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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002828

March 19, 2010

Subject: AP1000 Response to Proposed Open Item (Chapter 19)

Westinghouse is submitting the following responses to the NRC open item (OI) on Chapter 19. These proposed open item responses are submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in these responses is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following proposed Open Item(s):

OI-SRP19F-SPLA-01

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Proposed Open Item (Chapter 19)

D063
NRO

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ENCLOSURE 1

AP1000 Response to Proposed Open Item (Chapter 19)

AP1000 DCD SER Open Item REVIEW

Open Item Resolution

OI Response Number: OI-SRP19F-SPLA-01
Revision: 0

Question:

The staff maintained open item OI-SRP19.0F-SPLA-01 as part of the Chapter 19 SER with open items until regulatory guidance was issued for the review of Appendix 19F.

Westinghouse Response:

Based on work with the NRC staff and the industry, Westinghouse is submitting an updated DCD description for Appendix 19.0F.

Design Control Document (DCD) Revision:

APPENDIX 19F MALEVOLENT AIRCRAFT IMPACT

19F.1 Introduction and Background

A design-specific assessment of the effects on the AP1000 of the beyond design basis impact of a large, commercial aircraft has been performed in accordance with 10 CFR 50.150(a) to identify design features and functional capabilities that demonstrate, with reduced use of operator actions: (i) The reactor core remains cooled, the containment remains intact; and (ii) spent fuel cooling and spent fuel pool integrity is maintained. The specific assumptions regarding the aircraft impact were based on guidance provided by the NRC and the Nuclear Energy Institute including the loading function derived from the aircraft impact characteristics for use in assessments of aircraft impact effects.

This appendix describes those design features and functional capabilities identified in the assessment, and discusses how the identified design features and functional capabilities show that, with reduced use of operator actions, the reactor core remains cooled and the containment remains intact, and spent fuel cooling and spent fuel pool integrity is maintained. In the following discussion the identified design features are designated as "key design features."

~~The design of AP1000 takes into account the potential effects of the impact of a large commercial aircraft. The impacting aircraft analyzed is based upon the impulse time curve provided by the NRC in July 2007. The impact of a large commercial aircraft is beyond design basis.~~

19F.2 Scope

The evaluation of plant damage caused by the impact of a commercial aircraft is a complex analysis problem involving phenomena associated with structural impact, shock-induced vibration, and fire effects. The analysis of the aircraft impact also considers

structural damage, such as that caused by the penetration of hardened components (e.g. engine rotors, landing gear).

An assessment of the effects of aircraft fuselage and wing structure is performed.

An assessment of the effects of shock-induced vibration on systems, structures, and components is performed.

An assessment of the penetration of hardened aircraft components, such as engine rotors and landing gear is performed.

Perforation of analyzed structural components is not predicted; therefore, realistic assessments of the damage to internal systems, structures, and components caused by 1) burning aviation fuel and 2) secondary impacts are not required.

~~**19F.2 Background**~~

~~It is prudent that the design of AP1000 take into account the potential effects of the impact of a large commercial aircraft. The NRC has determined that the impact of a large commercial aircraft is a beyond design basis event. An assessment of this type demonstrates the inherent robustness of AP1000 with regard to potential aircraft impact.~~

19F.3 Assessment Methodology

Methods described in NEI 07-13 Revision 7 (Reference 1) were followed to assess the effects on the structural integrity of the primary containment and spent fuel pool, and to assess the physical, fire and vibration effects of the aircraft impact on the core cooling capability of the existing and enhanced design.

19F.4 Results / Conclusions

~~The AP1000 Aircraft Impact Assessment is detailed in Technical Report APP-GW-GLR-126 (Reference 1)~~A detailed aircraft impact assessment was performed for AP1000 in accordance with the guidance in NEI 07-13 (Reference 1). The assessment concludes ~~that AP1000 can continue to provide adequate protection of the public health and safety with respect to aircraft impact as defined by the NRC. The~~that an aircraft impact would not inhibit AP1000's core cooling capability, containment integrity, spent fuel pool integrity, or adequate spent fuel cooling based on best estimate calculations.
The assessment resulted in the identification of the following design features and functional capabilities; changes to which should be evaluated and reported in accordance with 10 CFR 50.150(d):

19F.4.1 Shield Building

The Shield Building as described in ~~Section 3H and Figure 3.7.2-12 (Sheets 7, 8, and 9)~~Tier 2 Chapter 3 is a key design feature for the protection of the safety systems located inside containment from the impact of a large commercial aircraft. The assessment ~~detailed in Reference 1~~ concludes that a strike upon the shield building would not result in ~~the penetration of~~damage to -the containment vessel. Therefore, ~~such as to cause direct~~ the systems and equipment within the containment vessel are not damaged from~~or~~ exposure to jet fuel ~~of the systems or equipment within the containment vessel~~.

