NORTH ANNA POWER STATION, UNITS 1 AND 2 (NAPS)
SUBSEQUENT LICENSE RENEWAL APPLICATION (SLRA)
REQUESTS FOR ADDITIONAL INFORMATION (RAIS)
SAFETY - SET Y

1. Fire Water System, AMP B2.1.16

Regulatory Basis:

Section 54.21(a)(3) of Title 10 of the Code of Federal Regulations (10 CFR) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the U.S. Nuclear Regulatory Commission (NRC) staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to the managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

Background:

Table XI.M27-1, "Fire Water System Inspection and Testing Recommendations," of NUREG-2191, Volume 2, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17187A204), recommends that the inspection and testing of fire pump suction screens follow Section 8.3.3.7, "Suction Screens," of National Fire Protection Association (NFPA) 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." Note 10 to Table XI.M27-1 of NUREG-2191, Volume 2, states, "…testing and inspections can be conducted on a refueling outage interval if plant-specific OE [operating experience] has shown no loss of intended function of the in-scope SSC [structures, systems, and components] due to aging effects being managed for the specific component (e.g., loss of material, flow blockage due to fouling)." Section 8.3.3.7 of NFPA 25 requires the suction screens be "inspected and cleared of any debris or obstructions" following the "waterflow portions of the annual test or fire protection system activations."

Subsequent License Renewal Application (SLRA) Section B2.1.16, "Fire Water System," includes an exception to Element 4, "Detection of Aging Effects." Instead of the fire pump suction screens being inspected for applicable aging effects on a refueling outage interval based on operating experience, Section B2.1.16 of the SLRA states:

> The circulating water [CW] and service water [SW] traveling screens will be monitored for a change in differential pressure since the water flow to the fire protection pumps travels through the respective circulating or service water traveling screens prior to the fire pump suction strainers.

> Monitoring and trending of the circulating water and service water traveling screens dp [differential pressure] will ensure clearing of any debris or obstructions from the fire protection suction is performed as a result of pump activations.

SLRA Table 3.3.2-42, "Auxiliary Systems – Fire Protection – Aging Management Evaluation," cites Aging Management Review (AMR) item 3.3.1-064 to manage loss of material and flow blockage of the copper alloy strainer element (fire pump suction screen) exposed to raw water by the Fire Water System program. The April 29, 2021 (ADAMS Accession No. ML21119A287), response to the NRC's Request for Additional Information (RAI) B2.1.16-1 revised SLRA Table 3.3.2-42 by adding plant-specific Note 13 to AMR item 3.3.1-064, which states, "As noted in the Fire Water System (B2.1.16) program exception, the filtration intended function of the fire pump suction strainer element will be performed by the upstream service water or circulationg water system traveling screens, which are active components and not subject to aging management review." The April 29, 2021, RAI response also described several activities, including periodic visual inspections to identify degradation or damage, that "have been credited as aging management activities for the CW and SW traveling screens as preventive measures in the Fire Water System program (B2.1.16)."

For original license renewal, the NRC staff noted that the SW traveling screens, which have a filtering intended function, were identified as "filters/strainers" in the service water system and included AMR items to manage loss of material.

RAI B2.1.16-1a (Exception for Fire Pump Suction Screen Inspections)

Issue:

The NRC staff is unclear on the rational for addressing the CW and SW traveling screens as active components not subject to aging management. 10 CFR 54.21(a)(1)(i) states that structures and components "That perform an intended function, as described in §54.4, without moving parts or without a change in configuration or properties," are subject to an aging management review. The staff's understanding of how the traveling screens work is that the filtering aspect is done by screens with certain size holes. As debris starts to clog the traveling screens, the mechanism cycles to allow a clean traveling screen to be appropriately positioned and the debris gets washed off the traveling screens. This is done by monitoring differential pressure across the traveling screens and cycling when the differential pressure gets too high. Therefore, it seems that although the traveling screen moves, the filtering function is performed without requiring moving parts. The moving aspect is only to refresh the filtering medium, and the moving aspect does not perform the filtering function.

