3.0 DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT, AND SYSTEMS

3.5.1.6 Aircraft Hazards

3.5.1.6.1 Introduction

For the Clinch River Nuclear (CRN) Site early site permit (ESP) application, the applicant provided information evaluating the potential hazards associated with aircraft. The U.S. Nuclear Regulatory Commission (NRC) staff reviewed these evaluations to ensure that the risks associated with potential aircraft hazards would be sufficiently low.

3.5.1.6.2 Summary of Application

In Site Safety Analysis Report (SSAR), Section 2.2.2.7, "Descriptions of Airports, Aircraft, and Airway Hazards," the applicant presented information concerning the airports, airways and military training routes in the vicinity of the site to evaluate potential hazards with respect to nuclear units that might be constructed on the proposed CRN Site.

The applicant stated that five small privately-owned airports, Big T, Wolf Creek, Cox Farm, Will A Hildreth Farm, and Riley Creek, are located between 8 to 16.1 km (5 and 10 statute mi) from the CRN Site. Two small privately-owned airports, Oliver Springs and Fergusons Flying Circus are within 16.1 to 24.1 km (10 to 15 mi) of the CRN Site. These airports with estimated number of flight operations are listed in the SSAR Table 2.2.7. Airports located beyond 24.1 km (15 miles) are also considered and are listed in the SSAR Table 2.2-7.

There is one Federal airway route V16 and one high altitude route J46, whose nearest edge lies within 2 statute mi of the CRN Site. The closest military route is located approximately 31 km (19.2 mi) to the west-northwest (WNW) of the site. The closest military operations area (MOA) is the Snowbird MOA located approximately 58 km (36 mi) from the CRN Site.

3.5.1.6.3 Regulatory Basis

The acceptance criteria for aircraft hazards are based on meeting the relevant requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 52.17, "Contents of Applications, Technical Information," and 10 CFR Part 100, "Reactor Site Criteria." The staff considered the following regulatory requirements and guidance in reviewing the site location and area description:

- 10 CFR 52.17, as it relates to the requirement that the applicant provide the location and description of any nearby military or transportation facilities and routes.

- 10 CFR Part 100, as it relates to the following:

    - 10 CFR 100.20(b), which states that the nature and proximity of man-related hazards (e.g., airports, transportation routes, and military facilities) must be evaluated to establish site characteristics for use to determine whether a plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is very low.

    - 10 CFR 100.21(e), which states that the potential hazards associated with nearby

transportation routes, industrial, and military facilities must be evaluated and site characteristics established such that potential hazards from such routes and facilities will pose no undue risk to the type of facility proposed to be located at the site. Review Standard (RS)-002, Section 3.5.1.6, "Guidance for Processing Applications for Early Site Permits," Regulatory Guide (RG) 1.206, "Regulatory Guide for Combined License Applications for Nuclear Power Plants," and NUREG–0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," specify that the above regulatory requirements are met if the probability of aircraft accidents having the potential for radiological consequences greater than the 10 CFR Part 100 exposure guidelines is less than about 10^{-7} per year. The probability is considered to be less than about 10^{-7} per year if the distance to an airport, or a to a military route, or to a federal airway from the site meets the appropriate following criteria:

- The site-to-airport distance (D) is between 5 and 10 statute mi and the projected annual number of operations is less than 500 D^2, or the D is greater than 10 statute mi, and the projected annual number of operations is less than 1000 D^2.

- The site is at least 5 statute mi from the edge of military training routes, including low-level training routes, except for those associated with usage greater than 1,000 flights per year, or where activities (such as practice bombing) may create an unusual stress situation.

- The site is at least 2 statute mi beyond the nearest edge of a Federal airway, holding pattern, or approach pattern.

If the above proximity criteria are not met, or if sufficiently hazardous military activities are identified, then a detailed review of aircraft hazards should be performed. The guidance on the performance of such reviews appears in RS-002, Section 3.5.1.6, RG.1.206, and NUREG–0800.

