

3.5 Missile Protection

The information in this section of the reference ABWR DCD, including all subsections, tables, and figures, is incorporated by reference with following departure and supplements.

STP DEP 3.5-1 (Table 3.5-1 and deletion of Figure 3.5-2)

3.5.1.1.1.3 Main Steam Turbine

STP DEP 3.5-1

Acceptance Criteria 1 of SRP Section 3.5.1.3 considers a plant with a favorable turbine-generator placement and orientation and adhering to the guidelines of Regulatory Guide 1.115 adequately protected against turbine missile hazards. Further, this criterion specifies that exclusions of safety-related structures, systems or components from low trajectory turbine-missile strike zones constitutes adequate protection against low trajectory turbine missiles. The turbine-generator placement and orientation of the ABWR Standard Plant meets the guidelines of Regulatory Guide 1.115 as illustrated in Figure 3.5-2.

The STP 3 & 4 turbine generator placement and orientation in relation to the STP 3 & 4 Reactor Buildings, Control Buildings, Ultimate Heat Sink (UHS), and to STP 1 & 2 are shown on Figure 1.2-1. Per Regulatory Guide 1.115, the STP 3 & 4 turbine generator placement and orientation is considered unfavorable. Per Acceptance Criteria 1 of Standard Review Plan Section 3.5.1.3 for unfavorable turbine generators, a value of 10^{-2} per year per plant was chosen as a conservative value for the product of strike probability (P_2) and damage probability (P_3). The criteria for unfavorable turbine generator orientation given in Standard Review Plan Table 3.5.1.3-1 and provided in Table 3.5-1 was assumed for the missile generation probability (P_1). The resulting probability of unacceptable damage from a main steam turbine missile (P_4), which is $P_1 \times P_2 \times P_3$, is less than 10^{-7} per year per plant.

Therefore STP 3 & 4 main steam turbine generator placement and orientation meets the acceptance criteria of Standard Review Plan 3.5.1.3 and the guidelines of Regulatory Guide 1.115.

3.5.4 COL License Information

3.5.4.1 Protection of Ultimate Heat Sink

The following site-specific supplement addresses COL License Information Item 3.9.

Compliance with Regulatory Guide 1.27 as related to the UHS and connecting conduits being capable of withstanding the effects of externally generated missiles, is demonstrated in Subsection 3H.6.

3.5.4.2 Missiles Generated by Other Natural Phenomena

The following site-specific supplement addresses COL License Information Item 3.10.

The only missiles generated by natural phenomena that have been identified, are those generated by tornados and hurricanes. Of tornado and hurricane missiles, tornado missiles govern the design of safety-related structures, systems, and components. The reference ABWR DCD tornado wind speeds (300 mph) exceed those specified in Regulatory Guide 1.76, Rev 1 for this site and exceed the design basis wind speed for this site. Therefore all missiles generated by other natural phenomena are bounded by the reference ABWR DCD tornado missiles specified in Subsection 3.5.1.4.

3.5.4.3 Site Proximity Missiles and Aircraft Hazards

The following site-specific supplement addresses COL License Information Item 3.11.

No site proximity missiles or aircraft hazards were identified for this site. For details see Subsection 2.2S.2.8.

3.5.4.4 Impact of Failure of Out of ABWR Standard Plant Scope Non-Safety-Related Structures, Systems, and Components due to a Design Basis Tornado

The following site-specific supplement addresses COL License Information Item 3.12.

In general, safety-related SSCs are protected from tornado missiles by being either underground or housed in a tornado missile proof structure. The design criteria for systems and components (not housed in tornado structures) are as follows: Such plant SSCs are analyzed for the design basis tornado missile to ensure that their failure will not affect the ability of safety-related SSCs from performing their intended safety functions.

3.5.4.5 Turbine System Maintenance Program

The following site-specific supplement addresses COL License Information Item 3.13.

A turbine system maintenance program will be made available for NRC review prior to fuel load that includes a probability calculation of turbine missile generation and shows that the turbine meets the minimum requirements as given in Table 3.5-1. (COM 3.5-1)

3.5.4.6 Maintenance Equipment Missile Prevention Inside Containment

The following site-specific supplement addresses COL License Information Item 3.14.

Procedures ensure that maintenance equipment inside containment, such as hoists, will either be removed prior to operation, moved to a location where they are not a potential hazard to safety-related equipment, or seismically restrained to prevent them from becoming a missile.

3.5.4.7 Failure of Structures, Systems, and Components Outside ABWR Standard Plant Scope

The following site-specific supplement addresses COL License Information Item 3.15.

Non-tornado resistant structures are constructed from materials such as reinforced concrete block, and/or structural steel with metal siding and roof deck. Potential missiles or debris from these materials, resulting from failure of structure or from items blown off, when subjected to winds of tornado intensity, would not generate missiles more severe than the design basis tornado missiles defined in Subsection 3.5.1.4 (Reference 3.5-10).

3.5.5 References

The following site-specific supplement addresses COL License Information Item 3.15.

- 3.5-10 "Rationale for Wind-borne Missile Criteria for DOE Facilities," J.R. McDonald, Sept. 1999

Table 3.5-1 Requirement for the Probability of Missile Generation for ABWR Standard Plant

Criterion	Probability/Yr	Required Licensee Action
(A)	$P_1 < 10^{-4} 10^{-5}$	Criterion (A) is the general, minimum reliability requirement for loading the turbine and bringing the system on line.
(B)	$10^{-4} 10^{-5} < P_1 < 10^{-3} 10^{-4}$	If Criterion (B) is reached during operation, the turbine may be kept in service until the next scheduled outage, at which time the COL applicant is to take action to reduce P1 to meet Criterion (A) before returning the turbine to service.
(C)	$10^{-3} 10^{-4} < P_1 < 10^{-2} 10^{-3}$	If Criterion (C) is reached during operation, the turbine is to be isolated from the steam supply within 60 days, at which time the COL applicant is to take action to reduce P1 to meet Criterion (A) before returning the turbine to service.
(D)	$10^{-2} 10^{-3} < P_1$	If Criterion (D) is reached at any time during the operation, the turbine is to be isolated from the steam supply within 6 days, at which time the COL applicant is to meet Criterion (A) before returning the turbine to service.