APPENDIX 19F MALEVOLENT AIRCRAFT IMPACT

19F.1 Introduction

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.1.2 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 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 Results/Conclusions

The AP1000 Aircraft Impact Assessment is detailed in Technical Report APP-GW-GLR-126 (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 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 are evaluated and reported in accordance with 10 CFR 50.150(d).

19F.3.1 Shield Building

The shield building as described in Section 3H and Figure 3.7.2-12 (Sheets 7, 8, and 9) 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 the containment vessel such as to cause direct damage or exposure to jet fuel of the systems or equipment within the containment vessel.

The location of key safety-related components inside containment, including the reactor pressure vessel, steam generators, and reactor coolant loop, was analyzed to show that structural integrity was 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.3.2 Site Arrangement

The location and design of the passive containment cooling ancillary water storage tank (PCCWAST) as depicted on Figure 1.2-2 and described in subsection 6.2.2.2.3 are key design features 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 location of potential aircraft impacts on the auxiliary building.

The design of the wall along the south end of the turbine building along column line 11.2 as described in subsection 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 along column line E as depicted on Figure 3.7.2-12 (Sheets 1 through 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 subsection 9.1.2.2 are key design features 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.3.3 Fire Barriers

The design and location of the 3-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) are key design features 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 a large fire created by the impact of a large commercial aircraft.

19F.4 References

1. APP-GW-GLR-126, "AP1000 Nuclear Island Response to Aircraft Impact," Westinghouse Electric Company LLC.