



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

December 17, 2010

10 CFR 50.4(b)(6)
10 CFR 50.34(b)
10 CFR 2.390(d)(1)

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

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: Watts Bar Nuclear Plant (WBN) Unit 2 – Safety Evaluation Report Supplement 22 (SSER22) – Response to Requests for Additional Information

This letter responds to a number of NRC staff requests for additional information (RAIs) necessary to complete Supplement 22 to the WBN SER.

Enclosure 1 provides the responses to the RAIs.

There are no new regulatory commitments contained in this letter. If you have any questions, please contact William Crouch at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 17th day of December, 2010.

Sincerely,

Masoud Bajestani
Watts Bar Unit 2 Vice President

Enclosure 1: Response to RAIs Necessary to Complete Supplement 22 to the WBN SER

Attachment 1: Procedures Noted in Response to RAI 3.11 - EQ - 2.

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cc (Enclosure):

U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

ENCLOSURE 1

Response to RAIs Necessary to Complete Supplement 22 to the Watts Bar SER

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Qualification Methods

- 3.11 - EQ - 1. *In its FSAR amendments and supplemental letters, TVA stated that qualification tests and analyses for safety-related electrical equipment were conducted in accordance with the requirements of 10 CFR 50.49 and the guidelines of NUREG-0588, Revision 1. In NUREG-0588, Revision 1, the NRC staff presents detailed procedures for qualifying safety-related electrical equipment in a harsh environment. The NUREG-0588 criteria apply to equipment that is important to safety as defined in 10 CFR 50.49.*

The staff concluded that the qualification methods used by TVA are consistent with NRC regulations and are, therefore, acceptable. However, based on the extensive layup period of equipment within WBN Unit 2, the NRC staff must review, prior to fuel load, the assumptions used by TVA to re-establish a baseline for the qualified life of equipment. The purpose of the staff's review is to ensure that TVA has addressed the effects of environmental conditions on equipment during the layup period.

Please provide the assumptions used by TVA to re-establish a baseline for the qualified life of equipment based on the extensive layup period of equipment within WBN Unit 2.

Response: For WBN Unit 2 equipment and cables that are not being replaced prior to startup, the layup period will be addressed in the qualified life evaluations. Engineering defines the service temperature and radiation dose conditions for the period following installation and prior to Unit 2 startup. The aging that occurred during this pre-operational period will be addressed in the qualified life calculations.

For the Reactor Building and Main Steam Valve Vault, the temperature will be assumed to be 100° F for conservatism (Calculation MDQ00200020100374, Unit 2 Layup Temperatures inside Reactor Building and Main Steam Valve Vault, has shown the value to be less than 100° F). All other areas are per the environmental drawings.

For all areas except the Reactor Building, the radiation dose will be assumed to be 1.5 times the normal 40 year dose for conservatism (the actual layup period from Unit 1 criticality to Unit 2 startup will be significantly less than 20 years). For the Reactor Building, the normal dose per the environmental drawings would be unreasonably high; thus, a conservative value of 1.5 times the normal 40 year dose of the Annulus is assumed (this is significantly higher than the actual dose since no dose source is present inside the Unit 2 Reactor Building during the layup period).

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For cables which were installed during the layup period from Unit 1 criticality to Unit 2 startup, consideration is given to additional heat rise due to energized Unit 1 cables. Engineering will document applicable cases for input to the qualified life evaluations.

Electrical Equipment in a Harsh Environment

3.11 - EQ - 2. *Please provide TVA's EQ program procedures for WBN Unit 2.*

Response: The EQ program procedures for WBN Unit 2 are:

- 25402-3DP-GEE-00001, Rev. 0, "Equipment Environmental Qualification (EQ) Program"; and
- 25402-000-GPP-0000-N1106, Rev. 3, "Equipment Environmental Qualification."

These procedures were created for the construction phase of Unit 2 based on the existing Unit 1 EQ program to implement the equivalent requirements. Upon completion of construction, the Unit 1 procedures will be the governing documents.

Attachment 1 provides copies of the two procedures.

3.11 - EQ - 3. *The NRC staff requested TVA confirm that equipment being replaced or refurbished will be qualified as Category I, as required by 10 CFR 50.49. In its response dated September 1, 2010, TVA stated that "replaced equipment is being procured qualified to the NUREG-0588, Category I requirements." TVA also stated, however, that a small population of components is being refurbished. The NRC staff reviewed these components as noted below.*

a. All 6.9 kV motors will be refurbished

TVA considers the refurbishment activities to be routine maintenance that do not impact the qualification of the motors. The staff considers that routine maintenance activities should result in increasing the EQ of the motors to Category I status in accordance with 10 CFR 50.49. Please justify refurbishment of all 6.9 kV motors impact on EQ.

Response: The refurbishment of the 6.9 kV motors for Unit 2 involves routine maintenance activities. These maintenance activities do not modify the Category II motor insulation system originally supplied by Westinghouse. Motors which only require routine maintenance will remain Category II qualified.

In some cases, the maintenance activities determine the need to rewind the motor. The rewind motor insulation system will be qualified in accordance with the EPRI motor rewind program which meets Category I criteria. Motors which

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require a rewind will be Category I qualified. Currently, one of the Unit 2 Containment Spray pump 6.9 kV motors is being rewound to repair insulation damage.

b. Terminal Blocks

TVA stated that it noted during a field walkdown that the terminal blocks installed in the EQ application for WBN Unit 2 are GE-make CR151B. According to TVA, these terminal blocks are qualified to NUREG-0588, Category I. TVA further noted that design modifications have been issued to inspect and replace the EQ terminal blocks that are found damaged or degraded with equivalent CR151B blocks.

Please clarify the use of the term "equivalent" (e.g., identical, similar) regarding the replacement terminal blocks. If the blocks are similar, please complete a similarity analysis and provide it to the NRC staff for review.

Response: For EQ applications, the replacement terminal blocks will be new GE CR151B terminal blocks certified to test reports that document qualification to NUREG-0588, Category I criteria.

c. Main Steam Isolation Valves (MSIVs)

TVA stated that the original WBN Unit 2 MSIVs are qualified to NUREG-0588, Category II. The MSIVs are being refurbished by replacing the missing subcomponents, including the solenoid valves, terminal blocks and manufacturing wiring, with components of the same make, model, and type as supplied on the original purchase order. With the exception of the solenoid valves, the subcomponents will be qualified to NUREG-0588, Category I requirements. According to TVA, the solenoid valves cannot be upgraded because equivalent subcomponents qualified to NUREG-0588, Category I requirements are not available.

Please justify not upgrading the MSIV solenoid valves to Category I in light of 10 CFR 50.49(l).

Response: 10 CFR 50.49(l) requires replacement equipment to be qualified in accordance with 10 CFR 50.49 unless there are sound reasons to the contrary. Regulatory Guide 1.89 (Revision 1), paragraph C.6.d indicates that one of the sound reasons for not upgrading replacement equipment is that replacement equipment qualified in accordance with the provisions of 10 CFR 50.49 does not exist. The MSIV supplier (Weir) has indicated that replacement solenoids qualified in accordance with the provisions of 10 CFR 50.49 are not available for the Unit 2 MSIVs.

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Mild Environment

- 3.11 - EQ - 4. *The NRC staff requested that TVA clarify that, for a mild environment, the threshold for electronic components such as semiconductors or electronic components containing organic material is a total integrated dose of less than 1×10^3 Rads, and that a threshold for a mild radiation environment for other equipment is less than 1×10^4 Rads. In its response dated August 30, 2010, TVA stated that the upper threshold for the EQ Mild Environment is 1×10^4 Rads for all components, which is consistent with WBN Unit 1. Since certain components may have a lower threshold for impacts from radiation exposure, TVA stated that it requires the following at WBN:*
- Per design standards, any device, whether in a mild, essentially mild, or harsh environment, is required to be purchased to the environmental conditions where it is to be located. That includes the usual radiation, temperature, humidity, etc. guidelines. An environmental conditions data sheet with the stated environmental parameters is sent to the manufacturer along with the purchase request and [TVA asks] the vendor to meet those conditions.*
 - For MOS [metal oxide semiconductors], CMOS or like circuitry, the same holds true. But, the design standard for qualification of electrical equipment in a harsh environment specifically requires that any of this type circuitry be evaluated on a case-by-case basis for any gamma dose exceeding 1×10^3 Rads.*

Please provide supporting documentation to justify TVA's establishment of a mild environment threshold for total integrated dose of less than 1×10^3 Rads for electronic components such as semiconductors or electronic components containing organic material.

Response: Note: NRC verbally provided the clarification that " 1×10^4 Rads" was the intended value in the last paragraph of the request.

In order to establish the upper threshold cutoff value for radiation levels in EQ Mild Environments, TVA did an analysis of a pertinent segment of available literature on radiation effects on both individual electronic components and electronic component assemblies. The literature was primarily EPRI documents, articles published in the IEEE Transactions on Nuclear Science, Radiation Effects Research Institute (REIC) reports, and other industry publications (References 1 through 17). The publications addressed both organic and inorganic materials. TVA concluded that typical, non-selected electronic components will, with certain notable exceptions, tolerate a total integrated radiation dose of greater than 5×10^4 Rads without significant degradation of their performance. Based on this analysis, TVA established a radiation cutoff for mild environments of 1×10^4 Rads. The evaluation of the "notable exceptions" (e.g., metal oxide semiconductors) was

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addressed in the earlier August 30, 2010, response as outlined the second bullet above in the request.

1. Radiation Effects Information Center (REIC) Report No. 36, "The Effect of Nuclear Radiation on Electronic Components, Including Semiconductors," October 1, 1964
2. Electric Power Research Institute (EPRI) NP-2129, "Radiation Effects on Organic Materials in Nuclear Plants," November 1981
3. Effects of Radiation on Materials and Components, by John F. Kircher and Richard F. Bowman, Reinhold Publishing Corporation, New York, New York, 1964
4. REIC Report No. 21, "The Effect of Nuclear Radiation on Elastomeric and Plastic Components and Materials," September 1, 1961
5. EPRI NP-4172M, "Radiation Data for Design and Qualification of Nuclear Plant Equipment," August 1985
6. EPRI NP-3326, "Correlation Between Aging and Seismic Qualification for Nuclear Plant Electrical Components," December 1983
7. Johnson, R.T., Jr., Thome, F.V. and Craft, C.M., "A Survey of Aging of Electronics with Application to Nuclear Power Plant Instrumentation," IEEE Transactions on Nuclear Science, Vol. NS-30, No. 6, December 1983
8. Johnson, R.T., Jr., Thome, F.V. and Craft, C.M., "Aging of Electronics with Application to Nuclear Power Plant Instrumentation," IEEE Transactions on Nuclear Science, Vol. NS-31, No. 1, February 1984
9. Gleason, James F., "Aging and Seismic Performance for Safety-related Equipment in a Mild Environment," IEEE Transactions on Nuclear Science, Vol. NS-31, No. 1, February 1984
10. Binkley, David M., "A Low-Cost Radiation-Hardened Preamplifier for Piezoelectric Accelerometers in Nuclear Power Plants," IEEE Transactions on Nuclear Science, Vol. NS-29, No. 6, December 1982
11. EPRI NP-4172SP, "Radiation Data for Design and Qualification of Nuclear Plant Equipment," August 1985
12. Nuclear Radiation Detection, by William J. Price, McGraw-Hill Book Co., New York, New York, 1964

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13. Transistor, Thyristor and Diode Manual, Radio Corporation of American (RCA), Harrison, New Jersey 1969
14. SCR Manual, Sixth Edition, General Electric Semiconductor Products Department, published by Prentice-Hall, Inc., Englewood Cliffs, NJ, 1982
15. Meyers, D.K. and Herzog, Williams, "Feasibility Study on the Design and Radiation Testing of Complex Functions for 2×10^8 (Si)", IEEE Transactions on Nuclear Science, Vol. NS-29, No. 6, December 1982
16. Measel, P.R., Gregor, R.B., and Wahlin, K.L., "Radiation Response of Several Memory Device Types," IEEE Transactions on Nuclear Science, Vol. NS-27, No. 6, December 1980
17. Myers, D.K., Herzog, W., Phy, W., and Coppage, F., "Ionizing Radiation Effects on Copperclad Polyimide," IEEE Transactions on Nuclear Science, Vol. NS-31, No. 6, December 1984

ATTACHMENT 1

Procedures Noted in Response to RAI 3.11 - EQ - 2.

