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Monticello Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

December 7, 2005

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10 CFR Part 54

U.S. Nuclear Regulatory Commission
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Monticello Nuclear Generating Plant
Docket 50-263
License No. DPR-22

Response to Request for Additional Information Regarding the Monticello Nuclear Generating Plant License Renewal Application (TAC No. MC6440)

References: 1) NMC letter to NRC, "Application for Renewed Operating License," dated March 16, 2005 (ADAMS Accession No. ML050880241)

2) NRC letter to NMC, "Request for Additional Information for the Review of the Monticello Nuclear Generating Plant License Renewal Application (TAC No. MC6440)," November 7, 2005 (ADAMS Accession No. ML053120003)

Pursuant to 10 CFR Part 54, the Nuclear Management Company, (NMC) LLC submitted a License Renewal Application (LRA) (Reference 1) to renew the operating license for the Monticello Nuclear Generating Plant (MNGP).

On November 7, 2005, the U.S. Nuclear Regulatory Commission (NRC) issued a Request for Additional Information (RAI) regarding the LRA for MNGP (Reference 2).

The NMC response to Reference 2 is provided in Enclosure 1.

This letter contains no new commitments or changes any previous commitments.

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

Executed on December 7, 2005.

John T. Conway
Site Vice President, Monticello Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure (1)

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
License Renewal Project Manager, Monticello, USNRC
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ENCLOSURE 1

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION DATED NOVEMBER 7, 2005

A. NRC RAI 2.5.2-2

LRA Section 2.5.2.4 states that the specific path for the 345 kV source is "the 4.16 kV Non-segregated Phase Bus ...the 34.5 kV direct buried cable to the Current Limiting Protector in parallel with ..." Also, the specific path for the 13.8 kV offsite source is, "the buried cables from the ...direct buried cable from the 1AR/10TR Disconnect Switch..." Please identify the Aging Management Program (AMP) that will be used to manage the aging effects of these buried cables.

NMC Response

The aging management program that will manage the aging effects of the referenced buried cables is the "Inaccessible Medium Voltage (2kV to 34.5kV) Cables Not Subject to 10 CFR 50.49 EQ Requirements Program." See Section B2.1.21 of the License Renewal Application (LRA) for a description of the program.

B. NRC RAI 3.6-1

LRA Table 3.6.2-1, Electrical Penetrations Commodity Group, addresses the components of Non-EQ Electrical and Instrumentation and Controls (I&C) penetration assemblies subject to aging management review (AMR). Please justify why the seal and other insulating material associated with these penetration assemblies do not require an AMP. In addition, identify the AMP that will be used to manage the aging effects of cables and connectors associated with penetrations that are within the scope of license renewal.

NMC Response

Electrical penetration assemblies consist of electrical conductors, connectors, potting compound, a moisture barrier, and a steel plate pressure boundary. The penetration is designed to maintain electrical continuity through the pressure boundary.

Although not in the Monticello Nuclear Generating Plant (MNGP) environmental qualification (EQ) program, the non-EQ penetrations were supplied by General Electric (GE) and manufactured and tested to the same specifications as the GE supplied EQ penetrations.

The materials (epoxy, hypalon paint, and fiberglass) and methods of construction for both sets of penetrations were similar. Each penetration was qualified to meet the same temperature, radiation and seismic requirements, since they are all required to provide a primary containment pressure boundary. The only difference in material between the penetrations is the type of insulation on the cable in each penetration. The EQ qualified penetrations have low voltage control and instrumentation leads and thermocouple cable with XLPE insulation. The XLPE cable insulation has been separately qualified. The non-EQ Neutron Monitoring drywell penetrations have tri-axial and shielded twisted pair cables, which have polyethylene (PE) insulation. PE insulation has a 60-year service limiting temperature of 112°F and a 60-year service limiting radiation dose of 2×10^7 Rads. The service conditions at MNGP for the drywell are 135°F and 1.58×10^7 Rads. The service conditions at MNGP external to the drywell for the penetration are 85°F and $\leq 4.20 \times 10^5$ Rads.

