February 19, 2010

Mr. Randall K. Edington
Executive Vice President, Nuclear
Mail Station 7602
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3, LICENSE RENEWAL APPLICATION (TAC NOS. ME0254, ME0255, AND ME0256)

Dear Mr. Edington:

By letter dated December 11, 2008, as supplemented by letter dated April 14, 2009, Arizona Public Service Company (APS) submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 to renew Operating License Nos. NPF-41, NPF-51, and NPF-74 for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3, respectively. The staff is reviewing the information contained in the license renewal application and has identified in the enclosures areas where additional information is needed to complete the review. Further requests for additional information may be issued in the future.

Items in Enclosure 1 were discussed with APS staff on January 28, 2010. APS staff did not request a conference call to discuss Enclosures 2 and 3. A mutually agreeable date for your response was determined to be 30 calendar days from the date of this letter. If you have any questions, please contact me at 301-415-1906 or by e-mail at Lisa.Regner@nrc.gov.

Sincerely,

/RA/

Lisa M. Regner, Sr. Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-528, 50-529, and 50-530

Enclosures:
As stated

cc w/encls: See next page

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OFFICE	LA:DLR	PM:RPB2:DLR	BC:RPB2:DLR	PM:RPB2:DLR
NAME	SFigueroa	LRegner	DWrona	LRegner
DATE	2/4/10	2/18/10	2/19/10	2/19/10

OFFICIAL RECORD COPY

Letter to Randal K. Edington from Lisa M. Regner, dated February 19, 2010

DISTRIBUTION:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3, LICENSE RENEWAL APPLICATION (TAC NOS. ME0254, ME0255, AND ME0256)

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L. Regner
D. Drucker
R. Hall
B. Mizuno, OGC
R. Treadway, RIV
G. Pick, RIV

Palo Verde Nuclear Generating
Station, Units 1, 2, and 3

cc:

Mr. Steve Olea
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, AZ 85007

Mr. Douglas Kent Porter, Senior Counsel
Southern California Edison Company
Law Department, Generation Resources
P.O. Box 800
Rosemead, CA 91770

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 40
Buckeye, AZ 85326

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125

Chairman
Maricopa County Board of Supervisors
301 W. Jefferson, 10th Floor
Phoenix, AZ 85003

Mr. Aubrey V. Godwin, Director
Arizona Radiation Regulatory Agency
4814 S. 40th Street
Phoenix, AZ 85040

Mr. Ron Barnes, Director
Regulatory Affairs
Palo Verde Nuclear Generating Station
Mail Station 7636
P.O. Box 52034
Phoenix, AZ 85072-2034

Mr. Dwight C. Mims, Vice President
Regulatory Affairs and Plant Improvement
Palo Verde Nuclear Generating Station
Mail Station 7605
P.O. Box 52034
Phoenix, AZ 85072-2034

Mr. John C. Taylor, Director, Nuclear
Generation
El Paso Electric Company
340 E. Palm Lane, Suite 310
Phoenix, AZ 85004

Mr. James Ray
Public Service Company of New Mexico
2401 Aztec NE, MS Z110
Albuquerque, NM 87107-4224

Mr. Geoffrey M. Cook
Southern California Edison Company
5000 Pacific Coast Highway, Bldg. D21
San Clemente, CA 92672

Mr. Robert Henry
Salt River Project
6504 E. Thomas Road
Scottsdale, AZ 85251

Mr. Jeffrey T. Weikert
Assistant General Counsel
El Paso Electric Company
Mail Location 167
123 W. Mills
El Paso, TX 79901

Mr. Eric Tharp
Los Angeles Department of Water & Power
Southern California Public Power Authority
P.O. Box 51111, Room 1255-C
Los Angeles, CA 90051-0100

Mr. Brian Almon
Public Utility Commission
William B. Travis Building
P.O. Box 13326
1701 N. Congress Avenue
Austin, TX 78701-3326

PALO VERDE NUCLEAR GENERATING STATION (PVNGS)
LICENSE RENEWAL APPLICATION (LRA)
REQUEST FOR ADDITIONAL INFORMATION

RAI 3.3-1

Background:

Table 3.2.1 of the LRA, item 3.2.1.21 states, "Not applicable. PVNGS has no in-scope high-strength steel closure bolting exposed to air with steam or water leakage in the engineered safety features system."

