Luminant

Jay Lloyd
Senior Director, Engineering
& Regulatory Affairs

Comanche Peak
Nuclear Power Plant
(Vistra Operations
Company LLC)
P.O. Box 1002
6322 North FM 56
Glen Rose, TX 76043

T 254.897.5337

CP-202300494
TXX-23081
December 6, 2023

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

Ref 10 CFR 54

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NUMBERS 50-445 AND 50-446
FACILITY OPERATING LICENSE NUMBERS NPF-87 and NPF-89
LICENSE RENEWAL APPLICATION REVISION 0 – SUPPLEMENT 3

REFERENCES:

1. Letter TXX-22077, from Steven K. Sewell to the NRC, submitting Comanche Peak Nuclear Power Plant License Renewal Application, October 3, 2022 (ADAMS Accession No. ML22276A082)
2. Letter TXX-23012, from Jay Lloyd to the NRC, submitting Comanche Peak Nuclear Power Plant License Renewal Application Revision 0, Supplement 1, April 6, 2023 (ADAMS Accession No. ML23096A302)
3. Letter TXX-23022, from Jay Lloyd to the NRC, submitting Comanche Peak Nuclear Power Plant License Renewal Application Revision 0, Supplement 2, April 24, 2023 (ADAMS Accession No. ML23114A377)
4. Letter TXX-23044, from Jay Lloyd to the NRC, Response to Request for Additional Information Regarding Review of the License Renewal Application – Set 1, July 12, 2023 (ADAMS Accession Nos. ML23193A845, ML23193A846, and ML23193A847)
5. Letter TXX-23048, from Jay Lloyd to the NRC, Response to Requests for Additional Information Regarding Review of the License Renewal Application – Sets 2 and 3, July 27, 2023 (ADAMS Accession No. ML23208A193)
6. Letter TXX-23069, from Jay Lloyd to the NRC, Response to Request for Additional Information Regarding the Safety Review of the License Renewal Application – Set 4, October 4, 2023 (ADAMS Accession No. ML23277A176)
7. Letter TXX-23070, from Jay Lloyd to the NRC, License Renewal Application Annual Update 1, October 17, 2023 (ADAMS Accession No. ML23290A273)

Dear Sir or Madam:

In Reference 1, as supplemented by References 2 through 7, Vistra Operations Company LLC (Vistra OpCo) submitted a license renewal application (LRA) for the Facility Operating Licenses for Comanche Peak Nuclear Power Plant (CPNPP) Units 1 and 2. Recent operating experience indicating intermittent spent fuel pool leakage has necessitated changes to the Structures Monitoring Aging Management Program. The attachment to this letter describes this change and the affected sections and page numbers of the docketed LRA (Reference 1) where the changes are to apply.

For clarity, revisions to the LRA are provided with deleted text by ~~strikethroughs~~ and inserted text by **bold red underline**. Revisions to LRA tables are shown by providing excerpts from each affected table. Previous LRA additions are denoted by **bold black text**. Previously submitted deletions to the LRA are reflected in the affected attachment.

This communication contains no new commitments regarding CPNPP Units 1 and 2.

Should you have any questions, please contact Todd Evans at (254) 897-8987 or Todd.Evans@luminant.com.

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

Executed on December 6, 2023

Sincerely,

Jay Lloyd (Dec 6, 2023 15:11 EST)

