L44 140422 002

Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-14-052

April 22, 2014

10 CFR Part 54

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

Sequoyah Nuclear Plant, Units 1 and 2
Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: **TVA Response to NRC Request for Additional Information Regarding the Review of the Sequoyah Nuclear Plant, Units 1 and 2, License Renewal Application: RAIs B.1.13-4 and 3.0.3-1-3c, Commitment 9.G, and 2013 LRA Annual Update (TAC Nos. MF0481 and MF0482)**

References:
1. Letter to NRC, "Sequoyah Nuclear Plant, Units 1 and 2 License Renewal," dated January 7, 2013 (ADAMS Accession No. ML13024A004)
2. NRC to TVA, "Requests for Additional Information for the Review of the Sequoyah Nuclear Plant, Units 1 and 2, License Renewal Application – Set 20," dated March 12, 2014 (ADAMS Accession No. ML14064A473)

By letter dated January 7, 2013 (Reference 1), the Tennessee Valley Authority (TVA) submitted a License Renewal Application (LRA) to the Nuclear Regulatory Commission (NRC) to renew the operating licenses for the Sequoyah Nuclear Plant (SQN), Units 1 and 2. The request would extend the licenses for an additional 20 years beyond the current expiration dates.

By Reference 2, the NRC forwarded a request for additional information (RAI) labeled Set 20 with a due date of 30 days from the date stated in the RAI (i.e., no later than April 11, 2014). The NRC License Renewal Project Manager, Mr. Emmanuel Sayoc, granted TVA a verbal extension for Set 20 until April 30, 2014. Enclosure 1 provides the requested RAI B.1.13-4 response.

Enclosure 1 contains revisions to Commitment 9.G and TVA's response to RAI 3.0.3-1-3a, dated January 16, 2014. Enclosure 2 contains the SQN 2013 LRA Annual Update, as required by 10 CFR Part 54.21(b).

Consistent with the standards set forth in 10 CFR 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards consideration associated with the LRA previously provided in Reference 1.

There are no new regulatory commitments contained in this letter. Please address any questions regarding this submittal to Henry Lee at (423) 751-2683.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 22nd day of April 2014.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures:

1. TVA Response to NRC Request for Additional Information: B.1.13-4 and 3.0.3-1-3c; Commitment 9.G
2. 2013 LRA Annual Update

cc (Enclosures):

NRC Regional Administrator – Region II
NRC SQN Senior Resident Inspector
NRC SQN Project Manager – lisa.regner@nrc.gov
NRR SQN LR PM - emmanuel.sayoc@nrc.gov

**ENCLOSURE 1**

**Tennessee Valley Authority**

**Sequoyah Nuclear Plant, Units 1 and 2 License Renewal**

**TVA Response to NRC Request for Additional Information:
B.1.13-4 and 3.0.3-1-3c, Commitment 9.G**

**B.1.13-4: UT Examination Methodology of ERCW & HPFP piping (Set 20)**

*Background:*
*The response to request for additional information (RAI) 3.0.3-1 Request 4b, dated January 16, 2014, states that nonintrusive techniques (e.g., volumetric testing) will be used in lieu of conducting flow testing or internal inspections to detect flow blockage, and an ultrasonic testing (UT) technique has been demonstrated on the essential raw cooling water (ERCW) system to detect flow blockage due to silt and clams.*
*Issue:*
*The staff lacks sufficient information to conclude that the UT technique can effectively detect flow blockage caused by corrosion product buildup.*
*Request:*
*For the requests below, ensure that the response addresses each sub-bullet.*

1. ***Provide a detailed description of the ultrasonic procedure that will be used to detect obstructions.***

   TVA Response: The Sequoyah Nuclear Plant (SQN) ultrasonic (UT) procedure used to detect blockage in piping is **N-UT-11**, *Ultrasonic Examination for Detecting and Measuring Fluid Levels in Austenitic and Ferritic Systems*. N-UT-11 was placed in Certrec for the NRC to review on March 3, 2014
   .

   a. ***What UT techniques are used to identify flow blockage in the ERCW system (e.g., 0 degree, guided wave)?***

      TVA Response: A zero degree UT technique is used to identify blockage in the ERCW system.

   b. ***Is the procedure automated or manual?***

      TVA Response: The TVA UT procedure is manual.

   c. ***What are the limits on the thickness, diameter, product form (e.g., straight pipe, elbows, and tees) for the procedure?***

      TVA Response: The limits of the procedure N-UT-11 are:
      (1) the two surfaces are parallel and a back wall signal can be received; and
      (2) the pipe is larger than 0.75" nominal diameter.

2. ***Describe the qualification requirements for personnel and procedures.***

TVA Response: The TVA UT personnel qualification requirements are located in procedure **IEP-200,** *Qualification and Certification Requirements for TVA Inspection Services Organization (ISO) Nondestructive Examination (NDE) Personnel***.**

IEP-200 was placed in Certrec for the NRC to review on March 3, 2014.

