Enclosure 2

MFN 14-056

GEH Response to RAI 08.02-1

ABWR DCD DRAFT Revision 6 Markups

Table 1.8-22 Experience Information Applicable to ABWR (Continued)

No.	Issue Date	Title	Comment
87-02, Supp 2	6/10/88	Fastener Testing to Determine Conformance with Applicable Material Specifications	COL Applicant
88-04	5/5/88	Potential Safety-Related Pump Loss Past Related Correspondence: IE Notice 87-59	
88-07	6/15/88	Power Oscillations in Boiling Water Reactors (BWRs) Past Related Correspondence: IE Notice 88-39	
88-07, Supp 1	12/30/88	Power Oscillations in Boiling Water Reactors (BWRs)	Subsections 7.1.2.6.1.4 and 7.1.2.1.1.2.2
90-01	03/09/90	Loss of Fill-Oil in Transmitters Manufactured by Rosemount	
90-02	03/20/90	Loss of Thermal Margin Caused by Channel Box Bow	
91-01	10/18/91	Reporting Loss of Criticality Safety Controls	
2012-01	07/27/12	Design Vulnerability in Electric Power System	COL Applicant
Type: IE Information Notices			
79-22	9/14/79	Qualifications of Control Systems	COL Applicant
80-12	3/31/80	Instrumentation Failure Causes PORV Opening	
80-21	5/16/80	Anchorage and Support of Safety-Related Electrical Equipment	
80-22	5/28/80	Breakdowns in Contamination Control Programs	COL Applicant
80-40	11/7/80	Excessive N_2 Supply Pressure	
80-42	11/24/80	Effect of Radiation on Hydraulic Snubber Fluid	
81-05	3/13/81	Degraded DC Systems at Palisades	COL Applicant
81-07	3/16/81	Potential Problem with Water Soluble Purge Dam Materials Used During Inert Gas Welding	COL Applicant
81-10	3/25/81	Inadvertent Containment Spray	COL Applicant
81-20	7/13/81	Test Failures of Electrical Penetrations	
81-21	7/21/81	Potential Loss of Direct Access to Ultimate Heat Sink	COL Applicant

(6) The batteries and chargers associated with the preferred power system can meet the requirements of their design loads.

(7) The generator breaker can open on demand. (Note: The breaker's actual opening and closing mechanisms are inherently confirmed during the shutdown and synchronizing processes. Trip circuits shall be periodically verified during shutdown periods while the breaker is open.)

(8) Isolated and non-segregated phase bus ducts are inspected and maintained such that they are clear of debris, fluids, and other undesirable materials. Also, terminals and insulators are inspected, cleaned and tightened, as necessary.

The test and inspection intervals will be established and maintained according to the guidelines of IEEE-338, Section 6.5, as appropriate for non-Class 1E systems (i.e., Items (4) and (7) of Section 6.5.1 are not applicable).

8.2.4.2 Procedures when a Reserve or Unit Auxiliary Transformer is Out of Service

Appropriate plant operating procedures will be imposed whenever the reserve auxiliary transformer or a unit auxiliary transformer is out of service.

8.2.4.3 Offsite Power Systems Design Bases

Interface requirements for the COL applicant offsite power systems design bases are provided in Subsection 8.2.3.

8.2.4.4 Offsite Power Systems Scope Split

Interface requirements for the COL applicant pertaining to offsite power systems scope split are provided in Subsection 8.2.3.

8.2.4.5 Capacity of Auxiliary Transformers

Appropriate plant procedures shall be provided to assure FOA ratings of the reserve auxiliary transformer, or any unit auxiliary transformer, will not be exceeded under any operating mode (Subsection 8.2.1.2).

8.2.4.6 Monitoring and Protection Against Design Vulnerabilities

The COL applicant shall describe the monitoring and protection scheme for the high voltage side of the UATs and RAT to protect against the concerns raised by NRC Bulletin 2012-01, Design Vulnerability In Electric Power System (Reference 8.2-3).

(27) The DC power needed to operate primary and backup protection and control equipment of the offsite power system is supplied from two separate switching station batteries located in each switching station, each with a battery charger fed from a separate AC bus. Each battery is capable of supplying the DC power required for normal operation of the switching station's equipment. Each charger is capable of supplying the required loads while recharging its battery.

