

3.8 Seismic Category I Structures

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

STD DEP T1 2.15-1

STD DEP 1.8-1

~~STD DEP 3.8-1~~

STD DEP 12.3-3

STD DEP Admin

3.8.1.3.1 Normal Loads

STD DEP T1 2.15-1

STD DEP 1.8-1

(2)

The criteria for consideration of live loads for the designs of structural elements of the Reactor Building, and Control Building ~~and the Radwaste Building~~ are provided in Subsections 3H.1.4.3.1, and 3H.2.4.3.1, ~~and 3H.3.4.3.1,~~ respectively.

(b) Section 9.3 of ASCE Standards 7-88 and ~~Section 2334(a) of the 1991 Uniform Building Code~~ Section 1613 of the International Building Code (IBC) specify that a minimum of 25% of the floor live loads should be considered for the computation of design seismic forces for storage and warehouse type occupancies. The variation in live load intensity and occurrence in operating nuclear plants is expected to be no higher than that for storage in warehouse occupancies. A 25% of full live loads is, therefore, equally applicable to the nuclear plants.

3.8.4 Other Seismic Category I Structures

STD DEP T1 2.15-1

STD DEP 12.3-3

Other Seismic Category I structures which constitute the ABWR Standard Plant are the Reactor Building, and Control Building, ~~and Radwaste Building substructure.~~ Figure 1.2-1 shows the spatial relationship of these buildings. The only other structures in close proximity to these structures ~~is~~ are the Radwaste Building and the Turbine Building. ~~It is~~ These are structurally separated from the other ABWR Standard Plant buildings.

The R/B, steam tunnel, Residual Heat Removal (RHR) System, Reactor Water Cleanup (CUW) System, and Reactor Core Isolation Cooling (RCIC) System rooms are designed to handle the consequences of high-energy pipe breaks. The RHR, RCIC, and CUW rooms are designed for differential compartment pressures, with the associated temperature rise and jet force. Steam generated in the RHR compartment from the postulated pipe break exits to the steam tunnel through blowout panels. The steam tunnel is vented to the Turbine Building (T/B) through the seismic interface restraint structure (SIRS). The steam tunnel, which contains several pipelines (e.g., main steam, feedwater, RHR), is also designed for a compartment differential pressure with the associated temperature changes and jet force.

3.8.4.1.3 ~~Radwaste Building Substructure~~ (Not Used)

STD DEP T1 2.15-1

~~STD DEP 3.8-4~~

~~The Radwaste Building (RWB) Substructure is shown in Section 1.2.~~

~~The Radwaste Building is a reinforced concrete structure 60.4 66.2m by 41.2 38.8m and a height of 29.5 27.4m from the top of the basemat. The building consists of a below grade substructure consisting of walls (1.2m thick) and slabs of reinforced concrete forming a rigid box structure which serves as a container to hold radioactive waste in case of an accident. This substructure is located below grade to increase shielding capability and to maximize safety. It is supported on a separate foundation mat whose top is 13.7m below grade. In addition, a reinforced concrete superstructure~~

~~15.7 13.4m high extends above grade floor level and houses the balance of the radwaste equipment.~~

~~The RWB Substructure houses the high and low conductivity tanks, clean up phase separators, spent resin storage tanks, a concentrated waste storage tank, distillate tank and associated filters, and pumps for the radioactive liquid and solid waste treatment systems.~~

~~Although the radwaste superstructure is not a Seismic Category I structure, its major structural concrete walls, slabs, columns and roof are designed to resist Seismic Category I loads.~~

~~The summary report for the radwaste building is in Section 3H.3. This report contains a description of radwaste building, the loads, load combinations, reinforcement stresses, and concrete stresses at locations of interest. In addition, the report contains reinforcement details for the basement, seismic walls, and floors.~~

3.8.4.2.3 ~~Radwaste Building Substructure~~ (Not Used)