IEP-200 establishes the requirements for qualification and certification of TVA ISO personnel performing pre-service or in-service ultrasonic examinations.

   a. ***What are the personnel qualification requirements?***

   TVA Response: The minimum personnel qualification requirement is Level II limited to straight beam. The Level II limited to thickness qualification is not allowed.

   b. ***What are the requirements for requalification (how often, what method, etc.)***

   TVA Response: IEP-200 requires requalification on a three year interval. IEP-200, Section 9, training consists of a written test and a practical factors demonstration.

c. ***What are the procedure requirements?***

<u>TVA Response</u>: The piping debris inspection procedural requirements are provided in N-UT-11, Section 7.4.

The UT technique to identify blockage is performed manually with a zero degree transducer. The following instructions are from **N-UT-11, Section 7.4**:

**7.4 Debris Inspections**

When inspecting for the presence of debris, ensure piping has fluid in it, preferable full. Attach transducer to the side of the pipe using a velocity of .0584 (for water) note the position of the signal. For a four inch pipe this should be at four inches. Ensure your range setting is enough to capture the size piping you are inspecting.

Also note the amount of gain required to obtain an 80% FSH signal. Excessive gain needed to obtain a through pipe signal may be indicative of piping that has I.D. coating (Mic nodules/sludge). This condition should be taken into consideration when inspecting for additional debris.

During the exam, on vertical runs, areas immediately upstream of valves fittings, reducers, flow restrictors, etc. should be inspected first. If debris is found, continue vertically up the pipe until a through pipe signal is obtained and report the area below this point as having debris.

On horizontal piping, after checking for a through pipe signal in the middle of the pipe, start the exam on the bottom of the pipe. If a through pipe signal is obtained here, then the pipe is clear. If no signal is obtained here, roll the transducer up the side of the pipe until a signal appears and report the area below this point as having debris. (i.e., 25%)

In both horizontal and vertical exams, adjust the gain and move the transducer to different areas to determine if the lack of signal is due to an I.D. coatings condition (Mic nodules/sludge). When debris is found, (if the piping is full or near full), place the transducer on top of the pipe and try to obtain a signal from the top of the debris. Percentage of debris can be determined by either using a percentage of screen divisions or using the “A” gate.

Note the characteristics of the signal from the top of the debris in horizontal runs. A single sharp signal is indicative of sand or sludge due to its smooth surface. A multifaceted signal with numerous tips is potentially indicative of mussel shells due to their rough textured surface.

Take precaution to ensure the range is set to capture different diameters of piping being inspected. Also be aware of any attachments on the opposite side of the pipe that may prevent a signal from being obtained in this area. (i.e., weld-o-lets)

***d. What procedure controls are in place to control essential variables for the procedure (e.g., equipment, frequency, and bandwidth)?***

TVA Response: **N-UT-11, Section 4.0**, Equipment and Material Requirements, provides the control of essential variables:

A. A pulse echo ultrasonic instrument shall be used. The instrument shall be equipped with a stepped gain control calibrated in units of 2dB or less. Analog or digitized units may be utilized. Krautkramer-Branson (GE) models USL-38, USL-48, USD-10, USN-50, USN-52, USN-60 and USK-7, Sonic MK-1, and Epoch meet these requirements.

B. Connecting cables shall be coaxial and their length limited to less than that at which significant signal degradation occurs, but shall not exceed 200 feet
.

C. Search units shall be certified as to essential properties including bandwidth, damping, and center frequency. Search units shall be selected according to the following table.

Other search units may be used and such use shall be documented.

| **Material Diameter** | **Size** (Square or Round) | **Frequency** |
|---|---|---|
| 4" or less | 1/4” | 1-5 MHz |
| 4" to 8" | 1/2" | 1-5 MHz |
| 8" and above | 3/4" - 1" | 1-5 MHz |

D. Couplant materials approved for use are listed in N-GP-9. Also General Electric silicone rubber adhesive sealant KTV 106 is a suitable adhesive/couplant.

E. Standard reference blocks (i.e. rompas, IIW, DSC, etc.) used for sweep/range calibration shall be of similar metallurgical structure as the component under examination.

3. ***Describe the practical demonstration performed on the ERCW system in detail.***

   TVA Response: No demonstrations were formally conducted or documented for this process. Therefore, the following questions '*3.a - d*' are not applicable. See TVA response in Question #4 below.

   a. ***How many tests were conducted during the demonstration process?***
   b. ***How many different sizes of pipe were tested?***
   c. ***What adverse conditions were tested for in the demonstration (e.g. blockage, wall thinning, and corrosion)?***
   d. ***Were there any false negatives or false positives during demonstration testing? Quantify if applicable.***

4. ***Describe the results of the field inspections conducted using this UT procedure.***

   a. ***How much field ERCW piping been examined (approximate number of feet) subsequent to the demonstration testing?***

      TVA Response: Watts Bar Nuclear (WBN) plant performs clam/silt inspections quarterly utilizing the described technique per TI-67.004 & TI-67.003.

      Clam/silt inspections at SQN are performed on an annual frequency.

      TVA does not have an "approximate number of ERCW feet of piping" of the demonstration UT testing because the distance between UT points was not recorded.

   b. ***How many tests in the field inspections have detected flow blockage****?*

      TVA Response: WBN has detected several lines blocked. SQN has detected blockage/silt build up at several locations.

