

TABLE 3.10-1
SUMMARY OF SEISMIC QUALIFICATIONS
FOR SAFETY-RELATED EQUIPMENT

<u>Equipment</u>	<u>Method</u>	<u>Results</u>
Control Console	Test & Dynamic Analysis	Simultaneous Time History Test ¹ producing accelerations greater than design basis earthquake (DBE). Test results were acceptable. Accelerations at the device location were determined by T-H dynamic analysis.
Nuclear Instrumentation System Cabinet; Process Control Equipment Cabinets; Solid State Protection Actuation Cabinet	Test Single Axis	Sine Beat Test with electrical functions of the equipment monitored.
12 KVA (Unit 1) 10 KVA (Unit 2) Vital Bus UPS	Triaxial Multifrequency Random Motion Test	Single axis Sine Sweep Resonance search test in front-to-back, side-to-side, and vertical axes followed by 30 second duration Triaxial Multifrequency Random Motion test. The specimen was subjected to 5 Operating Basis Earthquake (OBE) tests and one Design Basis Earthquake (DBE) test.
Auxiliary Control System Terminal and Relay Cabinets	Test Single Axis	Single axis Sine Sweep Resonance search test in front-to-back, side-to-side, and vertical axes followed by 30 second duration Triaxial Multifrequency Random Motion test. The equipment functioned satisfactorily.

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Relay Racks	Dynamic Analysis and Test Multiple Axis	The finite element dynamic analysis shows that the stress in the racks are within acceptable limits. The acceleration at different locations of the rack were also determined by analysis. The relays were qualified by test to a level higher than the acceleration level of the rack.
125V and 28V dc Distribution Cabinets	Test Biaxial	Simultaneous Time History Test ¹ was performed. The distribution cabinet components functioned properly.
Terminal Cabinets	Static Analysis Multiple Axis	Structural integrity of the cabinets was justified.
Diesel Control Cabinets	Test Biaxial	Simultaneous Time History Test ¹ . It was demonstrated that the specimens possessed sufficient integrity to withstand, without compromise of structures or electrical function, the prescribed simulated seismic environments.
Control Room Recorder Panels	Dynamic Analysis Multiple Axis	A finite element computer analysis was performed. It was demonstrated that the panel possessed sufficient integrity to withstand, without compromise of structural integrity, the prescribed simulated seismic environment.

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Solid State Protection Output Test and Interface Cabinets	Test Biaxial	Simultaneous Time History Test ¹ with the functionality monitored.
Radiation Monitoring Cabinets and Components	Test Biaxial	Random multifrequency test with functionality monitored.
Safeguards Equipment Control	Test Single Axis Dynamic Analysis Multiple Axis	It is demonstrated, thru a combination of Analysis and Dynamic Testing of similar equipment, that the equipment will perform its function under a design basis earthquake event.
Replacement CEU's	Dynamic Analysis Multiple Frequency Test Multiple Axis	Each of the three existing Control Electronics Units (CEU's) in the SEC's are replaced with a new CEU, a new test panel, and various other more minor modifications (switches, pushbuttons, etc.). Analysis of the reconfigured cabinet(s) confirmed seismic structural integrity, anchorage integrity, and II/I interaction acceptability; and produced Required Response Spectrum (RRS) for the CEU location in the cabinet(s). Seismic testing, employing simultaneous three axis, multi-frequency random motion, was acceptably completed in conformance with the requirements of IEEE-344.

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Control Centers	Test Single Axis	The MCC was tested in the three orthogonal directions and the transmissibility was determined. The individual components were tested separately.
Unit Substations and dc Switchgear	Test Single Axis	The unit was shock tested at accelerations greater than the design basis earthquake (DBE). Test results are acceptable.
5 kV Switchgear	Static Analysis Multiple Axis	It is justified thru analysis that the equipment maintains its structural integrity when subjected to Design Basis Earthquake (DBE) event.
Diesel Generator and Accessories	Static Analysis Single Axis	It is justified thru analysis that the equipment maintains its structural integrity when subjected to Design Basis Earthquake (DBE) event.
Tray and Hangers	Dynamic Analysis Multiple Axis	It is justified thru analysis that the equipment maintains its structural integrity when subjected to Design Basis Earthquake (DBE) event.

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Battery Charger 125V	Test Biaxial	A resonant search was performed. The unit was then subjected to a resultant acceleration greater than the Design Basis Earthquake (DBE) at the determined natural frequencies. Test results were acceptable.
Battery Charger 28V	Test Single Axis	Resonance search from 1-35Hz and a random multi-frequency test with functionality monitored. The test results were acceptable.
Batteries 28V & 125V	Test Biaxial	Random multifrequency testing for 5 OBE and 1 DBE with functionality monitored. Test results were acceptable.
Battery Racks	Static Analysis Dynamic Test	Qualified on the basis of dynamic testing and testing and static analysis.
Electrical Penetrations	Static Analysis Multiple Axis	Stresses were determined using maximum g level obtained from response spectra. Results of the analysis were acceptable.

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Aux. Bldg. Vent. Fan Motors	Static Analysis	The analysis substantiates that the motor will function both mechanically and electrically under DBE conditions.
Service Water Pump Motors	Static Analysis	The analysis substantiates that the motor will function both mechanically and electrically under DBE conditions.
Aux. Feedwater Pump Motors	Static Analysis	The analysis substantiates that the motor will function both mechanically and electrically under DBE conditions.
Engineered Safeguards Motors	Analysis	Pump motors supplied by Westinghouse with seismic qualifications.

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Radiation Monitoring Transformers	Test Bi-axial	Subjected to a biaxial random multifrequency test with functionality monitored during and after the test.
Radiation Monitoring System circuit Breaker Panelboards	Test Single Axis Single Frequency	The unit was vibrated in all of the three orthogonal axes and the functionality monitored.
Pressure Transmitters, Differential, Absolute, and Gauge	Test Multiple Axis	RMF tests were performed in three mutually perpendicular axes. During testing the transmitters maintained structural integrity and met functional requirements. The tests establish the functional adequacy of the transmitters to a certain input acceleration level. Analysis of the supporting structure ensures that the actual seismic loading is within the qualified level.

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Limit Switches	Test Single Axis	Seismic tests performed on limit switches qualify the switches for a certain acceleration limit. Analysis of the supporting structure ensures that the postulated seismic loading is within the qualified level.
ASCO Solenoid Valves	Test Single Axis	The seismic test establish the valve adequacy to a certain input level. Analysis of the supporting structures ensures that the actual seismic loading is within the qualified levels.
Instrument Panels, Cabinets, NEMA 12 Enclosures, Racks	Test Dynamic Analysis Multiple Axis	Some of the panels are qualified by a finite element analysis. Some panels were tested, with devices mounted on them.

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Pressure Switches	Test Multiple Axis	Tests were performed in three mutually perpendicular axes. The switches met their structural and functional requirements.
Instrumentation	Test Multiple Axis	Tests were performed in three mutually perpendicular axes. The equipment met their respective structural and functional requirements.
- Controllers		
- Thermostats		
- E/P Converters		
- Power Supplies		
- Indicating Stations		
- Terminal Blocks		
- Setpoint Stations		
- Timers		
- Pneumatic Controllers		
- Switches		
- Indicators		
- Pressure Regulators		

¹All time history tests were performed using the time history response spectra of floor Elevation 122' in the Auxiliary Building.