Enclosure 2

MFN 15-053

GEH Responses to RAIs 19-6 through 19-9

ABWR DCD DRAFT Revision 6 Markups

steam dryer and steam separator pool. The top slab has an opening of 5.15m radius at center for the refueling head.

Major containment internal structures consist of the reactor pedestal, the reactor shield wall and the diaphragm floor.

The reactor pedestal is a composite steel and concrete structure which provides support for the reactor pressure vessel, the reactor shield wall, the diaphragm floor (D/F), access tunnels, horizontal vents, and the lower drywell access platforms. The pedestal consists of two concentric steel shells tied together by vertical steel stiffener plates and filled with concrete.

The diaphragm floor serves as a barrier between the drywell and the wetwell. It is a reinforced concrete circular slab, with an outside radius of 14.5m, and a thickness of 1.2m. The diaphragm floor is supported by the containment wall with a fixed-end connection and by the reactor pedestal with a hinged connection.

The internal surface of the containment is lined with a steel liner plate. The liner plate is fabricated from carbon steel except that stainless steel is used for the wetted portion of the suppression pool.

There are two 4.3m diameter access tunnels that penetrate the containment suppression pool wall and the reactor pedestal at azimuths 0° and 180°. The center lines of these tunnels are located about 7.1m above the top of the base slab.

The RPV is laterally restrained near the top of the reactor shield wall by RPV stabilizers.

The Reactor Building is a 59.6m x 56.6m reinforced concrete structure. On the periphery, there are 24 reinforced concrete columns which are connected by reinforced concrete walls. Inside the Reactor Building, there are 18 columns supporting the floors and the fuel pool girders.

The Reactor Building has six reinforced concrete floors which are monolithically connected to the containment.

The operating floor at elevation TMSL 31700 mm is connected to the fuel pool girders which are supported by the containment and the Reactor Building.

The Reactor Building interior walls and the floor beams are not connected to the containment structure.

Reactor Cavity Shield Blocks as shown in Figure 3H.1-23 sit above the drywell head in the reactor cavity between the fuel pool girders. They provide missile shielding for the drywell head, and radiation shielding for maintenance personal on the operating floor during normal plant operations.

3H.6 Summary of Key Structural Design Features

An assessment of the effects on the ABWR for the beyond design basis impact of a large, commercial aircraft has been performed in accordance with 10 CFR 50.150(a). A summary of the assessment can be found in Appendix 19G.

This appendix describes the key structural design features of the ABWR that were identified in that assessment.

(1) Structural configuration of Spent Fuel Pool (SFP) within Reactor Building precludes direct strike on SFP, and structural design of SFP insures integrity of SFP to maintain water.

(2) Structural configuration of primary containment (RCCV) within Reactor Building precludes direct strike on containment, and structural design of RCCV insures that RCCV is not perforated.

(3) Shield blocks over drywell head ~~to be~~ are designed to fully resist secondary impact from concrete debris, aircraft wreckage, and falling crane components to protect integrity of drywell head. The reactor cavity shield blocks are shown in Figure 3H.1-23.

(4) ~~Exterior~~ Interior partition walls on 1F (Figure 1.2-8) and 2F (Figure 1.2-9) will be thickened to ~~1200mm~~ and strengthened with additional reinforcement to limit physical damage to ~~exterior wall.~~ interior partition walls.

(5) Reinforced Concrete Sliding Barriers will be provided for the 6 large openings on 1F (Figure 1.2-8) to limit physical damage to exterior wall.

(6) Protective awnings will be provided for the 3 EDG HVAC exhausts on 2F (Figure 1.2-9) to limit physical damage to exterior wall.

(7) Protective external vestibules will be provided for the 5 single entry doors on 1F (Figure 1.2-8) to limit physical damage to exterior wall.