Jay Lloyd

Attachment

c: (email) w/o Attachments

Mahesh Chawla, NRR, DORL [Mahesh.Chawla@nrc.gov]
Dominic Antonangeli, RGN IV, CPNPP [Dominic.Antonangeli@nrc.gov]
Victor Dricks, RGN IV/OPA [Victor.Dricks@nrc.gov]
John Ellegood, RGN IV, CPNPP [John.Ellegood@nrc.gov]
Dennis Galvin, NRR [Dennis.Galvin@nrc.gov]
Lauren Gibson, NRR/DNRL [Lauren.Gibson.nrc.gov]
Jessica Hammock, NRR, DNRL [Jessica.Hammock@nrc.gov]
Shiattin Makor, RGN IV [Shiattin.Makor@nrc.gov]
Jim Melfi, RGN IV [Jim.Melfi@nrc.gov]
John Monninger, RGN IV [John.Monninger@nrc.gov]
Greg Pick RGN IV [Greg.Pick@nrc.gov]
David Proulx, NRR/RGN IV [David.Proulx@nrc.gov]
Mark Yoo, NRR/DNRL [Mark.Yoo@nrc.gov]
Chris Smith, RGN IV [Chris.Smith@nrc.gov]
Theodore Smith, NMSS/REFS [Theodore.Smith@nrc.gov]
Tam Tran, NMSS/REFS [Tam.Tran@nrc.gov]
Nick Taylor, RGN IV [Nick.Taylor@nrc.gov]
Greg Werner, RGN IV [Greg.Werner@nrc.gov]

Attachment:

Spent Fuel Pool Leakage

12 pages follow

Spent Fuel Pool Leakage

Affected LRA Sections: Table 3.5-1, Table A-3, Section B.2.3.34

LRA Page Numbers: 3.5-64, A-84, B-193, B-194

Description of Change:

Table 3.5-1 (Item Number 3.5-1, 078) is revised to address operating experience that leakage through the SFP liner that is not captured via the leak chase channels has been observed at CPNPP.

Table A-3 and Section B.2.3.34 are revised to add enhancements to the Structures Monitoring Program after considering additional industry and plant-specific OE.

Plant-Specific Operating Experience Related to SFP Leakage

Leakage from the Spent Fuel Pools (SFP), Fuel Transfer Canals, and Refueling Cavities are accounted for in the current CPNPP design. The CPNPP design employs a leak chase system common to many Pressurized Water Reactors that routes SFP, Fuel Transfer Canal and Refueling Cavity leakage to a collection area via drain piping (that is, tell-tales). Such leakage does not normally come into contact with concrete structures. However, under some circumstances, leakage has been known to come in contact with concrete.

The SFP are always filled whereas the Fuel Transfer Canals and the Refueling Cavities are temporarily filled for relatively short periods of time during plant evolutions such as refueling outages. Therefore, active leakage from the Fuel Transfer Canals and Refueling Cavities will only occur during those times that they are filled.

License Renewal NRC inspectors made inquiries with respect to aging management of such leakage during the IP 71002 inspection. As a result, CPNPP conducted a review of relevant operating experience. Leakage was first identified at CPNPP in 1996 at tell-tale drain points near the Unit 1 (south) end of the Fuel Transfer Canal at the sump pit area immediately below the Fuel Transfer Cart. An evaluation concluded that the SFP leakage collection system was operating properly, the leakage was contained and isolated to eliminate the spread of contamination, the leakage did not exceed the makeup capacity to the SFP, and that system operation and component integrity were not adversely affected.

Another instance of leakage was identified in the ceiling of the room located below SFP #2. In 1997, white efflorescence was observed in the ceiling with a puddle on the floor. A liquid sample was analyzed and showed indications of boron and traces of cobalt and cesium. A visual inspection of pipe and cable tray supports in the area of the leak showed no signs of corrosion. A review of drawings concluded that there is no embedded piping or tubing located in the area of the leakage. A comprehensive evaluation, which is described below, concluded that the leaks were not detrimental to the function of the liner or the concrete and reinforcing steel.

Subsequent to 1997, leakage from the SFP was identified in the ceiling of the room located below SFP #2. Leakage was also observed coming from tell-tales associated with the Fuel Transfer Canal. A comprehensive evaluation was performed in 1999 that resulted in the following actions which were completed as of February 2002:

