3.0 SITE SAFETY ASSESSMENT

3.5.1.6 Aircraft Hazards

3.5.1.6.1 Introduction

For its ESP application, the applicant provided information evaluating the potential hazards associated with aircraft. The NRC staff reviews these evaluations to ensure that the risks associated with potential aircraft hazards are sufficiently low.

3.5.1.6.2 Regulatory Basis

The acceptance criteria for aircraft hazards are based on meeting the relevant requirements of 10 CFR 52.17 and 10 CFR Part 100. The NRC staff considered the following regulatory requirements in reviewing the site location and area description.

- 10 CFR 52.17, insofar as it requires the applicant to 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 requires that the nature and proximity of man-related hazards (e.g., airports, transportation routes, and military facilities) must be evaluated to establish site parameters for use in determining 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 parameters 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.

RS-002, Section 3.5.1.6, specifies that these requirements are met if the probability of aircraft accidents having the 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 by inspection if the distance from the site meets all of the following criteria:

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

2. the site is at least 5 statute miles from the edge of military training routes, including low-level training routes, except for those associated with usage greater than 1000 flights per year, or where activities (such as practice bombing) may create an unusual stress situation, and

3. the site is at least 2 statute miles 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. Section 3.5.1.6 of RS-002 provides guidance on the performance of such reviews.

3.5.1.6.3 Technical Evaluation

Following the procedures described in RS-002, Section 3.5.1.6, the NRC staff reviewed Section 3.5.1.6 of the SSAR included in the VEGP application. In this section, the applicant provided information that addressed and analyzed aircraft hazards. The applicant's response to the NRC staff's RAI 3.5.1.6-1 further supplements this information with regard to the calculation of effective area being used in the aircraft hazards analysis.

In Section 2.2.2.6 of the SSAR, the applicant presented information concerning the airports, airways, and military training routes in the site vicinity that need to be evaluated for potential hazards with respect to nuclear units that might be constructed on the proposed ESP site.

The applicant stated that all airports in the VEGP site vicinity are greater than 10 miles from the site. The closest and largest commercial airport is the Augusta Regional Airport at Bush Field (Bush Field), which is located about 17 miles north-northwest of the VEGP site. According to the applicant, on the basis of FAA projections up to 2025, the number of airport operations (including landings and take-offs) is estimated to be about 43,000.

The applicant stated that this total number of projected aircraft operations is substantially less than the threshold number of operations set forth in RS-002, Section 3.5.1.6., which indicates that the probability for the aircraft accident is considered acceptable if the projected annual number of operations is less than 1000 D^2, where D is the site-to-airport distance in miles. The applicant also stated that other airports in the vicinity are much smaller than Bush Field. The applicant noted that the aircraft hazard threshold for these airports is greater than the 100,000 annual number of operations because of their distance from the site. This threshold annual number of operations is significantly higher than the estimated annual operations for each of these airports. Therefore, the applicant found that the hazard probability of these airports was acceptable and did not require a detailed evaluation of the potential hazards with respect to aircraft operations at these airports.

The applicant stated that there is a small unimproved grass airstrip located immediately north of the VEGP site (north of Hancock Landing Road and west of the Savannah River). This privately owned and operated airstrip has a 1650-foot turf runway oriented 80° east- 260° west. The airstrip is for personal use and the associated traffic consists of small single-engine aircraft. In addition, a small helicopter landing pad is located on the VEGP site. This facility exists for corporate use and for use in case of emergency. The traffic associated with either of these facilities may be characterized as sporadic. The applicant stated that because of the small amount and the nature of the traffic, these facilities do not present a safety hazard to the VEGP site.

The applicant stated that the closest military training route is VR97-1059, the nearest edge of which is located more than 6 miles from the VEGP site. Military aircraft using route VR97-1059 come mainly from Shaw Air Force Base (about 32 miles east of Columbia, South Carolina) and McEntire Air National Guard Station (about 13 miles east-southeast of Columbia). The applicant stated that the total number of military aircraft using route VR97-1059 is approximately 833 per year. According to RS-002, the aircraft accident probability for a military training route is considered to be less than 10^{-7} per year if the distance from the site is at least 5 miles from the edge of the military training route, including low-level training routes, except for routes that have a usage greater than 1000 flights per year or where activities may create an unusual stress situation. The applicant stated that since the VEGP site is located more than 5 miles from the edge of VR97-1509, and the total military flights (833 per year) using the same route is less than 1000 per year, no aircraft accident analysis is required for flights using VR97-1509. The probability number of 10^{-7} was cited from RG 1.70, Revision 3, issued November 1978, in reference to design basis external events.