      Nine specific UT detected piping blockages were placed in Certrec on March 3, 2014, for the NRC to review.

      TVA did not perform any demonstration UT field test inspection for flow blockage.

   c. ***Have there been any false negatives or false positives during the field examination? Quantify if applicable.***

      TVA Response: There have been no false negatives or false positives during field examination.

      When blockages are identified, the silt/blocked piping is cleaned/flushed and re-inspected to ensure blockages/silt/debris are removed.

**Commitment 9.G due dates revision**:

The due dates stated in Commitment 9.G were in error. The Periods of Extended Operation (PEOs) for SQN Units 1 and 2 are 09/17/20 and 09/15/21 respectively. The NRC requested that all commitments be completed six months prior to the PEO, when feasible. TVA is revising the due dates in Commitment 9.G with deletions lined through and additions underlined.

**Commitment 9.G**:

Revise FWSP procedures to include periodically remove a representative sample of components, such as sprinkler heads or couplings, **within five years prior to the PEO**, and every five years during the PEO, to perform a visual internal inspection of the dry fire water system piping for evidence of corrosion, and loss of wall thickness, and foreign material that may result in flow blockage using the methodology described in NFPA-25 Section 14.2.1. The acceptance criteria shall be “no debris” (i.e., no corrosion products that could impede flow or cause downstream components to become clogged). Any signs of abnormal corrosion or blockage will be removed, its source determined and corrected, and entered into the CAP

Due dates:

SQN1: Within five years ~~w/i 5yr~~ prior to 03/17/20 ~~03/17/15~~, and every five years ~~5yr~~ during the PEO

SQN2: Within five years ~~w/i 5yr~~ prior to 03/15/21 ~~03/15/16~~, and every five years ~~5yr~~ during the PEO

**3.0.3-1-3c:** Revising **Set 19 - RAI 3.0.3-1-3a**
In TVA's response for Set 19 - RAI 3.0.3-1-3a (Follow up to 3.0.3-1, Request 3, in TVA's letter, dated January 16, 2014, pages E-1 – 5 & 11 of 42 (ADAMS Accession No. ML14057A808)), Table 3.3.2-3 should have included a deletion for the 'Piping' row that was previously added in the RAI 3.0.3-1 Request 3 Response, dated November 4, 2013, pg E-1 – 13 of 51(ADAMS Accession No. ML13312A005).

This piping was lined through in the text response of TVA's letter, dated January 16, 2014, pg E-1 – 5 & 11 of 42 (ADAMS Accession No. ML14057A808).

Table 3.3.2-3 is revised as shown below with deletions lined through.

**Table 3.3.2-3**: Fire Protection CO2 and RCP Oil Collection System

| Component Type | Intended Function | Material | Environment | Aging Effect Requiring Management | Aging Management Program | NUREG-1801 Item | Table 1 Item | Notes |
|---|---|---|---|---|---|---|---|---|
| ~~Piping~~ | ~~Pressure boundary~~ | ~~Metal with Service Level III or other internal coating~~ | ~~Treated Water (int)~~ | ~~Loss of coating integrity~~ | ~~Periodic Surveillance and Preventive Maintenance Program~~ | ~~-~~ | ~~-~~ | ~~H~~ |

**ENCLOSURE 2**

**Tennessee Valley Authority**

**Sequoyah Nuclear Plant, Units 1 and 2 License Renewal**

**2013 LRA Annual Update**

## LRA Tables

The following LRA tables are changed as a result of site document changes during the review period. Some of the tables are truncated to only show additions or deletions. Linedthrough text indicates ~~deletions~~ and underlined text indicates additions.

**Table 3.3.2-9**
**Sampling and Water Quality System**
**Summary of Aging Management Evaluation**

| **Table 3.3.2-9: Sampling and Water Quality System** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| ~~Heat exchanger (shell)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Air – indoor (ext)~~ | ~~Loss of material~~ | ~~External Surfaces Monitoring~~ | ~~VII.I.A-77~~ | ~~3.3.1-78~~ | ~~A~~ |
| ~~Heat exchanger (shell)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Treated water (int)~~ | ~~Loss of material~~ | ~~Water Chemistry Control – Closed Treated Water Systems~~ | ~~VII.C2.AP-189~~ | ~~3.3.1-46~~ | ~~C~~ |

**Table 3.3.2-17-17**
**Sampling and Water Quality System**
**Nonsafety-Related Components Affecting Safety-Related Systems**
**Summary of Aging Management Evaluation**

| **Table 3.3.2-17-17: Sampling and Water Quality System, Nonsafety-Related Components Affecting Safety-Related Systems** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Heat exchanger (shell) | Pressure boundary | Carbon steel | Air – indoor (ext) | Loss of material | External Surfaces Monitoring | VII.I.A-77 | 3.3.1-78 | A |
| Heat exchanger (shell) | Pressure boundary | Carbon steel | Treated water (int) | Loss of material | Water Chemistry Control – Closed Treated Water Systems | VII.C2.AP-189 | 3.3.1-46 | C |