The assessment finds that safety related components inside containment including the reactor pressure vessel and passive core cooling system remain intact and maintain their intended capabilities following the shock-induced vibrations resulting from the impact of a large commercial aircraft based on the methodology in Reference 1. ~~The location of key safety related components inside containment including the Reactor Pressure Vessel, Steam Generators, and Reactor Coolant Loop were analyzed to show that structural integrity were maintained as a result of shock induced vibrations resulting from the impact of a large commercial aircraft. The assessment detailed in Reference 1 concluded that the loads induced by the impact of a large commercial aircraft are enveloped in all situations by the forces for the Safe Shutdown Earthquake.~~

19F.4.2 Site Arrangement

The assessment credits the design and arrangement of certain building features, depicted in Figures 3.7.2-12 and 3.7.2-19, to limit the effects of a potential aircraft impact on the auxiliary building. These key features are:

- The design of the wall along the south end of the turbine building at column line 11.2 as described in section 3.7.2.8.3 is a key design feature for the protection of the auxiliary building from the impact of a large commercial aircraft.
- The design of the wall along the east side of the annex building at column line E as depicted on Figure 3.7.2-19 is a key design feature for the protection of the auxiliary building from the impact of a large commercial aircraft.
- The design and location of the spent fuel pool in the southern portion of the auxiliary building as depicted on Figure 3.7.2-12 and described in section 9.1.2.2 is a key design feature for the protection of the spent fuel from the effects of an impact of a large commercial aircraft.
- The separation between the radiologically controlled and non-radiologically controlled portions of the auxiliary building is a key design feature for the protection of the auxiliary building from the effects of an impact of a large commercial aircraft
- The locations of the Main Control Room, Remote Shutdown Station, and the secondary Diverse Actuation System (DAS) panel are a key design feature for the protection against the impact of a large commercial aircraft.

~~The location and design of the Passive Containment Cooling Ancillary Water Storage Tank (PCCWAST) as depicted on Figure 1.2-2 and described in section 6.2.2.2.3 is a key~~

~~design feature for the protection of the auxiliary building from the impact of a large commercial aircraft. The assessment detailed in Reference 1 credited the location of this tank to limit the exposure of potential aircraft impacts on the auxiliary building.~~

~~The design of the wall along the south end of the turbine building at column line 11.2 as described in section 3.7.2.8.3 is a key design feature for the protection of the auxiliary building from the impact of a large commercial aircraft. The assessment detailed in Reference 1 credited the design of this wall to limit the location of potential aircraft impacts on the auxiliary building.~~

~~The design of the wall along the east side of the annex building at column line E as depicted on Figure 3.7.2-12 (sheet 1-5) is a key design feature for the protection of the auxiliary building from the impact of a large commercial aircraft. The assessment detailed in Reference 1 credited the design of this wall to limit the location of potential aircraft impacts on the auxiliary building.~~

~~The design and location of the spent fuel pool in the southern portion of the auxiliary building as depicted on Figure 3.7.2-19 (sheet 5) and described in section 9.1.2.2 is a key design feature for the protection of the spent fuel from the effects of an impact of a large commercial aircraft. The assessment detailed in Reference 1 credited the design and location of the spent fuel pool to limit the effects of potential aircraft impacts on spent fuel.~~

19F.4.3 Fire Barriers

The design and location of 3-hour fire barriers, including fire doors and security doors, within the auxiliary building are key design features for the protection of equipment to manually actuate the passive core cooling system from the impact of a large, commercial aircraft. The assessment credited the design and location of fire barriers (including doors) as described in Appendix 9A to limit the effects of internal fires created by the impact of a large, commercial aircraft.

~~The design and location of the three hour fire barrier that separates the radiological portion of the auxiliary building from the non-radiological portion of the auxiliary building as depicted on Figure 9A-1 (Sheet 13) is a key design feature for the protection of the auxiliary building from the effects of an impact of a large commercial aircraft. The assessment detailed in Reference 1 credited the design and location of this barrier to limit the effects of large fire created by the impact of a large commercial aircraft.~~

19F.5 References

1. NEI 07-13, Revision 7, Methodology for Performing Aircraft Impact Assessments for New Plant Designs
~~APP-GW-GLR-126, March 2008, "AP1000 Nuclear Island Response to Aircraft Impact" Westinghouse Electric Company LLC.~~

PRA Revision:
None

Technical Report (TR) Revision:
None