The source range and intermediate range monitor cables are furnished with hermetically sealed bulkhead mounted connectors with characteristics compatible with connecting cables. The insulation on these cables is not exposed to the drywell environment because the penetration, in which the cable is installed, is inerted with dry nitrogen and experiences a temperature less than that of the drywell. The local power range monitor cables are terminated in pigtails for insulated crimp splice coupling with connecting cables. A portion of the insulation on these cables may be exposed to the drywell service conditions for temperature and moisture but are not subject to the drywell service conditions for radiation due to the shielding provided by the penetration.

The epoxy and hypalon paint have been shown to have greater than a 60-year life at MNGP for the drywell service conditions. This is based on the qualification provided for the EQ qualified penetrations. (Note: Fiberglass is non-age degradable and has no aging effects requiring management.) Additionally, the penetrations are pressurized to 45 psig with dry nitrogen to prevent the intrusion of moisture.

The aging management programs that will be used to manage the aging effects of cables and connectors associated with the non-EQ penetrations within the scope of license renewal are the "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program" and the "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program."

C. NRC RAI 3.6-2

In LRA Table 3.6.2-4, the applicant identified AMR line items for cable connections and stated that no AMP is required for the cable connections. The staff notes that the applicant referenced SAND96-0344, "Aging Management Guidelines for Electrical Cable and Terminations," in its justification for not having an AMP. However, this report indicates that several plants identified loosening of terminations and found that the major concern is that failures of a deteriorated cable system (cables, connections including fuse holders, and penetrations) might be induced during accident conditions. Since these connections are not subject to the requirements of 10 CFR 50.49, an AMP is required to manage the aging effects in cable connections.

In addition, operating experience has shown evidence of loosening of metallic parts of cable connections. Several licensees reported in Licensee Event Reports loose connections due to corrosion, vibration, thermal cycling, etc. Based on the above, justify why an AMP is not required for cable connections or provide an AMP.

NMC Response

SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants—Electrical Cable and Terminations," September 1996, prepared by Sandia National Laboratories for the U.S. Department of Energy Technology Management Center categorizes aging mechanisms as being either "significant" or "significant and observed". The aging mechanisms listed below are identified in SAND96-0344 as being "significant".

Section 4.2 of SAND96-0344 emphasizes that "the applicability of some aging mechanisms to actual cable systems (cables and connections) may be very limited or the frequency of their occurrence may be extremely low." After a consideration of all of the stressors and the reported incidence of their effects in the industry, SAND96-0344 concluded:

> ... the likelihood of substantially increased effects or failure rate resulting from aging mechanisms currently categorized only as "significant" is considered low.

This assessment, which is based on industry wide observations, provides reasonable assurance that these aging mechanisms will not cause a loss of intended function if left unmanaged during the period of extended operation.

Chemical Contamination, Oxidation and Corrosion

The non-EQ insulated cable and splice conductor metal is protected by its insulation from environments that induce aging effects. Severe damage to the insulation barrier coupled with an adverse environment (chemical, moisture, etc.) is required to induce electrochemical aging effects. Cable splice connections outside electrical enclosures are covered by engineered splice kits, environmentally qualified Raychem splice sleeves, or engineering approved splices utilizing various tapes to fill, insulate and provide physical protection for the connection. These various methods prevent any corrosive atmosphere from reaching the metallic components and prevent any type of oxidation, corrosion or chemical contamination. Most cable connections are located inside enclosures, which are located inside buildings. This prevents any significant exposure to moisture. MNGP is located in a rural area with no exposure to an aggressive chemical atmosphere. Corrosive chemicals at MNGP are controlled and are not stored in sufficient quantities inside operational buildings to create an adverse atmosphere. Connections located within an electrical enclosure with active components are monitored on a routine periodicity. Any oxidation or corrosion which could affect electrical connections would also affect active components such as relays, switches, contactors, etc. Any identified adverse condition of these components would trigger a corrective action evaluation which would include other components within the enclosure, including cable connections.

Therefore, industry and MNGP operating experience do not support chemical contamination, oxidation, and corrosion (electrochemical stress) as an aging effect that requires management for cable connections.