(8) Control Building Annex exterior walls running in the North-South direction are made of reinforced concrete and are at least 600mm thick.
(9) Service Building exterior walls running in the North-South direction in total are made of reinforced concrete and are at least 600mm thick.

reactor cavity shield blocks

12 and external barriers as shown in Figures 1.2-8 and 1.2-9 that, in combination with the external wall, protects the critical penetrations. That analysis was also used to determine the key design features for the ~~reactor well shield plugs~~ for protecting the drywell head from secondary impacts as identified in Section 3H.1.4.

and Figure 3H.1-23

(4) The location and design of the Spent Fuel Pool and its supporting structure as described in Section 9.1 and Figure 1.2-12 are key design features in protecting the spent fuel pool from the impact of a large commercial aircraft.

(5) The physical separation of the Class 1E emergency diesel generators is a key design feature that prevents the loss of all electrical power to core cooling systems.

(6) The location and design of the Service Building structure as described in Section 3H.6 and Figures 1.2-20 through 1.2-22 are key design features that protect the east wall of the C/B from the impact of a large commercial aircraft.

(7) The location and design of the Control Building Annex structure as described in Section 3H.6 and Figures 1.2-20 through 1.2-22 are key design features that protect the west wall of the C/B from the impact of a large commercial aircraft.

19.G.4.3 Fire Barriers and Fire Protection Features

The design and location of 3-hour fire barriers fire doors and watertight fire doors within the R/B are key design features for the protection of core cooling equipment within these buildings from the impact of a large commercial aircraft. The assessment credited the design and location of fire barriers (including doors) as described in Sections 9.5.1 and 9A.4 for the R/B to limit the effects of internal fires created by the impact of a large commercial aircraft. All credited watertight doors have a 5 psid, 3-hour fire rating. Additionally, all credited 3-hour rated fire barriers and penetration seals are rated for 5 psid.

19.G.4.4 Core Cooling Features

The design and physical separation of the emergency core cooling systems described in Section 6.3 are key design features for assuring core cooling.

The ABWR design for aircraft impact is in full compliance with the guidance of NEI 07-13 Rev 7, "Methodology for Performing Aircraft Assessments for New Plant Designs." In the event of a threatened aircraft impact while the reactor is critical and operating normally at power, the guidelines in NEI 07-13 Rev 7 allow the assumption that the operators will have advance warning to take manual action to shutdown the reactor prior to impact unless the hydraulic control units (HCUs) are in the physical damage footprint. For the ABWR design, the HCUs are located below grade, outside of the damage footprint. As a result, such advance warning to shutdown the reactor can be credited.

Following shutdown from normal power operation, an undamaged Emergency Core Cooling System (ECCS) division has the capability of maintaining core cooling. The assessment determined that at least one division of ECCS is available following the impact of a commercial aircraft on the R/B.

For an aircraft impact during shutdown with the reactor head removed and reactor water level at the level of the vessel flange or higher, at least one train of RHR is available to provide sufficient decay heat removal. In the event the undamaged train of RHR is out of service for maintenance, sufficient time is available to employ fire hoses connected to the spent fuel pool makeup standpipes installed to meet the requirements of 10CFR50.54(hh) to provide makeup water and cooling to the reactor vessel.