Procedure 25402-3DP-GEE-00001, Rev. 0

**Equipment Environmental
Qualification (EQ) Program**

 TVA WATTS BAR UNIT 2 CONSTRUCTION COMPLETION PROJECT PROCEDURE		25402-3DP-GEE-00001 REV. 000 PAGE 1 of 39 EFFECTIVE: 01-26-2009			
EQUIPMENT ENVIRONMENTAL QUALIFICATION (EQ) PROGRAM		ASME		QUALITY RELATED	
		YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>		
Prepared By <i>W.H. Dwyer</i>	Reviewed By <i>K. Blanchard</i>	PPM <i>William H. Dwyer</i>	PPROE <i>[Signature]</i>	OM <i>[Signature]</i>	PEM <i>W. H. Dwyer</i>
PPM <i>W.H. Dwyer</i>	POAM <i>[Signature]</i>	TVA Eng <i>[Signature]</i>	TVA OM <i>[Signature]</i>	TVA QA <i>Paul Bana</i>	TVA QA <i>[Signature]</i>
Approved By Project Director <i>[Signature]</i>					

1.0 PURPOSE

This procedure controls the Environmental Qualification (EQ) process, defines responsibilities and specifies requirements to establish and maintain auditable documentation demonstrating qualification of electrical equipment for Watts Bar Unit 2 Construction Completion Project (WB2CCP) activities in compliance with 10 CFR 50.49. Procedure 25402-3DP-GEM-00001 (Reference 4.9) defines the process and responsibilities for implementation of the Mechanical Equipment Environmental Qualification (MEQ) program for Watts Bar Unit 2.

2.0 SCOPE

- 2.1 This procedure is applicable to WB2CCP engineering and construction activities. This procedure applies to all individuals who perform design, procurement, installation, modification, maintenance, or replacement activities on equipment within the scope of the WB2CCP EQ Program. The major components of the WB2CCP EQ Program are shown on the flow chart in Appendix D.
- 2.2 This procedure is not intended to be used to perform Watts Bar Unit 1 or Unit 1/Unit 2 Interface Design Change Notice (DCN) related work.

3.0 DEFINITIONS

10 CFR 50.49 List - A design output document that identifies the currently installed equipment in the EQ Program. The list may also identify pending changes to the list due to design changes. Each item on the list is uniquely identified by device number. Cables and splices may be identified generically (e.g., cable contract numbers and mark letters are identified on the 10 CFR 50.49 List). The 10 CFR 50.49 List is maintained in the Enterprise Maintenance Planning and Control (EMPAC) data system. Appendix A identifies the EMPAC data fields that comprise the 10 CFR 50.49 List.

10 CFR 50.49 Piece Parts - Items (parts) from which a 10 CFR 50.49 applicable whole device is assembled. Some subassemblies such as motors and limit switches may be uniquely identified and treated as whole devices, and some subassemblies such as Main Steam Isolation Valve (MSIV) solenoids may be uniquely identified but treated as piece parts.

Electronic documents, once printed, are uncontrolled and may become outdated. Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

3.0 DEFINITIONS (continued)

10 CFR 50.49 Scope - The electrical equipment important to safety required to be in compliance with 10 CFR 50.49 as defined in the following paragraphs excerpted from 10 CFR 50.49:

10 CFR 50.49(b) (1) - Safety-related electrical equipment (Class 1E as defined by IEEE 323-1974) located in a harsh environment. This equipment is relied upon to remain functional during and following certain Design Basis Accidents (DBAs) to ensure (a) the integrity of the reactor coolant pressure boundary, (b) the capability to shut down the reactor and maintain it in a safe shutdown condition, and (c) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the 10 CFR Part 100 guidelines. The DBAs considered are those accidents, exclusive of external events, natural phenomena, and seismic or dynamic events, which result in a harsh environment for a defined plant area.

10 CFR 50.49(b) (2) - Nonsafety-related electrical equipment (non-1E) located in a harsh environment whose failure under postulated post DBA environmental conditions could prevent satisfactory accomplishment of safety functions performed by the safety-related equipment.

10 CFR 50.49(b) (3) - Certain post accident monitoring equipment (per Reg. Guide 1.97) located in a harsh environment.

NOTE

10 CFR 50.49(c) excludes the electrical equipment important to safety, located in a mild environment, from the scope of 10 CFR 50.49. Other 1E requirements must be satisfied for such equipment. This paragraph should not be confused with Equipment Category C (see definition of Equipment Category).

10 CFR 50.49 Whole Device (Device As A Whole) - A complete piece of equipment or instrumentation that requires environmental qualifications as a unit or assembly. Its boundary is limited to the physical equipment identified in the corresponding Environmental Qualification Data Package (EQDP).

Business Support Library (BSL) - The Electronic Data System used to index, retrieve, and store documents. BSL provides the search and retrieval mechanism for viewing documents that are associated together to form the EQDPs. It also provides the cross referencing capabilities to associate documents such as Environmental Qualification Change Supplement (EQCS) and Environmental Qualification Information Releases (EQIRs) against EQDPs.

Category and Operating Times Document - Defines for each component ID number identified, in areas determined to be a harsh environment, the component function(s) for each 10 CFR 50.49 accident(s), or event(s) potentially causing a harsh environment, the operating time and category associated with each event, and a justification for the operating time and category. See Appendix C.

Design Basis Accident (DBA) - The Design Basis Events (DBEs) for which electrical equipment must be environmentally qualified to comply with the requirements of 10 CFR 50.49. Dynamic and seismic qualification, external events and natural phenomena are excluded by 10 CFR 50.49(c). DBAs, for the purpose of 10 CFR 50.49, are identified by comparing the definition of DBEs in 10 CFR 50.49(b) (1) with the statements defining accident conditions in USNRC NUREG 0588. Engineering provides the analysis that defines the DBEs that are considered applicable DBAs for inclusion into the EQ Program. This comparison demonstrates that the required DBAs for 10 CFR 50.49 are:

- Loss of Coolant Accidents (LOCAs)
- High Energy Line Breaks (HELBs) inside Containment
- HELBs outside Containment

Electronic Document Management System (EDMS) - TVA's repository for official TVA records in electronic format. EDMS (the electronic vault) provides protected, reliable record storage and desktop access. It complies with all applicable regulatory, legal, and business requirements for electronic record storage and disposition.

Enterprise Maintenance Planning and Control (EMPAC) - The electronic data system that implements the Enterprise Asset Management program. EMPAC acts as the repository of the 10 CFR 50.49 list stored in the 25402-3DP-G04G-00503 (Reference 4.3) Master Equipment List (MEL) controlled fields of the EMPAC Assets database.

Environmental Excursion - A plant event that results in environmental parameters greater than those specified on environmental drawings or Design Criteria.

Environmental Qualification - The generation and maintenance of auditable documentation of procurement, testing, installation, and maintenance limited to demonstrating that the equipment (within the scope of the EQ Program) is capable of performing its safety function under significant environmental stresses resulting from a DBA in order to avoid common cause failures.

Environmental Qualification Change Supplement (EQCS) - A supplement to an Engineering Document Construction Release (EDCR) package issued by Engineering to identify changes to an EQDP as a result of the EDCR. The EQCS contains as-designed information which describes how the design change will affect the EQ Program and an identification of the changes to the EQ Program documentation. The EQCS is considered "As-Designed" and does not affect the as-constructed status of the EQDP. The EQCS is removed from the EQDP when the formal revision is made to reflect the "As-Constructed" plant status following implementation of the EDCR.

Environmental Qualification Data Package (EQDP) - A design output document which demonstrates the adequacy of equipment to perform its safety function and provides the auditable basis for environmental qualification of equipment within the scope of 10 CFR 50.49 (Reference 4.10). The EQDP documents qualification of the as-constructed equipment configuration.

Environmental Qualification Program - The administrative responsibilities and requirements defined by this procedure controlling the activities associated with the development and maintenance of the documentation proving qualification under 10 CFR 50.49.

Environmental Quality Information Release (EQIR) - An official transmittal of quality data affecting information in the EQDPs, and as applicable the 10 CFR 50.49 List, as a result of certain maintenance or modification activities. EQIRs are stored electronically in EDMS and cross referenced (posted against) the appropriate EQDP to maintain the BSL stored documents in "as-constructed" status while Engineering develops the formal EQDP revision.

Equipment Category - Per NUREG-0588 (Reference 4.11), Appendix E, Section 2, equipment evaluated per the EQ Program is categorized as:

Category A - Equipment that will experience the environmental conditions of DBAs for which it must function to mitigate a 10 CFR 50.49 DBE, and that will be qualified to demonstrate operability in the accident environment for the time required for accident mitigation, with safety margin to failure.

Category B - Equipment that will experience environmental conditions of DBAs through which it need not function for mitigation of these accidents, but through which it must not fail in a manner detrimental to plant safety or accident mitigation, and that will be qualified to demonstrate the capability to withstand any accident environment for the time during which it must not fail, with safety margin to failure.

Category C - Equipment that will experience environmental conditions of DBAs through which it need not function for mitigation of these accidents, and whose failure (in any mode) is deemed not detrimental to plant safety or accident mitigation (and need not be qualified for any accident environment).

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

Category D - Equipment that will not experience environmental conditions of design basis accidents and that will be qualified to demonstrate operability under the expected extremes of its non-accident service environment. This equipment would normally be located outside the reactor containments.

Essential Maintenance - The section of the Qualification Maintenance Data Sheet (QMDS) (EQDP Tab G) that establishes the maintenance that is necessary (must be performed) to maintain the components qualification on a continuing basis.

Essentially Mild (EM) - An evaluation of equipment located in a harsh zone and required to function or not fail for mitigation of a 10 CFR 50.49 specific DBA; however, for the specific DBA, the combined normal plus accident environment is determined not to impose a significant environmental stress on the equipment. This evaluation takes into consideration the design of the equipment (materials, complexity, etc.) as well as the severity of the environment. All devices located in a harsh zone but whose environmental conditions are determined to be "essentially mild" require an Engineering calculation documenting the engineering basis for classifying the equipment as essentially mild and removing the device from the scope of the 10 CFR 50.49 Program. (See Reference 4.1, Section 5.0)

Field Verification - Field verification is the documentation of the installed configuration and other relevant information for equipment, components and cables installed in the plant. Whenever possible, the field verification data should be obtained directly from markings or name plate information on the equipment or cables. Field verification data (e.g., contract number, manufacturer, model number) may also be obtained from the warehouse issue ticket or other procurement documentation when the required information cannot be obtained directly from the manufacturer's markings or name plate data.