**Table 4.3-1**
**Unit 1 Projected and Analyzed Transient Cycles**

| Transient Name | Cycles as of Nov. 1, 2011 | Nominal Rate per Year(2) | Projected Cycles(3) | Allowable Number of Cycles |
|---|---|---|---|---|
| Primary side hydro | 1 | 0.04 | 3 | ~~5~~ <u>10</u> |
| Secondary side hydro | 0 | 0 | 0 | ~~5~~ <u>10</u> |
| Primary side leak test | 0 | 0 | 0 | ~~50~~ <u>200</u> |

**Table 4.3-2**
**Unit 2 Projected and Analyzed Transient Cycles**

| Transient Name | Cycles as of Nov. 1, 2011 | Nominal Rate per Year(2) | Projected Cycles(3) | Allowable Number of Cycles |
|---|---|---|---|---|
| Primary side hydro | 0(5) | 0 | 0 | ~~5~~ <u>10</u> |
| Secondary side hydro | 0(5) | 0 | 0 | ~~5~~ <u>10</u> |
| Primary side leak test | 0(5) | 0 | 0 | ~~50~~ <u>200</u> |

**Table 3.4.2-3-8**
**Steam Generator Blowdown System**
**Nonsafety-Related Components Affecting Safety-Related Systems**
**Summary of Aging Management Evaluation**

| Table 3.4.2-3-8: Steam Generator Blowdown System, Nonsafety-Related Components Affecting Safety-Related Systems | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| ~~Heat exchanger (bonnet)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Air – indoor (ext)~~ | ~~Loss of material~~ | ~~External Surfaces Monitoring~~ | ~~VIII.H.S-29~~ | ~~3.4.1-34~~ | ~~A~~ |
| ~~Heat exchanger (bonnet)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Treated water (int)~~ | ~~Loss of material~~ | ~~Flow-Accelerated Corrosion~~ | ~~VIII.F.S-16~~ | ~~3.4.1-5~~ | ~~C~~ |
| ~~Heat exchanger (bonnet)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Treated water (int)~~ | ~~Loss of material~~ | ~~Water Chemistry Control – Primary and Secondary~~ | ~~VIII.F.SP-74~~ | ~~3.4.1-13~~ | ~~A, 401~~ |
| ~~Heat exchanger (shell)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Air – indoor (ext)~~ | ~~Loss of material~~ | ~~External Surfaces Monitoring~~ | ~~VIII.H.S-29~~ | ~~3.4.1-34~~ | ~~A~~ |
| ~~Heat exchanger (shell)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Steam (int)~~ | ~~Loss of material~~ | ~~Flow-Accelerated Corrosion~~ | ~~VIII.A.S-15~~ | ~~3.4.1-5~~ | ~~C~~ |
| ~~Heat exchanger (shell)~~ | ~~Pressure boundary~~ | ~~Carbon steel~~ | ~~Steam (int)~~ | ~~Loss of material~~ | ~~Water Chemistry Control – Primary and Secondary~~ | ~~VIII.A.SP-71~~ | ~~3.4.1-14~~ | ~~C, 401~~ |

**Table 3.4.2-1**
**Main Steam System**
**Summary of Aging Management Evaluation**

| **Table 3.4.2-1: Main Steam System** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Flow element | Pressure boundary<br>Flow control | Stainless steel | Air – indoor (ext) | None | None | VIII.I.SP-12 | 3.4.1-58 | A |
| Flow element | Pressure boundary<br>Flow control | Stainless steel | Treated water > 140°F (int) | Cracking | Water Chemistry Control – Primary and Secondary | VIII.B1.SP-88 | 3.4.1-11 | A, 401 |
| Flow element | Pressure boundary<br>Flow control | Stainless steel | Treated water > 140°F (int) | Cracking – fatigue | TLAA – metal fatigue | VII.E3.A-62 | 3.3.1-2 | C |
| Flow element | Pressure boundary<br>Flow control | Stainless steel | Treated water > 140°F (int) | Loss of material | Water Chemistry Control – Primary and Secondary | VIII.B1.SP-87 | 3.4.1-16 | A, 401 |
| Heat exchanger (bonnet) | Pressure boundary | Carbon steel | Air – indoor (ext) | Loss of material | External Surfaces Monitoring | VIII.H.S-29 | 3.4.1-34 | A |
| Heat exchanger (bonnet) | Pressure boundary | Carbon steel | Treated water (int) | Loss of material | Flow-Accelerated Corrosion | VIII.D1.S-16 | 3.4.1-5 | C |
| Heat exchanger (bonnet) | Pressure boundary | Carbon steel | Treated water (int) | Loss of material | Water Chemistry Control – Primary and Secondary | VIII.B1.SP-74 | 3.4.1-13 | C, 401 |
| Heat exchanger (shell) | Pressure boundary | Carbon steel | Air – indoor (ext) | Loss of material | External Surfaces Monitoring | VIII.H.S-29 | 3.4.1-34 | A |
| Heat exchanger (shell) | Pressure boundary | Carbon steel | Steam (int) | Loss of material | Flow-Accelerated Corrosion | VIII.A.S-15 | 3.4.1-5 | C |
| Heat exchanger (shell) | Pressure boundary | Carbon steel | Steam (int) | Loss of material | Water Chemistry Control – Primary and Secondary | VIII.B1.SP-71 | 3.4.1-14 | C, 401 |