(28) Two redundant low voltage AC power supply systems are provided to supply AC power to the switching station's auxiliary loads. Each system is supplied from separate, independent AC buses. The capacity of each system is adequate to meet the AC power requirements for normal operation of the switching station's equipment.

8.2.6 References

8.2-1 ANSI Std C37.06, Preferred Ratings and Related Capabilities for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

8.2-2 ANSI Std C57.12.00, General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.

8.2-3 NRC Bulletin 2012-01, Design Vulnerability In Electric Power System.

(4) Capacity of switchgear, power centers with their respective transformers, motor control centers, and distribution panels is equal to or greater than the maximum available fault current to which it is exposed under all design modes of operation until the fault is cleared.

Interrupting capability of the Class 1E switchgear and MCC breakers is selected to interrupt the available short-circuit current at the circuit breaker load terminals. Short circuit analysis will be performed in accordance with IEEE 141 and/or other acceptable industry standards or practices to determine fault currents. See Subsection 8.2.3(16) for interface requirement.

Power center transformers are sized and impedances chosen to facilitate the selection of low-voltage switchgear, MCCs and distribution panels, which are optimized within the manufacturer's recommended ratings for interrupting capacity and coordination of over-current devices. Impedance of connecting upstream cable is factored in for a specific physical layout.

8.3.1.1.6 Circuit Protection

8.3.1.1.6.1 Philosophy of Protection

Simplicity of load grouping facilitates the use of conventional, protective relaying practices for isolation of faults. Emphasis has been placed on preserving function and limiting loss of Class 1E equipment function in situations of power loss or equipment failure.

Breaker coordination analysis will be performed in accordance with IEEE 141, 242 and/or other acceptable industry standards or practices.

Circuit protection of the Class 1E buses is interfaced with the design of the overall protection system.

8.3.1.1.6.2 Grounding Methods

Station grounding and surge protection is discussed in Section 8A.1. The medium voltage (6.9 kV) system is low resistance grounded except that each diesel generator is high resistance grounded to maximize availability.

See Subsection 8.3.4.14 for COL license information pertaining to administrative control for bus grounding circuit breakers.

8.3.1.1.6.3 Bus Protection

Bus protection is as follows:

(1) 6.9 kV bus incoming circuits have inverse time over-current, ground fault, bus differential and under-voltage protection. The undervoltage monitoring is responsive to all three phases. The monitoring is effective for both load shedding and emergency

diesel start and protection of the safety-related bus loads for grounds and loss of one or more phases.

(2) 6.9 kV feeders for power centers have instantaneous, inverse time over-current and ground fault protection.

(3) 6.9 kV feeders for heat exchanger building substations have inverse time over-current and ground fault protection.

(4) 6.9 kV feeders used for motor starters have instantaneous, inverse time over-current, ground fault and motor protection.

(5) 480V bus incoming line and feeder circuits have inverse time over-current and ground fault protection.

(6) Nonsafety-related buses A4, B4, C4, and the new H bus are monitored by their own protective relays and will trip power to the safety-related buses on detection of abnormal voltages and frequency, including loss of one or more phases and ground conditions.

8.3.1.1.6.4 Protection Requirements for Diesel Generators

Protective devices of the diesel generators meet all requirements of IEEE-603. When the diesel generators are called upon to operate during LOCA conditions, the only protective devices which shut down the diesel are the generator differential relays, and the engine over-speed trip. These protection devices are retained under accident conditions to protect against possible, significant damage. Other protective relays, such as loss of excitation, anti-motoring (reverse power), over-current voltage restraint, low jacket water pressure, high jacket water temperature, and low-lube oil pressure, are used to protect the machine when operating in parallel with the offsite power system, during periodic tests. The relays are automatically isolated from the tripping circuits during LOCA conditions when there is a concurrent LOPP signal. However, all of these bypassed parameters are annunciated in the main control room (Subsection 8.3.1.1.8.5). The bypasses and protective relays are testable and meet all IEEE-603 requirements, and are manually reset as required by Position 1.8 of Regulatory Guide 1.9. No trips are bypassed during LOPP or testing. See Subsection 8.3.4.22 for COL license information.