Harsh Environment - The environment (temperature, pressure, and relative humidity) resulting from a DBA that is significantly more severe than the environmental conditions that would occur during normal/abnormal plant operation, including anticipated operational occurrences, or whose radiation environment imposes a significant environmental stress.

Harsh Zone - A defined room or building zone where (1) the temperature, pressure, and relative humidity resulting from the direct effects of a DBA (e.g., temperature rise due to steam release) are more severe than those which would occur during an abnormal plant operational condition; (2) the temperature will exceed 130°F due to the indirect effects of DBE (e.g., increased heat loads from electrical equipment); (3) the event radiation dose is greater than 1×10^4 rads; or (4) the total event plus the 40-year total integrated dose (TID) is greater than 5×10^4 rads.

Harsh Environment Records Management System (HERMS) - WBN electronic program for controlling EQ maintenance activities. HERMS is procedurally controlled by TI-10.12 (See Reference 4.6 for WBN-2 Implementation of TI-10.12 requirements).

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

Like for Like - For the purposes of EQ, a "like for like" replacement of either a whole device or piece part is defined as the identical manufacturer and model (or part) having traceability to qualification documentation as was established in the EQDP for the original equipment. Traceability involves ensuring a written auditable link exists between the replacement equipment and the qualification documentation applicable to the original equipment. Such traceability ensures that material or design changes not reflected in the part ID number which would invalidate the applicability of the EQDP do not occur.

Management/Specialist Review - Management/specialist review is a detailed review of an EQDP, EQCS, or revisions of these documents to ensure both technical adequacy and compliance with TVA EQ program requirements. Performance of management/specialist review is at the option of the responsible discipline lead engineer. When the management/specialist review option is elected, the review is documented by an additional signature line subtitled "Management/Specialist Review" on the EQDP or EQCS issue.

MEL (Master Equipment List) - The Master Equipment List, which is controlled by Reference 4.3, contains the 10 CFR 50.49 List and is stored electronically in the EMPAC electronic data system. EMPAC asset queries are used to search for 10 CFR 50.49 List information.

Mild Environment - 10 CFR 50.49 (c) (iii) defines mild environment as "an environment that would at no time be significantly more severe than the environment that would occur during normal plant operation, including anticipated operational occurrences."

NOTE

TVA has quantified this definition in the mild environment zone criteria and the essentially mild criteria. Electric equipment located in a harsh environment zone but deemed "essentially mild" is in a mild environment in accordance with TVA's interpretation of 10 CFR 50.49 (c) (iii).

Mild Zone - A defined room or building zone where (1) the temperature, pressure, and relative humidity resulting from the direct effects of a DBA (e.g., temperature rise due to steam release) are no more severe than those which would occur during an abnormal plant operational condition; (2) the temperature will not exceed 130°F due to the indirect effects of DBA (e.g., increased heat loads from electrical equipment); (3) the event radiation dose is less than or equal to 1×10^4 rads; and (4) the total event plus the 40-year total integrated dose (TID) is less than or equal to 5×10^4 rads.

Module - Any assembly of interconnected piece parts which constitutes an identifiable unit. A module can be disconnected, removed as a unit, and replaced with a spare. It has definable performance characteristics which permit it to be tested as a unit. A module can be a circuit card, electronic board, or other subassembly.

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Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

Operating Time(s) - Time from the beginning of a DBA to the time of initiation of the device's safety function plus the operating time necessary to complete the safety function and any period thereafter during which the device is not required to operate but cannot fail.

Piece Part - A component which will be combined with other components to form a whole device. A piece part may or may not be qualified on its own.

Qualification Level (QL) - All devices identified on the 10 CFR 50.49 List are assigned a Qualification Level, denoted on 10 CFR 50.49 List as the QL.

Level 1 - Components are assigned this level if they are qualified to 10 CFR 50.49, NUREG-0588 Category I (IEEE 323-1974) and are commonly called Cat 1.

Level 2 - Components are assigned this level if they are qualified to NUREG-0588 Category II (IEEE 323-1971) and are commonly called Cat 2.

NOTE

The qualification requirements of 10 CFR 50.49, NUREG-0588 Category I, and IEEE 323-1974 are compatible and provide equivalent qualification criteria. Also, the qualification requirements of NUREG-0588 Category II and IEEE 323-1971 are compatible and provide equivalent qualification criteria.

Qualification Maintenance Data Sheets (QMDS) - The Qualification Maintenance Data Sheets are located in Tab G of the EQDP. The QMDS defines maintenance and surveillance activities which are deemed essential for maintaining the qualified status of 10 CFR 50.49 scope equipment. Also identified are maintenance and surveillance activities which are not essential (i.e., not requirements) but are good practice for maintaining the qualified status of 10 CFR 50.49 scope equipment. The QMDS defines maintenance activities which are related to maintaining the qualified status of the equipment and do not define routine maintenance (e.g., vendor maintenance not related to EQ). The basis used in the preparation of the QMDS is the premise that the plant has in place a maintenance program that satisfies the requirements for maintaining Class 1E equipment in its normal environment.

Qualified Life - The engineering conclusion relative to the period of time for which the applicable item's satisfactory performance can be demonstrated for a specific set of service conditions. The qualified life is the longest period of service, at the end of which the equipment is still capable of performing its specified function if a DBA occurs. Reference 4.1 details the use of the corporate EQ Data base for aging and radiation data evaluations.

Sound Reasons to the Contrary - Justification provided under certain conditions as defined in Regulatory Guide 1.89 (Reference 4.14), where a NUREG-0588 Category II device is not required to be upgraded to a NUREG-0588 Category I device when replacement is needed. See Reference 4.2, Appendix J for requirements.

Unqualified Equipment - Equipment for which there is not adequate documentation to establish that this equipment will perform its intended safety function(s) when challenged by a significant accident/post-accident environment stress.

Whole Device - An assembly of interconnected piece parts that has been qualified as a unit by test or analysis.

4.0 REFERENCES

- 4.1. DS-M18.14.1, *Design Standard for Environmental Qualification of Electrical Equipment in Harsh Environments*
- 4.2. SPP-9.2, *Equipment Environmental Qualification (EQ) Program*
- 4.3. 25402-3DP-G04G-00503, *Master Equipment List (MEL)*
- 4.4. Design Criteria WB-DC-40-42, *Environmental Design*
- 4.5. Design Criteria WB-DC-40-54, *Environmental Qualification to 10 CFR 50.49*
- 4.6. 25402-000-GPP-0000-N1106, *Equipment Environmental Qualification*
- 4.7. SS-E18.10.01, *Environmental Qualification Requirements for Safety-Related Electrical Equipment*
- 4.8. SS-E18.10.02, *Environmental Qualification Requirements for Safety-Related Electrical Cable*
- 4.9. 25402-3DP-GEM-00001, *Mechanical Equipment Environmental Qualification (MEQ) Program*
- 4.10. 10 CFR 50.49, *Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants*
- 4.11. NUREG-0588, Rev. 1, *Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment*
- 4.12. IEEE Standard 323-1971, *IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations*
- 4.13. IEEE Standard 323-1974, *IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations*

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

- 4.14. Regulatory Guide 1.89, Rev. 1, *Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants*
- 4.15. 25402-ADM-00001, *Document Control*
- 4.16. NUREG-0737, *Clarification of TMI Action Plan Requirements*
- 4.17. Regulatory Guide 1.97, Rev. 2, *Criteria For Accident Monitoring Instrumentation For Nuclear Power Plants*
- 4.18. Calculation WBNOSG4134, *10CFR50.49 Category and Operating Times Methodology*
- 4.19. Design Criteria WB-DC-30-4, *Separation/Isolation*
- 4.20. NRC Information Notice No. 88-86, *Operating with Multiple Grounds in Direct Current Distribution Systems*
- 4.21. NEDP-9, *Seismic/Structural Qualification*
- 4.22. 25402-MGT-00003, *Corrective Action Program*
- 4.23. 25402-3DP-G06G-00001, *Material Requisitions*
- 4.24. 25402-PRO-0002, *Purchase Order Formation*
- 4.25. 25402-3DP-G04G-00081, *Engineering Document Construction Release (EDCR) Process*
- 4.26. 25402-000-GPP-0000-N1206, *Work Order Processing*
- 4.27. 25402-3DP-G04G-00027, *Design Verification*

5.0 RESPONSIBILITIES

5.1 Project Engineering Manager (PEM)

The PEM is responsible for the following:

- 5.1.1 Identifying the environmental parameters for normal, abnormal and post-accident conditions in plant areas (harsh and mild) containing Watts Bar Unit 2 safety-related equipment and revising the Watts Bar environmental data drawings to support WB2CCP activities.
- 5.1.2 Specifying the environmental parameters during the extended period of construction and lay-up to be used for evaluations of equipment and cables in the EQ and EM Programs (See Attachment 1).

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- 5.1.3 Identifying the equipment and cables within the scope of 10 CFR 50.49 and the TVA Essentially Mild classification, and ensuring that the data fields specified in Appendix A are completed in EMPAC.
- 5.1.4 Preparing Category and Operating Times calculations for Watts Bar Unit 2 equipment in accordance with Appendix C.
- 5.1.5 Defining the specific attributes and criteria for the WB2CCP EQ walkdowns.
- 5.1.6 Providing walkdown data for the Watts Bar Unit 2 EQ equipment/cables.
- 5.1.7 Preparing material aging/degradation calculations for the Watts Bar Unit 2 equipment that is in the scope of the 10 CFR 50.49 EQ Program.
- 5.1.8 Evaluating each EDCR/DCN for its impact on the 10 CFR 50.49 Program to determine if EQ program documents are affected.
- 5.1.9 Preparing EM calculations for the Watts Bar Unit 2 equipment and cables designated as "E" in the EQ field in EMPAC.
- 5.1.10 Revising the Watts Bar Unit 1 EQDPs to include similar Watts Bar Unit 2 equipment and cables designated as "Y" in the EQ field in EMPAC.
- 5.1.11 Preparing new EQDPs for the Watts Bar Unit 2 equipment and cables designated as "Y" in the EQ field in EMPAC that is different from the equipment or cables qualified by the existing Watts Bar Unit 1 EQDPs.
- 5.1.12 Identifying the storage, installation and maintenance requirements in the QMDS documents for Watts Bar Unit 2 EQ equipment and cables.
- 5.1.13 Including EQ requirements in the purchase requisitions for procurement of 10 CFR 50.49 equipment and cables in accordance with TVA standard specifications SS E18.10.01 (Reference 4.7) and SS E18.10.02 (Reference 4.8).
- 5.1.14 Including any specific requirements in the purchase requisitions for the procurement of EM components.
- 5.1.15 Documenting the implementation of QMDS requirements in the HERMS computer data base (Reference 4.6).

5.2 Construction Manager (CM)

The CM is responsible for the following:

- 5.2.1 Incorporating QMDS requirements into the Work Order (WO) packages impacting EQ equipment (Reference 4.6).