Electrical Stress

With the exception of medium voltage cable insulation, industry and MNGP operating experience do not support electrical stress as being a significant aging mechanism associated with the loosening of metallic parts of electrical connections. Most insulated cables are not exposed to significant electrical fields or wetted environments, which are required to initiate electrical stress related aging effects. The concern related to electrical stress is primarily associated with cable insulation and is not related to the metallic portions of electrical connections. Therefore, only medium voltage cables installed in a wetted environment require electrical stress related aging management. This condition is addressed by the MNGP GALL XI.E3 program.

Mechanical Stress

Mechanical stress failures resulting from vibration, frequent manipulation, and tensile stress have extremely low occurrences. Degradation due to the above aging effects are considered to be either event driven, caused by a design deficiency, or are a result of human error or intervention.

Mechanical failures resulting from vibration are due to a design deficiency or single event, and are not age related. These failures typically manifest themselves in a short period of time with failure occurring shortly after onset of vibration. Most electrical components are not designed for, nor installed in, an environment subject to continuous vibration. Industry and MNGP operating experience, therefore, do not support vibration as an aging effect requiring management.

Human error and human intervention has been addressed earlier in an NRC letter dated June 5, 1998, "License Renewal Issue No. 98-0013, Degradation Induced Human Activities." The letter states:

> ...the staff concludes that the issue of degradation induced by human activities need not be considered as a separate aging effect and should be excluded from aging management review.

Thermal Cycling, Ohmic Heating, and Electrical Transients

Thermal cycling, ohmic heating, and electrical transients are conditions that are accounted for in the initial design of a system. Adverse effects on the electrical cable and connections are experienced only if there is a design deficiency or improper installation. The only metallic parts that could potentially be exposed to thermal cycling and ohmic heating are those that carry significant current in power supply circuits. Power supply circuits are typically installed in continuous runs from the supply to the load. The connections at the supply end and at the load end are internal to active equipment and are screened out of license renewal aging management requirements. In-line cable splices are constructed of a material similar to that of the cable; therefore they have similar coefficients of expansion, and, if properly designed, have a current carrying capacity equal to or greater than that of the cable.

In-line cable splices are not frequently used at the MNGP. While certain types of bolted in-line splices are approved for use, crimped butt splices are typically used when splicing is necessary. Crimped butt splices are not subject to loosening due to thermal cycling.

Properly designed and installed cable splices have electrical characteristics better than those of the original cable. Power cables are typically continuously energized and are not exposed to thermal cycling due to ohmic heating. Stresses due to electrical faults and transients are mitigated by the fast action of circuit protective devices and are accounted for in the initial design. These stresses are not considered a credible aging mechanism, since such faults are infrequent and are event driven. The corrective action program at MNGP evaluates and tracks these transients. Any significant transient will result in an evaluation to determine the extent of cable damage and proper corrective action. Therefore, industry and MNGP operating experience do not support thermal cycling, ohmic heating, and electrical transients as aging effects requiring management.

MNGP Thermography Program

MNGP has implemented a thermography program. Equipment that presents a significant risk to core protection, is necessary to maintain full power production, or has the potential to reduce power is monitored at least semiannually. The equipment monitored includes, but is not limited to, substation equipment, 4-kV breakers, load centers, motor control centers, control panels, DC equipment, motors, and generators. Thermography inspections look at connections associated with these components. These inspections exceed, both in scope and in frequency, the requirement proposed in the GALL XI.E6 program. Any loose connections identified are evaluated using the MNGP corrective action program and repaired prior to loss of function. The program has not identified any trend in connector failures which would indicate the need for aging management.

Conclusion

As supported by SAND96-0344, industry experience, and MNGP operating experience, the likelihood of significant increased failure rates resulting from the aging mechanisms of thermal cycling, ohmic heating, electrical transients, mechanical stress (vibration), chemical contamination, corrosion, oxidation, and frequent manipulation (at connections and terminal blocks) as applied to the metallic components of electrical cables and connections is considered low. Therefore, these mechanisms are not considered aging effects requiring management.

