

**UNITED STATES OF AMERICA**  
**NUCLEAR REGULATORY COMMISSION**

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE L.L.C.	)	Docket No. 72-22
	)	
(Private Fuel Storage Facility)	)	

**DECLARATION OF JAMES COLE, JR.**

James L. Cole, Jr. states as follows under penalties of perjury:

1. I am Executive Director of the National Air Traffic Controllers' Association (NATCA) and an associate with Burdeshaw Associates, Ltd. In 1994 I retired from the United States Air Force with the rank of Brigadier General. I am providing this affidavit in support of a motion for partial summary disposition of Contention Utah K in the above captioned proceeding to indicate the risk of aircraft or air-delivered weapon accidents impacting the proposed Private Fuel Storage Facility (PFSF) for the storage of spent nuclear fuel in Skull Valley, Utah.

2. My professional and educational experience is summarized in the curriculum vitae attached as Exhibit 1 to this affidavit. I have extensive experience in and knowledge of aircraft operations and aviation safety. From 1991 to 1994, I served as Chief of Safety of the United States Air Force and directed the entire USAF safety program. I was responsible for accident prevention and investigation in all aspects of ground and air operations. Furthermore, I am specifically knowledgeable about the safety of the civilian and military aircraft that fly in and around Skull Valley, Utah, including the military aircraft that fly from Hill Air Force Base and on or around the Utah Test and Training Range and Dugway Proving Ground.

3. In the bases for Contention Utah K, as admitted by the Licensing Board, the State asserts in part that Applicant Private Fuel Storage (PFS) inadequately considered the impact on the PFSF of credible accidents involving materials or activities at or emanating from Salt Lake City International Airport, Hill Air Force Base, the Utah Test and Training Range, and Dugway Proving Ground (which is the location of Michael Army Airfield). I have reviewed information and data concerning the potential hazard to the PFSF from air crashes and air-delivered weapons used in testing and training at these facilities and have determined that they pose no credible or significant hazard to the PFSF. I have prepared a report documenting my assessment which is attached as Exhibit 2. The major conclusions from my report are summarized below.

4. In conducting my research, I consulted a wide range of sources that are reflected in the footnotes attached to my report. Regarding civilian aviation activities and aviation safety, I relied on a number of reports published by government sources, including the Department of Transportation, the National Transportation Safety Board, the Federal Aviation Administration, and National Aeronautical Space Administration. I also relied on a number of reports published by companies in the aviation industry. Regarding military aviation and air-delivered weapons usage, I relied on documents provided by the U.S. Air Force in response to Freedom of Information Act requests, briefings and documents provided by the Headquarters U.S. Air Force, Safety Issues Team, at the Pentagon, and other government-related documents. In addition, I conducted an on-site visit to Hill Air Force Base and discussed key issues regarding flight operations in the UTTR with the Vice Commander of the 388th Fighter Wing, which fly the F-16, and key members of his staff.

5. Crashes involving aircraft flying to or from Salt Lake City International Airport or in airways near Skull Valley pose no significant hazard to the PFSF. Modern aviation in the United States has an excellent safety record. In 1996 there were only 38 large air carrier "accidents" in the entire United States with an accident rate of only 0.28 per 100,000 flight hours. "Hull losses" with fatalities, which usually involve an aircraft

impacting the ground and being damaged beyond repair or totally destroyed, really represent the only potential threat to the proposed PFSF. Of the 38 large carrier accidents which occurred in the United States in 1996 (final data), only three were hull losses with fatalities, or only one for every 1,262,439 square miles of the United States. This is an inconsequential probability for a specific point of impact, such as the PFSF, particularly given the location of the PFSF away from takeoff and departure corridors, approach and landing corridors, and airways. See Exhibit 2, pp. 3-5.

6. The proposed PFSF facility location is not situated under the takeoff and departure corridor nor the approach and landing corridor of any airport. This is important since the majority of Hull Loss aircraft accidents for large air carriers, 23.7% and 44.6% respectively, occur during these phases of flight. Climbs and descents account for only 7.3% and 6.4% respectively, while only 4.7% occur during cruise. See Exhibit 2, p. 5.