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Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

- 5.2.2 Implementing modifications required to establish qualification of Watts Bar Unit 2 EQ equipment and cables.
- 5.2.3 Performing degradation inspections during the performance of maintenance and modifications impacting EQ equipment or cables.
- 5.2.4 Implementing the QMDS requirements for Watts Bar Unit 2 EQ equipment and cables.

5.3 Procurement Manager

The Procurement Manager is responsible for the following:

- 5.3.1 Including EQ requirements specified by the PEM in the contracts/purchase orders for procurement of 10 CFR 50.49 equipment and cables.
- 5.3.2 Including any requirements specified by the PEM for EM components in the contracts/purchase orders for the EM components.

6.0 REQUIREMENTS

6.1 10 CFR 50.49 List

- 6.1.1 Appendix A specifies the EMPAC data fields that comprise the Watts Bar Unit 2 10 CFR 50.49 list.
- 6.1.2 The equipment and cables within the scope of 10 CFR 50.49 are identified with a "Y" in the EQ field in EMPAC.
- 6.1.3 The equipment and cables classified as EM are identified with an "E" in the EQ field in EMPAC.
- 6.1.4 The PEM is responsible for identifying the equipment and cables within the scope of 10 CFR 50.49 and the TVA EM classification, and ensuring that the data fields specified in Appendix A are completed in EMPAC.

6.2 Environmental Data

- 6.2.1 The normal, abnormal and post-accident environmental parameters are identified on the Watts Bar environmental data drawings (47E235-Series) for those plant areas that contain safety-related equipment.
- 6.2.2 The PEM is responsible for revising the Watts Bar environmental data drawings to support WB2CCP activities.

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

6.2.3 The PEM is responsible for specifying the environmental parameters during the extended period of construction and lay-up to be used for the evaluation of equipment and cables in the EQ and EM programs (See Attachment 1).

6.3 Category and Operating Times (Cat & Op) Calculations

6.3.1 The Category and Operating Times calculations are predecessors to the 10 CFR 50.49 List and include all 10 CFR 50.49 scope devices [10 CFR 50.49 b (1), b (2) and b (3)] which are located in harsh environment areas and are candidates for inclusion in the EQ Program scope. Appendix C describes the process for revising the WBN Category and Operating Times calculations.

6.3.2 The PEM is responsible for revising the WBN Category and Operating Times calculations for Watts Bar Unit 2 equipment in accordance with Appendix C.

6.4 Essentially Mild (EM) Component Evaluations

6.4.1 EM equipment and cables are designated as "E" in the EQ field in EMPAC.

6.4.2 The evaluations of EM equipment and cables are documented in EM calculations using the guidelines provided in Reference 4.1.

6.4.3 The PEM is responsible for preparing EM calculations for the Watts Bar Unit 2 equipment and cable designated as "E" in the EQ field in EMPAC.

6.4.4 The PEM is responsible for identifying any specific requirements for EM components in the purchase requisitions (Reference 4.23) for procurement of EM components.

6.4.5 The Procurement Manager is responsible for including any requirements specified by the PEM for EM components in the contracts/purchase orders (Reference 4.24) for the EM components.

6.5 10 CFR 50.49 Scope Equipment Evaluations

6.5.1 The PEM is responsible for preparing material aging/degradation calculations for the Watts Bar Unit 2 equipment/cables that are in the scope of the 10 CFR 50.49 EQ Program to determine the qualified life and document post-accident operability.

6.5.2 The PEM is responsible for revising the Watts Bar Unit 1 EQDPs to include similar Watts bar Unit 2 equipment and cables designated as "Y" in the EQ field in EMPAC.

- 6.5.3 The PEM is responsible for preparing new EQDPs for the Watts Bar Unit 2 equipment and cables designated as "Y" in the EQ field in EMPAC that is different from the equipment or cables qualified by the existing Watts Bar Unit 1 EQDPs.
- 6.5.4 The PEM is responsible for identifying the storage, installation and maintenance requirements for Watts Bar Unit 2 EQ equipment and cables in the QMDS documents (EQDP Tab G).
- 6.5.5 The PEM is responsible for including EQ requirements in the purchase requisitions for procurement of 10 CFR 50.49 equipment and cables in accordance with TVA standard specifications SS E18.10.01 (Reference 4.7) and SS E18.10.02 (Reference 4.8).

6.6 Engineering Document Construction Release (EDCR) Process

- 6.6.1 The PEM is responsible for evaluating each EDCR for impact on the 10 CFR 50.49 EQ Program.
- 6.6.2 The PEM is responsible for identifying changes to the EQDPs in EQCS documents as specified in Appendix B for each EDCR that impacts EQ equipment or cables.
- 6.6.3 The following requirements shall be satisfied when adding installed (no field work to add device to plant) devices/cables to the 10 CFR 50.49 List:
- a. Cables and splices associated with currently installed components shall be evaluated to ensure their configuration is in accordance with qualification requirements. This includes cable in-line splices for installed cable being added where end devices are not 10 CFR 50.49. Results of the inspection must be documented within the design change adding the device(s) to the 10 CFR 50.49 List or included within the design change for field work as an inspection requirement and rework as required.
 - b. Evaluation shall be completed on the installed equipment for any maintenance parts/whole device replacement, which may have been performed on the device since it was installed. This evaluation is to confirm that the maintenance did not result in the device becoming unqualified. Results of the evaluation must be documented within the associated design change and/or the EQCS prepared to support the design change.

NOTE

This action is not required for 10 CFR 50.49 cables unless they are TVAN identified cables which actually are 10 CFR 50.49 equipment pigtails, which must be evaluated as a part of the device.

- c. Currently installed cables and device leads located in harsh environment areas for circuits being addressed shall be evaluated to identify if any Raychem tape repairs are installed. Any identified repairs are to be documented in the appropriate EQ documents as part of the design change.

6.6.4 The PEM is responsible for specifying storage, installation and maintenance requirements for Watts Bar Unit 2 EQ equipment and cables in the QMDS (EQDP Tab G) of the EQCS for each EDCR that impacts EQ equipment or cables.

6.6.5 The PEM is responsible for identifying any specific field verification data needed for EQ (e.g., specific location data for radiation evaluations) in the EDCR package.

6.6.6 The CM is responsible for incorporating QMDS requirements into WO packages impacting EQ equipment or cables (Reference 4.6).

6.6.7 The CM is responsible for documenting the implementation of QMDS requirements in the HERMS computer data base (Reference 4.6).

6.6.8 The CM is responsible for providing the field verification data specified by the PEM in the EDCR package.

6.7 Field Verification and Walkdowns

6.7.1 The PEM is responsible for defining the specific attributes and criteria to be used for walkdowns of equipment and cables on the 10 CFR 50.49 List.

6.7.2 The PEM is responsible for providing field verification/ walkdown data for the Watts Bar Unit 2 EQ equipment and cables. The form provided in Attachment 4 may be used to document field verification data. Other forms may be used provided the necessary information is included.

6.7.3 Field verification forms shall be completed and verified for accuracy by the persons performing the work.

6.8 Environmental Quality Information Release (EQIR)

- 6.8.1 When approved and issued, an EQIR is an official transmittal of quality information affecting an issued EQDP.
- 6.8.2 Generally, an EQIR transmits field verification data as a result of maintenance or modification activities. EQIRs may also transmit new information which is required to maintain equipment qualification (e.g., revised test reports).
- 6.8.3 The process for preparation and handling of Watts Bar Unit 2 EQIRs is detailed in Appendix F.

6.9 Procurement

- 6.9.1 The PEM is responsible for specifying any specific requirements in the purchase requisitions (Reference 4.23) for the procurement of EM components.
- 6.9.2 The PEM is responsible for specifying EQ requirements in the purchase requisitions for procurement of 10 CFR 50.49 equipment and cables in accordance with TVA standard specifications SS E18.10.01 (Reference 4.7) and SS E18.10.02 (Reference 4.8).
- 6.9.3 The Procurement Manager is responsible for including any EM or EQ requirements specified by the PEM in the contracts/purchase orders (Reference 4.24) for procurement of EM and EQ equipment.

7.0 RECORDS

7.1 Quality Assurance (QA) Records

The following documents are QA records and shall be controlled and processed in accordance with Construction Completion Project Procedure 25402-ADM-0001, *Document Control*.

- EQ Field Verification Data Sheets
- Category & Operating Times Calculations
- Material Aging/Degradation Calculations
- Essentially Mild Calculations
- EQDPs and EQDP Revisions
- EQIRs
- EQCS Documents
- EQ Degradation Inspection Forms

7.2 Non-QA Records

The following documents are non-QA records:

- EQIR Log

8.0 APPENDICES

Appendix A – Identification of EMPAC Data Fields Which Comprise the 10 CFR 50.49 List

Appendix B – Environmental Qualification Change Supplement (EQCS)

Appendix C – Category and Operating Times Calculation Control

Appendix D – Major Components of the WB2CCP EQ Process

Appendix E – Degradation Inspections

Appendix F – Environmental Quality Information Release (EQIR)

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

9.0 ATTACHMENTS

Attachment 1 – WBN2 EQ Component/Cable Pre-Operational Environmental Conditions

Attachment 2 – EQDP Change Supplement (EQCS) Coversheet (Typical)

Attachment 3 – EQIR Coversheet (Typical)

Attachment 4 – Generic Field Verification Data Sheet (FVDS)

Attachment 5 – EQIR Log (Typical)

Valid for 10 days after printing

**Appendix A
(Page 1 of 5)**

**Identification of EMPAC Data Fields Which Comprise the 10 CFR 50.49 List
(10 CFR 50.49 List is stored in EMPAC and controlled by MEL SPP-9.6)**

1.0 PURPOSE

This appendix defines and standardizes the information and designations used in EMPAC to identify Watts Bar Unit 2 electrical equipment requiring environmental qualification to satisfy the requirements of 10 CFR 50.49. The fields noted below comprise the 10 CFR 50.49 List (EQ List) in EMPAC.

2.0 10 CFR 50.49 LIST (EQ LIST) DATA

2.1 The EQ field in EMPAC (EQ field on ASSET Template's CLASSIFICATION Tab) is completed with the following designators:

- Y** Device is 10 CFR 50.49 scope (EQ)
- M** Device is MEQ scope
- E** Device is Essentially Mild (EM)
- N or blank** Device is not EQ, MEQ or EM

2.2 The 10 CFR 50.49 List data shall consist of the following fields in EMPAC:

Component ID: (UNID field on ASSET MAINTENANCE template 1) Unique component identification number assigned to the specific device by Engineering. UNID field in EMPAC is design output data for EQ components.

Description: (DESCRIPTION field on ASSET MAINTENANCE template 1) Brief description of the device's function.

Manufacturer: (MFR CODE + DESCRIPTION field on ASSET MAINTENANCE template 2) Manufacturer of the device. MFR CODE + DESCRIPTION field in EMPAC is design output data for EQ components.

Model Number: (MODEL NO field on ASSET MAINTENANCE template 2) Manufacturer's model number for the device. MODEL NO field in EMPAC is design output data for EQ components.

Purchase Contract: (PURCHASE CONTRACT field on ASSET MAINTENANCE template 2) PURCHASE CONTRACT field in EMPAC is design output data for EQ components.

