Attachments to Appendix 3D

3D Attach A Sample Equipment Qualification Data Package (EQDP)

EQ FILE _____

REVISION _____

Manufacturer
Product
Model Number

Prepared _____ Date _____

Reviewed _____ Date _____

Approved _____ Date _____

Revision Control Summary

PAGE(S) INVOLVED	BASIS FOR CHANGE

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TAB A

QUALIFICATION SUMMARY

QUALIFICATION SUMMARY

1 QUALIFICATION SUMMARY

_____

_____

_____

_____

_____

_____

_____

2 PRINCIPAL QUALIFICATION DOCUMENTATION

Title/Number/Revision _____

_____ DATE _____

Title/Number/Revision _____

_____ DATE _____

Title/Number/Revision _____

_____ DATE _____

3 QUALIFICATION CRITERIA:

___ Criteria used to demonstrate qualification is in accordance with the following (indicate documents that are applicable):

___ 10CFR50.49, “Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants”.

___ IEEE Std 323 (1974) - “IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations.”

___ Other. Specify _____

_____

_____

4 OPEN ITEMS

TAB B

REFERENCES (OPTIONAL)

TAB C

EQUIPMENT IDENTIFICATION

EQUIPMENT IDENTIFICATION

MANUFACTURER: _____

TAG NO	NAME TAG (EQUIPMENT DESCRIPTION)	LOCAL AREA LOCATION (ROOM NO.)

TAB D

CHECKLIST FOR

ENVIRONMENTAL QUALIFICATION

DATA PACKAGE (EQDP)

CHECKLIST FOR ENVIRONMENTAL QUALIFICATION DATA PACKAGE (EQDP)

1 QUALIFICATION METHODOLOGY

1.1 Description of Methodology: _____

1.2 Does the qualification report state that the qualification method conforms to IEEE Std 323 (1974) or an IEEE "daughter" standard? _____ Reference: _____

COMMENTS:_____

1.3 If analysis was performed in lieu of testing:

1.3.1 Was justification provided? ___ Reference: _____

Identify analysis performed:_____

1.3.2 Was partial type test data provided to support the analytical assumptions and conclusions? ___ Reference: _____

1.3.3 Were equipment performance requirements identified? ___ Reference: _____

1.3.4 Were specific features and failure modes and effects analyzed? ___ Reference: _____

1.3.5 Were assumptions and mathematical models used together with appropriate justification for their use? ___ Reference: _____

COMMENTS:_____

1.4 When test data or operating experience data have been extrapolated, has the basis been appropriately identified and justified? ___ Reference: _____

Identify extrapolated data:_____

COMMENTS:_____

2 COMPARISON OF INSTALLED EQUIPMENT TO QUALIFIED EQUIPMENT

Is the equipment identified in the qualification program identical to the plant equipment that requires qualification? ___

	PLANT DEVICE	QUALIFIED DEVICE	QUALIFICATION REFERENCE
2.1 Equipment Type			
2.2 Manufacturer			
2.3 Model Number(s)			
2.4 Serial Number(s)			

2.5 Identify Component-Unique check sheet attached (See Supplements 1–4):

COMMENTS:_____

3 MATERIALS ANALYSIS

Identify the materials susceptible to significant thermal and/or radiation degradation and aging (Use Tab E of Binder for Detailed Materials Analysis)

MATERIAL	PROPERTY	FUNCTION	RADIATION THRESHOLD	REFERENCE	ACTIVATION ENERGY	REFERENCE

COMMENTS:_____

4 TEST SEQUENCE

4.1 Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE Std 323 (1974), paragraph 6.3.1.7? ___ (note below)