Synchronizing interlocks are provided to prevent incorrect synchronization whenever the diesel generator is required to operate in parallel with the preferred power supply (see Section 5.1.4.2 of IEEE-741). Such interlocks are capable of being tested, and shall be periodically tested per Section 8.3.4.23).

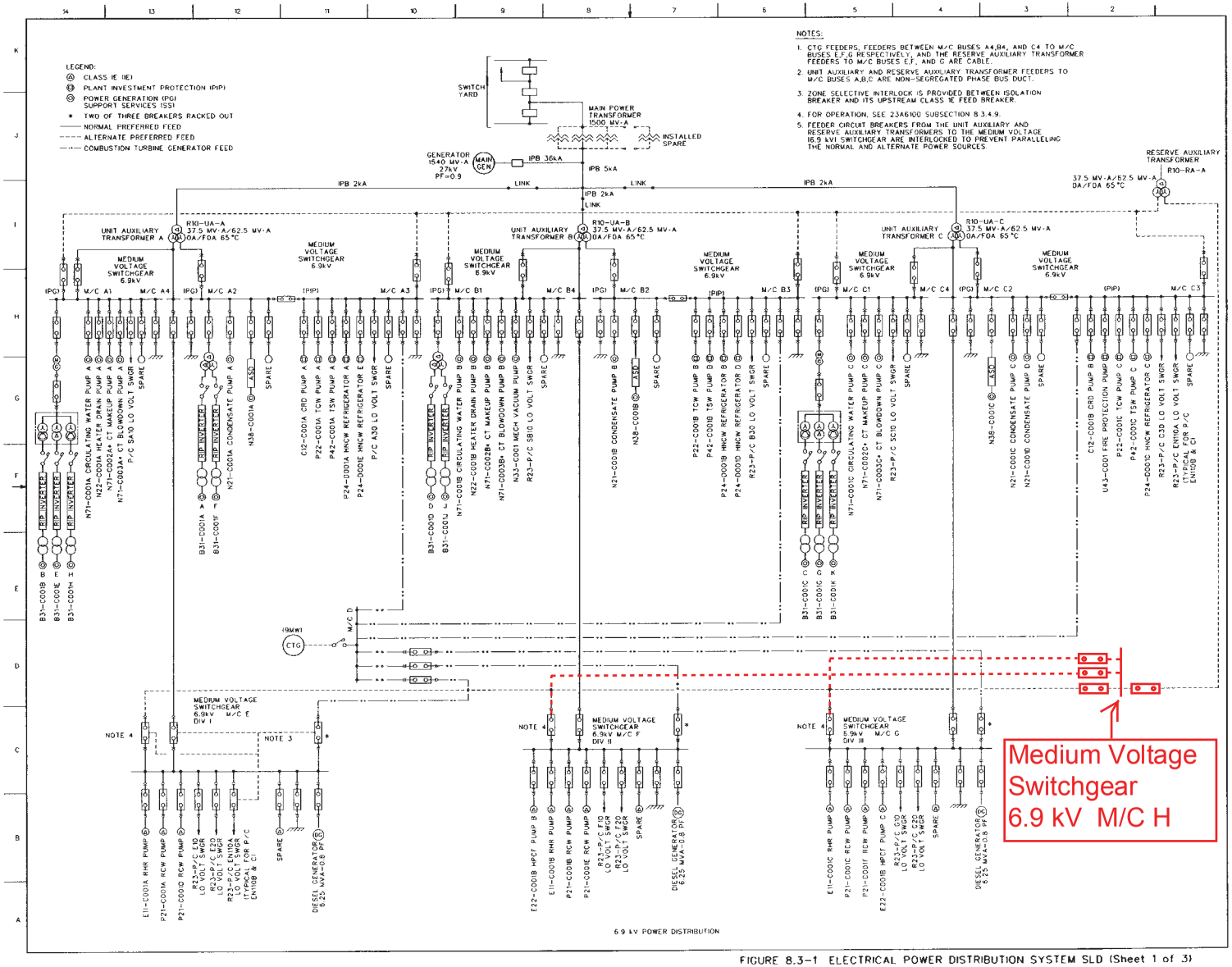

FIGURE 8.3-1 ELECTRICAL POWER DISTRIBUTION SYSTEM SLD (Sheet 1 of 3)