As noted in the Statements of Consideration (SOC) for the 1995 revision to 10 CFR Part 54 (60 FR 22461, May 8, 1995), components can have active functions, passive functions, or both. The SOC also states that current licensee programs and activities are adequate to manage the effects of aging on the active functions of all components, and that direct verification is practical for active functions where the parameter of concern (required function) can be directly measured or observed. However, for passive functions, the relationship between the measurable parameters and the required function is less directly verified and the verification is generally done indirectly by confirmation of physical dimensions or component physical condition. The NRC staff considers that the "filter" intended function for the traveling screen

includes both an active function associated with flow blockage, which can be directly verified through monitoring the differential pressure, and a passive function associated with loss of material, which can only be verified by confirmation of physical dimension or physical condition of the traveling screens themselves. If the traveling screen corrodes or if the traveling screen material cracks, larger diameter debris could pass through to the fire pump suction screen.

As noted above, the April 29, 2021, RAI response described activities that are credited for aging management of the CW and SW traveling screens, which can directly verify the physical dimension or physical conditoin of the traveling screens. However, the RAI response did not incorporate these credited aging management activities into the SLRA. Incorporating the credited aging management activities in the SLRA provides reasonable assurance that the passive function associated with loss of material of the CW and SW traveling screens will be managed during the subsequent period of extended operation.

As noted above, SLRA Table 3.3.2-42 includes an AMR item to manage both loss of material and flow blockage of the copper alloy fire pump suction screen. In addition, the SLRA was modified to note that the filtration intended functon of the fire pump suction screen will be performed by the upstream CW and SW traveling screens. While the flow blockage aging effect of the fire pump suction screen can be reasonably monitored by the differential pressure across the upstream traveling screens, a comparable situation does not exist for the loss of material aging effect of the fire pump suction screen. SLRA Section B2.1.16 and the April 29, 2021, RAI response do not state how the periodic visual inspections and monitoring of the differential pressure of the CW and SW traveling screens will manage loss of material of the fire pump suction screen. Given that the fire pump suction screens could deteriorate to the extent that screen material could reach the fire pump.

Request:

1. Discuss the rational for addressing the passive function associated with loss of material of the CW and SW traveling screens as active not subject to aging management. Alternatively, provide AMR items to manage loss of material for these screens.

2. Revise the SLRA to incorporate the description of the activities credited for managing loss of material (i.e., degradation and damage) of the CW and SW traveling screens, such as those described in the April 29, 2021, RAI response.

3. Describe how the proposed exception to Element 4 (e.g., type of activities, frequency, procedures) will manage loss of material for the fire pump suction screens.

2. Outdoor and Large Atmospheric Metallic Storage Tanks, AMP B2.1.17

Regulatory Basis:

Section 54.21(a)(3) of Title 10 of the Code of Federal Regulations (10 CFR) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the

current licensing basis for the period of extended operation. One of the findings that the U.S. Nuclear Regulatory Commission staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to the managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

Background:

SLRA Section B2.1.17, "Outdoor and Large Atmospheric Metallic Storage Tanks," as amended by letter dated April 29, 2021 (ML21119A287), states that the Outdoor and Large Atmospheric Metallic Storage Tanks program is consistent with the GALL-SLR, Section XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks". Additionally, SLRA Section B2.1.17, states "The ECST vent and vacuum breaker caulking is periodically inspected during ECST missile shield inspections.

GALL-SLRA Section XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks, " states "Degradation of an exterior metallic surface can occur in the presence of moisture; therefore, periodic visual inspections at each outage are conducted to confirm that the paint, coating, sealant, and caulking are intact."

GALL-SLRA Section XI-S6, "Structures Monitoring," states "[t]he inspection frequency depends on safety significance and the condition of the structure as specified in NRC RG 1.160. In general, all structures are monitored on an interval not to exceed five years."