- Repairs of leaks in the Fuel Transfer Canal liner associated with leakage captured in tell-tales. These repairs included identification of leakage points using pressurized instrument air followed by drainage of the transfer canal and repair of the welds. These repairs were completed in May 2000.
- A conservative calculation of the margin available in the upper and lower reinforcement in the concrete slab ceiling of the room below SFP #2. In this calculation, the concrete ceiling slab was modeled as a one way slab using simplified single span beam simulation with fixed-fixed end boundary condition. The most critical load combination, based on the stress analysis of record at the time was used. The analysis showed that there was 34.5% design margin in the bottom reinforcement. A much higher margin (660%) was obtained in the top reinforcement. This calculation was completed in 1999.
- A report on the current condition of the concrete in the ceiling of the room located below SFP #2. The report concluded that the structural integrity of the concrete slab under SFP #2 was within its design basis and adequate margin existed. This conclusion was based on visual inspection of the concrete, margin calculations of over 700% in the lower rebar based on finite element analysis (as opposed to the simplified model utilized in the initial conservative calculation described above), pH measurements, and chemical analysis of the efflorescence. This report was Phase I of the overall evaluation and was completed in November 2000.
- During Phase II of the overall evaluation, the report was revised to include updated load inputs resulting from the reracking of the SFPs. The revised evaluation identified a margin of 191% available for the bottom rebar based on a two-dimensional finite element analysis of the slab between SFP #2 and the room below, using design basis loads and critical load combinations. This assessment was completed in November 2001.
- A detailed evaluation of the condition of the concrete in the ceiling of the room located below SFP #2 was performed, which included hammer sounding, Schmidt hammer (rebound hammer) and visual inspections with windows cut into the concrete to expose the lower reinforcing steel (including descriptions, photographs, and chemical analyses of the concrete at the leakage locations). The hammer sounding proved that the concrete surface in the vicinity of the leakage locations was sound, with no indications of delamination. Both the hammer sounding and the Schmidt hammer testing demonstrated uniformity of the concrete strength at the leakage locations (i.e., there was no difference between the concrete strength at the leakage locations versus other locations away from the leakage). The visual examinations concluded that the concrete and rebar were dry and free of any form of degradation. Chemical analysis of concrete samples indicated that the concrete was maintaining its alkalinity at the leakage locations. These activities were performed in December 2001.

This comprehensive evaluation provides a baseline for future inspections to identify changes in the condition of the concrete and rebar if leakage occurs again in the ceiling of the room below SFP #2.

An additional evaluation was performed in 2004 in response to NRC Information Notice 2004-05. The evaluation recommended cleaning of the tell-tales for the Spent Fuel Pools. As a result of this recommendation, the tell-tales were inspected and cleaned in 2005 and a Preventive Maintenance (PM) strategy was put in place to inspect and clean the tell-tales on a 5 year frequency. This includes removal of identified blockage. The PM includes instructions for inspection and cleaning and was performed in 2010, 2014 and 2019. Cleaning has been successful and hydrolasing was performed in 2010 and 2014.

During a structural walkdown in 2009, dry boron residue was found on the reactor side compartment walls. An evaluation concluded that the boron residue may have originated from a sandbox cover leak or a cavity liner leak in a previous outage (leakage originating from a sandbox cover leak or a cavity liner leak would only occur when the area is flooded during an outage for refueling purposes), and that there was no impact on the concrete or embedded rebar.

Existing Management Activities

Visual inspection walkdowns of the Fuel Handling Building are currently performed every 5 years in accordance with the Structures Monitoring program. These walkdowns will identify evidence of leakage in the ceiling of the area below the SFP or the Fuel Transfer Canals and monitor/assess leakage observed via the leak detection system.

Given that the Refueling Cavities are periodically filled, monitoring of the tell-tales associated with these areas is performed when they are filled. An enhancement is detailed below to also include monitoring of the tell-tales associated with the Fuel Transfer Canals when they are filled.

A 2016 industry effort (Reference 1) researched the impacts of SFP leakage on concrete and found that the potential for significant degradation of reinforced concrete is low. The alkaline nature of the concrete neutralizes the boric acid in the SFP water with degradation limited to a thin layer just below the liner. To ensure that SFP leakage is identified in a timely manner, some recommendations were also provided.