**Table 2.3.4-1**
**Main Steam System**
**Components Subject to Aging Management Review**

| Component Type | Intended Function |
|---|---|
| Bearing housing | Pressure boundary |
| Bolting | Pressure boundary |
| Ejector | Pressure boundary |
| Flex connection | Pressure boundary |
| Flow element | Pressure boundary<br>Flow control |
| Heat exchanger (bonnet) | Pressure boundary |
| Heat exchanger (shell) | Pressure boundary |
| Nozzle | Flow control |
| Orifice | Pressure boundary<br>Flow control |
| Piping | Pressure boundary |
| Strainer | Filtration |
| Strainer housing | Pressure boundary |
| Tank | Pressure boundary |
| Thermowell | Pressure boundary |
| Trap | Pressure boundary |
| Tubing | Pressure boundary |
| Turbine casing | Pressure boundary |
| Valve body | Pressure boundary |

**Table 3.3.2-2**
**High Pressure Fire Protection – Water System**
**Summary of Aging Management Evaluation**

| Table 3.3.2-2: High Pressure Fire Protection – Water System | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Tubing | Pressure boundary | Stainless steel | Air – indoor (ext) | None | None | VII.J.AP-123 | 3.3.1-120 | A |
| Tubing | Pressure boundary | Stainless steel | Raw water (int) | Loss of material | Fire Water System | VII.G.A-55 | 3.3.1-66 | A |

**Table 2.2-4**
**Structures Not Within the Scope of License Renewal**

| Structure Name | Structure Function or UFSAR Reference |
|---|---|
| Steam generator storage building | Provide a storage facility for the original Unit 1 and Unit 2 steam generators removed during the steam generator replacement projects. |

**Table 3.3.2-1**
**Fuel Oil System**
**Summary of Aging Management Evaluation**

| **Table 3.3.2-1: Fuel Oil System** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Screen | Filtration | Stainless steel | Air – outdoor (int) | Loss of material | External Surfaces Monitoring | VII.H2.AP-221 | 3.3.1-6 | C |
| Screen | Filtration | Stainless steel | Air – outdoor (ext) | Loss of material | External Surfaces Monitoring | VII.H2.AP-221 | 3.3.1-6 | C |

**Table 2.3.3-1**
**Fuel Oil System**
**Components Subject to Aging Management Review**

| **Component Type** | **Intended Function** |
|---|---|
| Bolting | Pressure boundary |
| Filter housing | Pressure boundary |
| Flame arrestor | Flow control |
| Flex connection | Pressure boundary |
| Piping | Pressure boundary |
| Pump casing | Pressure boundary |
| Screen | Filtration |
| Strainer | Filtration |
| Strainer housing | Pressure boundary |
| Tank | Pressure boundary |
| Tubing | Pressure boundary |
| Valve body | Pressure boundary |

**Table 3.3.2-3**
**Fire Protection $CO_2$ and RCP Oil Collection System**
**Summary of Aging Management Evaluation**

| **Table 3.3.2-3: Fire Protection $CO_2$ and RCP Oil Collection System** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Piping | Pressure boundary | Stainless steel | Lube oil (int) | Loss of material | Periodic Surveillance and Preventive Maintenance | VII.C1.AP-138 | 3.3.1-100 | E |
| Piping | Pressure boundary | Stainless steel | Air – indoor (ext) | None | None | VII.J.AP-123 | 3.3.1-120 | A |

**Table 3.3.1**
**Summary of Aging Management Programs for the Auxiliary Systems**
**Evaluated in Chapter VII of NUREG-1801**

| **Table 3.3.1: Auxiliary Systems** | | | | | |
|---|---|---|---|---|---|
| **Item Number** | **Component** | **Aging Effect/ Mechanism** | **Aging Management Programs** | **Further Evaluation Recommended** | **Discussion** |
| 3.3.1-100 | Stainless steel piping, piping components, and piping elements exposed to lubricating oil | Loss of material due to pitting, crevice, and microbiologically influenced corrosion | Chapter XI.M39, "Lubricating Oil Analysis," and Chapter XI.M32, "One-Time Inspection" | No | Consistent with NUREG-1801 for most components. Loss of material for stainless steel components exposed to lube oil is managed by the Oil Analysis Program. The One-Time Inspection Program will verify the effectiveness of the Oil Analysis Program to manage loss of material. For stainless steel piping and strainers in the RCP oil collection subsystem of the fire protection equipment, the External Surfaces Monitoring and Periodic Surveillance and Preventive Maintenance Programs manages loss of material. |