D. **NRC RAI 3.6-3**

In LRA Table 3.6.2-2, the applicant identified AMR line items for fuse holders and stated that no AMP is required for the fuse holders. The staff finds that the justification provided by the applicant is not adequate. For example, thermal cycling due to energizing and de-energizing of circuits is not addressed. Also, it is not clear to the staff how the fuse holders are protected from exposure to external sources of moisture and chemical contamination. Please justify in detail why the fuse holders at MNGP do not need an AMP by addressing each aging effect included in Generic Aging Lessons Learned Report (GALL) AMP XI.E5, Fuse Holders.

Additionally, identify those fuse holders that perform an intended function to meet the criteria of 10 CFR 54.4(a) (i.e., isolate safety loads from non-safety loads or are used as protective devices to ensure the integrity of containment electrical penetrations). Where are these fuse holders located?

NMC Response

Aging effects associated with fuse holders listed in NUREG-1801, Revision 1, include:

- Thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling, or electrical transients
- Mechanical fatigue caused by frequent removal/replacement of the fuse or vibration, chemical contamination, corrosion, and oxidation

The only fuse holders at MNGP identified as being within the scope of license renewal are those fuse holders located in panel C-379 and panel C-380. The fuse holders are part of the fire detection system.

Panel C-379

The fuse holders located in Panel C-379 are constructed with an insulating base and metallic clips. The panel is located in the Turbine Building, elevation 931', just north of motor control center (MCC) 142. The average temperature in this area, as documented in the environmental qualification (EQ) file, is 80°F. The integrated dose is 6.94 x 10^2 Rads. These values are well below the 60-year service limiting values provided in Electric Power Research Institute (EPRI) 1003057, "License Renewal Electrical Handbook," for the insulating material used for fuse holders.

Thermal Fatigue

The fuses provide power to fire detectors, which are low power control applications and, as such, are not subject to ohmic heating. The fuse holders are not subject to thermal cycling, since they are operated below their design current rating and are continuously energized.

Mechanical Fatigue

Panel C-379 is mounted on a structural concrete wall and is not subject to vibration. The fuse holders are not directly exposed to external sources of moisture or chemical contamination. The fuses in Panel C-379 are not frequently removed. Therefore, metallic fatigue and deformation are not an issue.

A field inspection of this panel did not reveal any visual indication of corrosion, chemical contamination, oxidation, cracking, or discoloration.

Panel C-380

The fuse holders located in Panel C-380 are also constructed with an insulating base and metallic clips. The panel is located in the Reactor Building, elevation 935', to the south of the main building access.

The average temperature in this area, as documented in the EQ file, is 80°F and the integrated dose is 1.11 x 10^5 Rads. These values are well below the 60-year service limiting values provided in EPRI 1003057 for the insulating material used for fuse holders.

Thermal Fatigue

The fuses provide power to fire detectors, which are low power control applications, and as such are not subject to ohmic heating. The fuse holders are not subject to thermal cycling, since they are operated below their design current rating and are continuously energized.

Mechanical Fatigue

Panel C-380 is located on a concrete structural wall and is not subject to vibration. The fuses in Panel C-380 are not frequently removed. Therefore, metallic fatigue and deformation are not an issue. The fuse holders are not subject to moisture, corrosive salt spray or any other type of corrosive atmosphere.

A field inspection of this panel did not reveal any visual indication of corrosion, chemical contamination, oxidation, cracking, or discoloration.

Conclusion

These fuse holders are operated in areas exposed to low heat and radiation, are operated below their design current, are not mounted on vibrating equipment, are not removed frequently, and are not exposed to an environment conducive to corrosion or chemical contamination. Thermal fatigue and mechanical fatigue are not applicable aging effects. Therefore no aging management program is required.

E. NRC RAI 4.7-1

The environmental qualification of electrical equipment results described in Section 4.7 indicate that the aging effects of the environmental qualification (EQ) of electrical equipment identified in the Time-Limited Aging Analysis (TLAA) will be managed during the extended period of operation under 10 CFR 54.21(c)(1)(iii). The important attributes of a re-analysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective actions. Please discuss how the important attributes for re-analysis of an aging evaluation of electrical equipment identified in the TLAA to extend the qualification under 10 CFR 50.49(e) will be implemented at MNGP (e.g., how the temperature data used in an aging evaluation is collected at MNGP).

