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November 17, 2009

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, DOCKET NOS. 50-445 AND 50-446, RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION RELATED TO NRC GENERIC LETTER 2008-01, "MANAGING GAS ACCUMULATION IN EMERGENCY CORE COOLING, DECAY HEAT REMOVAL, AND CONTAINMENT SPRAY SYSTEMS" (TAC NOS. MD7813 AND MD7814)

REFERENCE:
1. NRC Generic Letter 2008-01 "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" dated January 11, 2008 (ML072910759)
2. Luminant Power letter, Logged TXX-08120, from Mike Blevins to the Nuclear Regulatory Commission dated October 14, 2008 (Nine Month Response) (ML082940033)
3. NRC Letter from Balwant K. Singal to Rafael Flores dated September 25, 2009 (Request for Additional Information) (ML083260571)
4. NRC Letter from William H. Ruland to James H. Riley (Nuclear Energy Institute) dated May 28, 2009 (ML091390637)

Dear Sir or Madam:

The Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2008-01 (Reference 1) to request that each licensee evaluate the licensing basis, design, testing, and corrective action programs for the Emergency Core Cooling System (ECCS), Residual Heat Removal (RHR) system, and Containment Spray System (CSS), 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. Reference 2 provided the Luminant Generation Company, LLC (Luminant Power) nine-month response to NRC GL 2008-01.

The NRC issued a request for additional information (Reference 3) related to the Luminant Power response (Reference 2). Luminant Power responses to the NRC request for additional information are provided in Attachment 1. The responses were developed considering the guidance in Reference 4.

The corrective action (commitment number 3618672 from Reference 2) to install vent valves and pressure gauges prior to startup from the refueling outage in the fall of 2009 (Unit 2) has been completed. The corrective action (commitment number 3618672 from Reference 2) to install vent valves and pressure gauges prior to startup from the refueling outage in the spring of 2010 (Unit 1) remains on schedule.

The commitment number is used by Luminant Power for the internal tracking of Comanche Peak commitments.

This communication contains no new licensing basis commitments regarding Comanche Peak Units 1 and 2.

The conclusions provided in Reference 2, that subject systems are in compliance with the current licensing and design bases and applicable regulatory requirements, and that suitable design, operational, and testing control measures are in place for maintaining this compliance, remain unchanged.

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

Executed on November 17, 2009.

Should you have any questions, please contact Mr. Carl Corbin at (254) 897-0121.

Sincerely,

Luminant Generation Company LLC

Rafael Flores

By: 
Fred W. Madden
Director, Oversight & Regulatory Affairs

c - E. E. Collins, Region IV
B. K. Singal, NRR
Resident Inspectors, Comanche Peak

This Attachment provides the Luminant Power response to the NRC Request for Additional Information (RAI), (Reference 1) for Comanche Peak Nuclear Power Plant (CPNPP) Units 1 and 2 regarding the CPNPP response (Reference 2) to Generic Letter (GL) 2008-01 (Reference 3). A list of referenced documents is located at the end of this attachment. [Note - Reference 2(b) as discussed in the CPNPP responses and Reference 4 as discussed in the NRC RAI are referring to the same document.]

NRC RAI # 1

"The licensee intends to conduct ultrasonic inspections of the subject systems with a frequency based on unspecified reactor system conditions. If these inspections will be less frequent than once every 31 days, provide a justification. Include a discussion of any conditions and parameters used to determine the need for inspections; such as pressures in the accumulator and piping, leakage rates, level indicators, and the methods used to monitor these parameters and conditions."

CPNPP Response:

CPNPP will use the method described in the answer to RAI 4 below to determine the periodic and conditional monitoring frequency for each local and system high point location. The ability to change the inspection frequency based upon plant conditions will ensure that the systems continue to be able to perform their specified design function throughout the frequency period. Additionally, this approach is consistent with industry plans to manage gas accumulation by permitting adjustment of the monitoring frequency.

