NMC
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Point Beach Nuclear Plant
Operated by Nuclear Management Company, LLC

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Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
License Nos. DPR-24 and DPR-27

Response to Request for Additional Information
Regarding the Point Beach Nuclear Plant License Renewal Application
(TAC Nos. MC2099 and MC2100)

By letter dated February 25, 2004, Nuclear Management Company, LLC (NMC), submitted the Point Beach Nuclear Plant (PBNP) Units 1 and 2 License Renewal Application (LRA). On November 18, 2004, the Nuclear Regulatory Commission (NRC) requested additional information regarding Electrical Instrumentation and Controls (Sections 2.5 and 3.6 of the LRA). The enclosure to this letter contains NMC's response to the staff's questions.

On December 1, 2004, the NRC staff verbally provided additional time for NMC to respond to this request for additional information in order for further clarifications to be provided. The clarifications allowed the PBNP License Renewal project staff to clearly understand the information needed.

Should you have any questions concerning this submittal, please contact Mr. James E. Knorr at (920) 755-6863.

This letter contains no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the forgoing is true and correct. Executed on January 25, 2004.

Dennis L. Koehl
Site Vice-President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosure

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cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 LICENSE RENEWAL APPLICATION

The following information is provided in response to the Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI) regarding the Point Beach Nuclear Plant (PBNP) License Renewal Application (LRA).

The NRC staff's questions are restated below, with Nuclear Management Company (NMC) responses following.

Section 2.5 - Scoping/Screening Electrical & Instrumentation and Controls

NRC Question RAI-2.5.1:

In section 2.5 the screening results listed Panels and junction boxes as a system within the scope of license renewal. In addition, the Panel and junction boxes are described under commodity group as a commodity that includes control boards, electrical panels, switchgear, cabinets, junction boxes, and other electrical enclosures. However, in table 2.5-1 the Panel and junction boxes is not listed as a component subject to an AMR. Are there any electrical passive components such as connections, wiring and hardware that could degrade because of aging mechanisms due to moisture and corrosion within the cabinets, junction boxes and other electrical enclosures? Discuss and provide justification why the passive components in panels and junction boxes are not subject to an AMR.

NMC Response:

The PBNP LRA, Section 2.5.1 (page 2-244) discusses "Panels and Junction Boxes." From a structural perspective, these components are addressed and age-managed in the Component Supports Commodity Group (CSUP), LRA Sections 2.4.10, 3.5.2.1.10, and 3.5.2.2.3.1; and Table 3.5.2-10. The material and environment for these component types are encompassed by carbon steel in an indoor environment. Any aging effects are managed by the Boric Acid Corrosion Program and the Structures Monitoring Program as presented in Table 3.5.2-10 on page 3-466.

Panels and junction boxes were evaluated regarding whether they contain any active components or have only passive components within them. If they contain any active components, then the contents are exempt from an aging management review (AMR) per NEI 95-10, Appendix B, items 83 and 103. If they contain only passive components, such as cable connections (e.g., connectors or splices) or terminal strips, these components are subject to an AMR within the scope of those specific commodities. PBNP does not have any junction boxes that only contain fuse holders, which are

considered a passive component subject to an AMR. Penetrations into panels and junction boxes are sealed. If appropriate, a weep hole is provided to drain moisture, including boric acid, to eliminate any moisture or boric acid related aging effects.

Section 3.6 - Aging Management of Electrical and Instrumentation and Controls

NRC Question RAI-3.6.2.1.1:

According to Table 3.6.2-1 of the LRA, "Electrical Components - Electrical Commodity Groups - Summary of Aging Management Evaluation" Aging Management Programs (AMPs) are not required for the following component types:

- High-voltage insulators (Offsite Power System)
- Phase bus (480 VAC, 4160 VAC, and 13.8 KVAC Power Systems)
- Transmission conductors (Offsite Power Systems)
- Electrical connections not subject to 10 CFR 50.49 EQ requirements that are exposed to borated water leakage (Some Electrical and I&C systems), Environment - Containment (External), Indoor - No Air-conditioning

The reason given for not including in the AMPs per note J of the Table 3.6.2-1 is that neither the component nor the material and environment combination is evaluated in NUREG-1801.