**Table 3.3.2-7**
**Compressed Air Systems**
**Summary of Aging Management Evaluation**

| **Table 3.3.2-7: Compressed Air Systems** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Piping | Pressure boundary | Carbon steel | Air – indoor (ext) | Loss of material | External Surfaces Monitoring | VII.I.A-77 | 3.3.1-78 | A |
| Piping | Pressure boundary | Carbon steel | Condensation (int) | Loss of material | Internal Surfaces in Miscellaneous Piping and Ducting Components | VII.G.A-23 | 3.3.1-89 | C |
| Valve body | Pressure boundary | Carbon steel | Air – indoor (ext) | Loss of material | External Surfaces Monitoring | VII.I.A-77 | 3.3.1-78 | A |
| Valve body | Pressure boundary | Carbon steel | Condensation (int) | Loss of material | Internal Surfaces in Miscellaneous Piping and Ducting Components | VII.G.A-23 | 3.3.1-89 | C |

**Table 3.4.2-2**
**Main and Auxiliary Feedwater System**
**Summary of Aging Management Evaluation**

| **Table 3.4.2-2: Main and Auxiliary Feedwater System** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component Type** | **Intended Function** | **Material** | **Environment** | **Aging Effect Requiring Management** | **Aging Management Program** | **NUREG-1801 Item** | **Table 1 Item** | **Notes** |
| Flex connection | Pressure boundary | Stainless steel | Air – indoor (ext) | None | None | VIII.I.SP-12 | 3.4.1-58 | A |
| Flex connection | Pressure boundary | Stainless steel | Treated water (int) | Loss of material | Water Chemistry Control – Primary and Secondary | VIII.D1.SP-87 | 3.4.1-16 | A, 401 |

**LRA Sections**

The following LRA sections are changed as a result of site document changes during the review period. Some of the sections are truncated to only show additions or deletions. Lined through text indicates ~~deletions~~ and underlined text indicates additions.

**3.3.2.1.9** Sampling and Water Quality

**Aging Management Programs**

The following aging management programs manage the aging effects for the sampling and water quality system components.

- Bolting Integrity
- Boric Acid Corrosion
- ~~External Surfaces Monitoring~~
- Internal Surfaces in Miscellaneous Piping and Ducting Components
- One-Time Inspection
- Water Chemistry Control – Closed Treated Water Systems
- Water Chemistry Control – Primary and Secondary

**3.4.2.1.1** Main Steam

**Environments**

Main steam system components are exposed to the following environments.

- Air – indoor
- Air – outdoor
- Condensation
- Lube oil
- Steam
- Treated water
- Treated water > 140°F

**B.1.31 Periodic Surveillance and Preventive Maintenance**

**Program Description**

| | |
|---|---|
| RCP oil collection | Visually inspect the inside surface condition of carbon steel and stainless steel RCP oil collection piping exposed to waste lube oil to manage loss of material. |

### A.1.31 Periodic Surveillance and Preventive Maintenance Program

The Periodic Surveillance and Preventive Maintenance (PSPM) Program manages for specific components' aging effects not managed by other aging management programs, including loss of material, fouling, cracking, loss of coating integrity, and change in material properties.

Each inspection occurs at least once every five years, with the exception of coating inspections for which frequency is based on coating condition. For each activity that refers to a representative sample, with the exception of coating inspection activities related to piping, a representative sample is 20 percent of the population (defined as components having the same material, environment, and aging effect combination) with a maximum of 25 components. For coated piping, a representative sample is 50% of in-scope coated piping systems or an area equivalent to the entire interior surface of 73 1-foot piping segments for each combination of type of coating, substrate material, and environment.

Credit for program activities has been taken in the aging management review of systems, structures and components as described below.

- Visually inspect the inside surface condition of carbon steel and stainless steel RCP oil collection piping exposed to waste lube oil to manage loss of material.

### 2.3.3.7 Compressed Air

System Description

The purpose of the compressed air systems is to supply adequate compressed air capacity for general plant service, instrumentation, testing, and control. The compressed air systems are common to both units and include the control air system (system code 32) and the service air system (system code 33). The service air system provides compressed air throughout the plant for general purpose use. The control air system provides compressed air for instrumentation and controls.

The control air system includes a safety-related subsystem, the auxiliary control air (ACA) system, which supplies air to vital equipment of Units 1 and 2. The ACA system ensures that all vital equipment will have an adequate instrument-grade air supply during both normal and accident conditions. The remaining nonsafety-related components of the control air system and the components of the service air system comprise the station control and service air (SCSA) system.

SCSA is supplied by two motor-driven reciprocating compressors, two motor-driven centrifugal compressors, and one motor-driven rotary screw service air compressor. The system includes normal accessory equipment such as cylinder cooling equipment, aftercoolers, and safety relief valves. The station control air compressors discharge into two redundant headers. These headers feed the two control air receivers which in turn supply air through redundant headers to the control air station. The control air station contains three complete trains of prefilters, dryers, and afterfilters. The control air is then piped through headers to valves, controllers, instruments, etc. throughout the plant. Service air is supplied to the service air receiver by a single header and by the single rotary screw compressor. The air is not processed through dryers and filter trains as is done for the control air. Service air is piped from the receiver to service outlets and miscellaneous equipment throughout the plant. Service air is provided inside containment and the system includes components that support the containment pressure boundary, which is the only safety function of the service air system.