CPNPP currently performs the following actions that meet the guidance from the industry effort:

- Periodic walkdowns via the Structures Monitoring program, including visual inspections of the area below the SFP and monitoring of leakage from the leak detection system.
- Preventive maintenance to clean and inspect the SFP and Fuel Transfer Canal tell-tale tubing every 5 years.
- Preventive maintenance to monitor the Refueling Cavity tell-tales each refueling outage.

Current assessment of the ceiling area beneath SFP #2, Rm X-247A, shows no active leakage. The crystallization is dry, superficial, and there is no loss of integrity of the underlying concrete. The identified areas show no noticeable change from the last inspection (performed in 2019) to the present. This provides confidence that the current actions are sufficient to give reasonable assurance that leakage other than through the tell-tales will be detected and corrective actions taken in a timely manner.

The Structures Monitoring AMP monitors and inspects concrete condition through periodic visual inspections in accessible areas for evidence of degradation and acceptability. LRA Table 3.5.2-5 includes items for cracking, loss of bond and loss of material, and increase in porosity and permeability, cracking, and loss of material for “Concrete interior” that includes the SFP concrete. The Structures Monitoring AMP is the credited AMP for these items. LRA Table 3.5.2-5 also includes the SFP liner managed by the Water Chemistry AMP and monitoring of the SFP water level in accordance with technical specifications and leakage from the leak chase channel.

Assessment of Existing Management Activities

A review of the Operating Experience (OE) contained in Reference 1 was performed. It was found that Reference 1 includes content relative to multiple designs and operating experiences, some of which are applicable to CPNPP. Some aging management practices discussed in Reference 1 provide insights to enhancements to the CPNPP Structures Monitoring AMP. The following is a summary of current practices and also enhancements to the CPNPP Structures Monitoring AMP that will provide added assurance that the intended function of reinforced concrete structures that have the potential to be exposed to leakage containing boric acid are maintained through the Period of Extended Operation (PEO). These enhancements will be completed prior to the PEO in accordance with the Implementation Schedule provided in LRA Table A-3 (as reflected in the LRA markups below). Enhancements that are also captured in the CPNPP CAP will be addressed on a timeline commensurate with the requirements of the CPNPP CAP, which means they are expected to be completed much sooner than what is being committed to in Table A-3.

- Element 3 – Parameters Monitored or Inspected
    - Walkdowns of the SFP and Fuel Transfer Canal structures are performed on a periodic basis, implicitly including those areas that could potentially be exposed to leakage from the SFP or Fuel Transfer Canal.
    - Refueling Cavity tell-tales are monitored each refueling outage when the cavity is filled.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to explicitly address the potential for exposure of SSCs to leakage containing boric acid and require that the periodic walkdowns include all accessible interior walls and ceilings of rooms that are adjacent to (including below) the SFPs, Fuel Transfer Canals, and Refueling Cavities (when accessible). This includes a requirement that newly identified leaks or changes in existing leak sites are entered into and evaluated via the CAP.
    - Inspection and cleaning, including blockage removal, of the SFP tell-tale drains are performed on a periodic basis.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to include periodic inspection and cleaning, including blockage removal, of the Fuel Transfer Canal and Refueling Cavity (when filled) tell-tale drains.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP that the periodic inspection and cleaning of SFP, Fuel Transfer Canal and Refueling Cavity tell-tale drains includes analysis of leak chase system discharge for flow (drip) rate and chemistry, including, at a minimum, measurement of pH, boron concentration and iron content.