As described below all the identified local and system high point locations currently have an established periodic monitoring frequency of once every 18 months to coincide with the emergence from each refueling outage. CPNPP history clearly supports that the fill and vent in concert with the full flow flush dynamic venting of all the Emergency Core Cooling Systems (ECCS) ensures that the systems are water solid when Mode 3 is reached. Additionally, the credible gas intrusion mechanisms are easily identifiable and the condition based monitoring frequency below will be instituted when gas intrusion mechanisms are identified. Should particular systems or locations in the future show trends of gas formation, then the periodic monitoring frequency would be re-evaluated.

CPNPP has two examples from 2009 that illustrate the success of this periodic/conditional monitoring plan.

1. During the Ultrasonic Testing (UT) inspections as a part of GL-2008-01 response and evaluation, CPNPP found a very small gas void adjacent to the closed isolation valve on the RHR shutdown cooling path. The void size was determined and found to be significantly less than the acceptance criteria for gas in that location. This gas void was discussed in the response to the GL-2008-01 (Reference 2(b) Section A.3.1). It was determined that there was no gas intrusion mechanism existing that would cause this gas void to grow. Further movement of the void was also not possible since the void was against a closed valve at the system high point. Based upon this information a conditional monitoring frequency of 90 days was established to be completed after each quarterly run of the train's RHR pump. No change in the gas void was detected in any subsequent inspection.

2. In late March 2009, Safety Injection (SI) accumulator 2-04 was identified by the system engineer's normal trending data as having a declining level. The pressure in all the possible leak paths was monitored and no pressurization was detected in any flow path. Therefore a UT inspection plan was established monitoring all possible leak paths from the subject accumulator. The local and system high points along these paths were included in the UT plan with a frequency of once a week. This frequency was established based upon the leak rate and potential gas that could come out of solution at the pressure in the flow paths to ensure that any gas void formed could not affect the ability of the systems to perform their safety function. Months went by with no gas detected during the UT inspections. Additional trouble shooting was accomplished and it was determined that the leak was into the Safety Injection cold leg injection lines. At this time the UT plan was modified to remove the locations no longer affected. In early June gas was detected in the SI line. The conditional monitoring frequency was modified to be every four hours. Again this frequency was determined based upon the growth rate of the gas void. Venting was accomplished to remove as much of the void as possible and the monitoring frequency was extended based upon the growth rate. Additional troubleshooting was accomplished which determined the valve that was leaking and causing the depressurization of the SI cold leg injection line resulting in gas accumulation. Maintenance was performed on the valve and post work UT inspections were performed to verify that the gas had been removed and the system was capable of performing its specified function. The conditional monitoring was discontinued.

NRC RAI # 2:

"In Reference 4, the licensee states that if "Gas voids [are] detected [they] are documented, evaluated, and dispositioned in the Comanche Peak Corrective Action Program (CAP)." Please discuss follow-up actions, such as quantifying and trending the volume of the void, as well as the methods used to fill and vent, and measure the amount of gas vented."

CPNPP Response:

Once a void is identified, short-term tracking of the void is initiated and regular inspection frequencies established commensurate to the void size, location, and observed growth rate. Short interval inspections are used early in the event to accurately capture the void characteristics, then incrementally increased as the void is quantified and corrective actions developed. Follow-up inspections are conducted as necessary to ensure proper void management in accordance with the event's course of action plan. Long-term trending of accumulated voids and intrusion mechanisms for individual systems is maintained by the responsible system engineer, while total ECCS gas tracking will be controlled under the Gas Intrusion Plan (GIP) as described further below.

Quantification of gas voids is a conservative estimation of the void size based on ultrasonic inspection measurements, pressure, and temperature combined with laserscan pipe slopes to create a topography of the void, which is then translated into a volume and void fraction. The estimation accounts for connecting branches and/or legs of an open pipe segment at a given elevation. Vented gas quantification is accomplished through comparison of pre-vent volume to the volume measured directly following the venting activity.