The ACA system is separated into two independent trains, each containing its own compressor, aftercooler, receiver, dryer, and filters. The compressors and aftercoolers are cooled by ERCW. Manual bypasses are provided around each dryer train for emergency operation and to facilitate dryer maintenance. The ACA piping is arranged so that the auxiliary receivers are charged from the SCSA system during normal operation. The ACA system compressors start automatically when SCSA pressure reduces below the required minimum. Each compressor is sized to supply one ESF train the total safety-related control air requirements of both units in the event of an accident, flood, or loss of the SCSA system.

Air cylinders, accumulators, and regulators are provided for the steam-driven auxiliary feedwater pump level control valves. These support opening or closing the valves during a station blackout.

A valve and associated piping located at the ERCW Pump Station provides protection from a Probable Maximum Flood.

The compressed air systems have the following intended functions for 10 CFR 54.4(a)(1).

- Supply instrument-grade air to vital equipment during both normal and accident conditions.
- Support ERCW system pressure boundary.
- Support containment pressure boundary.

The compressed air systems have the following intended function for 10 CFR 54.4(a)(2).

- Provide for the protection of plant equipment during a design bases flood.

- Maintain integrity of nonsafety-related components such that no physical interaction with safety-related components could prevent satisfactory accomplishment of a safety function.

The compressed air systems have the following intended functions for 10 CFR 54.4(a)(3).

- Perform a function (support for safe shutdown equipment) that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48).
- Perform a function that demonstrates compliance with the Commission's regulations for station blackout (10 CFR 50.63).

License Renewal Drawings

Additional details for components subject to aging management review are provided in the following license renewal drawings.

| | |
|---|---|
| LRA-1,2-47W848-1 | LRA-1-47W845-6 |
| LRA-1,2-47W848-12 | LRA-2-47W845-4 |
| LRA-1,2-47W846-1 | |

### 2.3.3.2 High Pressure Fire Protection

System Description

The purpose of the high pressure fire protection (HPFP) system (system code 026) is to provide a source of water for fire suppression around the site. The system includes the system water supply tanks and pumps, fire water distribution piping, valves, sprinklers, hydrants, hose stations, instruments and controls, and fire extinguishers used for fire suppression throughout the plant. The HPFP system is also connected to two fire/flood mode pumps (old fire pumps), which can be used by opening the normally closed valves which isolate them from the system.

The system water supply is common to both units and consists of an electric fire pump and a diesel fire pump. Each pump can take suction from either of two 300,000-gallon potable water storage tanks (pumps are normally aligned to their own associated tanks) which are supplied by the local municipal utility. The electric pump is the lead pump and the diesel pump is a backup. Each pump is connected to the HPFP system looped yard main which supplies the site fire water distribution system. The HPFP system is normally pressurized by a cross-connect to the fire tank potable water supply and two jockey pumps that automatically start if the potable water supply cannot maintain system header pressure. The fire pumps automatically start on low HPFP system header pressure. The fire water distribution system supplies yard hydrants, interior manual hose installations, manually actuated fixed water suppression systems, and automatic suppression systems throughout the plant. Portable fire extinguishers of a size and type compatible with specific hazards are located throughout the plant and are included in the HPFP system code.

The HPFP system supplies fire suppression equipment inside containment. System components support the containment pressure boundary.

Two safety-related stand-by pumps in the fire protection system (fire/flood mode pumps) are for use during the flood mode condition to assure a long-term source of water to remove RCS and spent fuel pit (SFP) decay heat. These pumps take suction from the forebay and are normally isolated from the HPFP system by closed valves. In the event of a natural flood above plant grade, the auxiliary feed water system for each unit can be connected to the common fire protection looped header through a spool piece connection and used to feed the steam generators. Decay heat can be removed by steam relief through the main steam power operated relief valves. Water can be added to the SFP from the HPFP system using fire hoses located in the SFP area, with SFP decay heat removed via steam exhausted through the area ventilation system.

A valve and associated piping located at the ERCW Pump Station provides protection from a Probable Maximum Flood.

The HPFP system has the following intended functions for 10 CFR 54.4(a)(1).

- Support RCS and SFP decay heat removal in the event of a natural flood above plant grade.
- Support containment pressure boundary.

The HPFP system has the following intended functions for 10 CFR 54.4(a)(2).

- Provide for the protection of plant equipment during a design bases flood.

- Support RCS and spent fuel pit decay heat removal in the event of a natural flood above plant grade.
- Maintain integrity of nonsafety-related components such that no physical interaction with safety-related components could prevent satisfactory accomplishment of a safety function.

The HPFP system has the following intended function for 10 CFR 54.4(a)(3).

- Perform functions that demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48).

(The following changes occur in LRA Section 2.4.3, page 2.4-44)

### 2.4.3 Turbine Building, Aux/Control Building and Other Structures

These structures provide physical support to the transformer yard and switchyard components in the SBO offsite power recovery path. These support structures include the transformer foundations and foundations for the associated transformer yard and switchyard breakers, switchyard bus, and fused disconnect.