A component type not presently listed in NUREG-1801 (GALL Report) is not a sufficient reason to exclude it from an Aging Management Program. Please explain why an Aging Management Program for the above components is not required or specifically needed as discussed in the following subsections:

NMC Response:

GENERAL – Since this question has multiple parts, first the general use of Note J is clarified and then each of the question's subsections are stated and responded to separately.

Note J states, "Neither the component nor the material and environment combination is evaluated in NUREG-1801." That is true for the components and the material and environment combinations for High-Voltage Insulators, Phase Bus, Switchyard Buses and Connections, and Transmission Conductors. Note J is a statement of fact that no GALL program exists for these components and is not intended to provide the reason for excluding a particular material and environment combination from an AMR. Individual evaluations of the components and their material – environment combinations were performed for each of these commodities during the AMR process. These evaluations are summarized in the LRA text and reach the conclusions that no aging effects requiring management (AERMs) were identified, as summarized in Table 3.6.2-1.

NRC Question RAI-3.6.2.1.2:

High-voltage insulators (Offsite Power System): Various airborne materials such as dust, salt, and industrial effluents can contaminate insulator surfaces. Airborne particles can buildup on the insulators and cause flashover or otherwise adversely impact the intended function. Therefore, please explain why an Aging Management Program for High-voltage insulators is not needed.

NMC Response:

Various airborne particulate contaminants such as industrial effluents, winter road-salt, and dust can contaminate insulator surfaces. Due to the location of PBNP in a rural environment with no major industry in close proximity, contamination from industrial effluents is not significant. No major traffic runs near the switchyard to make winter road-salt airborne. Lake Michigan is a fresh-water lake and therefore there is no salt spray that can affect the insulators. The buildup of any other surface contaminants is gradual and would be washed away by rainfall or snow, which is seasonal in nature, and cumulative buildup is not expected. The glazed insulator surface aids this contamination removal. Operating experience of over thirty years at PBNP has shown that this is true. Therefore, surface contamination of high-voltage insulators is not an AERM at PBNP.

NRC Question RAI-3.6.2.1.3:

Phase bus (480 VAC, 4160 VAC, and 13.8 KVAC Power Systems): Information Notices 89-64, 98-36, and 2000-14 provide examples that underscore the safety significance of bus ducts and the potential problems that can arise from age-related bus component failures. Please explain why the aging management program (AMP) for bus ducts is not necessary. If needed, the AMP must address the following aging effects: oxidation, loosening of bolted connections due to thermal cycling, corrosion due to moisture, embrittlement, cracking, melting, discoloration, swelling or loss of dielectric strength of bus duct insulating materials (if applicable) leading to reduced insulation resistance and dielectric strength. The AMP should check bolted connections for proper torque. A periodic visual inspection of the bus duct is needed to inspect for signs of insulation cracking, corrosion, debris, excessive dust buildup, evidence of moisture and water intrusion, or discoloration of insulation which may indicate overheating. The internal bus supports should also be inspected for structural integrity and signs of cracks. If visual inspection of the whole bus assembly can not be performed, appropriate electrical tests should be conducted on a periodic basis to assess its condition for aging degradation.

NMC Response:

The phase bus that is in-scope for license renewal at PBNP is not installed in an area or configured in a manner where it is exposed to significant debris or dust, moisture, radiation, high temperatures, or vibration that would result in an aging effect requiring

management. The phase bus that is in-scope for license renewal at PBNP is fully enclosed and installed in the control building, turbine building, 13.8KVAC switchgear building, gas turbine building, and outdoors (weatherproof enclosures). Where enclosure vents are part of the design, filters are provided to ensure cleanliness. Phase bus is not installed in the containment, facade, or the primary auxiliary building. The environments for phase bus in the control building and 13.8KVAC switchgear buildings are indoors with air conditioning. Phase bus between non-vital switchgear in the turbine building is routed beneath the ceiling of the control building in an air-conditioned environment. Exposure to moisture is eliminated in these locations. Phase bus located outdoors is weatherproof designed for those locations, integral to the switchgear connections to the high-voltage and low-voltage station auxiliary transformers for each unit, and inspected and maintained as part of those active components, which includes periodic inspections and cleaning. Where appropriate, heaters are installed to prevent condensation internal to the bus enclosure. Therefore, exposure to moisture due to water ingress or condensation is mitigated.