3.5.1.6.4 Technical Evaluation

In SSAR Section 3.5.1.6, the applicant addressed the aircraft hazards evaluations. There are five airports within 8 to 16.1 km (5 to 10 mi) of the CRN Site. The airports have small number of flight operations annually (less than allowable number of flight operations based on 500 D^2, where D is the distance in miles from the site to airport) that would not contribute to exceeding the acceptable aircraft hazards probability of 10^{-7} per year, and therefore, are not considered a safety hazard based on guidance. Based on the review of the information provided by the applicant and the information obtained from sources available in the public domain, the staff considers the applicant's conclusion acceptable.

There are two airports within 16.1 to 24.1 km (10 to 15 mi) having projected number of flights from each of the airports much less than the respective plant-to-distance criterion of 1000 D^2, where D is the distance in miles from the site to the airport. Therefore, the aircraft crash probability is considered to be acceptable as less than about 10^{-7} per year. Based on the review of the flight data information, the staff considers the applicant's approach and conclusion acceptable as it meets the acceptance criteria.

The applicant addressed a military training route and MOA, which were not evaluated further as they are much farther away (58 km (36 mi)) from the CRN Site and meet the above proximity screening criterion.

The applicant addressed and evaluated the airways for the aircraft hazards probability. The applicant identified two airways (V16 and J46) that are within 3.2 km (2 mi) of the site. The applicant performed aircraft hazard probability analysis using the U.S. Department of Energy's (DOE's) four-factor formula that uses crash rates for non-airport operations referenced in DOE-STD-3014-96, "Accident Analysis for Aircraft Crash into Hazardous Facilities." The staff considers the applicant's approach and methodology reasonable and acceptable in determining the aircraft hazard calculations as it conforms to the staff review guidance. The applicant used calculated effective area based on assuming maximum R (length of diagonal of the facility) value of 179.5 m (589 ft) and maximum length of 162.45 m (533 ft), width of 75.9 m (249 ft) and building height of 48.8 m (160 ft). The staff considers this reasonable and acceptable as the methodology satisfies the requirements and guidance. Based on using these data and assumption, the applicant determined the aircraft crash probability of 7.53×10^{-7} per year.

The staff reviewed the applicant's assumptions and calculations and finds them reasonable, consistent and acceptable, as they comply with the requirements of 10 CFR 52.17, 10 CFR 100.20(b), and conform to the guidance in RS-002, RG 1.206, and NUREG–0800. The staff performed independent confirmatory aircraft crash probability calculations, using the highest of the most recent 5-year (2011-2015) Federal Aviation Administration (FAA) supplied flight operations data within 8 km and 16.1 km (5 mi and 10 mi) of the site. The potential aircraft crash probability of 1.5×10^{-8} per year is estimated by the staff, conservatively assuming that all the flights within 10 mi of CRN Site from FAA data follow these two airways. Therefore, the staff considers that the probability of aircraft accidents, resulting in radiological consequences greater than 10 CFR Part 100 exposure guidelines, is approximately less than an order of magnitude of 10^{-7} per year for the CRN Site, and agrees with applicant's conclusion.

3.5.1.6.5 Conclusion

The staff reviewed the applicant's aircraft hazard analysis using the guidelines in RS-002, Section 3.5.1.6, RG 1.206, and NUREG–0800. As discussed above, the staff independently verified the applicant's assessment of aircraft hazards at the CRN Site and concludes that the estimated probability of an accident having the potential for radiological consequences in excess of the exposure criteria contained in 10 CFR Part 100 approximately less than an order of magnitude of 10^{-7} per year.

Based on these considerations, the staff concludes that aircraft hazards do not present an undue risk to the safe operation of nuclear units at the CRN Site, and finds the CRN Site acceptable. The staff also concludes that the CRN Site meets the relevant requirements related to aircraft hazards of 10 CFR Part 52 and 10 CFR Part 100 for compliance with respect to determining the acceptability of the site.