RAI B.2.1.17-2

Issue:

A justification was not provided for the exception between the inspection frequency recommended by the GALL-SLR XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks," which recommends caulking to be inspected at every outage and the SLRA which indicates that caulking will be periodically inspected during ECST missile shield inspections. Missile Shield inspection is in scope under the GALL-SLRA Section XI-S6, "Structures Monitoring" program which states that inspection frequency is on a five-year interval.

Request:

Provide a technical justification for the use of the GALL-SLRA Section XI-S6, "Structures Monitoring," program which has a less frequent inspection than the GALL-SLRA Section XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks," program that recommends inspection of caulking at every refueling outage.

3. Selective Leaching, AMP B2.1.21

Regulatory Basis:

Paragraph 54.21(a)(3) of 10 CFR requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI B2.1.21 1a

Background:

As amended by letter dated April 1, 2021, SLRA Section B2.1.21, "Selective Leaching," states the following:

- "[t]he Selective Leaching program is a new program that, when implemented, will be consistent, with NUREG-2191, Section XI.M33, Selective Leaching."
- "[a] sample of 3 percent of the population or a maximum of ten components per population at each unit will be visually and mechanically (gray cast iron and ductile iron components) inspected [in each 10 year interval for one time and periodic inspections]."
- "[f]or two-unit sites the periodic visual and mechanical inspections can be reduced from ten to eight because the operating conditions and history at each unit are sufficiently similar (e.g., flowrate, chemistry, temperature, excursions) such that aging effects are not occurring differently between the units."

Dominion's response to RAI B2.1.21 1 dated April 1, 2021 (ADAMS Accession No. ML21091A187) addresses the staff's request (i.e., provide a basis for using the extent of inspections in GALL-SLR AMP XI.M33 for gray cast iron piping and piping components exposed to soil) in four different technical areas: (1) selection of leading sample location; (2) enhanced fire water jockey pump monitoring; (3) aging management effectiveness; and (4) elimination of fire protection over pressure events.

During a public meeting on May 27, 2021, Dominion provided additional discussion on RAIs B2.1.21 1 and B2.1.21 2 (the following discussion is relevant to RAIs B2.1.21 1 and B2.1.21 2, but will only be discussed in this RAI). Dominion's presentation (ADAMS Accession No. MLXXXXXXXXX) during the public meeting included the following statements:

(a) "[s]elective Leaching one time inspections (pre SPEO) more than triples the XI.M33 inspections with 50 components rather than 16 components inspected at both Units;" and

(b) "[e]xcavating 10 foot piping segments for inspection is consistent with NUREG 2191 XI.M41[.]Based on Table XI.M41 2 for cathodic protection meeting availability and effectiveness performance criteria, one inspection of a 10 foot piping length of buried gray cast iron piping would be required every ten years."

In addition, Dominion stated during the public meeting that all buried gray cast iron fire protection piping is provided with cathodic protection.

SLRA Section B2.1.27, "Buried and Underground Piping and Tanks," states cathodic protection will be provided for buried piping in the following systems: flood protection dike, service water, and emergency electrical power.

UFSAR Section 3.11.3, "Corrosion Prevention for Underground Piping," states "[b]uried piping adjacent to the service water headers is also bonded into the cathodic protection system to mitigate the corrosive effects of stray currents of the service water cathodic protection. Piping that is bonded in the subsystems includes….6 inch and 12 inch fire mains…"

Issue:

The staff's issues with the four technical areas of Dominion's response to RAI B2.1.21 1 are as follows:

(1) This section describes the criteria for the selection of the leading inspection sample location. However, given the industry OE described in IN 2020-04, it does not specifically address why the extent of inspections in GALL-SLR AMP XI.M33 are appropriate for gray cast iron piping and piping components exposed to soil.

