

3. DESIGN

3.5.1.6 Aircraft Hazards

For an ESP application, the staff reviews the applicant's assessment of aircraft hazards to ensure that the risks associated with aircraft hazards are sufficiently low.

3.5.1.6.1 *Technical Information in the Application*

In SSAR Section 2.2.2.6, the applicant presented information concerning airports and airways in the site vicinity that could affect a nuclear power plant or plants that might be constructed on the proposed ESP site. The applicant evaluated this information in SSAR Section 2.2.3.2.1.

The applicant stated that there are three airports within 24 km (15 mi) of the proposed ESP site. Two of the airports are paved civil fields at which one or more aircraft are based, and the other is an unpaved private field at which no aircraft are based. None of the airports has commercial operations.

The closest airport is the Lake Anna Airport, about 10 km (6 mi) south-southeast of the proposed ESP site. According to the applicant, there were approximately 3640 operations at the field in 2002. The field is occasionally used for practice takeoffs and landings. The other paved field is the Louisa County Airport, which is about 18 km (11 mi) west-southwest of the proposed ESP site. There were approximately 6240 operations at the field in 2002. The third airport is Cub Field. It is located about 16 km (10 mi) south-southwest of the proposed ESP site, and has a few operations per year.

The applicants stated that none of these airports has a sufficient number of flight operations per year to rise above the threshold set forth in RS-002, Section 3.5.1.6, which would trigger a detailed evaluation of potential hazards associated with airport flight operations. Therefore, the applicant did not include a detailed evaluation of potential hazards associated with airport flight operations.

The applicant stated that one civil airway and three military training routes pass near the proposed ESP site. The centerline of the civil airway (V223) is about 8.8 km (5.5 mi) west of the site, and the edge of the airway is about 2.4 km (1.5 mi) from the site. No traffic data are kept for this airway. However, the applicant stated that the Federal Aviation Administration (FAA) characterizes the airway as "not heavily used," and estimates the traffic to be less than 200 aircraft per day.

The centerlines of the military training routes, which are 16 km (10 mi) wide, are less than 1.6 km (1 mi) south of the proposed ESP site. The applicant stated that these routes are controlled by the Oceana Naval Air Station in Virginia Beach. The applicant added that, according to a knowledgeable representative of the Navy whom it had contacted, pilots using these routes are instructed to fly near the edge of the route to avoid the NAPS, and to generally remain 5 to 6 km (3 to 4 mi) from NAPS. Flights along the routes typically involve one or two aircraft, and rarely four aircraft. The applicant stated that the number of flights per year on the military routes has remained approximately constant, as evidenced by the documented total traffic for

these three routes over a three-year period. Specifically, the annual number of flights for these three routes was 2582, 2348, and 2623 for the years 1991, 1992, and 1993, respectively.

The airways are sufficiently close to the proposed site to require detailed evaluations of the associated potential hazards. In the SSAR, the applicant included detailed evaluations it performed following the guidance in RS-002, Section 3.5.1.6. The applicant's analysis concluded that the probability of an aircraft crash on the proposed ESP site from flights along the V223 airway is 3.45×10^{-8} per year. Similarly, the applicant's analysis concluded that the probability of an aircraft crash on the proposed ESP site from flights along the military training routes is 1.56×10^{-8} per year.

3.5.1.6.2 Regulatory Evaluation

In SSAR Section 1.8, the applicant identified the applicable NRC regulations and guidance related to the identification and evaluation of hazards associated with aircraft hazards as 10 CFR Part 100, Subpart B; RG 1.70; and RS-002, Section 3.5.1.6. Section 2.2.3.2 of the SSAR refers to NUREG-0800, however, RS-002 includes the portion of NUREG-0800 that is referenced. The staff finds that the applicant correctly identified the applicable regulations and guidance. The staff considered the regulatory requirement in 10 CFR Part 100, Subpart B, in reviewing aircraft hazards.

According to Section 3.5.1.6 of RS-002, the 10 CFR 100.20 requirement that individual and societal risks of potential plant accidents be low is met if the probability of aircraft accidents having the potential for radiological consequences greater than the 10 CFR 50.34(a)(1) 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 distances from the site meet all 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 a usage greater than 1000 flights per year, or where activities (such as practice bombing) may create an unusual stress situation.
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, a detailed review of aircraft hazards should be performed. Section 3.5.1.6 of RS-002 provides guidance on performing such a review.