The discussion in item 3.2.1.22 states, "Not applicable. PVNGS has no closure bolting in Engineered Safety Features systems that is exposed to an environment of water [*sic*] with steam or water leakage, so the applicable NUREG-1801 line was not used."

In LRA Table 3.3.1, item 3.3.1.42, the discussion states, "Not applicable. PVNGS has no in-scope steel closure bolting exposed to air with steam or water leakage in the auxiliary systems, so the applicable NUREG-1801 line was not used."

The discussion in item 3.3.1.44 states, "Not applicable. PVNGS has no in-scope steel closure bolting exposed to condensation in the compressed air system, so the applicable NUREG-1801 line was not used."

Issue:

The discussion in the LRA, item 3.2.1.21, is not sufficient for the staff to determine whether there is no in-scope high-strength closure bolting used in the Engineered Safety Features (ESF) systems or whether high-strength closure bolting is used but these bolts are not exposed to an environment of air with steam or water leakage.

The discussion in LRA items 3.2.1.22, 3.3.1.42 and 3.3.1.44 is not sufficient for the staff to determine why the environments identified in the Generic Aging Lessons Learned (GALL) Report are not applicable for steel closure bolting in the ESF and auxiliary systems.

Request:

a) For Table 3.2.1, item 3.2.1.21, clarify whether high strength closure bolting is used in ESF systems.

b) For Table 3.2.1, item 3.2.1.22 and for Table 3.3.1, items 3.3.1.42 and 3.3.1.44, clarify the basis for your claim that the environments listed in the GALL Report are not applicable for steel closure bolting in ESF or auxiliary systems.

RAI 3.3-2

Background:

Table 3.3.2-2 of the LRA, page 3.3-76, includes two AMR line items for closure bolting made of stainless steel in an environment of borated water leakage. For one of these line items the aging effect requiring management (AERM) is identified as loss of preload which is managed by

the Bolting Integrity AMP (B2.1.7); for the other of these line items the AERM is identified as "none," and no AMP is recommended. There also are similar pairs of AMR line items for closure bolting in other LRA tables where for identical materials and environments one AMR line item identifies the AERM as loss of preload managed by the Bolting Integrity AMP and the other line identifies the AERM as "none," with no AMP recommended. These occur in Table 3.3.2-4, page 3.3-89 (stainless steel, plant indoor air); Table 3.3.2-5, page 3.3-101 (stainless steel, plant indoor air); Table 3.3.2-7, page 3.3-107 (copper alloy, plant indoor air); Table 3.3.2-8, page 3.3-114 (stainless steel, borated water leakage); and Table 3.3.2-9, page 3.3-122 (copper alloy, plant indoor air).

Issue:

Because one of the AMR line items identifies the aging effect of loss of preload to be managed by the Bolting Integrity program and the other AMR line item, with the same component, material and environment combination, states that there is no aging effect, the two AMR result lines appear to contradict each other.

Request:

Explain why the AMR line items discussed above specify differing results for closure bolting for the same material and environment.

RAI 3.3.2.2.5–1

Background:

Section 3.3.2.2.5.1 of the LRA states that the External Surfaces Monitoring Program will manage hardening and loss of strength from elastomer degradation for elastomer external surfaces exposed to plant indoor air (uncontrolled) in locations where the ambient temperature cannot be shown to be less than 95 degrees Fahrenheit. It also states that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program will manage hardening and loss of strength from elastomer degradation for elastomer internal surfaces exposed to plant indoor air (uncontrolled) in locations where the ambient temperature cannot be shown to be less than 95 degrees Fahrenheit.