	RELATIVE ORDER/ NO/NA	REFERENCE
4.1.1 Test sample inspected for damage:		
4.1.2 Baseline functional tests performed under normal conditions		
4.1.3 Test sample operated at extremes of all performance, operating, surge voltages and electrical characteristics given in equipment specifications, excluding DBE and post DBE events.		
4.1.4 Equipment aged:		
Thermal:		
Radiation:		
Wear:		
4.1.5 Test sample subjected to specified nonseismic mechanical vibration		
4.1.6 Test sample subjected to simulated OBE and safe shutdown earthquake (SSE) seismic vibration in accordance with IEEE Std 344 (2004)		
4.1.7 Test sample performs required safety function(s) while exposed to simulated Design Basis Event (DBE) exposure:		
4.1.8 Test sample performs required safety function(s) while exposed to simulated Post-DBE exposure:		
4.1.9 Post test final inspection and disassembly of test sample		

COMMENTS:_____

4.2 Was the same piece of equipment used throughout the test sequence described in question 4.1 above? _ Reference: _____

COMMENTS:_____

4.3 Have the test equipment, test equipment accuracies and calibration data been appropriately documented? _ Reference: _____

COMMENTS:_____

5 NORMAL SERVICE CONDITIONS QUALIFICATION

5.1 Qualified Life Basis:

Limiting Parameter Reference

COMMENTS:_____

5.2 Were all known synergistic effects that are believed to have a significant effect on equipment performance considered in the aging program? ___ Reference: _____

COMMENTS:_____

5.3 Thermal Aging:

5.3.1 Was thermal aging considered in the qualification program? ___ Reference: _____

COMMENTS:_____

5.3.2 Was the basis for thermal aging identified in the qualification program? ___ Reference: _____

COMMENTS:_____

5.3.3 Was the aging acceleration rate justified and were the parameters of time and temperature identified in the qualification program? ___ Reference: _____

COMMENTS:_____

5.3.4 Identify the methodology used for thermal aging analyses.

COMMENTS:_____

5.3.5 Was the equipment operated during the thermal aging? ___ Reference: _____

COMMENTS:_____

5.3.6 Were process interface environments considered during the thermal aging? ___ Reference: _____

COMMENTS:_____

5.4 Radiation Aging Exposure:

5.4.1 Was radiation aging exposure considered in the qualification program? ___ Reference: _____

COMMENTS:_____

5.4.2 Was the basis for radiation aging exposure identified in the qualification program? ___ Reference: _____

COMMENTS:_____

5.4.3 Is the radiation test exposure dose and dose rate acceptable? ___ Reference: _____

COMMENTS:_____

5.5 Special environmental calculations (e.g., temperature, radiation)

Type	Reference

5.6 Vibration (non-seismic) Aging:

5.6.1 Were the effects of nonseismic vibrations induced during normal and abnormal operation addressed in the qualification program? ___ Reference: _____

COMMENTS:_____

5.6.2 Was the basis for vibration aging identified and justified in the qualification program? ___ Reference: _____

COMMENTS:_____

5.7 Operational Stress Aging:

5.7.1 Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation addressed in the qualification program? ___ Reference: _____

COMMENTS:_____

5.7.2 Was the basis for stresses induced during operational aging identified and justified in the qualification program? ___ Reference: _____

COMMENTS:_____

6 ACCIDENT SERVICES CONDITIONS QUALIFICATION

6.1 Do the test values of the qualification program envelop the plant specific requirements? ___

6.1.1 Function Time

Required Function Time (duration vs. test)	Plant Application and Service Conditions	Qualification Documentation	Report Section

COMMENTS:_____

6.1.2 Accident Profile

	Plant Application and Service Conditions	Qualification Documentation	Report Section
Rate of temperature/ pressure increase			
Peak: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			

COMMENTS:_____

6.1.3 Radiation

	Plant Application and Service Conditions	Qualification Documentation	Report Section
Radiation qualification method	NA		
Equipment susceptible to beta radiation			
Radiation type			
Accident radiation dose rate (rad/hr)			
Accident radiation dose (rad)			

COMMENTS:_____

6.1.4 Spray and Submergence

	Plant Application and Service Conditions	Qualification Documentation	Report Section
Spray qualification method (test/analysis)			
Pressure at time of spray Introduction			
In-leakage considered			
Corrosion considered			
Spray composition (in ppm and % solution by weight)			
Submergence duration			
Time to submergence			

