk downs of the piping located within the Containment Building are scheduled to be completed during the next refueling outage 2R20 (fall 2009). Results of these walk downs will be documented per previous commitments contained within the three month Generic Letter 08-01 response.

CONCLUSION

Entergy has evaluated the accessible portions of those ANO-2 systems that perform the functions described in this GL and has concluded that these systems are operable, as defined in the ANO-2 TS and are in conformance to Entergy's commitments to the applicable General Design Criteria (GDC), as stated in the ANO-2 SAR.

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 4 of the cover letter, Entergy will complete its evaluation of the inaccessible portions of these systems by startup from the next refuel outage at ANO-2 and will provide a supplement to this response within 90 days thereafter.

Attachment 3 to

0CAN100801

List of Regulatory Commitments

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Entergy will evaluate its applicability to ANO-1 and 2, and evaluate adopting the Traveler to either supplement or replace the current TS requirements.	X		Within 90 days following NRC publication of the Notice of Availability of the TSTF Traveler,
Perform walk downs of the ANO-1 HPI, DH/LPI, BS and CF systems located in the RB during the 1R21 refueling outage (Fall 2008)	X		1R21
Provide the supplement GL 2008-01 response for ANO-1.	X		90 days after the completion of 1R21.
Perform walk downs of the ANO-2 ECCS and CSS piping located in Containment during the 2R20 refueling outage (fall 2009)	X		2R20
Provide the supplement GL 2008-01 response for ANO-2.	X		90 days after the completion of 2R20
Perform the UT examinations of the inaccessible portions of the ANO-2 SDC, LPSI and CSS system locations within the Auxiliary Building	X		Prior to 2R20