The applicant stated in Section 2.2.2.6.2 of the SSAR that the centerline of Airway V185 is approximately 1.5 miles west of the VEGP site. Additionally, Airway V417 is about 12 miles northeast of the VEGP site, and Airway V70 is approximately 20 miles south of the VEGP site. Because the VEGP site is within the 2 statute-mile limit specified in Section 3.5.1.6 of RS-002, the applicant performed a more detailed review of aircraft hazards associated with air traffic along the V185 Airway; and this analysis was presented in Section 3.5.1.6 of the SSAR. The applicant stated that the FAA does not maintain records of air traffic in Airway V185. Therefore, since the traffic data for Airway 185 is not available, the applicant calculated the maximum number of airway flights per year required to exceed the acceptance guideline crash probability of 10^{-7} per year as stated in RS-002 and NUREG-0800. The applicant estimated that the total number of flights traveling along Airway V185 would need to be greater than approximately 51,100 per year in order to exceed a crash probability of 10^{-7} per year. Since this value is higher than the projected yearly total of flights through 2025 at Bush Field, the applicant did not consider Airway V185 to pose a significant hazard to the VEGP site.

The NRC staff independently verified the applicant-identified airports. The NRC staff contacted the FAA, and obtained the Bush Field flight operations data for the 2000 through 2006. These data reveal that the average number of flight operations at Bush Field is about 42,363, which is comparable to the applicant's stated number. Therefore, the NRC staff's agrees with the applicant's conclusion that all public and private airports in the vicinity of the VEGP do not have sufficient annual flight operations to warrant a detailed risk analysis for potential nuclear units at the ESP site.

The NRC staff verified the applicant's cited reference of 14 CFR Part 71, "Designation of Class A, B, C, D, and E Airspace Areas; Air Traffic Routes, and Reporting Points." The applicant used the information cited in this regulation in recommending the width of the airway as 4 nautical miles on either side of the centerline, for a total width of 8 nautical miles. The NRC staff also verified the applicant's effective area calculation based on applicant's reference of the 1996 U.S. DOE guidance. The FAA provided the NRC staff with the number of flights that traversed V185 airways (FAA, 2007). As a result of the large amount of data to be analyzed, as well as the limitations of computing time and data handling, the FAA estimated the flight count data by extracting the flight count along V185 airways for every Thursday (typically as this day of the week is observed to have large number of flights) from January 2003 through

December 2006. Based on these FAA data, the NRC staff calculated the average number of flights along V185 airways to be about 3000 per year. Also based on this value and the guidance provided in RS-002, Section 3.5.1.6, the NRC staff independently estimated the annual probability of an aircraft traversing along V185, crashing into the plant to be about 6×10^{-9}.

The NRC staff evaluated the applicant's analysis of military aircraft for route VR97-1059. Based on 3 years of military training route data for Route VR97-1059, Shaw Air Force Base determined the average number of military training flights to be 761 compared to the applicant's referenced data of 833. Because the actual flights are lower than the threshold value of 1000 flights per year, the NRC staff finds the probability to be less than 10^{-7} per year. Regarding the identification of any activities within VR97-1059 that could create an unusual stress situation, Shaw Air Force Base informed the NRC staff that practice bombings are not authorized within Route VR97-1059. However, Shaw Air Force Base indicated that military aircraft will fly to Poinsett Range, to practice bombing and strafing. Inert bombs are used at Poinsett Range, instead of live bombs. Poinsett Range is approximately 10 miles south of Shaw Air Force Base. The NRC staff calculated the distance from the VEGP site to Poinsett Range to be approximately 78 miles. The guidance contained in RG 1.70 specifies that an aircraft hazard analysis should be done for practice bombing ranges within 20 miles from the site. Because the distance from the VEGP site to Poinsett Range is greater than the 20-mile distance specified in RG 1.70, the NRC staff finds the practice bombing at Poinsett Range does not create any unusual stress situations.

The NRC staff has reviewed the applicant's assumptions and calculations and finds them to be reasonable, consistent, and acceptable. On the basis of its independent estimation of the probability of a potential aircraft crash, the NRC staff agrees with the applicant's conclusion that Airway V185 does not present a safety concern for the VEGP site.

3.5.1.6.4 Conclusions

The NRC staff has reviewed the applicant's aircraft hazard analysis using the procedures delineated in RS-002, Section 3.5.1.6. As set forth above, the NRC staff has independently verified the applicant's assessment of aircraft hazards at the site and has concluded that the estimated probability of an accident having the potential for radiological consequences in excess of the exposure criteria found in 10 CFR Part 100 is less than about 10^{-7} per year.

Based on these considerations, the NRC staff concludes that aircraft hazards do not present an undue risk to the safe operation of nuclear units at the proposed ESP site. Therefore, the NRC staff concludes that, with respect to aircraft hazards, the proposed site is acceptable for planned nuclear units, and that the site meets the relevant requirements of 10 CFR Part 52 and 10 CFR Part 100.