COMMENTS:_____

6.2 Special environmental calculations (temperature, radiation, etc.)

Type Reference

6.3 Was margin applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? ___

Suggested Margin According to IEEE Std 323 (1974)	Margin Applied	Reference
Temperature: +15°F		
Pressure: +10% of gauge		
Radiation: +10% of accident dose		
Operating Time: +10% of the period of time the equipment is required to operate following the start of the design basis event or 2 hours.		
Voltage: ±10% of rated value, but not to exceed equipment design limits		
Frequency: ±5% of rated value, but not to exceed equipment design limits		
Vibration: +10% added to acceleration requirements at the mounting point of the equipment. COMMENTS:_____		

6.4 For equipment that is required to perform its safety function within a short time following an accident, was the equipment qualified for at least 2 hours? ___ Reference: _____
COMMENTS:_____

6.4.1 If equipment is to operate in the short term, does the test discuss the long-term equipment failure modes? ___ Reference: _____

6.5 Is the equipment subject to moisture or liquid intrusion that can affect the performance of the equipment under design basis event conditions? ___ Reference: _____
COMMENTS:_____

6.6 Was process/component induced temperature rise considered during DBE testing? ___
Reference: _____
COMMENTS:_____

7 PERFORMANCE AND OPERABILITY EVALUATION

7.1 Identify the safety function(s) of the equipment:_____

7.2 Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics, which would constitute failure if not met? ___ Reference: _____
Identify Acceptance Criteria: _____
COMMENTS:_____

7.3 Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment, which should be verified before, after, and periodically during the test to judge equipment performance? ___ Reference: _____
Identify baseline and functional testing:_____
COMMENTS:_____

7.4 Does the qualification report/analysis describe loads (or load combinations) applied during DBE test? ___ Reference: _____
COMMENTS:_____

7.5 Do the applied loads during baseline testing reflect normal operating conditions? ___ Reference: _____
COMMENTS:_____

7.6 Identify electrical characteristics necessary for the equipment performance specifications to be satisfied.

Parameter	Specific Accident Conditions	Reference	Demonstrated Conditions	Reference
Voltage				
Load				
Frequency				
Accuracy				
Other(s)				

COMMENTS:_____

7.7 Did the equipment perform its intended function during and after the simulated design basis event exposure? ___ Reference: _____
COMMENTS:_____

7.8 Did the test demonstrate the operability requirements for the required time interval for that the equipment is required to operate? ___ Reference: _____
COMMENTS:_____

8 ANOMALIES

Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved? ___ Reference: _____

COMMENTS:_____

9 INSTALLATION/INTERFACES REQUIREMENTS AND RECOMMENDATIONS

List all interfaces pertinent to EQ identified in the test report or evaluation and reference the source.

9.1 REQUIREMENTS

Interface	Vendor Requirement	Basis Reference	Plant Requirement	Reference
Mounting Bolts				
External Process Connections				
Electrical Connections				
Mechanical Connections				
Conduit Seals				
Connector Seals				
Orientation				
Physical Configuration				
Other				

COMMENTS:_____

9.2 RECOMMENDATIONS

Interface	Vendor Recommendation	Basis Reference	Plant Recommendation	Reference
Mounting Bolts				
External Process Connections				
Electrical Connections				
Mechanical Connections				
Conduit Seals				
Connector Seals				
Orientation				
Physical Configuration				
Other				

COMMENTS:_____

10 MAINTENANCE AND CONDITION MONITORING REQUIREMENTS AND RECOMMENDATIONS

10.1 REQUIREMENTS

Maintenance	Vendor Requirement	Basis Reference	Plant Requirement	Reference
	1 2 3 4			
Condition Monitoring				
	1 2 3 4			