Carbon steel hardware (bolts, washers, nuts, and clamp screws) was factory coated (plated or galvanized) to inhibit corrosion and is used only in the bus duct enclosure assembly. Stainless steel hardware is used in bus electrical connections (copper bus bar and fittings) and has no age-related degradation due to moisture in either indoor or outdoor environments. Bus connection bolting maintains contact pressure using Belleville washers or lock washers. After more than 33 years in their service environments, minimal or no signs of corrosion or loss of material have been observed and no functional loss has been observed. Therefore, loss of material for steel hardware due to corrosion or oxidation and loosening of connecting hardware are not applicable aging effects that would lead to a loss of intended function for the phase bus for the period of extended operation.

Phase bus is supported by static structural components such as concrete foundations, building steel, and switchgear cabinets. Phase bus structural supports and enclosures are considered part of the Component Support Commodity Group for aging management.

Phase bus is connected to static equipment that does not normally vibrate such as switchgear, transformers and disconnect switches; therefore, loosening of bolted connections is not an aging effect requiring management. Vibration is not an applicable stressor for these connections to non-moving and non-vibrating equipment and supports and aging effects due to vibration are not applicable. Flexible connectors are used throughout the plant in connections between phase bus and different sections of switchgear.

The one section of phase bus connected to a potential source of vibration connects to the non-vital gas turbine generator through flexible conductors. These flexible conductors prevent generator vibrations from propagating into the rigid phase bus. Internal to the enclosures the bus is supported by porcelain insulators, which have no

aging effects in their controlled environments. In addition, this equipment is only run for testing and as a (typically) summer peaking unit. Therefore, the associated bus will have far less than 40 years of actual operation at the end of the period of an extended license. In addition, vibration is not an applicable stressor even for phase bus that is connected to equipment that may move, and aging effects due to vibration are not applicable. Periodic gas turbine maintenance, inspections, and testing include this phase bus in their scope and would address any equipment issues found.

All of the phase bus and flexible connections are copper, silver-plated and/or coated with anti-oxidant grease. Copper bus, solid and flexible connectors and ground straps are highly conductive and provide good contact surfaces. To prevent the formation of oxide on connection surfaces, the connections were factory silver-plated, cleaned to remove any existing oxide, and covered with grease before assembly. The grease excludes air from the connection after assembly, precluding oxidation of the surface, thereby maintaining good conductivity between the bus connecting surfaces. The grease is a consumable that is replaced during each routine maintenance of the bus.

The referenced NRC Information Notices (IN) were re-examined during the RAI phase of the NRC review of the PBNP LRA. Specific attention was directed to the questions asked by NRC reviewers regarding why PBNP was not proposing a bus bar aging management program.

- IN 89-64 was previously examined and considered in the Operating Experience section of the PBNP electrical AMR. The failures noted in this IN were results of either an accumulation of water or debris, inadequate design, manufacturing defect, or an environment that caused deterioration of insulation. A review of the construction, materials, and bus bar environments at PBNP concluded that no aging effects from this IN were applicable to phase bus at PBNP.

- IN 98-36 was examined and excluded from the AMR since it addresses event-driven faults caused by impact of an external foreign object (roofing materials), direct water leakage or moisture intrusion, inadequate design or assembly, or mis-operation, including an event at PBNP where a bus duct heater breaker was open for an extended period of time (exceeding one year). These are all events due to causes other than aging. Therefore, no aging effects from this IN were applicable to phase bus at PBNP.