(2) This section describes enhanced fire water jockey pump monitoring which, along with timely corrective actions, can reduce exposure of buried gray cast iron fire protection piping to an aggressive wet soil environment that promotes loss of material due to selective leaching. The staff recognizes that rates of external surface selective leaching are likely to be higher on buried piping segments where there is ongoing through wall or non pressure boundary leakage (i.e., higher moisture content results in higher soil corrosivity per AWWA C105, "Polyethylene Encasement for Ductile-Iron Pipe Systems," Table A.1, "Soil Test Evaluation," and Table 9-4, "Soil Corrosivity Index from BPWORKS," of EPRI Report 3002005294, "Soil Sampling and Testing Methods to Evaluate the Corrosivity of the Environment for Buried Piping and Tanks at Nuclear Power Plants"). However, extensive selective leaching can occur on the external surfaces of buried piping with or without ongoing leakage from the pipe. Therefore, enhanced jockey pump monitoring does not appear to be an applicable basis addressing the staff's request in RAI B2.1.21 1.

(3) The section regarding aging management effectiveness states "[t]here were nine inspections of cementitious lined buried gray cast iron fire protection piping [since 2011]." However, this section also states "[i]n 2015, the piping inspection guidance

of the UPTI [Underground Piping and Tank Integrity] program that included selective leaching inspection considerations was enhanced to consider susceptible materials and inspect for the presence of selective leaching by visual, mechanical, or other appropriate means." Based on the timing on the nine inspections of buried gray cast iron fire protection system piping, which were done before 2015 when inspection guidance was revised to account for selective leaching, the staff needs justification that these inspections were a sufficient basis for addressing the staff's request in RAI B2.1.21 1.

(4) This section describes implementation of corrective actions to minimize fire protection over-pressurization events that have caused previous piping failures. Although the RAI response states that crack growth of casting defects resulted in leakage that promoted selective leaching, none of the documentation associated with the six previous piping failures mentioned selective leaching as a contributing cause. In that regard, the operating experience discussion in the SLRA for the Selective Leaching program did not indicate that selective leaching had been involved in the previous failures. As noted in technical area No. 2 above, extensive selective leaching can occur on the external surfaces of buried piping with or without ongoing leakage from the pipe. Therefore, implementation of corrective actions to minimize fire protection over-pressurization events does not appear to be an applicable basis addressing the staff's request in RAI B2.1.21 1.

In addition, the staff notes the following with respect to discussions during the May 27, 2021, public meeting:

- The presentation material for "Selective Leaching Extent of Inspection" says that inspections for cracking and loss of material of cementitiously lined buried gray cast in fire protection piping is based on one-time, periodic, and opportunistic inspections. It further states that the one-time inspections prior to the subsequent period of extended operation is consistent with GALL Report AMP XI.M35, "ASME Code Class 1 Small Bore Piping," resulting in a sample size of 25 components per unit, which more than triples the number of inspections provided in GALL Report AMP XI.M33, "Selective Leaching" (i.e., 50 components at both units rather than the 16 components). The staff seeks clarification regarding if 50 or 16 buried gray cast iron components will be inspected during the pre SPEO 10 year interval. In addition, the staff seeks clarification if these inspections will be at one location (i.e., 50 or 16 consecutive 1 ft segments) or at multiple locations (e.g., five discrete 10 ft segments) to provide a representative sample of the entire buried gray cast iron fire water system component population.

- Dominion stated that all buried gray cast iron fire protection piping is provided with cathodic protection; however, based on the staff review of the SLRA and UFSAR, it appears that only portions of the system in the vicinity of the buried service water headers are provided with cathodic protection. The staff seeks clarification regarding if all buried gray cast iron fire protection piping will be provided with cathodic protection at least five years prior to the SPEO.

Request:

Provide a technical justification for using the extent of inspections in GALL-SLR AMP XI.M33 for gray cast iron piping and piping components exposed to soil. In addition, address the issues identified by the staff in response to the public meeting on May 27, 2021 (i.e., extent of inspections in the pre-SPEO period, whether the inspections would be performed at one or multiple locations, whether buried gray cast iron fire protection piping will be provided with cathodic protection at least five years prior to the SPEO) and revise the SLRA as appropriate.

regard to the matters described below.