COMMENTS:_____

10.2 RECOMMENDATIONS

Maintenance	Vendor Recommendation	Basis Reference	Plant Recommendation	Reference
	1 2 3 4			
Condition Monitoring				
	1 2 3 4			

COMMENTS:_____

SUPPLEMENT 1

COMPONENT-UNIQUE CHECKLIST

MOTORS

A. EQUIPMENT IDENTIFICATION

(1) Is the motor identified in the qualification report identical to the plant motors that require qualification? ____

Item		Plant	Report	Acceptable	Report Section
(a)	Insulation system materials				
(b)	Coil construction (form or random wound, cast)				
(c)	Insulation class (B, F, H)				
(d)	Lubricant: Manufacturer				
	Type				
(e)	Bearing: Manufacturer				
	Type				
(f)	Seals: Manufacturer				
	Type				
	Material				
(g)	Motor lead insulation				
(h)	Plant Motor Operating Characteristics:				
	RPM				
	Load HP				
	Configuration				
	Duty				

COMMENTS:_____

(2) Was a motorette or formette used in the qualification program? ____

If so, explain any differences between the motorette or formette system and the plant motor.
COMMENTS:_____

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

A. EQUIPMENT IDENTIFICATION

(1) Are the cables (splices) identified in the qualification program identical to the plant cables (splices) that require qualification?

Item		Plant	Report	Acceptable	Report Section
(a)	Conductor Insulation: Material				
	Size				
	Stranding				
	Coating				
	Insulation Thickness				
	Number of conductors				
	Arrangement of conductors				
(b)	Shielding				
(c)	Insulation jacket: Material				
	Thickness				
	Construction Method				
(d)	Outer jacket: Material				
	Thickness				
(e)	Rated voltage				
(f)	Rated current				

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

A. EQUIPMENT IDENTIFICATION (Continued)

Item		Plant	Report	Acceptable	Report Section
(g)	Operating temperature rating: Normal				
	Emergency				
	Short circuit				
(h)	Insulation resistance				
(i)	Splice: Material				
	Thickness				
	Identification				

COMMENTS:_____

(2) Does the qualification program adequately address temperature and moisture resistance? ___ Reference: _____

COMMENTS:_____

(3) Was the cable subjected to a mandrel bend or voltage withstand test? ___ Reference: _____

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

B. CABLE PERFORMANCE

(1) For cables subjected to LOCA/HELB simulation testing provide the following cable performance characteristics:

Reference

Cable Specimen Number

Test Cable Length

Applicable Plant Cable Codes

Applicable Plant Applications

(2) Test Data:

Parameter	Test Data (units)*	Reference	Normalized Test Data (ohms-1000FT)	Normalized Data Corrected for Wall Thickness (ohms-1000FT)	R_{cs} (ohms-1000FT)	R_{cc} (ohms-1000FT)
Baseline						
Post Thermal Aging						
Pre-LOCA						
LOCA (0-1 h)						
LOCA (1-6 h)						
LOCA (8 h - 24 h)						
LOCA (24 h - end)						
Post-LOCA						

* Record the lowest IR value or the highest leakage current.

R_{CS} = Resistance for Conductor to Shield.

R_{CC} = Resistance for Conductor to Conductor

COMMENTS:_____

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

(3) Test Loading:

	Value	Reference
Cable test loads: Voltage		
Current		
Period energized		
Voltage withstand test: Voltage		
Leakage current		

COMMENTS:_____

C. INSTRUMENT CABLE IDENTIFICATION

Component	Scheme Number	Location

SUPPLEMENT 3

COMPONENT-UNIQUE CHECKLIST

ELECTRICAL PENETRATIONS

A. EQUIPMENT IDENTIFICATION

(1) Are the penetrations identified in the qualification program identical to the plant penetrations that require qualification? ___

Item		Plant	Report	Acceptable	Report Section
(a)	Penetration type				
(b)	Mounting				
(c)	External connections COMMENTS:_____				

(2) Does the qualification report identify the following performance characteristics?