**Appendix A
(Page 2 of 5)**

Identification of EMPAC Data Fields Which Comprise the 10 CFR 50.49 List

2.0 10 CFR 50.49 LIST (EQ LIST) DATA (continued)

Vendor Part Number: (VENDOR PART NUMBER field on ASSET MAINTENANCE template 2) VENDOR PART NUMBER field in EMPAC is design output data for EQ components.

Serial Number: (SERIAL NUMBER field on ASSET MAINTENANCE template 2) SERIAL NUMBER field in EMPAC is design output data for EQ components.

Date Installed: (DATE INSTALLED field on ASSET MAINTENANCE template 2) DATE INSTALLED field in EMPAC is design output data for EQ components.

Building/Floor: (BUILDING/FLOOR field on ASSET template GENERAL tab) BUILDING/FLOOR field in EMPAC is design output data for EQ components.

Room: (ROOM field on ASSET template GENERAL tab) See Section 2.3 of this appendix for room designations to be used. ROOM field in EMPAC is design output data for EQ components.

Location/Row: (LOC ROW field on ASSET template GENERAL tab) Building row closest to the component's location for components located outside of containment. LOC ROW field in EMPAC is design output data for EQ components.

Location/Column: (LOC COL field on ASSET template GENERAL tab) Building column closest to the component's location for components located outside of containment. LOC COL field in EMPAC is design output data for EQ components.

Location/Azimuth: (LOC AZ field on ASSET template GENERAL tab) Azimuth closest to the component's location for components located inside of containment. LOC AZ field in EMPAC is design output data for EQ components.

Location/Radius: (LOC RADIUS field on ASSET template GENERAL tab) Radius of the component's location for components located inside of containment. LOC RADIUS field in EMPAC is design output data for EQ components.

**Appendix A
(Page 3 of 5)**

Identification of EMPAC Data Fields Which Comprise the 10 CFR 50.49 List

2.0 10 CFR 50.49 LIST (EQ LIST) DATA (continued)

Device Elev. Ft.: (DEVICE ELEVATION FT field on ASSET template GENERAL tab) DEVICE ELEVATION FT field in EMPAC is design output data for EQ components.

Device Elev. In.: (DEVICE ELEVATION IN field on ASSET template GENERAL tab) DEVICE ELEVATION IN field in EMPAC is design output data for EQ components.

Mark Number: (MARK NUMBER field on ASSET template GENERAL tab) MARK NUMBER field in EMPAC is design output data for EQ cables.

EQDP Number: (EQ BINDER NUM field on EQ template's EQ GEN Tab) Designator of the EQDP which documents the qualification of the device. EQ BINDER NUM field in EMPAC is design output.

PAM/TMI Code: (PAM TMI CODE field on EQ template's EQ GEN Tab) Identified if a component is included to comply with commitments to NUREG-0737 (TMI - Three Mile Island) or Regulatory Guide 1.97 (PAM - Post Accident Monitoring) [(P/T, PAM, TMI)]. PAM TMI CODE field in EMPAC is design output.

Installed Comp Ref: (INSTALLED COMP REF on EQ template's EQ GEN Tab) Alternate ID for EQ components and cables.

Mark Number EQ Cable: (MARK NUMBER EQ CABLE field on EQ template's EQ GEN Tab) MARK NUMBER EQ CABLE field in EMPAC is design output.

Calculation ID: (CALCULATION ID field on EQ template's EQ GEN Tab) Identifies the EM calculation for EM components.

**Appendix A
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Identification of EMPAC Data Fields Which Comprise the 10 CFR 50.49 List

2.0 10 CFR 50.49 LIST (EQ LIST) DATA (continued)

QL: Qualification level (1 or 2). (QUAL LEVEL field on EQ template's EQ GEN Tab) QUAL LEVEL field in EMPAC is design output.

Level 1 - Components are assigned this level if they are qualified to 10 CFR 50.49/NUREG-0588 Category I (IEEE 323-1974).

Level 2 - Components are assigned this level if they are qualified to NUREG-0588 Category II (IEEE 323-1971)

EQ Notes: (EQ NOTES field on EQ template's EQ GEN Tab) Denotes any special information related to the device which is not provided elsewhere in the listing. EQ NOTES field in EMPAC is design output.

There are six sets of the followings fields on the EQ template's EQ CAT_OP Tabs that are used to define the post-accident operating categories and required post-accident operating times for the WBN DBAs that are evaluated in the EQ Program. These fields are Design Output.

Installed Component Accn: Identifies the specific DBA that is being addressed.

Accident Location: Identifies the break location for the specific DBA that is being addressed.

EQ Category Code: Equipment Category A, B or A/B as defined in Section 3.0 of this procedure (Definitions) for the specific DBA that is being addressed.

Acc Oper Time: Required post-accident operating time for the specific DBA that is being addressed.

Appendix A
(Page 5 of 5)

Identification of EMPAC Data Fields Which Comprise the 10 CFR 50.49 List

2.0 10 CFR 50.49 LIST (EQ LIST) DATA (continued)

2.3 For room input outside the reactor building, the architectural drawing room number is used; for areas inside the reactor building, the following room numbers are used:

ANN	Annulus
UC	Upper Compartment
LC	Lower Compartment
PRS	Pressurizer Compartment
RW	Raceway (below Fan and Accumulator Rooms)
IBC	Ice Bed Condenser
IIR	Lower Compartment Incore Instrument Room

SG-1	Steam Generator Compartment Number 1
SG-2	Steam Generator Compartment Number 2
SG-3	Steam Generator Compartment Number 3
SG-4	Steam Generator Compartment Number 4

AC1	Accumulator Room Number 1
AC2	Accumulator Room Number 2
AC3	Accumulator Room Number 3
AC4	Accumulator Room Number 4

FN1	Fan Room Number 1
FN2	Fan Room Number 2

ALK	Alrlook
-----	---------

VESS	Reactor Vessel
------	----------------

LOCATION (Cable): The following inputs are used to define location of cables:

O	Outside Containment
I	Inside Containment
VO	Valve Vault
I,O	Inside and Outside Containment

**Appendix B
(Page 1 of 3)**

Environmental Qualification Change Supplement (EQCS)

1.0 PURPOSE

- 1.1 This Appendix describes how an EQCS is prepared and handled for EQDP changes in conjunction with an EDCR package.
- 1.2 An EQCS clearly describes how the design change will affect the EQDP including the identification (by unique identification number) of any equipment additions, deletions, or changes to the EQ Program scope.
- 1.3 An EQCS provides supplemental "as-designed" information and does not affect the "as-constructed" status of the EQDP. The EQCS is developed to ensure the equipment to be installed by the design change will be qualified upon installation.

2.0 GENERAL

- 2.1 The EQCS is a method of revising (or preparing new) EQDP documents due to design changes. The EQCS follows the same process from preparation through issue as the EQDP document.
- 2.2 An issued EQCS supports the qualification to 10 CFR 50.49 for devices to be installed in the plant and made operational without further qualification efforts. The EQCS changes shall be incorporated into the affected EQDP document by EQIR or formal revision prior to EDCR closure.
- 2.3 The EQCS provides the "as designed" changes to the EQDP. An EQCS shall be revised as necessary by raising the revision number until the associated EDCR is closed within Engineering. The revision shall be prepared and issued following the same procedures as used for the original issuance.
- 2.4 The EQIR provides the "as constructed" information, including field verification, resulting from implementation of the EDCR, and is added to the affected EQDP upon issue. All of the information provided by the EQCS/EQIR shall be incorporated by formal revision of the EQDP following implementation of the EDCR.

**Appendix B
(Page 2 of 3)**

Environmental Qualification Change Supplement (EQCS)

3.0 FORMAT

- 3.1 The EQCS coversheet format is given in Attachment 2. The format of the change supplement will be the same as that for the EQDP with revision bars (or annotation, or circling) clearly denoting changes to the currently issued document. If a current page is affected, the page is to be denoted at the bottom of the change supplement page (e.g. "page G-8"). All pages of the change supplement shall be numbered sequentially with the coversheet being page one. A total page count shall be included on the coversheet.
- 3.2 A summary of the revision, similar to a revision log, will be included with each EQCS revision.

4.0 INSTRUCTIONS

- 4.1 The Responsible Engineer (RE) reviews the EDCR change documentation and determines which pages of the EQDP are affected and the impact on the 10 CFR 50.49 List. The RE prepares an EQCS for each EQDP affected by the EDCR. A summary of the revision is included in the revision log in the front of the EQCS. The typical format for an EQCS coversheet is provided in Attachment 2.
- 4.2 The RE signs, dates, and forwards the EQCS to an independent reviewer assigned to conduct a design verification review.
- 4.3 The design verifier completes the review in accordance with Reference 4.27 then signs, dates, and forwards the EQCS to the Electrical EGS (or designee) for approval.
- 4.4 Upon completion of the review for approval, the Electrical EGS (or designee) signs as approver.
- 4.5 Engineering includes the approved EQCS in the EDCR package.
- 4.6 Revisions to an EQCS are to be prepared and processed in the same manner as the original issuance. The Revision Log for the EQCS shall be explicit in noting why the EQCS was revised.

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Environmental Qualification Change Supplement (EQCS)

5.0 EQCS NUMBER

The PEM will assign an EQCS number as follows:

WBNEQ- XXXX-000- 99999-00

EDCR number (and sequence as needed)

EQDP Identifier

Plant assignment (Watts Bar)

6.0 EMPAC DATA INPUT

EQ Information is input into EMPAC using the appropriate update forms. Appendix A to this procedure defines the EQ related fields in EMPAC.

**Appendix C
(Page 1 of 2)**

Category and Operating Times Calculation Control

1.0 PURPOSE

This appendix describes how the Project Engineering Manager (PEM) revises the Category and Operating Times Calculations for Watts Bar Unit 2 Construction Completion Project activities. The Category and Operating Times calculations are design input documents. On a system basis for each component ID number identified in areas determined to be a harsh environment, each Category and Operating Times Calculation defines the component function(s) for each 10 CFR 50.49 accident(s) or event(s) potentially causing a harsh environment, the operating time and category associated with each event, and a justification for the operating time and category.

NOTE

All pertinent Engineering procedures apply to these calculations. The requirements in this appendix are additional requirements for these calculations only or are repeated here for emphasis.

2.0 INSTRUCTIONS

2.1 The PEM shall coordinate maintenance of the Category and Operating Times Calculations as follows:

2.1.1 Include the information described in Section 3.3 of this appendix, for Class 1E "end devices" located in harsh environment spaces (e.g., transmitters, motors, limit switches, etc.). Exclude associated equipment such as cables, splices, junction boxes, terminal blocks, conduit seals, etc. Also include nonsafety-related end components whose failures might impact 10 CFR 50.49 (b) (1) equipment in accordance with 10 CFR 50.49 (b)(2), and some post-accident monitoring equipment in accordance with 10 CFR 50.49 (b)(3).

NOTE

Associated equipment is evaluated as Category A for all events or is evaluated based on end devices.

2.1.2 Revise the calculations as necessary to reflect WB2CCP activities, noting the changes and the reasons for the changes in the appropriate calculation revision log(s).

2.2 All disciplines are responsible for identifying changes which impact the Category and Operating Times Calculations. It is expected that this notification shall be made by coordination review during the approval of design changes, conditions adverse to quality, etc.

