

December 18, 2000

Mr. David A. Lochbaum, Nuclear Safety Engineer  
Union of Concerned Scientists  
1707 H Street, NW, Suite 600  
Washington DC 20006-3919

SUBJECT: POTENTIAL RISK TO TURKEY POINT NUCLEAR PLANT FROM PROPOSED  
COMMERCIAL AIRCRAFT OPERATIONS AT THE HOMESTEAD AIR FORCE  
BASE

Dear Mr. Lochbaum:

Your letter dated October 10, 2000, addressed to Mr. George Frampton, Council on Environmental Quality, and Ms. Jane F. Garvey, Administrator, Federal Aviation Administration contains a number of concerns regarding the efforts of the NRC to warrant an independent response. Your letter raised a number of issues regarding the NRC staff's safety assessment of the risk to Turkey Point Nuclear Plant from proposed commercial aircraft operations, in addition to military and government aircraft operations, at the Homestead Air Force Base. The safety assessment was issued on June 19, 2000, based on our review of the November 17, 1999, and May 1, 2000, submittals by Florida and Light Company (FPL), the Turkey Point licensee. In this regard, I would like to express my appreciation for your effort in keeping the NRC staff informed of your concerns, and furthermore I would like to take this opportunity to encourage the continued exchange of information on an informal basis between the Union of Concerned Scientists (UCS) and the NRC staffs.

The issues raised in your October 10, 2000, letter are summarized below, followed by our response to each one.

***The NRC may have underestimated the risk of an aircraft crash causing adverse consequences at the Turkey Point nuclear ... and "stretched" the NRC's Standard Review Plan (SRP) acceptance criterion of "about  $10^{-7}$ /year," concluding that the estimated aircraft crash frequency met the SRP guidelines.***

The SRP acceptance criterion, in Section 3.5.1.6 regarding aircraft hazards, is given as an order of magnitude value. This criterion had been established with the understanding that aircraft crash statistics typically are very approximate. Hence, it is reasonable to round off estimated aircraft crash rates to the nearest order of magnitude. For example, an aircraft crash rate in the range of  $5 \times 10^{-x}$  to  $5 \times 10^{-(x+1)}$  crashes/year is on the order of  $10^{-x}$  crashes/year. On this basis, the  $3.63 \times 10^{-7}$  and  $4.43 \times 10^{-7}$  crash rates cited in the letter are considered to be of the order of magnitude of  $10^{-7}$  crashes/year.

***You stated that it is not clear on how the term F defined as “crash probability density over area A by aircraft category and flight phase,” in the equation  $f=N*P*A*F$  is derived.***

With respect to the above DOE [Department of Energy] aircraft crash frequency equation, the factor F is defined in the DOE standard used by FPL (Eq. 5-1, p. 38, DOE-STD-3014-96) and is derived in the supporting document, “Data Development Technical Support Document for the Aircraft Crash Risk Analysis Methodology (ACRAM) Standard (Section 2.4., UCRL-ID-124837).” Basically, the derivation is based on using a truncated lognormal distribution to fit crash data for various flight phases (e.g., takeoffs and landings at an airport).

***You noted that the term P is the aircraft crash per mile. By itself, this term applies uniform risk for a flight from Airport X to Airport Y. However, the actual risk is not uniform.... “the equation relies on crash rate per mile without apparently accounting for the fact that most aircraft crashes occur during takeoffs and landings.” You also express doubt that the term F can properly account for crash rates associated with different flight phases. You note the proximity of the Homestead airport to Turkey Point (about 5 miles) and that the majority of aircraft accidents involve takeoff or landing operations.***

It should be noted that the factor P in the DOE aircraft crash frequency equation is defined in your October 10, 2000, letter as “in flight crash rate per mile for aircraft by aircraft category and flight phase [emphasis added].” Thus, it is clear that the term P is a function of the flight phase (e.g., takeoff/landing and en route phase). Furthermore, crash rate dependence on flight phase is addressed explicitly in the review methodology described in SRP 3.5.1.6, “Aircraft Hazards.” Specifically, Section III of SRP 3.5.1.6 includes guidelines for appropriate review methods with respect to airways, airports, designated airspaces, and holding patterns. The factor P is defined as an “aircraft crash rate (per takeoff or landing for near-airport phases and per flight for the in-flight (non-airport) phase of operation for each applicable summation parameter).” Hence, specific flight phase crash probabilities were properly accounted for during the staff review of FPL aircraft risk evaluation.

***You stated that ... “But the term F is not specified as being a function of aircraft category and flight phase.”***

The NRC staff accepted FPL’s definition of the term F as “ aircraft crash location conditional probability (per square mile) given a crash evaluated at the facility location for each applicable summation parameter.” This definition is equivalent to the definition in your October 10, 2000, letter of the term F as “crash probability density over area A by aircraft category and flight phase [emphasis added].” The two definitions agree that F is specified as being a function of aircraft category and flight phase. It appears that there is an inconsistency in your letter. However, this can be clarified and discussed through informal contacts.

***You stated that “It appears to me that the aircraft crash frequency calculated by FPL and accepted by NRC is non-conservative.... This Turkey Point risk assessment seems to be yet another example in a long series of flawed and deficient risk assessments.”***

NRC review of the licensee’s analyses indicated that the licensee had considered a number of conservatisms in its estimates of the aircraft crash frequency. Specifically, as noted in our safety assessment of FPL submittals, the licensee has identified qualitatively some conservatisms which indicate that the actual risk from on-site aircraft crashes is lower than the estimated value. For example, FPL notes that shielding by adjacent structures or heavy machinery, as well as the canal and the adjacent fossil units are not fully credited. Moreover,

the structural capability of safety-related structures (e.g., containment building) against missile impacts has not been taken into account when considering conditional core damage probability and conditional containment failure probability.

In summary, we believe that the NRC staff has made an appropriate assessment of FPL submittals dated November 17, 1999, as supplemented May 1, 2000, of the aircraft risk to Turkey Point Nuclear Plant with respect to the proposed changes to aircraft operations at the Homestead Air Force Base. We trust this letter provides useful discussion and clarification of the NRC staff's assessment and its review methodology of these risk-informed submittals. The staff is available to discuss any of the concerns raised in your October 10, 2000, letter, and our responses to them directly with you. The staff's project manager for Turkey Point is Mr. K. Jabbour who can be reached at 301-415-1496.

Sincerely,

***/RA/***

Richard P. Correia, Chief, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

cc: See next page

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**\*See previous concurrence**

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