- Element 4 – Detection of Aging Effects
    - Walkdowns of the SFP and Fuel Transfer Canal structures are performed on a 5 year frequency.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to ensure that the walkdowns will inspect for any evidence of SFP or Fuel Transfer Canal leakage such as formation of deposits or wet areas on SFP or Fuel Transfer Canal structures.
    - Inspection and cleaning, including blockage removal, of the tell-tale drains are performed on a 5 year frequency.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to assess the frequency of inspection and cleaning of the tell-tale drains to increase confidence that there are no blockages.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to assess blockage detection techniques, including use of video probes to check for development of blockages in the tell-tales.
- Element 6 – Acceptance Criteria
    - An enhancement will be added to the CPNPP Structures Monitoring AMP for the development of acceptance criteria for the parameters monitored. This includes, at a minimum, leak chase system discharge flow (drip) rate, pH, boron concentration and iron content. Any indications of new or increased leakage from the SFP (formation of white crystal deposits or wet areas) will be documented and evaluated via the CAP.
- Element 7 – Corrective Actions
    - Cleaning of the SFP tell-tale drains is performed by using a rod or brush or by high-pressure cleaning (hydrolasing).
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to include cleaning of the Fuel Transfer Canal and Refueling Cavity tell-tale drains using a rod or brush or by high-pressure cleaning (hydrolasing) if inspection results indicate cleaning is necessary.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to require that monitoring data collected for the SFP, Fuel Transfer Canal and Refueling Cavity that do not meet the acceptance criteria will be entered into the CAP and that consideration be given to revisiting structural evaluations to determine whether any future observed indications of changes in the leakage conditions cause structural margin to become inadequate.
    - An enhancement will be added to the CPNPP Structures Monitoring AMP to evaluate OE relative to effective methods for restoring flow to tell-tale drains.

Current practices combined with the enhancements will ensure that the tell-tale system remains functional as designed.

Additional actions are being taken under the CPNPP CAP. These actions were discussed separately during the IP 71002 inspection.

Other Operating Experience

Unrelated to SFP leakage topics discussed above, a question was raised as part of the IP 71002 inspection regarding a groundwater in-leakage event that occurred in October 2023. White deposits and residuals were noted on the ceiling, piping, insulation and other locations in the CST/RWST piping tunnel. It was noted that the conditions appeared to be similar to conditions observed in February 2018. Although not expected to occur for below-grade concrete above the water-table, groundwater in-leakage from perched water may occur during infrequent instances of heavy rainfall. Such deposits (efflorescence, stalactites), including those on the piping, are entered into the corrective action process and cleaned as housekeeping items. The below-grade tunnels and enclosed piping are not subject to continuous or prolonged exposure to groundwater in-leakage (or any chlorides that may be picked up from the soil or concrete by the in-leakage). Therefore, potential impacts of chlorides on the stainless steel piping in the tunnel are not expected but are evaluated by the CAP when in-leakage is identified. Actions captured in the CPNPP CAP for the October 2023 in-leakage event include cleaning of the deposits and establishment of a requirement to periodically inspect and clean deposits in the affected area. The potential for this condition to occur is also considered during the planning for Structures Monitoring program inspections. The Structures Monitoring Program will continue to manage the aging of the subject components such that they will be able to continue to perform their intended functions consistent with the CLB through the PEO.

Also unrelated to SFP leakage, the IP 71002 inspection inquired about an October 2023 CPNPP CAP item that captured an observation of what was initially characterized as a possible crack in the dome portion of the Unit 2 Containment structure. A close up photograph using a drone was taken and was compared to a photo taken in March 2023. An evaluation has been completed which concluded that a crack does not exist but rather it is an area with an increase in concrete thickness, possibly due to variation in formwork placement during the concrete pour (during construction) or during a previously performed repair work. Therefore, there are no aging management considerations pertinent to this condition. This is an example of Operating Experience that would be assessed by the ASME Section XI, Subsection IWL AMP.

References:

1. EPRI 3002007348, Aging Management for Leaking Spent Fuel Pools, December 2016.

LRA Table 3.5-1 (page 3.5-64) is revised as follows:

Table 3.5-1 Summary of Aging Management Programs for Containments, Structures, and Commodities