Performance Characteristics		Acceptable	Report Section
(a)	Temperature rating		
(b)	Voltage rating		
(c)	Continuous current rating		
(d)	Short-time overload current rating & duration		
(e)	Rated short circuit current & duration		
(f)	Pressure rating		
(g)	Maximum gas leakage rate COMMENTS:_____		

SUPPLEMENT 3

COMPONENT-UNIQUE CHECKLIST

ELECTRICAL PENETRATIONS

A. EQUIPMENT IDENTIFICATION (Continued)

(3) Does the qualification program address the following tests?

Item		Acceptable	Report Section
(a)	Continuous current rating		
(b)	Short-time overload current rating and duration		
(c)	Short circuit current rating and duration		
(d)	Rated maximum duration of rated short circuit current		
(e)	Pneumatic pressure rating		
(f)	Maximum gas leakage rate		
(g)	Conductor continuity		
(h)	Dielectric strength		
(i)	Impulse		
(j)	Insulation resistance		
(k)	Flame		

COMMENTS:_____

SUPPLEMENT 4

COMPONENT-UNIQUE CHECKLIST

TRANSMITTERS

A. TRANSMITTER PERFORMANCE

Provide the following transmitter accuracy data:
Transmitter Model_____

Parameter	Accuracy	Reference
Baseline		
Post-Thermal Aging		
Radiation Aging		
Post-Radiation Aging		
Seismic		
Pre-LOCA		
LOCA (0-24 hrs)		
LOCA (24 hrs to end)		
Post-LOCA		

COMMENTS:_____

TAB E

ENGINEERING JUSTIFICATION AND ANALYSIS (OPTIONAL)

(Suggested Headings)

1. Documentation
2. Qualification Summary
3. Qualification Criteria
4. Qualification Methodology
5. Comparison of Installed Equipment to Qualified Equipment
6. Required Operating Environment
7. Materials Analysis
8. Test Sequence
9. Normal Service Conditions Qualification
    - 9.1 Thermal Aging
    - 9.2 Radiation Aging
    - 9.3 Vibration (Non-Seismic) Aging
    - 9.4 Operational Stress Aging
10. Accident Service Conditions Qualification
    - 10.1 Function Time
    - 10.2 Accident Profile
    - 10.3 Radiation
    - 10.4 Spray and Submergence
11. Performance Requirements, Acceptance Criteria, and Operability Evaluation
12. Anomalies
13. Installation Evaluation
14. Maintenance and Surveillance
15. Deviation Justification

TAB F

FIGURES (OPTIONAL)

FIGURES

TAB G

EQ QUALIFICATION INSTALLATION, INTERFACE, MAINTENANCE,

AND CONDITION MONITORING REQUIREMENTS AND RECOMMENDATIONS

	Requirements (Yes/No)	Recommendations (Yes/No)
EQ Installation		
EQ Interface		
EQ Maintenance		
EQ Condition Monitoring		

	Requirements				
Description	Basis Requirements	Exceptions	Basis Reference	Implementation	Basis Reference
Installation/Interfaces					
Maintenance					
Condition Monitoring					

	Recommendations				
Description	Basis Recommendation	Exceptions	Basis Reference	Implementation	Basis Reference
Installation/Interfaces					
Maintenance					
Condition Monitoring					

TAB H

QUALIFICATION DOCUMENTS (OPTIONAL)

TAB I

MISCELLANEOUS DOCUMENTS AND CORRESPONDENCE (OPTIONAL)

TAB J

EVALUATION OF NRC GENERIC LETTERS

AND BULLETINS (OPTIONAL)

EVALUATION OF NRC GENERIC LETTERS AND BULLETINS

Pursuant, to 10 CFR 52, this tab addresses any NRC Generic Letters and Bulletins issued after March 2007 (i.e., the date of the most recent revision of the applicable Standard Review Plan) to determine if any written responses or other action was (or had been) required for the components identified in Tab C. The responses provided to the NRC are summarized in this section.

Next File