Issue:

In Table XI.D of the GALL report, the temperature of 95 degrees Fahrenheit is identified as a temperature limit below which any thermal aging of organic materials can be considered to be insignificant over the period of extended operation. However, being below this temperature limit does not preclude hardening and loss of strength of due to other aging mechanisms such as exposure to ozone, oxidation, and radiation.

Request:

Identify which plant systems contain in-scope elastomer components that will be inspected using this criteria and which plant systems will use this criteria to eliminate inspection of all in-scope elastomer components.

PALO VERDE NUCLEAR GENERATING STATION (PVNGS)
LICENSE RENEWAL APPLICATION (LRA)
REQUEST FOR ADDITIONAL INFORMATION

RAI 3.5.2.2.1-1

Background

The GALL Report states that aging management is not necessary for certain aging effects (increase in porosity, leaching of calcium hydroxide, and loss of strength) of inaccessible concrete if the concrete was constructed in accordance with the recommendations in ACI 201.2R-77 "Guide to Durable Concrete." However, further evaluation is necessary if the concrete is not constructed in accordance with these recommendations. The intent of the GALL Report recommendation is to ensure the durability of the as-placed concrete during the period of extended operation.

Issue

Sections 3.5.2.2.1.4 and 3.5.2.2.1.10 of the LRA state that concrete mixes were designed in accordance with ACI 211.1-74, "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete," which does not provide recommendations for ensuring durable concrete. The LRA provides no additional information as to how this code compares to ACI 201.2R-77.

Request

Explain how ACI 211.1-74 meets the intent of ACI 201.2R-77. Include important concrete design parameters (e.g. water-cement ratio, air entrainment, etc.) which demonstrate that PVNGS concrete meets the recommendations in ACI 201.2R-77.

RAI 3.5.2.2.2-1

Background

The GALL Report recommends periodic monitoring of below-grade water chemistry to ensure the below-grade environment is non-aggressive. Additionally, it recommends examination of representative samples of below-grade concrete when excavated for any reason.

Issue

The LRA states that concrete structures are not subject to groundwater for any sustained periods; however, it does not discuss groundwater sampling or opportunistic examinations of exposed below-grade concrete. In addition, the LRA does not clearly explain how the current AMP demonstrates that the below-grade environment is non-aggressive.

Request

a) Explain how the current AMP demonstrates that the environment (groundwater or soil) adjacent to inaccessible concrete structures is not aggressive. Include in this discussion an explanation of why periodic monitoring of groundwater is unnecessary.

Question:

b) Explain why there is no provision for opportunistic inspections of excavated portions of below-grade concrete.

RAI 3.5.2.3-1

Background

For the component type 'structural steel,' Table 3.5.2-9 of the LRA credits the Structures Monitoring Program to manage loss of material for carbon steel in a buried environment. The LRA states that neither the component nor the material and environment combination is evaluated in the GALL Report.

Issue

It is not clear to the staff how the Structures Monitoring Program will be used to inspect a buried component since the program is, primarily, a visual inspection program.

Request

Explain how the Structures Monitoring Program will manage the effect of aging on carbon steel in a buried environment.

RAI 3.5.2.3-2

Background

For the component type 'screen,' Table 3.5.2-10 of the LRA credits the Structures Monitoring Program to manage loss of material for copper alloy in a raw water environment. The LRA states that neither the component nor the material and environment combination is evaluated in the GALL Report.

Issue

The 'screen' component is used as a filter in a raw water environment and may have limited accessibility. It is not clear to the staff how the Structures Monitoring Program will inspect the component to ensure the aging effect is being managed.

Request

Explain how the Structures Monitoring Program will manage the effect of aging on copper alloy screens in a raw water environment.

RAI 3.5.2.3-3

Background

For the component type 'supports, non-ASME,' Table 3.5.2-14 of the LRA credits the Structures Monitoring Program to manage loss of material for carbon and stainless steel in a raw water environment. The LRA states that the environment is not in the GALL Report for this component and material.