- IN 2000-14 was examined and excluded from the AMR since it addresses a fault-based event, not aging. Multiple non-Class 1E buses were lost due to co-location (crossing) of bus duct with an initiating failure caused by a center bus bar overheating at a splice joint, causing a PVC boot to smoke, and heat induced failure of fiberglass insulation on adjacent phases causing phase-to-phase arcing. A combination of poor design factors was the root cause: mixture of aluminum and copper bus bars, poor silver-plating on the aluminum bar, corrosion induced on the aluminum bar due to the PVC boot material, and

undersized splice plates of wrong material not centered on the bus bar, reducing contact area. Splice plates were undersized aluminum rather than larger copper plates, used by the vendor during tests to determine design temperature rise to meet IEEE 37.20-1969 of 65°C. The bus was routinely loaded to 2100 amps and actual worst case loaded to 2250 amps, its rating limit. This caused the bus to exceed the design conditions for some time. Torque relaxation likely occurred due to the overheating and bus bar expansion and contraction. A 1995 explosion of an auxiliary transformer that physically displaced the bus could have also contributed to the low torque values. Inability to isolate the bus caused a small event to propagate to multiple buses and major damage.

The only non-Class 1E buses in-scope for PBNP are in the 13.8KVAC system. The system was constructed in 1988 – 1991 and is located separate from all other bus in a dedicated building. Bus bar at PBNP is all copper with proper sized and located connections, per vendor design (PBNP was a turn-key plant by Westinghouse, which supplied and installed the original switchgear and bus). Bus duct are not co-located with other bus duct from the same or different parts of any electrical systems and are able to be isolated, thus fault propagation is not an issue. Bus bar loading is low compared to bus bar rating and thus expansion and contraction is minimized to within the range of the design capacity of the lock washers and Belleville washers.

The PBNP bus bar configuration is represented by all copper bus, properly assembled to original vendor specifications, and installed in a dry, clean environment. Therefore, there are no applicable aging effects for the phase bus that are in-scope for license renewal at PBNP when exposed to their service conditions for the extended period of operation.

NRC Question RAI-3.6.2.1.4:

Transmission conductors (Offsite Power Systems): Section 2.5.1, under the sub-heading "Transmission Conductors," states that the transmission conductor connections to active disconnect switches, power circuit breakers and transformers are inspected using thermography and maintained along with and as part of disconnect switch, power circuit breaker or transformer and, therefore, meet the definition of an active component as discussed in the Statement Of Considerations (SOC) that accompanied the License Renewal Rule. The reason provided in Table 3.6.2-1 (note J) for not including transmission conductors in an AMP is different from the explanation provided in Section 2.5.1 of LRA. Provide an explanation for the discrepancy between Table 3.6.2-1 and Section 2.5.1 for Transmission conductors.

NMC Response:

Table 3.6.2-1, Note J states, "Neither the component nor the material and environment combination is evaluated in NUREG-1801." The note is a statement of fact that there is no GALL program for this component and was not intended to provide a reason for the

determination of needing or not needing an AMP. As stated in Section 2.5.1, the total length of transmission conductor in-scope for license renewal consists of short sections of a few feet in length that connect each phase of the high-voltage station auxiliary transformers to the circuit switchers. They are maintained, along with, and as part of the transformer and circuit switchers that they interconnect and therefore meet the definition of an active component as discussed in the Statements of Consideration that accompanied the License Renewal Rule. Therefore, the evaluation provided in the text and conclusions reached that no AERM was identified for transmission conductors after a thorough AMR was performed, as summarized in Table 3.6.2-1, is valid.

NRC Question RAI-3.6.2.1.5:

It is possible that some in-scope electrical components located indoor but outside containment may also be subjected to borated water leakage causing degradation of the components. Provide justification why in Table 3.6.2-1, Boric Acid Corrosion Program is not required for components located indoors but outside of containment.

NMC Response:

Piping systems containing borated water are located in three physical areas of the plant: the Unit 1 containment, the Unit 2 containment, and the Primary Auxiliary Building. The environment of "Borated Water Leaks (External)" in Table 3.6.2-1 applies to any location in all three areas where in-scope electrical and Instrumentation and Controls (I&C) cables and connections are located and may be exposed to borated water leakage. Therefore, the Boric Acid Corrosion Program in Table 3.6.2-1 applies to the in-scope electrical components in all of these locations.

Some of the connections in these physical locations are identified in Table 3.6.2-1 as also having normal environments away from sources of borated water, "Containment (External)" and "Indoor - No Air-Conditioning (External)" in the Primary Auxiliary Building, where no AERM is expected. These materials and environments were considered in the AMR, and for the locations away from boric acid leaks no AERMs were identified. NUREG-1801 does not have a specific program for these components, except as part of GALL Program XI.E1.