3.5.1.6.3 Technical Evaluation

The applicant identified three airfields near the proposed ESP site. Two of the three airfields are identified as public fields, and the third is identified as a private field. As noted in Section 3.5.1.6.1 of this SER, the applicant concluded that none of the fields has a sufficiently large number of flight operations to require a detailed analysis of the risk to a plant constructed at the proposed ESP site.

The staff notes, however, that there is a landing approach holding pattern for the Louisa County Airport that is relatively close to the ESP site. Depending on the speed of an aircraft on an approach to the airport, this holding pattern can be less than 2 statute miles from the ESP site. As such, it would not meet the third criterion described in Section 3.5.1.6.2 of this SER. Failure to meet this criterion would, under the guidance in RS-002, necessitate a detailed aircraft hazards review. After consulting with the FAA, the staff has determined that only about 1 percent of all landing approaches to the Louisa County Airport involve the use of this particular holding pattern. Hence, the staff has made an estimate of this hazard by taking into account the above holding pattern usage fraction, the number of annual airport operations (6240 operations per year), the effective target area (0.013 mi^2), and the crash frequency for general aviation as given in NUREG-0800 (Section II.3 of Standard Review Plan 3.1.5.6). On this basis, the estimated crash frequency is about 9.7×10^{-9} crashes per year.

The staff has confirmed that the applicant identified the public airfields closest to the proposed ESP site. The next closest public airfield is in Spotsylvania County, more than 32 km (20 mi) from the site. The staff did not identify any additional private air fields within 16 km (10 mi) of the site. Given the typical number of flight operations per year from private airfields and the size and type of aircraft that generally use private fields, the staff concludes that a detailed analysis of risk to a plant at the proposed ESP site from operations at private fields is not necessary.

The applicant identified one airway and three military training routes that pass near or over the proposed ESP, and, using procedures described in RS-002, Section 3.5.1.6, separately estimated the probability of an aircraft crashing into a plant constructed at the proposed site from aircraft using the airway or military training routes. The staff has reviewed the applicant's calculations and finds them to be consistent with the procedures detailed in RS-002.

In calculating the crash probabilities, the applicant used an effective area of 0.013 mi^2 for safety-related structures that might be damaged by a crash sufficient to cause the potential for radiological consequences in excess of the 10 CFR 50.34(a)(1) criteria. The applicant used drawings included in the SSAR to estimate this area. The area is somewhat smaller than that listed for the power block (0.018 mi^2) in the PPE. The staff considers the area the applicant used in its calculation to be reasonable. Use of either figure for effective area would result in a crash frequency less than 10^{-7} per year.

Appropriately, the applicant used the crash rates per mile of flight included in NUREG-0800 for the calculations. The staff concludes that the probability of an aircraft crash on the ESP site having radiological consequences greater than the 10 CFR 50.34(a)(1) criteria is about 5.98×10^{-8} ($3.45 \times 10^{-8} + 1.56 \times 10^{-8} + 0.97 \times 10^{-8}$) per year.

3.5.1.6.4 *Conclusions*

The staff has reviewed the applicant's aircraft hazard analysis using the procedures set forth in RS-002, Section 3.5.1.6. As set forth above, the staff has independently verified the applicant's assessment of aircraft hazards at the site. The staff concludes that the probability of an accident having the potential for radiological consequences in excess of the exposure criteria found in 10 CFR 50.34(a)(1) is less than about 10^{-7} per year. In addition, equivalent aircraft traffic in equal or closer proximity to plant sites reviewed in past NRC licensing actions was, after careful examination, found to present no undue risk to the safe operation of those plants. Based upon these considerations, the staff concludes that aircraft hazards do not present an undue risk to the health and safety of the public from potential construction and operation of one or more new nuclear plants on the proposed ESP site. Therefore, the staff concludes, with respect to aircraft hazards, that the proposed site is acceptable for constructing a plant falling within the applicant's PPE, and that the site meets the relevant requirements of 10 CFR Part 52 and 10 CFR Part 100.