Issue

The 'support' component is in a raw water environment and may potentially have limited accessibility. It is not clear to the staff how the Structures Monitoring Program will inspect the component to ensure the aging effect is being managed.

Request

Explain how the Structures Monitoring Program will manage the effect of aging on carbon and stainless steel components in a raw water environment.

PALO VERDE NUCLEAR GENERATING STATION (PVNGS)
LICENSE RENEWAL APPLICATION (LRA)
REQUEST FOR ADDITIONAL INFORMATION

RAI 3.6.2.2.2-1

Background:

Section 3.6.2.2.2 of the LRA states that PVNGS is located in an area where the outdoor environment is not subject to industry air pollution or salt spray. It further states that contamination buildup on high-voltage insulators is not a problem due to sufficient rainfall in the spring and summer washing the insulators. Additionally, there is no salt spray at the plant since the plant is not located near the ocean. The applicant also stated that degradation of insulator quality in the absence of salt deposits and surface contamination is not an aging effect requiring management.

Issue:

Section 3.6.2.2.2 of the Standard Review Plan for License Renewal states that degradation of insulator quality due to presence of any salt deposit and surface contamination could occur in high voltage insulators. The applicant did not address plant-specific operating experience with high-voltage insulator failures relating to surface contamination.

Request:

Confirm that there is no plant-specific operating experience with failures of high voltage insulators due to surface contamination.

RAI 3.6.2.2.2-2

Background:

Section 3.6.2.2.2 of the LRA states that industry experience has shown that transmission conductors are designed and installed not to swing significantly and cause wear due to wind induced abrasion and fatigue. The applicant further stated that the transmission conductors are designed and installed not to swing significantly and cause wear due to wind induced abrasion and fatigue. The applicant then concluded that loss of material due to wind induced abrasion and fatigue is not an applicable aging effect requiring management.

Issue:

Section 3.6.2.2.2 of the Standard Review Plan for License Renewal states of the that loss of material due to mechanical wear caused by wind blowing on transmission conductors could occur in high voltage insulators. The applicant did not address plant-specific operating experience with high-voltage insulator and transmission conductor loss of material due to wear.

Request:

Confirm that there is no plant-specific operating experience concerning wear of high-voltage insulators and transmission conductors.

RAI 3.6.2.2.3-1

Background:

Section 3.6.2.2.3 of the LRA states that transmission conductor and switchyard bus connections are torqued to avoid loss of pre-load. Based on temperature data in the Updated Final Safety Analysis Report, Chapter 2.3, the transmission connections and switchyard bus does not experience thermal cycling. The applicant further stated that transmission connections and switchyard bus are subject to average monthly temperatures ranging from 105 degrees Farenheit in July and August to 38 degrees Farenheit in January with minimal ohmic heating. The applicant concluded that increased resistance of connections due to loss of pre-load is not an aging effect requiring management for the period of extended operation. Electric Power Research Institute Technical Report 104213, "Bolted Joint Maintenance & Applications Guide," states that an electrical connection must be designed to remain tight and maintain good conductivity through a large temperature range. Meeting this design requirement is difficult if the materials specified for the bolt and the conductor are different and have different rates of thermal expansion. For example, copper and aluminum bus materials expand faster than most bolting materials. If thermal stress is added to stresses inherent at assembly, the joint members or fasteners can yield. If deformation occurs during thermal loading (i.e., heatup), when the connection cools, the joint will become loose.

Issue:

Section 3.6.2.2.3 of the Standard Review Plan for License Renewal states that increased resistance of connections due to loss of pre-load could occur in transmission connections and in switchyard bus connections. Torqueing transmission conductor and switchyard bus connections alone may not avoid loss of pre-load due to different thermal expansion between bolted connection and conductor materials.

Request:

Provide additional technical justification for why loss of pre-load of switchyard bus and transmission connections is not an applicable aging effect requiring management. Also, confirm that there is no plant-specific operating experience concerning failures of transmission connections and switchyard bus connections due to loss of pre-load.