The offsite power source required to support SBO recovery is fed through the Unit 1 24 kV-6.9 kV unit station service transformers (USST) 1A or 1B via the Unit 1 500 kV-24 kV Main Transformer, the Unit 2 24 kV-6.9 kV unit station service transformers (USST) 2A or 2B via the Unit 2 161 kV-24 kV Main Transformer, or one of the 161 kV common station service transformers (CSST) A, B or C. For the Unit 1 USSTs, the path include the 500 kV switchyard circuit breaker feeding the 500 kV-24 kV Main Transformer, the U1 500 kV-24 kV Main Transformer, the circuit breaker-to-transformer and transformer-to-onsite electrical distribution interconnections, and the associated control circuits and structures. For the Unit 2 USSTs, the path include the 161 kV switchyard circuit breaker feeding the 161 kV-24 kV Main Transformer, the U2 161 kV-24 kV Main Transformer, the circuit breaker-to-transformer and transformer-to-onsite electrical distribution interconnections, and the associated control circuits and structures. For the CSSTs ~~Specifically~~, the path includes the 161-kV switchyard circuit breaker feeding the common station service transformer, the common station service transformer, the circuit breaker-to-transformer and transformer-to-onsite electrical distribution interconnections, and the associated control circuits and structures.

### 2.5 Scoping and Screening Results: Electrical and Instrumentation and Control Systems

Scoping Boundaries

The Unit 1 and Unit 2 preferred off-site power sources required to support SBO recovery are supplied by two physically and electrically independent circuits from the 161-kV and 500-kV switchyards through three separate common station service transformers (CSSTs) to the onsite electrical distribution system (see LRA Drawing LRA-E-001).

The two physically and electrically independent circuits consist of the normal and alternate off-site power sources. The SQN 500-kV switchyard is the source of one of the physically and electrically independent circuits from the 500-kV switchyard through two separate transformers (USSTs 1A and 1B) to the onsite electrical distribution system. Specifically, this offsite power recovery path includes the 500-kV switchyard circuit breakers feeding the USSTs (1A or 1B) via the U1 Main Transformer. USSTs (1A or 1B) are each capable of supplying power to the two U1 6.9-kV shutdown boards (1A-A, 1B-B) via the Unit Boards (1A, 1B, 1C, 1D). Components in the 500-kV USST preferred off-site power paths consist of switchyard bus and connections, transmission conductors and connections, high-voltage insulators, control circuit cables and connections, and metal-enclosed bus (isolated phase and non-segregated).

The SQN 161-kV switchyard is the source of one of the physically and electrically independent circuits from the 161-kV switchyard through two separate transformers (USSTs 2A and 2B) to the onsite electrical distribution system. Specifically, this offsite power recovery path includes the 161-kV switchyard circuit breakers feeding the USSTs (2A or 2B) via the U2 Main Transformer. USSTs (2A or 2B) are each capable of supplying power to the two U2 6.9-kV shutdown boards (2A-A, 2B-B) via the Unit Boards (2A, 2B, 2C, 2D). Components in the 161-kV USST preferred off-site power paths consist of switchyard bus and connections, transmission conductors and connections, high-voltage insulators, control circuit cables and connections, and metal-enclosed bus (isolated phase and non-segregated).

The SQN 161-kV switchyard is the source of two one of the physically and electrically independent circuits from the 161-kV switchyard through three separate transformers (CSSTs A, B, and C) to the onsite electrical distribution system. Specifically, the offsite power recovery path includes the six 161-kV switchyard circuit breakers (874, 878, 944, 948, 994, 998) feeding the CSSTs (A, B, or C). CSST B is connected to the 161-kV transmission system but does not normally carry load. In the event CSST A or C becomes unavailable, the loads supplied by that transformer transfer to transformer B. CSSTs (A, B, or C) are each capable of supplying power to the two 6.9-kV shutdown boards (1A-A, 1B-B, 2A-A, 2B-B) for each unit. Components in the 161-kV CSST preferred off-site power paths consist of switchyard bus and connections, transmission conductors and connections, high-voltage insulators, 161-kV oil-filled cables and connections, control circuit cables and connections, metal-enclosed bus (non-segregated), and inaccessible power cables and connections with manholes.

Structures supporting breakers, disconnects, transformers, transmission conductors, and switchyard bus within the off-site power recovery paths are evaluated with structures in Section 2.4, Scoping and Screening Results: Structures. Steel transmission towers and foundations utilized in the 161-kV and 500-kV off-site power recovery path are also evaluated in Section 2.4.

B.1.21 Metal Enclosed Bus Inspection
**Program Description**

The Metal Enclosed Bus Inspection Program is a new condition monitoring program that will provide for the inspection of the internal and external portions of metal enclosed bus (MEB) to identify age-related degradation of the bus and bus connections, the bus enclosure assemblies, and the bus insulation and insulators. The program will inspect the following MEB required for recovery of offsite power: MEB (non-segregated) associated with CSST A, CSST B, CSST C, USST buses (1A, 1B, 2A, 2B), the 6.9 kV start buses (1A, 1B, 2A, 2B), and the 6.9 kV unit boards (1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D). MEB (isolated phase) associated with USST 1A, USST 1B, USST 2A, and USST 2B