STD DEP T1 2.15-1

~~STD DEP Admin (Subsection is inconsistent with 3H.3)~~

~~[The RWB Substructure shall be designed using the same codes and standards as the reactor building. Refer to Subsection 3.8.4.2.1 for a complete list.]*~~

~~In addition, the non Seismic Category 1 I reinforced concrete portion of the superstructure is designed according to the seismic provisions of the uniform building code to resist Seismic Category 1 I loads.~~

3.8.4.3.2 Control Building and Radwaste Building Substructure

STD DEP T1 2.15-1

3.8.4.4.1 Reactor Building, and Control Building, and Radwaste Building Substructure

STD DEP T1 2.15-1

~~[The Reactor Building, and Control Building, and Radwaste Building Substructure will be designed in accordance with ACI-349 for concrete structures and ANSI/AISC-N690 specification for steel structures.]*~~

~~The Reactor Building, and Control Building, and Radwaste Building Substructure are analyzed using the computer codes listed in Appendix 3C.~~

~~The foundation for Category I structures is contained in the summary reports for their respective buildings. The reactor building foundations is contained in Section 3H.1, and the control building foundation is in Section 3H.2, and the radwaste building foundation is in Section 3H.3. This summary report contains a section detailing safety factors against sliding, over turning, and floatation.~~

3.8.4.5.3 Radwaste Building Substructure (Not Used)

STD DEP T1 2.15-1

~~STD-DEP-Admin~~

~~[Structural acceptance criteria are defined in ANSI/AISC N690 and ACI 349 Codes.]* In no case does the allowable stress exceed $0.9F_y$ where F_y is the minimum specified yield stress. The design criteria preclude excessive deformation of the Reactor Radwaste Building. The clearances between adjacent buildings are sufficient to prevent impact during a seismic event.~~

3.8.5.1 Description of the Foundations

STD DEP T1 2.15-1

~~STD-DEP-3.8-1~~

~~The Radwaste Building foundation is a rectangular reinforced concrete mat 60.4 ~~66.2~~ m by 41.2 ~~38.8~~ m and 2.5 m thick. The top of the Radwaste Building mat is 13.5 m ~~13.7~~ m below grade. The foundation mat is constructed of cast in place conventionally reinforced concrete. It supports the Radwaste Building structure.~~

The foundation for Category 1 structures is contained in the summary reports for their respective buildings. The Reactor Building foundation is contained in Section 3H.1, and the Control Building foundation is in Section 3H.2, ~~and the Radwaste Building foundation is in Section 3H.3.~~ This summary report contains a section detailing safety factors against sliding, over turning, and floatation.

3.8.6 COL License Information

3.8.6.1 Foundation Waterproofing

The following standard supplement addresses COL License Information Item 3.23.

Foundation waterproofing is done by placing a chemical agent on the exposed concrete surface of the mudmat. The concrete foundation is poured directly onto the concrete mudmat. A waterproof membrane that could degrade the ability of the foundation to transfer loads is not used.

3.8.6.2 Site Specific Physical Properties and Foundation Settlement

The following site-specific supplement addresses COL License Information Item 3.24.

Physical properties of the site-specific subgrade medium and the settlement of foundations are assessed in Sections 3H.6.4.2 and 2.5S.4.

3.8.6.3 Structural Integrity Test Result

The following standard supplement addresses COL License Information Item 3.25.

Structural Integrity Test (SIT) of the containments will be performed in accordance with Subsection 3.8.1.7.1 and ITAAC Table 2.14.1 Item #3. The first containment will be considered a prototype and its SIT performed accordingly. The details of the test and the instrumentation, as required for such a test, will be provided to NRC for approval.

3.8.6.4 Identification of Seismic Category I Structures

The following site-specific supplement addresses COL License Information Item 3.26.

A complete list of Seismic Category I Structures, Systems, and Components can be found in Table 3.2-1, which includes the following site-specific Seismic Category I Structures:

- Ultimate Heat Sink
- Reactor Service Water Piping Tunnel

A description of these structures can be found in section 3H.6.