19G.5 Conclusions of Assessment

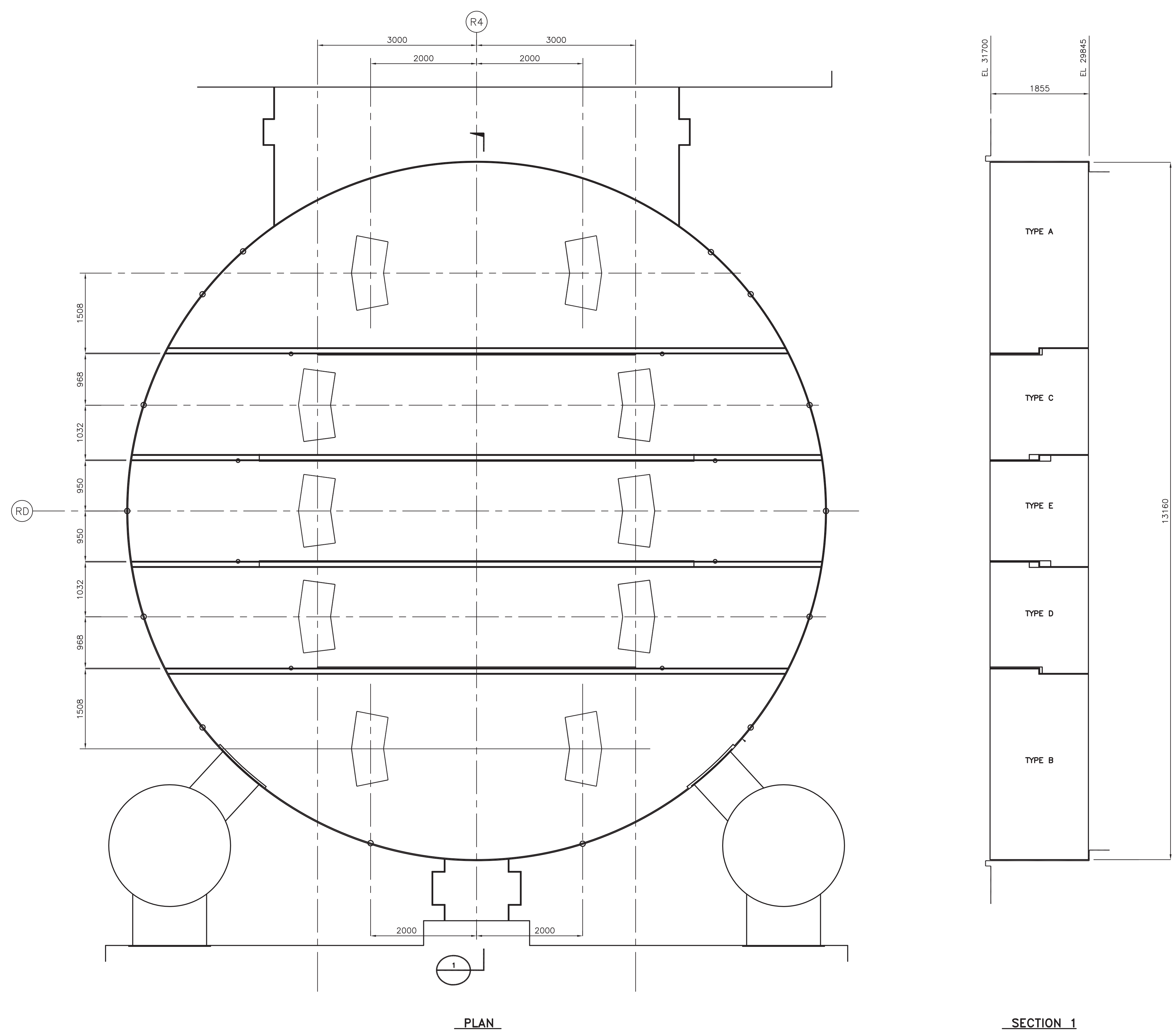
The aircraft impact would not inhibit the

This assessment based upon NEI 07-13 Rev 7, concludes that the ABWR can continue to provide adequate protection of the public health and safety in the event of an impact of a large, commercial aircraft, as defined by the NRC. ABWR's core cooling capability and spent fuel pool integrity ~~is maintained~~ based on best estimate calculations. There are no AIA scenarios that would result in leakage from the spent fuel pool below the required minimum water level. The pool liner is not perforated and all piping attachments are configured such that they will not allow drain down below the minimum water level described in Section 9.1.3.3. The assessment resulted in the identification of the key design features and functional capabilities described in Section 19.G.4, changes to which are required to be controlled in accordance with 10 CFR 50.150(c).

19G.6 References

19.7-1 NEI 07-13, Rev 7

3H.1-23 Reactor Building Reactor Cavity Shield Blocks



MAX WEIGHT

TYPE	WEIGHT (t)
A	145
B	145
C	125
D	125
E	130

FIGURE 3H.1–23 REACTOR BUILDING REACTOR CAVITY SHIELD BLOCKS

ABWR DCD REV 6 25A5675BB