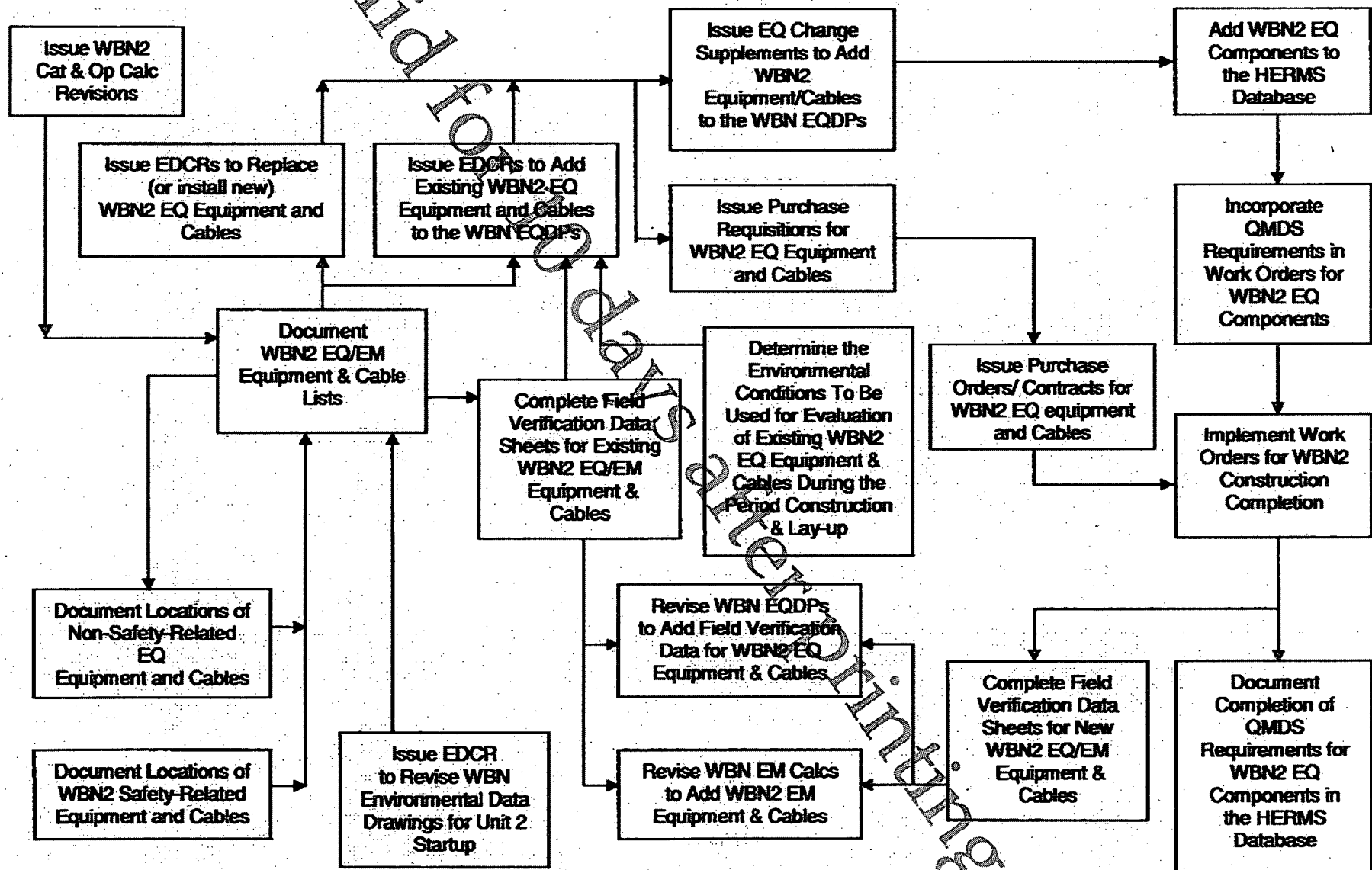
**Appendix C
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Category and Operating Times Calculation Control

3.0 SPECIAL REQUIREMENTS

- 3.1 The guidelines and assumptions used to determine the specific Category and Operating Times are to be included in each calculation or included in a separate calculation referenced by the others. See TVA calculation CWNOSG4134 (Reference 4.18) for control of the WBN Category and Operating Times calculations.
- 3.2 An "A to C" interaction analysis which determines if certain nonqualified (Category C) equipment could impact qualified (Category A) equipment is required as calculation input for new components being added to the Category and Operating Times Calculation, existing Category A or B components being changed to Category C, or Category C components being changed to Category A or B. The supporting calculation (or alternative justification) is to be referenced in the associated Category and Operating Times calculation. See SPP-9.2 (Reference 4.2) for Failure Analysis instructions.
- 3.3 Each component listing in a Category and Operating Times Calculation shall include the following minimum information:
- 3.3.1 A component identification number
 - 3.3.2 A brief description of the component's function
 - 3.3.3 A listing of events which could cause significant environmental stress on the component due to a 10 CFR 50.49 event.
 - 3.3.4 Required categories and operating times for each of the events identified in 3.3.3 above
 - 3.3.5 A justification (i.e., explanation) of the logic used to determine the specific Category and Operating Times given. Judgment must be used to determine the length or detail of the justification required for each component/event.
 - 3.3.6 Identification of Post Accident Monitoring (Regulatory Guide 1.97, Revision 2) Category 1 and 2 end devices.

Appendix D Major Components of the WB2CCP EQ Process



**Appendix E
(Page 1 of 2)**

Degradation Inspections

1.0 PURPOSE

This appendix describes the scope of degradation inspections on Watts Bar Unit 2 EQ equipment.

2.0 INSTRUCTIONS

2.1 Radiation and temperature accelerate reactions which are detrimental to equipment performance. In addition, degradation of equipment installed in Watts Bar Unit 2 may have resulted from the period of extended construction and lay-up. Nonmetallic components and materials may:

1. Lose pliability and become brittle, crack, crumble, or decompose.
2. Lose sealing capability or elasticity (the ability to stretch and return to original shape).
3. Undergo a physical change (become discolored or swell) that alters performance characteristics.

2.2 In order to document the equipment condition and provide documentation to support degradation trend evaluations, an inspection shall be conducted each time a piece of EQ equipment is opened for a maintenance or modification activity. That inspection should address the following items:

NOTE

This inspection is limited to the scope of work covered by the work package. The visual inspection is not intended to require additional work or configuration changes beyond that scoped in the applicable work package.

1. Inspect the organic materials (the nonmetallic materials such as: gaskets, O-rings and seals, terminal blocks, terminal lug insulation, wire insulation, cable jackets, electronic components, electrical coils, switches, sealants, and epoxy) for signs of degradation.
2. Inspect the lubricants and ensure the level (amount) is adequate, that it is free of foreign material and contaminants, that it is not discolored, and that it is of the right consistency.
3. For EQ equipment that is required to be sealed for moisture protection, visually inspect for evidence of moisture in the device.
4. For EQ equipment with weep holes, ensure the weep holes are clear.
5. For EQ equipment with QMDS requirements for conduit entries to be sealed with RTV, ensure a complete seal is present.

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

**Appendix E
(Page 2 of 2)**

Degradation Inspections

2.0 INSTRUCTIONS (continued)

- 2.3** In addition to degradation, physical damage or installation anomalies may affect environmental or seismic/structural qualification (See Reference 4.21). The documented degradation inspection should also address the following items:
- 1.** Inspect for physical damage such as deformation, cracks, dents, broken parts, damaged conduit, etc.
 - 2.** Inspect for installation deficiencies such as loose or missing mounting screws, bolts, fasteners, conduit fittings, seals, cover screws and clips, etc.
 - 3.** Inspect for evidence of water/fluid leakage, corrosion, excessive dirt/dust, leakage from seals or plugs, etc.
 - 4.** Ensure the vendor nameplate or other vendor identification (and applicable TVA ID tags) is present and readable.
- 2.4** The condition of these items shall always be observed and documented. Correction of identified deficiencies on a piece of EQ equipment must be accomplished under an applicable work control document. When installing a replacement whole device, document the condition of the old device to facilitate identification and evaluation of degradation trends, and document the condition of the new device to provide a baseline against which to evaluate future degradation.
- 2.5** Degradation inspection results shall be documented on the form provided in Reference 4.6 Appendix C and entered into the HERMS data base as required by Reference 4.6.
- 2.6** Any degradation or non-conforming conditions identified during the inspection shall be addressed in accordance with the WB2CCP Corrective Action Program (Reference 4.22).

**Appendix F
(Page 1 of 3)**

Environmental Quality Information Release (EQIR)

1.0 PURPOSE

This appendix describes how quality information related to the EQ program (e.g., field verification data) is transmitted and evaluated for incorporation into the EQDP. An EQIR form (Attachment 3) or equivalent is used for this purpose.

2.0 INSTRUCTIONS

2.1 EQIR Initiation and Review

2.1.1 Any organization may use the EQIR form to submit information that potentially affects the EQ program to Engineering.

2.1.2 The originating organization shall prepare the EQIR by:

1. Initiating the EQIR form (Attachment 3 or equivalent).
2. Identifying the affected EQDP, affected systems(s), and UNID(s) of the affected equipment.
3. Describing the information being released in the "Quality Information Released" block and its effect on the applicable EQDP/QMDS.

NOTE

If more space is needed for the "Quality Information Released" data, add continuation pages to the EQIR and ensure the page number (e.g., Page 2 of 2) is included in the upper right hand corner of each continuation page.

4. Describing the reason the EQIR is being initiated (e.g., WO number, EDCR, etc.).
5. Attaching sufficient information to the EQIR form to support revisions to the EQDP (e.g., Certificates of Conformance for equipment being replaced or installed).

NOTE

If another document is part of the EQIR but is already incorporated in one of the Management Services Record Management systems, list on the EQIR the document and its identifying number (such as a drawing number, document accession number, or the item ID of a document scanned into EDMS or electronically submitted from File Keeper).

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

Appendix F
(Page 2 of 3)

Environmental Quality Information Release (EQIR)

2.0 INSTRUCTIONS (continued)

2.1 EQIR Initiation and Review (continued)

2.1.3 The originating organization preparer shall ensure the information on the EQIR form is accurate and complete and sign the "Prepared" block on the EQIR form under "INITIATING ORGANIZATION".

2.1.4 The originating organization reviewer shall verify that the information on the EQIR is accurate and supporting documentation and forms are attached or referenced in the EQIR package. The originating organization reviewer shall sign the "Reviewed" block on the EQIR form under "INITIATING ORGANIZATION".

2.2 Engineering Approval

2.2.1 The Engineering responsible engineer (RE) shall evaluate the technical adequacy and accuracy of the information on the EQIR and sign the "Prepared" block on the EQIR form under "EQIR ENGINEERING APPROVAL". If the EQIR is initiated by Engineering, the RE shall mark the Initiating Organization "Prepared" and "Reviewed" blocks as "NA".

2.2.2 The Engineering reviewer shall perform a verification of the information documented on the EQIR and sign the "Reviewed" block on the EQIR form under "EQIR ENGINEERING APPROVAL".