NMC Response

NUREG-1801, Revision 1, states:

> Under 10 CFR 54.21(c)(1)(iii), plant EQ programs, which implement the requirements of 10 CFR 50.49 (as further defined and clarified by the DOR Guidelines, NUREG-0588, and Regulatory Guide 1.89, Revision 1), are viewed as aging management programs (AMPs) for license renewal. Reanalysis of an aging evaluation to extend the qualification of components under 10 CFR 50.49(e) is performed on a routine basis as part of an EQ program. Important attributes for the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met).
>
> This reanalysis program can be applied to EQ components now qualified for the current operating term (i.e., those components now qualified for 40 years or more). As evaluated below, this is an acceptable AMP. Thus, no further evaluation is recommended for license renewal if an applicant elects this option under 10 CFR 54.21(c)(1)(iii) to evaluate the TLAA of EQ of electric equipment.

MNGP has elected option 10 CFR 54.21(c)(1)(iii) as stated in Section 4.7 of the MNGP application and expanded upon below.

Analytical Methods

The MNGP EQ Program generally uses the same analytical models in the reanalysis of an aging evaluation as those previously applied for the current evaluation. The Arrhenius methodology is used for performing thermal aging evaluations. MNGP has implemented temperature monitoring (see response to RAI B3.1-2, below) by using temperature recorders in areas of the plant in which EQ equipment is located. The plant's EPRI GOTHIC thermal hydraulic computer model provides temperature and pressure input for accident scenarios. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose).

For license renewal, MNGP established the 60-year normal radiation dose by multiplying the 40-year normal radiation dose by 1.5 or used the actual calculated value for 60 years. That result is added to the accident radiation dose to obtain the total integrated dose for the component. In some cases, the normal radiation dose is insignificant when compared to the accident dose. In such cases the total integrated dose may be valid for both the 40 year and 60 year periods. For cyclical aging, the 40-year value was multiplied by 1.5 to obtain the 60-year value or an estimated 60-year value was used.

Data Collection and Reduction Methods

Temperature data used in aging evaluations is typically conservative and based on plant design temperatures. Actual plant temperature data is obtained in several ways, including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, temperature sensors on large motors (while the motor is not running), and the newly implemented temperature monitoring devices installed in areas where EQ equipment is located (see response to RAI B3.1-2, below).

A representative number of temperature measurements are conservatively evaluated to establish the temperature used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to the material activation energy values as part of a reanalysis are justified on a plant specific basis.

Radiation surveys are routinely monitored and incorporated into EQ basis calculations on an as needed basis.

Underlying Assumptions

EQ component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken. Corrective actions may include changes to the qualification bases and conclusions.

Acceptance Criteria and Corrective Action

A reanalysis of an aging evaluation can extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component is maintained, replaced, or re-qualified prior to exceeding the period for which the current qualification remains valid. Reanalysis is performed in a timely manner (that is, sufficient time is available to maintain, replace, or re-qualify the component if the reanalysis is unsuccessful).

Parameters (temperature, radiation, pressure, cycles, etc.) evaluated and found to be outside the current bases are documented in the corrective action program, per 10 CFR 50 Appendix B requirements. Corrective actions are then implemented to achieve compliance with EQ program requirements.

F. NRC RAI B2.1.6-1

The applicant states in AMP B2.1.6, for the "Detection of Aging Effects" program element, that this program will visually inspect internal portions of bus ducts, the bus insulating system, and bus supports. In addition, a torque test or resistance test of a sample of accessible bolted connections will be performed. However, the staff notes that vendors do not typically recommend re-torquing of bolted connections unless the joint requires service or the bolted connections are clearly loose. The torque required to turn the fastener in the tightening direction (restart torque) is not a good indication of the pre-load once the fastener is in service. Due to relaxation of the parts of the joint, the final loads are likely to be lower than the installed loads. Provide a technical justification detailing how re-torque of bolted connections is a good indicator of the pre-load once the fastener is in service. Please modify the acceptance criteria accordingly. Also, please clarify if there are any bolted connections covered with heat sink tape, sleeving, insulating boots, etc., that are accessible and are not covered by this activity.

