Enclosure 1
Changes to Hermes 2 PSAR Chapter 2
(Non-Proprietary)

to consider local overflights, either planned overflights associated with the facility operations, e.g., security flights, or flights associated with area operations, e.g., spraying flights. Thus, the calculation of in-flight helicopter impact frequencies is a site-specific calculation" (Reference 14). Using available information for the proposed airport from the 2016 DOE EA and guidance from the DOE-STD-3014-2006, the helicopter impact frequency evaluation is determined by the following formula:

$$F_H = N_H \cdot P_H \cdot (2/L_H) \cdot A_H \qquad \text{(Equation 2.2-5)}$$

Where:

F_H	=	helicopter impact frequency
N_H	=	expected number of helicopter local overflights per year
P_H	=	helicopter crash per flight (per takeoff or landing)
L_H	=	average length (in miles) of the flight
H	=	helicopter
A_H	=	effective area for helicopter in-flight crashes

Table 2.5 in the 2016 DOE EA provides estimates of the expected number of helicopters at the proposed airport (Reference 11). Table B-1 in DOE-STD-3014-2006 provides aircraft crash rate values, and the helicopter effective area is calculated in the same manner as Equations 2.2-2 through 2.2-4 (Reference 14). The average flight distance of 37 miles is selected based on the generic flight length provided in Table B-43 of DOE-STD-3014-2006 (Reference 14). Applicable inputs are provided in Table 2.2-8. The crash impact frequency for the helicopter operations are provided in Table 2.2-9.

2.2.2.4 Summary of Risks from Air Traffic

NUREG-1537 does not provide acceptance criteria to evaluate the aircraft accident probability posed by nearby airports and airways. NUREG-1537 does, however, state that the radiological risk from external incidents from manmade facilities (i.e., airports) are analyzed in or are shown to be bounded by accidents considered in Chapter 13 of the PSAR. DOE-STD-3014-2006 provides a screening value of 1.00E-06 per year, where the risk of an aircraft accident is considered acceptable if the frequency of occurrence is less than 1.00E-06 per year (Reference 14). The total crash frequency for all airway, helicopter operations, airport takeoff operations, and airport landing operations of 9.678~~.00~~E-05 exceeds this criterion. Excluding near-airport, the impact risk from jetway/airways of 1.683~~9~~E-05 is greater than the screening criterion of 1.00E-06. Additionally, the proposed nearby airport and helicopter operations crash frequency is 7.996~~.61~~E-05 and exceeds the 1.00E-06 screening criterion. In all cases, the crash frequency criterion is exceeded due to small, non-military aircraft from general aviation or helicopter operations. The risk from large commercial aviation aircraft is well below the screening criterion. As a result, the safety-related portion of the Reactor Building structure will be designed to withstand the impact of a small non-military general aviation aircraft as described in Section 3.5. The maximum crash frequency for all aircraft type and aircraft operations are provided in Table 2.2-9.

2.2.3 Analysis of Potential Accidents at Facilities

Each of the nineteen nearby facilities listed in Table 2.2-1 is considered with respect to possible effects on the reactor facility that could precipitate an event. It was determined that ten of the nearby facilities do not have a significant potential to affect the facility. Table 2.2-2 lists the nearby facilities that were concluded not to affect the reactor facility with a brief description of the basis for that finding. The remaining facilities are evaluated in this section. Six of these facilities (i.e., the Kairos Power Hermes

Table 2.2-6: DOE Input Values

NjPjfj(x,y) Values	
	NjPjfj(x,y) Value[a] ($1/mi^2$)
Air Carrier	6.00E-07
Air Taxi	2.00E-06
General Aviation	2.00E-03
Small Military	6.00E-07
Large Military	1.00E-07

Effective Area Input Values			
	WS(ft)[b]	**cot(ϕ)**[c]	**S (ft)**[d]
Air Carrier	98	10.2	1440
Air Taxi	59	10.2	1440
General Aviation	73	8.2	60
Small Military	110	8.4	246
Large Military	223	7.4	780
Helicopter	50	0.58	0