2.2.3 The PEM is responsible for maintaining a log for Watts Bar Unit 2 EQIRs and assigning a unique EQIR number using the following system:

WB2EQ- 00 000

Sequential number (3 digits)

Year (e.g., 08)

Plant assignment (Watts Bar Unit 2 = WB2EQ)

Example: WB2EQ-08001

2.2.4 Attachment 5 provides a suggested format for the WB2CCP EQIR Log. The EQIR Log is not a QA Record.

**Appendix F
(Page 3 of 3)**

Environmental Quality Information Release (EQIR)

2.0 INSTRUCTIONS (continued)

2.3 EQIR Processing

- 2.3.1 The PEM is responsible for transmitting the approved EQIR to document control to be scanned into EDMS.
- 2.3.2 Approved EQIRs shall be stored in the EQIR folder for the affected EQDP in BSL.
- 2.3.3 EQIRs are removed from the EQIR folder in BSL when the information is incorporated by an EQDP revision.
- 2.3.4 If necessary, an EQIR may be revised. The EQIR revision should be reflected on the EQIR Log.

Valid for 10 days after printing

25402-3DP-GEE-00001-000 REV. 000
PAGE 34 of 39

WBN2 EQ Component/Cable Pre-Operation Environmental Conditions

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

**Attachment 2 – EQCS Coversheet (Typical)
(Page 1 of 1)**

**EQDP
CHANGE SUPPLEMENT
(EQCS)**

Page 1 of ____

EQCS No. _____

	Revision 0			
EDCR No.				
Prepared				
Reviewed				
Approved				
Date				

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Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

ENVIRONMENTAL QUALITY INFORMATION RELEASE (EQIR)

TO: EDMS

EQIR No.

WB2EQ-

FROM:

DATE _____

PLANT/UNIT(S)**WBN / Unit 2**

SUBJECT (EQDP No.)

SYSTEM(S) AFFECTED

UNID(S)

QUALITY INFORMATION RELEASED:

REASON FOR EQIR:

REFERENCE DOCUMENTS

Document Number

EDMS No.

Document Number

EDMS No.

INITIATING ORGANIZATION

Prepared

Date _____

Reviewed

Date

EQIR ENGINEERING APPROVAL

Prepared

Date

Reviewed

Date

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WBN2 EQ Field Verification Data Sheet - General

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

ENVIRONMENTAL QUALIFICATION INFORMATION RELEASE LOG

[illegible]

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Refer to the electronic documents in TVA Business Support Library (BSL) for current revision.

Revision History

Revision Number	Description of Changes
0	Initial Issue

Valid for 10 days after printing

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25402-000-GPP-0000-N1106, Rev. 3

Equipment Environmental Qualification



TVA WATTS BAR NUCLEAR UNIT 2 CONSTRUCTION COMPLETION
PROJECT PROCEDURE

UNIT 2 CONSTRUCTION

25402-000-GPP-0000-N1106

EQUIPMENT ENVIRONMENTAL QUALIFICATION

Revision 0003

Quality-Related: Yes ☒ / No ☐

ASME: Yes ☐ / No ☒

Training Required: ☐ Classroom ☐ Required Reading ☒ None Required

Level of Use: Reference Use

Effective Date:	6-29-10		
Responsible Organization:	Construction Field Engineering		
Prepared by:	Mike Brady	Date:	6-9-10
Reviewed by:	Brenda Hixson	Date:	6-9-10
Approved by:	PFE Robert E. Rood	Date:	06-14-10
Approved by:	CM Andrew J. Broussard	Date:	6-15-10
Concurrence by:	PE Mahmoud H. Haghighi	Date:	6-16-10
Approved by:	BQM Timothy B. Franchuk	Date:	6/18/2010
Reviewed by:	TVA-CM Brian D. Briody	Date:	6/21/10
Reviewed by:	TVA-QA Raul R. Baron	Date:	6/25/10

Revision History

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	01/23/09	All	Initial issue
0001	04/07/10	1, 2, 3, 8, 9, 13	New format for this revision includes Cover sheet, Revision history and Table of Contents. Replaced 'EMPAC' with 'Maximo', 6.3.1 and 6.3.2. Deleted Attachment E, Rev log, at 8.0 and page 14. Attachment D-1, chg'd external to internal. All forms need to be replaced in BSL.
0002	05/24/10	5, 6, 9, 12	At 5.4, chg'd 'may' to 'shall' in the first sentence, and added 'if available from the HERMS software program', added 'with concurrence of Unit 2 EQ Coordinator if Form HERMS-235 is not available', added 'or MEL data sheet', and added 'when working on EQ mechanical equipment ('M' in Maximo). MEQ is not part of HERMS'. At 5.4.1, added '(touching the equipment)', added 'electrical / instrument' and '(Y' in Maximo)'. At 5.4.5, added 'of Form HERMS-235' and added note. Added 5.4.6 through 5.4.9. At 7.0, removed attachments from paragraph and listed attachments and HERMS 235. Attachment C, aligned cells. Removed Attachment E from 8.0, deleted in previous rev. Attachment C modified by this revision.
0003	6-29-10	6	Changed "EQ" to "MEQ" in the note below 5.4.5 and subsection 5.4.7. Provided new direction for subsection 5.4.8. Deleted subsection 5.4.9. No forms affected by this revision.

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1.0 PURPOSE

This procedure develops a Bechtel Watts Bar Unit 2 Construction Completion Project (WB2CCP) procedure to adopt and implement the existing TVA Environmental Qualification (EQ) Program. It defines responsibilities and specifies requirements to establish and maintain auditable documentation demonstrating the environmental qualification of electrical equipment in compliance with 10 CFR 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants".

The purpose of the Mechanical Equipment Environmental Qualification (MEQ) Program is to ensure compliance with the requirements of 10 CFR 50, Appendix A, General Design Criteria (GDC-4, Reference 4.4) for active safety-related mechanical equipment located in harsh environment areas.

2.0 SCOPE

- 2.1 This procedure is applicable to the TVA WB2CCP, which is under the administrative control of Bechtel Construction Operations Incorporated (BCOI).
- 2.2 Requirements for Subcontractors performing activities as described in Section 1.0 are found in Construction Completion Project Procedure 25402-000-GPP-0000-N4102, *Subcontractor Requirements*.
- 2.3 Any deviation from this procedure shall be documented and approved in advance in accordance with CCPP 25402-000-GPP-0000-N1301, *Construction Project Specific Procedures*.
- 2.4 This procedure is primarily for data collection.

3.0 DEFINITIONS

Definitions associated with this procedure can be found within the applicable subsections of the following TVA procedures:

- TVA Standard Programs & Processes procedure SPP-9.2, *Equipment Environmental Qualification (EQ) Program*
- TVA WBN Unit 1 Technical Instruction TI-10.12, *QMDS Verification, Implementation and EQ Activities*

4.0 REFERENCES

- 4.1 Project Nuclear Quality Assurance Manual (PNQAM)
- 4.2 CCPP 25402-ADM-0001, *Document Control*
- 4.3 CCPP 25402-MGT-0003, *Corrective Action Program*
- 4.4 CCPP 25402-3DP-GEE-00001, *Equipment Environmental Qualification (EQ) Program*
- 4.5 CCPP 25402-3DP-GEM-00001, *Mechanical Equipment Environmental Qualification (MEQ) Program*
- 4.6 CCPP 25402-000-GPP-0000-N1301, *Construction Project Specific Procedures*
- 4.7 CCPP 25402-000-GPP-0000-N4102, *Subcontractor Requirements*
- 4.8 TVA Standard Programs & Processes procedure SPP-9.2, *Equipment Environmental Qualification (EQ) Program*
- 4.9 TVA WBN Unit 1 & 2 Technical Instruction TI-404, *Unit Two Separation During Construction / Startup*
- 4.10 TVA WBN Unit 1 Technical Instruction TI-10.12, *QMDS Verification, Implementation and EQ Activities*
- 4.11 TVA WBN Unit 1 & 2 Technical Instruction TI-12.08, *Control of Unit Interfaces*
- 4.12 Walkdown Procedure WDP-GEN-1, *General Walkdown Requirements*

5.0 RESPONSIBILITIES

5.1 Construction Manager (CM)

- 5.1.1 The CM is responsible for ensuring that the requirements of this procedure are properly implemented.
- 5.1.2 Providing walkdown data for Watts Bar 2 EQ equipment / cables based on criteria provided by the Project Engineering Manager.

5.2 Project Field Engineer (PFE)

The PFE is responsible for the following:

- 5.2.1 Providing guidance and supervision to field engineering personnel assigned to implement the requirements of this procedure.
- 5.2.2 Determining which Bechtel Engineering Department Procedure Instructions are adopted under the scope of this procedure; and providing clarification and guidance on the extent to which Bechtel WB2CCP personnel implement these procedures and instructions.
- 5.2.3 Ensuring personnel have the required training and experience necessary to implement the requirements of this procedure.

5.3 Responsible Superintendent (RS)

The RS is responsible for the following:

- 5.3.1 Supervising and coordinating craft labor and equipment required to complete installation.
- 5.3.2 Adhering to project drawings and specifications, maintaining good workmanship, and fulfilling all safety and quality requirements pertaining to the work, as required by procedure and implementing work orders.
- 5.3.3 Coordinating and scheduling activities based on project schedule requirements.
- 5.3.4 Ensures craftsmen who implement modification activities involving 10CFR50.49 equipment are aware of any applicable EQ activities.
- 5.3.5 Ensure craftsmen are adequately trained and fully cognizant of the responsibilities associated with conducting EQ Degradation Inspections.

5.4 Work Planners

Work Planners shall incorporate forms per the following: Use Form HERMS-235 (Harsh Environment Record Management System), (Appendix H, TI-10.12), if available from the HERMS software program. Use Attachment A, 'Degradation Inspection', with concurrence of Unit 2 EQ Coordinator if Form HERMS-235 is not available.

Use Attachment B, 'Generic Field Verification Data Sheet', or MEL data sheet, when collecting field data for Unit 2 equipment or initial installation.

Use Attachment C, 'Mechanical EQ Field Verification Data Sheet', or MEL data sheet, and Attachment D, 'MEQ Inspection for Degradation', when working on EQ mechanical equipment ('M' in Maximo). MEQ is not part of HERMS.

- 5.4.1 Work packages that involve physical work (touching the equipment) on 10CFR50.49 electrical / instrument equipment / cables ('Y' in Maximo).
- 5.4.2 Work packages that accomplish Qualification Maintenance (QM) activities.

NOTE If modifying an EQ whole device, it may become apparent that some existing QM and/or Qualification Maintenance Data Sheets (QMDS) activities (in HERMS or applicable EQ Binder) may no longer be applicable. In these cases, and when performing activities on an EQ whole device which is installed as part of a modification, but which is yet to be incorporated into the WBN QMDS, then the appropriate installation requirements will be identified in the associated Environmental Qualification Change Supplement (EQCS). Work planners / Field personnel are responsible to ensure they are properly addressing the QM and installation requirements of the device.

- 5.4.3 Work Planners shall identify all 10CFR50.49 equipment (i.e., EQ whole devices such as cables, conduit seals, solenoid valves, etc.) affected by the work document, based EQ data supplied from the Engineering Document Construction Release / Design Change Notice.
- 5.4.4 Work Planners shall ensure that all applicable Qualification Maintenance Instructions (QMI's) are addressed by the work document and performance of the QM is clear to field personnel.
- 5.4.5 Ensure EQ Degradation Inspection Result Sheets, Attachment A or Form HERMS-235, and an accurate listing of EQ equipment / cable Component Identifiers are included in the work order.