NMC Response

Following the guidance of EPRI 104213, Section 8.2, " Inspection of Electrical Bolted Joints," re-torquing of bolted connections is not recommended. Therefore, in AMP B2.1.6, for the "Detection of Aging Effects" program element, the first two paragraphs are replaced with the following two paragraphs:

> A sample of accessible bolted connections will be checked for loose connection by using thermography or by measuring connection resistance using a low range ohmmeter. Metal enclosed bus (MEB) internal surfaces will be visually inspected for aging degradation of insulating material and for foreign debris and excessive dust buildup, and evidence of moisture intrusion. Bus insulation will be visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. Internal bus supports will be visually inspected for structural integrity and signs of cracks. This program will be completed before the period of extended operation and every ten years thereafter provided visual inspection is not used to check bolted connections. A ten-year inspection interval will provide two data points during a 20-year period, which can be used to characterize the degradation rate. This is an adequate inspection frequency to preclude failures of the MEBs, since experience has shown that aging degradation is a slow process.

> Visual inspection will be used as an alternative to thermography or measuring connection resistance of bolted connections, for the accessible bolted connections that are covered with heat shrink tape, sleeving, insulating boots, etc. Visual inspection of the insulation material will detect surface anomalies, such as discoloration, cracking, chipping or surface contamination. When this alternative visual inspection is used to check bolted connections, the first inspection will be completed before the period of extended operation and every five years thereafter.

Most connections within the metal enclosed bus are either taped or covered with Noryl sleeving. All bolted connections that are accessible will be covered by this activity. This is consistent with NUREG 1801 Vol. 2, Revision 1.

G. NRC RAI B2.1.6-2

With regard to the "Corrective Action" element for the Bus Duct Inspection Program, it is stated that requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants," is applicable to MNGP. However, the staff notes that GALL AMP XI.E4, Metal Enclosed Bus, the "Corrective Actions" element states that further investigation and evaluation are performed when the acceptance criteria are not met. Corrective actions may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or repair of the affected metal enclosed bus components. If an unacceptable condition or situation is identified, a determination is made as to whether the same condition or situation is applicable to other accessible or inaccessible metal enclosed bus. Please revise corrective actions in B2.1.6 to add specific requirements or provide justification why these corrective actions are not necessary.

NMC Response

In accordance with the NUREG 1801 Vol. 2, Revision 1, GALL XI.E4, NMC will add the following statement to the corrective action element:

> Further investigation and evaluation are performed when the acceptance criteria are not met. Corrective actions may include, but are not limited to, cleaning, drying, increased inspection frequency, replacement, or repair of the affected metal enclosed bus components. If an unacceptable condition or situation is identified, a determination is made as to whether the same condition or situation is applicable to other accessible or inaccessible metal enclosed bus.

H. NRC RAI B3.1-1

In Section B3.1 under the "Scope of Program" element, it is stated that an equipment master list is maintained at MNGP that has been developed to encompass the requirements of 10 CFR 50.49(b). This master list includes safety-related electrical equipment and non-safety-related equipment whose failure could prevent accomplishment of safety functions. Please identify the non-safety-related electrical equipment that is needed to be qualified to meet the requirements of 10 CFR 50.49.

NMC Response

The statement under "Scope of Program" is consistent with the requirements of 10 CFR 50.49(b). That is, the statement reiterated the requirements to ensure inclusion of all equipment covered by the regulation:

(1) Safety-related electric equipment.

(2) Nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions specified in subparagraphs (b)(1)(i)(A) through (C) of paragraph (b)(1) of this section by the safety-related equipment.

(3) Certain post-accident monitoring equipment.

This statement was made to demonstrate that NMC was in full compliance with the requirements of 10 CFR 50.49. The statement did not intend to imply that there are nonsafety-related components included in the MNGP EQ master list. All components in the MNGP EQ master list are currently designated as safety related.