Static and dynamic fill and vent processes are used to remove accumulated gas from the ECCS systems in most cases. A vacuum fill process is employed during outages to ensure all pipes placed back in service are water solid, or to remove accumulated gas which is not ventable by static venting while at power. In some cases, a flush procedure may be used to sweep voids into the SI test header, then back to the Refueling Water Storage Tank. For situations which do not allow any of the above methods, location-specific methodologies are developed in cooperation with engineering, operations, and maintenance to ensure operability and remove the maximum amount of gas feasible.

NRC RAI # 3:

"The licensee stated that "Comanche Peak verifies that the pipes are full ... after any maintenance or operations activity which drains portions of the system" (Reference 4). Please clarify the extent to which this verification ensures gas was not transported into a point that was previously considered gas-free."

CPNPP Response:

The Gas Intrusion Plan (GIP) will implement a required engineering evaluation prior to breaching any of the ECCS systems. The above process, which will be formalized in the CPNPP GIP, is currently being used in the interim. The evaluation will assess the potential for gas entrapment at both local and system high points as a result of the system closure and if necessary, develop venting requirements to return the system to a water solid condition. Additionally, the evaluation will consider the potential transport of gas vertically and laterally within the system, and denotes any necessary boundaries or additional inspection locations required. Ultrasonic inspection of designated high points for each system, along with location-specific points, ensures water solid conditions will be achieved.

NRC RAI # 4:

"Describe the Gas Intrusion Program (GIP) mentioned in Reference 4 section A.3.2; including a brief description of training."

CPNPP Response:

CPNPP is in the process of developing the gas intrusion program identified in the CPNPP response to GL-2008-01 (Reference 2(b) Section A.3.2 and B.2 Corrective action 2). NEI 09-10 Rev 0 "Guidelines for Effective Prevention and Management of System Gas Accumulation" (Reference 4) will be used to develop this program. The program will be governed by a new site level administrative procedure with revisions required to several implementing procedures. The major elements of the program are described below:

UT examinations after refueling outages

For the subject systems of GL 2008-01, CPNPP has identified the local and system high point that could potentially accumulate gas if the static fill and vent process in concert with the dynamic vent were to be incomplete. The program will require UT examination of these locations and will determine that the systems are water solid. Any location where gas voids are found will be quantified and entered into the CPNPP corrective action program.

Monitoring gas intrusion sources

In CPNPP's response to GL 2008-01 (Reference 2(b) section A.2.10) the credible gas intrusion mechanisms that were evaluated are listed. The program will identify each of these gas intrusion sources and the applicability to each specific system. Additionally, specific monitoring mechanisms will be established for the gas intrusion mechanisms identified. Anytime a potential gas intrusion mechanism is identified it will be documented in the CPNPP corrective action program.

An example of this monitoring would be a safety injection accumulator level decrease. In this case, pressures in the connecting systems would be monitored to determine the leak path. A UT inspection plan including local and system high points that could accumulate gas given the potential leak locations and a frequency to ensure continued ability of the system to perform its function will be established.

Evaluating Maintenance Activities

Any system maintenance activity that will result in a reduction in fluid inventory of a fluid system in the scope of gas accumulation management will be evaluated to determine the required fill, vent and verification inspection. The work processes will include provision for engineering review and evaluation of such evolutions. If the specific evolution has been previously evaluated and the fill, vent and verification requirement identified then engineering review if required could be limited to verifying applicability.

Engineering will either specify as part of their review or confirm the procedure that the selected verification locations will demonstrate that the system is sufficiently full to perform its functions. This includes the specification of appropriate verification locations and methods.

Establish Periodic Monitoring Frequencies

CPNPP will determine the appropriate monitoring frequency for each monitored potential void location. The monitoring plan must be developed to ensure the system meets the acceptance criteria (design) and must ensure the system is capable of performing its design function throughout the next monitoring interval. The monitoring frequency for each local or system high point location which requires periodic monitoring will be documented. The monitoring frequency may be changed based on the system, location, function, and results of previous monitoring, and should be established considering:

- Probability of gas intrusion due to known gas generation rates at that location
- Probability of gas intrusion due to normal plant evolutions and equipment manipulation.
- Ability to detect gas intrusion caused by equipment failure or degraded equipment conditions.
- Consequence of a gas intrusion event at that location (some locations may tolerate more gas than others).
- System history of gas accumulation.
- Integration of monitoring frequencies into normal plant work schedules (e.g. 31 days, 90 days, 6 months, refueling).