NOTE For refurbishment activities that restore a component to a like new condition, and minimize the potential for rework with regard to MEQ, the following steps may apply:

- 5.4.6 Work Planners shall verify that the component is MEQ on Unit 1.
- 5.4.7 Reference the Unit 1 MEQ binders and verify that the Unit 2 equipment is the same as Unit 1 equipment.
- 5.4.8 If the Unit 2 components are not the same as Unit 1 initiate a PER to design engineering.
- 5.4.9 Deleted

5.5 Field Engineer (FE)

The FE is responsible for the following:

- 5.5.1 Understanding the procedural, process and technical requirements associated with the requirements of this procedure.
- 5.5.2 Ensuring that the installation has been completed in accordance with applicable drawings, codes, specifications, standards, and quality requirements.
- 5.5.3 Verify that the required MEL Data, such as Unique Identifier Number, Model Number, Serial Number, Manufacturer, etc., has been recorded on Attachment B or C, in accordance with CCPP 25402-3DP-GEE-00001 or CCPP 25402-3DP-GEM-00001.

5.6 Environmental Qualification (EQ) Coordinator

The EQ Coordinator is responsible for the following:

- 5.6.1 When an EQ whole device is replaced or installed, coordinates required updates to the EQ Binders in accordance with SPP-9.2 and 25402-3DP-GEE-00001.
- 5.6.2 Initiates field work to obtain equipment information, including EQ degradation inspection.
- 5.6.3 Tracks EQ Binder, field related open items, impact of design changes, and the preparation of forms related to closure of these items and other EQ Binder / List impacts.

- 5.6.4 Reviews completed work packages and inputs applicable data into the Harsh Environment Records Management System U-2 database.

5.7 Field Personnel

- 5.7.1 Field Personnel using Form HERMS-235 (EQ Work Record) shall complete the form in accordance with Appendix H, TI-10.12. Field Personnel using Attachments A, B, C, or D, shall complete the form in accordance with CCPP 25402-3DP-GEE-00001 or 25402-3DP-GEM-00001. Site Personnel shall immediately notify the EQ Coordinator, as appropriate, when problems are encountered in implementing Qualification Maintenance.

- 5.7.2 For all cable component identifiers and wiring, personnel shall have current training in

- WBN Cable Damage Inspection
- WNB Specific Penetration Component Familiarization
- This procedure, 25402-000-GPP-0000-N1106

Note – Individuals trained and qualified (i.e. completed WBNSCA950002 training) for inspections of cable and wiring

- 5.7.3 Field Personnel performing QM shall ensure any changes to the work scope receives adequate re-planning for QM required by the additional work.

- 5.7.4 Field Personnel shall ensure a degradation inspection, per Attachment A, Degradation Inspection Results, is completed for 10CFR50.49 equipment when engaged in the following activities:

- A. Performing physical work on equipment / cables.
- B. Performing inspections on equipment for which a configuration change to the equipment is not required. If the scope of work only requires viewing external surfaces (i.e., with no physical contact), then documenting an external inspection is NOT required.
- C. If opening an EQ device which contains additional EQ items inside (i.e., junction box with several cables and terminal blocks inside; primary penetration with multiple cables attached, etc.), perform degradation inspections as follows:

Document the performance of an external and internal degradation inspection (in accordance with Appendix C, TI-10.12) on the EQ device being opened.

If EQ items within the enclosure are physically affected as part of the work scope (e.g., physical work, moved, touched, adjusted, etc.), then document an individual degradation inspection on the item(s) affected.

- If the inspection discovers degradation on any 50.49 item within the enclosure, this requires action / identification per the next step.
 - If a Non-EQ device is opened which contains EQ cables, a degradation inspection is not required for the EQ cables.
- D. If the degradation inspection identifies any degradation, the responsible Field Engineer shall initiate corrective action by generating a PER, and, if applicable, correcting the identified deficiency on the existing work order / work plan.

6.0 REQUIREMENTS

6.1 Work Implementation

- 6.1.1 Field Personnel shall record the Master Equipment List Data (cable number, contract number, etc.) on the Field Verification Data Sheets, on Attachments B or C.
- 6.1.2 Form HERMS-235, Appendix H, TI-10.12, may be used in work orders for maintenance, surveillance, corrective and / or replacement activities, which are performed on 10CFR50.49 equipment / cables.

6.2 Equipment Environmental Qualification (EQ) Program, No. 25402-3DP-GEE-00001

- 6.2.1 Design Engineering is responsible for identifying U-2 equipment and cables designated as EQ. Attachment B, Generic Field Verification Data Sheet, shall be used to document field verification data.
- 6.2.2 Field verification forms shall be completed and verified for accuracy by the persons performing the work.
- 6.2.3 In order to document the equipment condition and provide documentation to support degradation trend evaluations, an inspection shall be conducted each time a piece of EQ equipment is opened for a maintenance or modification activity. That inspection should address the following items:

NOTE

This inspection is limited to the scope of work covered by the work package. The visual inspection is not intended to require additional work or configuration changes beyond that scoped in the applicable work package.

1. Inspect the organic materials (the nonmetallic materials such as: gaskets, O-rings and seals, terminal blocks, terminal lug insulation, wire insulation, cable jackets, electronic components, electrical coils, switches, sealants, and epoxy) for signs of degradation.
2. Inspect the lubricants and ensure the level (amount) is adequate, that it is free of foreign material and contaminants, that it is not discolored, and that it is of the right consistency.
3. For EQ equipment that is required to be sealed for moisture protection, visually inspect for evidence of moisture in the device.
4. For EQ equipment with weep holes, ensure the weep holes are clear.
5. For EQ equipment with QMDS requirements for conduit entries to be sealed with RTV, ensure a complete seal is present.

6.3 Mechanical Equipment Environmental Qualification (MEQ) Program, No. 25402-3DP-GEM-00001

- 6.3.1 Field verification data is obtained by walkdowns, and/or obtaining the required information from other quality sources such as verified information from MAXIMO and from EDCR packages and/or other implementing work documents. Attachment C, Mechanical Equipment Qualification Field Verification Data Sheet, may be used to document the field verification data.
- 6.3.2 Field verification data used within the MEQ program shall be quality information. The minimum data required for components on the MEQ List is the component's location (room and elevation), manufacturer and model number. Also identified are manufacturer and model number (if available) of ancillary equipment installed with the device (e.g., filter regulator), and any other pertinent data necessary to properly identify the component and verify its qualification status. Field verification data is obtained by walkdowns, and / or obtaining the required information from other quality sources such as verified information from MAXIMO and from EDCR packages and / or other implementing work documents. This field verification data must be sufficiently detailed to establish qualification of the installed device. The form provided in Attachment 4 may be used to document the field verification data. Other forms may be used (WDP-GEN-1) provided the required information is included.

- 6.3.3 For MEQ equipment that will not be replaced prior to startup, a degradation inspection shall be performed to document the condition of the existing equipment. Attachment D, MEQ Inspection for Degradation, may be used to document the results of the degradation inspection. Any degradation or non-conforming conditions identified during the inspection shall be addressed in accordance with the WB2CCP Corrective Action Program (Reference 4.3).

7.0 RECORDS

All records generated by implementation of these same instructions and procedures are QA Records, will be retained in accordance with the implementing Work Order (WO). Records will be maintained by Bechtel, in a U-2 HERMS Data Base, separate from U-1, until system turnover.

TI-10.12 - Form HERMS-235

Attachment 'A' – Degradation Inspection Results

Attachment 'B' - Generic Field Verification Data Sheet (FVDS)

Attachment 'C' - Mechanical Equipment Qualification Field Verification Data Sheet (FVDS)

Attachment 'D' - MEQ Inspection for Degradation

8.0 ATTACHMENTS

Attachment 'A' – Degradation Inspection Results

Attachment 'B' - Generic Field Verification Data Sheet (FVDS)

Attachment 'C' - Mechanical Equipment Qualification Field Verification Data Sheet (FVDS)

Attachment 'D' - MEQ Inspection for Degradation

Valid for 10 days after printing

ATTACHMENT 'A'

Degradation Inspection Results (Page 1 of 1)

Work Doc. No.: _____ Page _____ of (or) _____ Continued On _____

*** NOTE: Perform an "As-Left" Visual Degradation Inspection. Record results below:

EQ Equipment to be Inspected and Results of Inspection (Check if degradation found. YES or NO):

	External	Internal
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>
CID: _____	Not Involved <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>	Not Inspected <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/>

If any 'AS-LEFT' results are checked YES, describe degradation:

EQUIPMENT, Inspection Signatures: _____ / _____
WORKER 1 Date WORKER 2 DateCABLES, Inspection Signature: _____ / _____
QUALIFIED DEGRADATION INSPECTION PERSONNEL NAME Date

If any results of inspection are YES, identify work document/work request which will correct the degradation.

NOTE: Ensure new Work Order is initiated within one working shift. Supervisor provide signature and any Clarification comments:

SUPERVISOR Signature Approving Corrective Actions: _____ Date: _____

***** COMPUTER DATA ENTRY (HERMS) *****

Data Entered By: _____ Date: _____ Verified By: _____ Date: _____

RETENTION PERIOD: LIFETIME (ORIGINAL TO BE STORED WITH WORK DOCUMENT) RESPONSIBLE
ORGANIZATION: DCRM

WBN2 EQ Field Verification Data Sheet - General

[illegible]

ATTACHMENT 'C'

(Page 1 of 1)

**MECHANICAL EQUIPMENT QUALIFICATION (MEQ)
FIELD VERIFICATION DATA SHEET**UNID: WBN-2-

Manufacturer: _____

Model Number: _____

Contract: _____

Date Installed: _____

Location

Row: _____ Column: _____ Building: _____ Room: _____ Floor Elevation: _____ Ft. _____ In.

Azim: _____ Degrees Radius: _____ Ft. _____ In. Device Elevation: _____ Ft. _____ In.

Other Nameplate Data: (Note: If ancillary devices such as a filter regulator are installed, complete a separate Field Verification Data Sheet for each ancillary device.)

Completed By: _____ Date: _____

Verified By: _____ Date: _____

ATTACHMENT 'D'

(Page 1 of 1)

MEQ INSPECTION FOR DEGRADATION

UNID WBN-2-

Radiation and temperature accelerate reactions which are detrimental to equipment performance. In addition, degradation of equipment installed in Unit 2 may have resulted from the period of extended construction and lay-up. Inspect all accessible non-metallic components. Complete the following checklist and explain any degradation in the remarks.

AS-FOUND EXTERNAL INSPECTION

		YES	NO	NA
1.	Deformation, cracks, dents, damage, missing name tag, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Loose/missing/broken parts or fittings, mounting hardware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Evidence of water/fluid leakage or corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

AS-FOUND INTERNAL INSPECTION

4.	Deterioration, physical damage, corrosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Moisture, condensation, dirt/dust, grease/oil leakage, blocked weep hole	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Discoloration of gaskets, o-rings, seals or other non-metallic parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Swelling/deformation of gaskets, o-rings, seals or other non-metallic parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Gaskets, o-rings, seals or other non-metallic parts cut, brittle or damaged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remarks:

Completed By: _____ Date: _____

Verified By: _____ Date: _____