I. NRC RAI B3.1-2

In Section B3.1 under the "Detection of Aging, Monitoring and Trending," and "Parameters Monitored or Inspected" elements, it is not clear how, without monitoring or inspection of certain environmental conditions or component parameters, the aging effects of electrical equipment can be managed, to assure that the component is within the bounds of its qualified life, or as a means to modify the qualification. Please justify why the EQ program at MNGP without the above attributes is acceptable for managing the effects of aging.

NMC Response

The format used in the MNGP License Renewal Application (LRA) repeats the first line of the applicable NUREG-1801 paragraph, and then explains the expectations of the MNGP EQ program. The MNGP LRA states the following for parameters monitored or inspected:

> Parameters Monitored or Inspected
>
> Although EQ component qualified life is not based on condition or performance monitoring, the EQ Coordinator is responsible for reviewing program data and industry information, determination of actions to be taken at MNGP which may include monitoring and/or inspection and confirming that completion of the actions have satisfactorily addressed potential MNGP environmental/functional issues.

This was intended to mean that the qualified life is not based on condition or performance monitoring. Per 10 CFR 50.49(e), the qualification must include and be based on the following: temperature and pressure, humidity, chemical effects, radiation, aging, submergence, synergistic effects and margins. Pursuant to Regulatory Guide 1.89, Revision 1, monitoring or inspection of certain environmental conditions or component parameters may be used to ensure that the component is within the bounds of its qualification basis, or as a means to modify the qualified life. At MNGP, the EQ coordinator is responsible for reviewing program data and industry information. Deviations are documented in the corrective action program and actions to correct identified issues may include monitoring, inspection, reanalysis or testing. For example, the EQ coordinator at MNGP monitors radiation protection surveys for changes in radiation levels and has initiated a temperature monitoring program in areas containing EQ equipment.

The MNGP LRA states the following for detection of aging effects:

> Detection of Aging Effects
>
> 10 CFR 50.49 does not require the detection of aging effects for in-service components. The MNGP EQ Program credits the application of adjunct Preventative Maintenance (PM) and the Quality Control (QC) Programs to preclude the adverse effects of aging from becoming unacceptable, and to identify and correct aging effects when they are evident. In addition, a Motor Operated Valve (MOV) program has been implemented at MNGP which addresses identification of aging effects. Operator and system engineering rounds at MNGP are another means of providing continual oversight of this attribute.

This paragraph was intended to mean that the corrective action program, the preventive maintenance programs (e.g. motor operated and air operated valve programs), and the quality control program at MNGP will identify any aging effects of EQ equipment and initiate corrective action as required to maintain equipment qualification. Additionally, as described above, monitoring and inspection of certain environmental conditions or component parameters may be used to ensure that the component is within the bounds of its qualification basis, or as a means to modify the qualified life.

The MNGP LRA states the following for monitoring and trending:

> Monitoring and Trending
>
> 10 CFR 50.49 does not require monitoring and trending of component condition or performance parameters of in-service components to manage the effects of aging. The MNGP EQ Coordinator is responsible for reviewing program data associated with the EQ program as well as subsequent assignment of actions to be taken at MNGP and confirming that completion of the actions has satisfactorily addressed potential EQ aging issues.

This statement was intended to mean that, although not required by 10 CFR 50.49, the MNGP EQ coordinator is responsible for reviewing program data to identify non-conforming items and taking corrective action to satisfactorily address EQ aging issues. This includes monitoring how long qualified components have been installed, monitoring environmental conditions, and monitoring routine inspections to ensure that components remain within the bounds of their qualification basis.

The MNGP EQ Program document, "PART B - Environmental Specifications," is the principal document for establishing the environmental parameters that equipment will be exposed to during normal and post-accident operation. This document provides conservative values for general areas throughout the plant. The EQ Central File may require revision whenever the EQ parameters change.