RAI B2.1.21 1a

Background:

In RAI B2.1.21-2, the staff requested the criteria and justification of the approach that will be used to select the single 10-foot piping section that would be a representative sample of the entire buried gray cast iron fire water system piping population. In its response (ADAMS Accession No. ML21091A187), Dominion provided the following criteria that will be used to select the sample location for the Selective Leaching program:

- Older piping segments
- Piping found to be continuously wetted due system leakage or in soil with high corrosivity
- Piping that is not cathodically protected
- Piping with significant coating degradation or unexpected backfill
- Consequence of failure (i.e., proximity to safety-related piping)
- Pipe locations with high stress and/or cyclic loading conditions

Issue:

The criteria provided by NAPS does not appear to be sufficiently specific to identify a single 10 foot section of buried gray cast iron piping that would provide bounding or lead components that are the most susceptible to selective leaching. For example, it is not clear how much of the buried gray cast iron piping is not cathodically protected. While non-cathodically protected piping would clearly be more prone to corrosion and is appropriate to include in the sample population, having an extensive amount of non-cathodically protected piping would not justify limiting the sample selection to only a single location. Similarly, while the older pipe segments would clearly represent bounding or lead components, having an extensive amount of older pipe segments would not justify limiting the sample selection to a single location.

In addition, some of the criteria for selecting the single 10-foot section of pipe appear to require information that would only be available after a pipe is excavated and inspected (e.g., continuously wetted, significant coating degradation, unexpected backfill). In other cases, some of the specified criteria (i.e., proximity to safety-related piping, piping locations with high stress

and/or cyclic loading conditions) do not appear to be applicable to susceptibility of the aging mechanism of concern (i.e., selective leaching) and would not be pertinent to sample selection as it relates to bounding or leading components.

The NRC staff view is that the response did not justify the adequacy of the approach to select a single 10-foot piping section as meeting the guidance to conduct eight periodic inspections of a representative sample of the entire buried gray cast iron fire water system piping population, as provided in NUREG-2191, Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) aging management program (AMP) XI.M33, "Selective Leaching."

Request:

Provide technical justification for the exception being taken to the guidance in GALL-SLR Report AMP XI.M33 for conducting eight visual and mechanical inspections and two destructive examinations on a sample that is representative of the entire population.

4. Buried and Underground Piping and Tanks, AMP B2.1.27

Regulatory Basis:

Paragraph 54.21(a)(3) of 10 CFR requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below

Background:

In RAI B2.1.27-1, the staff requested additional information regarding how the Buried and Underground Piping and Tanks aging management program (AMP) will manage cracking due to cyclic fatigue for buried gray cast iron piping. Dominion's response to RAI B2.1.27 1 dated April 1, 2021 (ADAMS Accession No. ML21091A187) states that NUREG-2191, AMP XI.M41, "Buried and Underground Piping and Tanks" allows fire water jockey pump monitoring as an alternative to performing visual inspections of the buried fire protection system components. The response then referred to the response for RAI B2.1.21-1 (regarding extent of inspections for the Selective Leaching program) for additional details regarding fire water jockey pump monitoring.

Dominion's response to RAI B2.1.21 1 (same letter as above) includes a section "Enhanced Fire Water Jockey Pump Monitoring," that states if an unexpected fire water jockey pump start occurs, then further investigation will isolate and identify the leak location. The response also states that this will minimize overpressure events by detecting crack growth that results in

elevated piping leakage, and that minimizing elevated system leakage due to crack growth will prevent unexpected jockey pump starts that create a potential for an overpressure event. In the section "Elimination of Fire Protection Overpressure Events," it states that corrective actions to address buried fire protection piping failures included performing fire water functional testing with the discharge valve shut, eliminating fire pump sequential start testing, and revising fire protection testing to avoid automatic fire pump starting. In the section "Aging Management Effectiveness," it notes that there has been no documented cracking of buried gray cast iron fire protection piping since 2003.