CPNPP has applied these criteria to the local and system high points for the subject systems and determined that the established frequency for UT inspection of these locations will be 18 months to coincide with the emergence from each refueling outage. CPNPP history clearly supports that the fill and vent in concert with the full flow flush dynamic venting of all the ECCS systems ensures that the systems are water solid when Mode 3 is reached. Additionally, the credible gas intrusion mechanisms are easily identifiable and the condition based monitoring frequency below will be instituted when gas intrusion mechanisms are identified. Should particular systems or locations in the future show trends of gas formation then the periodic monitoring frequency would be reevaluated.

Conditional Monitoring Based upon Potential or Actual Gas Intrusion

When an actual gas intrusion event has occurred or there exists an increased possibility that gas intrusion may occur in a given location or system the condition will be documented in the corrective action program.

Additional monitoring or increased monitoring frequencies will be established when potential problems are observed, until the root cause of gas accumulation can be identified and corrected. The monitoring frequency will be established based on evaluation or analysis that demonstrates operability of the system within the monitoring period.

A monitoring plan with specific locations, techniques, and frequencies will be employed to verify that any gas accumulation resulting from the active gas intrusion mechanism remains less than the volume that challenges the ability of the system to perform its design function(s). Levels will be established that would cause a reevaluation if the frequency of greater than expected gas volumes are detected.

The conditional monitoring plan may be pre-established based on the system evaluations and considering accumulation rates and operability void acceptance criteria.

An extent of condition review will be performed to identify other locations that are potentially affected by the observed gas intrusion mechanism and inspections will be performed at the locations identified by the review as required.

Gas Trending

CPNPP will collect the results of all UT inspections and trend local and system high point locations for as found and as left gas void volumes. The trends will be used to determine the need for increased periodic monitoring frequency, potential system modifications, operation procedure changes, and other means to prevent future gas accumulation.

Review of Design Changes for Impact

CPNPP design change process will include an impact review for any design change that could:

- Add a gas intrusion mechanism not previously evaluated
- Add or modify piping in the subject systems
- Alter a subject system in such a way that a new local or system high point would be created
- Result in procedure changes that would affect gas intrusion or accumulation

Training

A training program describing the major elements mentioned above will be in place and available for use by March 31, 2010 (Reference 2(c)).

CPNPP is an active participant in the NEI Gas Accumulation Team, which is currently coordinating with the Institute of Nuclear Power Operations (INPO) in the development of generic training modules for gas accumulation and management. These training modules target the Engineering, Operations, and Maintenance disciplines. When these training modules are completed and become available to the industry CPNPP will evaluate them for applicability to CPNPP and implement a version tailored to meet station needs.

References:

1. NRC Letter from Balwant K. Singal to M. R. Blevins dated September 25, 2009
2. Luminant Power Responses to NRC Generic Letter 2008-01:
    a. Luminant Power letter, Logged TXX-08060, from Mike Blevins to the Nuclear Regulatory Commission dated April 10, 2008 (Three Month Response) (ML081120110)
    b. Luminant Power letter, Logged TXX-08120, from Mike Blevins to the Nuclear Regulatory Commission dated October 14, 2008 (Nine Month Response) (ML082940033)
    c. Luminant Power letter, Logged TXX-08138, from Mike Blevins to the Nuclear Regulatory Commission dated November 11, 2008 (Supplemental Response – Completion of Confirmatory Testing) (ML083260571)
    d. Luminant Power letter, Logged TXX-09118, from Mike Blevins to the Nuclear Regulatory Commission dated September 21, 2009 (Supplemental Response – Revision of Implementation Date for Gas Intrustion Program) (ML092650236)
3. NRC Generic Letter 2008-01 "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" dated January 11, 2008 (ML072910759)
4. NEI 09-10, "Guidelines for Effective Prevention and Management of System Gas Accumulation," Revision 2, October 2009