Additionally, the MNGP EQ Program document states:

> Environmental parameters at specific locations are calculated using the GOTHIC computer code and the controlled calculation process. Any changes to the environmental conditions in the plant must be evaluated using the GOTHIC computer model and processed as a revision to the controlled calculations which PART B is based on. When revising the environmental parameters, it must be noted that:

1. Changes in design bases may require a 10 CFR 50.59 Evaluation. Perform a 10 CFR 50.59 screening to make this determination.

2. If environmental conditions become more severe at any location, a methodical search to identify any affected equipment must be completed. A review of the appropriate Calculation Files must then be performed to ensure that the environmental conditions have not compromised the qualification of the equipment.

NMC corporate directives concerning EQ contain the following requirements:

5.4.1 Temperature Monitoring

1. In order to verify that the normal operating temperatures used in the EQ Program have not changed and would result in the established thermal qualified life being impacted, temperature monitoring should be implemented to measure temperatures. This will also assist in identifying any potential plant hot spots. Temperature monitoring can also result in longer qualified lifetimes if temperatures are lower than previously assumed.

and,

5.8.1.5 Environmental Service Conditions Report

a. The conditions contained in the report include temperature, pressure, relative humidity, radiation, spray, and submergence, as applicable. Conditions during normal operation and Design Basis Accidents are reported for each EQ Area. In addition, the basis for the postulated scenarios are summarized and presented for the EQ Program.

From the above statements, examples, and program requirements, it is clear that the MNGP EQ program incorporates extensive monitoring of environmental conditions and inspection of component parameters to manage the effects of aging and maintain the qualified life of components.

J. **NRC RAI B3.1-3**

In Section B3.1, the "Corrective Actions" element refers to 10 CFR Part 50, Appendix B. In GALL AMP X.E1, Environmental Qualification of Electrical Components, the "Corrective Actions" element states that when unexpected adverse conditions are identified during operational or maintenance activities that affect the environment of a qualified component, the affected component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. When an emerging industry aging issue that affects the qualification of an EQ component is identified, the affected component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. Please revise corrective actions in B2.1.6 to add specific requirements or provide justification why these corrective actions are not necessary.

NMC Response

In accordance with the NUREG 1801 Volume 2, Revision 1, GALL X.E1, NMC will add the following statement to the corrective action element:

> If an EQ component is found to be outside the bounds of its qualification basis, corrective actions are implemented in accordance with the station's corrective action program. When unexpected adverse conditions are identified during operational or maintenance activities that affect the environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. When an emerging industry aging issue is identified that affects the qualification of an EQ component, the affected component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

K. **NRC RAI B2.1.21-1**

In AMP B2.1.21, Inaccessible Medium Voltage (2kV to 34.5 kV) Cables Not Subject to 10 CFR 50.49 EQ Requirements, the applicant described under the "Preventive Action" element that periodic actions are taken to prevent medium voltage cables from being subject to prolonged exposure to significant moisture, such as inspecting for water collection in cable manholes and conduit, and draining water, as needed. The staff requests the applicant to state the inspection frequency and its basis.

In addition, because it is the staff position that inaccessible medium voltage cables be tested and inspected, the staff requests the applicant remove the following line from the "Preventive Action" element, "Medium-voltage cables, for which such actions are taken, are not required to be tested since operating experience indicates that prolonged exposure to significant moisture and being energized for significant periods of time are required to induce this effect."

NMC Response

In Section B2.1.21 of the MNGP LRA, under "Preventive Action," NMC will remove the following text:

> Medium-voltage cables, for which such actions are taken, are not required to be tested since operating experience indicates that prolonged exposure to significant moisture and being energized for significant periods of time are required to induce this effect.

In Section B2.1.21 of the MNGP LRA, under "Detection of Aging Effects," NMC will add the following statement:

> The underground electrical vaults (manholes, handholes, etc) containing cable at MNGP are designed and installed without a concrete bottom. The electrical vaults are set on natural soil which is porous river sand. Historically, water accumulation in electrical vaults has not been an issue due to the natural draining of the porous soil. The inspection frequency for water collection will be based on actual plant experience. For those electrical vaults within the scope of license renewal, the initial inspection frequency for water accumulation will be at least once every two years. The first inspection for license renewal is to be completed before the period of extended operation.