During a public meeting on May 13, 2021, Dominion provided additional discussion on RAI B2.1.27 1. Subsequent to the public meeting, Dominion uploaded several documents to the ePortal for the staff's review. One of the documents (MESL-N-00233, "Analysis of North Anna Station Cast Iron Fire Protection Line Failure," dated October 12, 1989) included the following statements:

- "[c]harpy V-notch tests performed at 70 degrees F revealed that the cast iron pipe material has practically no notch toughness."

- "[t]he significance of this failure is marked by the relatively small critical crack size. Because this cast iron pipe material may fail in the presence of a flaw that is approximately 4 to 6 inches in length, it is unlikely that noticeable water seepage would occur before catastrophic failure. Thus, if another crack location exists at a casting defect in the fire protection line, and this crack is sensitive to fatigue driven crack extension, future system performance tests may lead to catastrophic failure. Such a catastrophic failure will likely occur again without warning as the low toughness of this material does not suggest leak-before-break."

RAI B2.1.27 1a (Cyclic Fatigue – Follow-Up)

Issue:

Failures of buried gray cast iron fire protection system piping have not occurred at North Anna since 2003 and the staff notes that the corrective actions taken after the 2003 event reduced the frequency of the hydraulic transients. However, these corrective actions did not eliminate overpressure events (which the applicant attributed as the cause of the failures) that would occur whenever there is an actual demand on the system by starting either of the main (electric and diesel-driven) fire water system pumps or to a lesser extent, starting the jockey pump. In addition, although some portions of the gray cast iron piping have been replaced with ductile iron, there is still a substantial amount of original piping likely with characteristics (i.e., manufacturing flaws) comparable to the piping that previously failed, which has also been subjected to the same past transients.

NUREG-2191, AMP XI.M41 allows monitoring of the fire water jockey pump as an alternative to visually inspecting the buried fire protection system components. However, as noted in the introduction of NUREG-2191:

If an applicant credits an AMP described in the GALL-SLR Report in the SLRA, the applicant should ensure that the conditions and operating experience (OE) at the plant are bounded by

the conditions and OE for which the GALL-SLR Report program was evaluated. If these bounding conditions are not met, the applicant should address any additional aging effects and augment the AMPs for subsequent license renewal.

The conditions and OE for which GALL-SLR AMP XI.M41 was evaluated do not bound the conditions and OE at North Anna with respect to managing cracking due to cyclic fatigue. Specifically, GALL SLR AMP XI.M41 does not include consideration of cyclic fatigue of gray cast iron piping due to pressure surges from pump starts. In addition, the operating experience considered by GALL-SLR AMP XI.M41 did not include loss of intended functions due to cracking of gray cast iron piping.

The approach being proposed by Dominion is based on an approach of using leakage detection to provide an indication of piping degradation that could result, if uncorrected, in pipe rupture. In order to make a safety finding that the cyclic fatigue failures are unlikely to occur during the subsequent period of extended operation, the staff requires technical details beyond what has been provided (due to the continued growth of flaws that have not yet grown to a critical flaw size).

Request:

Provide additional information describing how jockey pump monitoring will adequately manage cracking due to cyclic fatigue for gray cast iron piping and piping components exposed to soil, which addresses the following:

(1) Describe the enhanced jockey pump monitoring in the 10-element AMP format

(2) The acceptance criteria associated with the monitoring

(3) If the acceptance criteria are met, the justification that provides assurance that the piping is capable of performing its intended functions. For example:

    a. What is the piping leak rate that meets the criteria?
    b. How does the leakage rate correlate to a flaw size in the piping?
    c. What is the relationship of this leakage flaw size to the critical crack size that could result in rupture of the piping?