Reactor Building Safety Related Area Dimensions[(e)]		
	feet	**miles**
Length (L)	170	3.22E-02
Width (W)	50	9.47-03
Height (H)	42	7.95E-03

[(a)] Source: Tables B-14, B-15 for Oak Ridge National Laboratory from Reference 14.
[(b)] Source: Table B-16 from Reference 14.
[(c)] Source: Table B-17 from Reference 14.
[(d)] Source: Table B-18, assume takeoff skid length for in-flight crashes from Reference 14.
[(e)] Final area used in calculations for Table 2.2-7 through Table 2.2-9~~10~~ is ~~increased~~ doubled to account for both Reactor Buildings.

Table 2.2-7: Calculated Effective Areas of Safety-Related Structures (square miles) by Aircraft Type Used for the Evaluation of Airways and Airport

Aircraft Type	Effective Area (A_j) (sq mi)
Air Carrier	3.82~~06~~E-02
Air Taxi	3.27~~2.78~~E-02
General Aviation	8.37~~6.91~~E-03
Small Military	1.37~~07~~E-02
Large Military	3.35~~2.36~~E-02
Helicopter	1.35~~1.13~~E-03

Table 2.2-8: Near-Airport and Helicopter Crash Frequency Inputs and Calculations

	N, Number of Operations Per Year[a]	x distance mi[b]	y distance mi[b]	f(x,y) value[c]	P, Crash Rate[d]	A, mi^2	Impact Frequency[e]
General Aviation Takeoff	2.41E+04	+0.7	-1.2	1.30E-02	1.10E-05	8.376.91E-03	2.8838E-05
General Aviation Landing	2.41E+04	-0.7	+1.2	1.20E-02	2.00E-05	8.376.91E-03	4.8400E-05

	N, Number of Operations Per Year[a]	P, Crash Rate[d]	A, mi^2	L_H[f]	Helicopter Impact Frequency[g]
Helicopter	1,491	2.50E-5	1.3513E-03	37	2.7228E-06

[a] Obtained from Table 2.5 in Oak Ridge EA, (Reference 11). Annual helicopter operations (1,491) were subtracted from total annual aircraft operations (49,713) total operations and the remainder was assumed 50% takeoff and 50% landing operations.
[b] Orthonormal distance from the site to the center of each runway at the flight source. Distance values were estimated based on the best current available information. Takeoff is assumed to be to the southwest and landing is assumed to be to the northeast.
[c] Reference 14, Tables B2-B5. Flight direction is currently unknown; therefore, the largest value of f(±x,±y) was selected for conservatism.
[d] Reference 14, Tables B-1. Assumed representative fixed wing for General Aviation operations.
[e] Calculated from Equation 5-1 (Reference 14).
[f] Reference 14, Table B-43.
[g] Calculated from Equation 5-3 (Reference 14).

Table 2.2-9: Total Crash Probability

Aircraft Type	Airway Operations	Near-Airport Operations			Total
		Airplane Takeoff	Airplane Landing	Helicopter Operations	
Air Carrier	2.301~~1.83~~E-08	-	-	-	2.301~~1.83~~E-08
Air Taxi	6.545~~5.56~~E-08	-	-	-	6.545~~5.56~~E-08
General Aviation	1.673~~8~~E-05	2.883~~8~~E-05	4.840~~0~~E-05	2.722~~8~~E-06	9.667~~7.99~~E-05
Small Military	8.226~~6.45~~E-09	-	-	-	8.226~~6.45~~E-09
Large Military	3.342~~2.36~~E-09	-	-	-	3.342~~2.36~~E-09
Total	1.681~~1.39~~E-05	2.883~~8~~E-05	4.840~~0~~E-05	2.722~~8~~E-06	**9.678~~8.00~~E-05**