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 078	Steel components: fuel pool liner	Cracking due to stress corrosion cracking; Loss of material due to pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” and Monitoring of the spent fuel pool water level in accordance with technical specifications and leakage from the leak chase channels	No, unless leakages have been detected through the SFP liner that cannot be accounted for from the leak chase channels	Consistent with NUREG-1801. The Water Chemistry (B.2.3.2) AMP is credited to manage loss of material and cracking of the stainless steel SFP liner and gate and refueling canal liner. The SFP water level is monitored in accordance with TSs. Monitoring of leak chase channels is performed as part of the Structures Monitoring (B.2.3.34) AMP. **Leakage through the SFP liner that is not accounted for from the leak chase channels has been observed historically. When such leakage was observed, it did not impact the ability to maintain water level in the SFP. Aging of the affected concrete is managed by the Structures Monitoring (B.2.3.34) AMP.** Fuel transfer tube and supports, fuel transfer upender, refueling canal liner and reactor vessel permanent cavity seal ring inside Containment are included, with the effectiveness of the Water Chemistry (B.2.3.2) AMP verified by the One-Time Inspection (B.2.3.19) AMP. A plant-specific note is used for the non-spent fuel components.

LRA Table A-3 (page A-84) is revised as follows:

Table A-3
List of LR Commitments and Implementation Schedule

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule
36	Structures Monitoring (A.2.2.34)	XI.S6	* s) Explicitly address the potential for exposure of SSCs to leakage containing boric acid and require that the periodic walkdowns include all accessible interior walls and ceilings of rooms that are adjacent to (including below) the SFPs, Fuel Transfer Canals, and Refueling Cavities (when accessible). This includes a requirement that newly identified leaks or changes in existing leaks are entered into and evaluated via the CAP. t) Require periodic inspection and cleaning, including blockage removal, of the Fuel Transfer Canal and Refueling Cavity tell-tale drains. u) Sample and analyze discharge from the leak chase system for, at minimum, flow (drip) rate and the following chemistry parameters: pH, boron concentration, and iron content. v) Assess blockage detection techniques, including the use of video probes to check for development of blockages in the tell-tales. w) Inspect for evidence of leakage from the SFP or Fuel Transfer Canal, such as the formation of deposits or wet areas on SFP or Fuel Transfer Canal structures. x) Assess the frequency of inspection and cleaning of the tell-tale drains to increase confidence that there are no blockages. y) Develop appropriate acceptance criteria for the parameters that are monitored for the SFP leak detection system, including, at a minimum, leak chase system discharge flow (drip) rate, pH, boron concentration, and iron content. Any indications of new or increased leakage from the SFP or Fuel	No later than 6 months prior to the PEO, i.e.: U1: 08/08/2029 U2: 08/02/2032, or no later than the last refueling outage prior to the PEO.

Table A-3
List of LR Commitments and Implementation Schedule

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule
			Transfer Canal (formation of white crystal deposits or wet areas) will be documented and evaluated via the CAP. z) Clean the Fuel Transfer Canal and Refueling Cavity tell-tale drains using a rod or brush or by high-pressure cleaning (hydrolasing) if inspection results indicate cleaning is necessary. aa) Require that any results of inspections or analysis of data collected (associated with leak detection for the SFP, Fuel Transfer Canal, and Refueling Cavity) that do not meet the acceptance criteria will be entered into the CAP and evaluated, including consideration of revisiting structural evaluations to determine whether any future observed indications of changes in the leakage conditions cause structural margin to become inadequate. bb) Evaluate operating experience relative to effective methods for restoring flow to tell-tale drains.	

* Prior adjustments to Commitment 36 were provided in LRA Supplement 2 (ML23114A377) and in the Annual Update to the LRA (ML23290A273).

LRA Section B.2.3.34 (pages B-193 and B-194), is revised as follows:

Element Affected	Enhancement
1. Scope	• Include the Diesel Generator Buildings, Switchgear Buildings, Transmission Towers associated with Startup Transformers, Spare Start-up Transformers, **Firewater Valve Houses,** Seismic Category I Manholes, Handholes, and Duct Banks**, and Plant Effluent Holdup and Monitor Tanks and pipe encasement** in the scope of the Structures Monitoring AMP. • Perform periodic sampling and testing of groundwater chemistry at a frequency once every 5 years. • Inspect structural members of crane supports, HELB and spray shields, stairs, and platforms, industrial and HELB doors. • Include exposed steel embedment's in the "Steel Structural Elements" group
2. Preventive Actions	• **Specify that the selection of bolting material, lubricants, and installation torque or tension are in accordance with the guidelines of** EPRI NP-5769**, NP-5067**, EPRI TR**-**104213**, and the additional recommendations of NUREG-1339 to prevent or mitigate degradation and failure of** structural bolting. • **Specify the use of** preventive actions for storage, lubricants, and SCC potential in **Section 2 of Research Council for Structural Connections** publication**, "Specification for Structural Joints Using ASTM A325 or A490 Bolts,"** for **structural bolting consisting of** ASTM A325**,** A490**, and equivalent** bolts. • Prohibit the use of molybdenum disulfide (MoS2) or other sulfur containing lubricants for structural bolts.
3. Parameters Monitored or Inspected	• Inspect concrete structures for increase in porosity and permeability, loss of strength, and reduction in concrete anchor capacity due to local concrete degradation. • Visually inspect concrete structures for unique cracking such as "craze", "mapping" or "patterned" cracking to determine the presence of alkali-silica gel. • **Monitor structural sealants for cracking, loss of material, and hardening.** • **Explicitly address the potential for exposure of SSCs to leakage containing boric acid and require that the periodic walkdowns include all accessible interior walls and ceilings of rooms that are adjacent to (including below) the SFPs, Fuel Transfer Canals, and Refueling Cavities (when accessible).** • **Require periodic inspection and cleaning, including blockage removal, of the Fuel Transfer Canal and Refueling Cavity tell-tale drains.**

Element Affected	Enhancement
	• Sample and analyze discharge from the leak chase system for, at a minimum, flow (drip) rate and the following chemistry parameters: pH, boron concentration, and iron content.
4. Detection of Aging Effects	• **Ensure component supports are included in the inspections every 5 years.** • Evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas. • Update the qualification requirements for inspection of structures and components as well as requirements for the reviewer to match ACI 349.3R current code requirements. • **Require engineering evaluation, more frequent inspections, or destructive testing of affected concrete (to validate properties) if ground water leakage is identified. When leakage volumes allow, assessments may include analysis of the leakage pH, along with mineral, chloride, sulfate, and iron content in the water.** • Inspect for evidence of leakage from the SFP or Fuel Transfer Canal, such as the formation of deposits or wet areas on SFP or Fuel Transfer Canal structures. • Assess the frequency of inspection and cleaning of the tell-tale drains to confirm the absence of any blockages. • Assess blockage detection techniques, including the use of video probes to check for development of blockages in the tell-tales.
5. Monitoring and Trending	• Provide guidance for documenting significant findings of the inspection, consistent with ACI 349.3R Section 3.5.5 to monitor and trend the extent of degradation.
6. Acceptance Criteria	• Provide guidance for documentation and archival requirements in accordance with ACI 349.3R Section 3.**4**. • Provide guidance for inspection reports to be completed in accordance with ACI 349.3R Section 3.5.5. • **Specify that the condition of structural sealants is acceptable if observed loss of material, cracking, and hardening will not result in loss of sealing.** • Develop appropriate acceptance criteria for the parameters that are monitored for the SFP leak detection system, including, at a minimum, leak chase system discharge flow (drip) rate, pH, boron concentration, and iron content. Any indications of new or increased leakage from the SFP (formation of white crystal deposits or wet areas) will be documented and evaluated via the CAP.

Element Affected	Enhancement
7. Corrective Actions	• Clean the Fuel Transfer Canal and Refueling Cavity tell-tale drains using a rod or brush or by high-pressure cleaning (hydrolasing) if inspection results indicate that cleaning is necessary. • Require that any results of inspections of analysis of data collected (associated with leak detection for the SFP, Fuel Transfer Canal, and Refueling Cavity) that do not meet the acceptance criteria will be entered into the CAP and evaluated, including consideration of revisiting structural evaluations to determine whether any future observed indications of changes in the leakage conditions cause structural margin to become inadequate. • Evaluate operating experience relative to effective methods for restoring flow to tell-tale drains.