NRC Question RAI-3.6.2.1.6:

In Table 3.6.2-1, it is indicated that "Switchyard buses and connections (Offsite Power System)" will be covered under Cable Condition Monitoring Program. However, Cable Condition Monitoring Program in Section B2.1.8 of Appendix B does not include Switchyard buses and connections. Section 2.5.1, under the sub-heading "Switchyard Bus," states that the review of switchyard bus includes the switchyard bus and the hardware used to secure the bus to a high-voltage insulator. This includes corona rings and other similar fixtures that are standard design features of the switchyard bus. It further states that the bus connection to an active disconnect switch is inspected using thermography and maintained along with and as part of disconnect switch and,

therefore, meets the definition of an active component as discussed in the SOC that accompanied the License Renewal Rule. Provide explanation for the discrepancy between Table 3.6.2-1 and Section 2.5.1 for the Switchyard buses and connections.

NMC Response:

The entry for "Switchyard buses and connections" in Table 3.6.2-1 should contain "None" in the AERM column, "None Required" in the AMP column, and Note "J." The Cable Condition Monitoring Program and related entries were referenced for that item to cover the aging management of the connecting control cabling for the switchgear, transformers, and circuit switchers located in the switchyard that are in-scope for license renewal. This is redundant to the Table 3.6.2-1 entry above for "Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements." The description in Section 2.5.1 accurately notes that any aging of switchyard bus components is managed as part of normal maintenance of the active circuit switcher. The description of the types of inspections used are typical of normal plant component condition monitoring activities and do not constitute an AMP. Operating experience of over thirty years at PBNP supports this conclusion. All other switchyard bus, fixtures, supports, and other components beyond the circuit switchers are out of scope. This should resolve any discrepancy between Table 3.6.2-1 and Section 2.5.1.

NRC Question RAI-3.6.2.1.7:

Cable Condition Monitoring Program, explained in Section B2.1.8 of Appendix B, indicates an exception to NUREG-1801 AMP regarding the scope of inaccessible Non-EQ Medium-Voltage cables. The Cable Condition Monitoring Program requires periodic testing of a representative sample of inaccessible medium-voltage cables not designed for submergence, subject to prolonged exposure to significant moisture and significant voltage, while the NUREG-1801 program implies all such cables are to be tested. Identify basis as to how the representative sample will be selected.

The number of inaccessible medium-voltage cables not designed for submergence subject to prolonged exposure to significant moisture and significant voltage is generally very low, and the testing is needed only once in 10 years. Therefore, provide an explanation why testing of all in-scope, inaccessible medium-voltage cables for detecting any deterioration of the insulation system due to prolonged exposure to moisture and voltage fluctuations is not required under the subject program.

NMC Response:

PBNP has been proactive and already tested all in-scope inaccessible Non-Environmentally Qualified (EQ) Medium-Voltage cables. This testing was performed in 2002 and 2003 and no significant deterioration of the cables was found to exist. On the ten-year testing interval required by license renewal, the next required test will occur just after the end of the current license for Unit 1, but prior to the start of the period of the extended license for PBNP Unit 2. The current testing by PBNP yields one

additional test period versus if PBNP had waited until just prior to the end of the current licensed period for Unit 1 to perform the initial testing. As part of the Cable Condition Monitoring Program, PBNP intends to perform additional medium-voltage cable testing prior to the next scheduled ten-year test, as deemed prudent by our system engineering personnel, to ensure continued awareness of the condition of our aged medium-voltage cables.

Since the program has not yet been developed, selection of the sample of medium-voltage cables to be tested in the future is yet to be determined, but will be based upon the criteria noted in B2.1.8, "Cable Condition Monitoring Program," Parameters to be Monitored or Inspected, on page B87. The cable sample selection for testing will be "based on the severity of prolonged exposure to significant moisture and significant voltage, and the age of the cable." For example, for cables of the same size, construction, voltage and ampere loading, and age run in parallel conduit in the same underground duct bank, the sample may consist of only those cables in the lowest conduits, since they are more likely to be exposed to water.