7. Salt Lake City International Airport is located 50 statute miles northeast of the PFSF. In 1998, Traffic Control logged 365,000 total takeoffs and landings at Salt Lake City International Airport. The major runways at the airport have a north/south alignment which places the PFSF well away from the takeoff and landing segments of flights departing and arriving Salt Lake City International Airport. Thus, there is no danger of a crash during departures or arrivals at Salt Lake City International Airport impacting the PFSF. See Exhibit 2, p. 5.

8. There are two airways that pass near Skull Valley and neither one is close enough for crashes of aircraft flying in them to pose a significant hazard to the PFSF. High altitude Jet Route 56 with a minimum en route altitude of 33,000 feet MSL passes 10 nautical miles (11.5 statute miles) north of the proposed PFSF site. For the purpose of analysis, one can consider Jet Route 56 to have a width of 8 nautical miles (9.2 statute miles). Thus, the closest edge of Jet Route 56 would be more than 5 statute miles from the PFSF. Low Altitude Route Victor 257 runs north/south with a minimum en route altitude of 12,300 feet MSL and a width of 12 nautical miles (13.8 statute miles). It passes 17 nautical miles (19.5 statute miles) east of the proposed PFSF site. Thus, the closest

edge of Victor 257 would be more than 10 statute miles from the PFSF. Taking the 4.7% figure for Hull Loss accidents that occur during the cruise portion of flight, together with the distance of the PFSF from commercial airways, makes the odds of an aircraft falling out of the sky and crashing on the proposed PFSF site too small to compute and so highly improbable as to even contemplate. See Exhibit 2, p. 6.

9. Crashes of other civilian aircraft flying to or from Salt Lake City airport also pose no significant hazard to the PFSF. The PFSF is located in a Military Operating Area (MOA), referred to as SEVIER B, which is adjacent to (just east of) military restricted airspace, Restricted Areas R6406 and R6402. Sevier B airspace extends up to 9,500 ft. altitude. Civilian aircraft are prohibited from operating in the Restricted Areas and generally avoid flying in Military Operating Areas. R6406 and R6402 airspace both extend up to 58,000 ft. (FL580) and are in continuous military use. The proximity of the SEVIER B MOA to the Restricted Areas makes it unlikely that civilian air traffic would transit the area near the PFSF. See Exhibit 2, p. 7.

10. Furthermore, similar to large commercial jet airliners, only a small fraction of other civilian aircraft accidents occur during the cruise phase of flight. Any civilian aircraft near the PFSF would be in that mode, since Salt Lake City International Airport is 50 statute miles away and there are no other airports near the PFSF at which such aircraft might land. Thus, higher risk takeoff and landing traffic for other civilian aircraft would be located far from the proposed PFSF site. See Exhibit 2, pp. 8-9. Consequently, crashes of other civilian aircraft will pose no significant risk to the PFSF.

11. The State has also alleged in the bases for Contention Utah K that aircraft flying to and from Hill Air Force Base and Michael Army Airfield and aircraft flying over the Utah Test and Training Range (UTTR) would pose a crash hazard to the PFSF. I have reviewed the potential for crashes involving military aircraft associated with these installations and the UTTR and have concluded that they do not pose a significant hazard to the PFSF.

12. Hill Air Force Base is located on the eastern shore of the Great Salt Lake, north of Salt Lake City. See Map, "UTTR Military Airspace," in Exhibit 2, p. 9a. It is 65 statute miles from the PFSF. Air Force aircraft based at Hill and military aircraft based outside the State of Utah train on the UTTR. The UTTR is an Air Force training and testing range over which the airspace is restricted to military operations. The UTTR is divided into a North Area and a South Area. See Map, "UTTR Military Airspace." The North Area is a roughly S-shaped area located on the western shore of the Great Salt Lake, about 10 miles north of Interstate 80. The southern edge of the UTTR North Area is approximately 35 miles from the PFSF. The UTTR South Area is a roughly rectangular area located to the west of the Cedar Mountains, south of Interstate 80 and northwest of Dugway Proving Ground. See Map, "UTTR Military Airspace." Michael Army Airfield is located on Dugway Proving Ground, southwest of the Cedar Mountains. See Map, "UTTR Military Airspace." Michael is over 17 miles from the PFSF.

13. Crashes of military aircraft would not pose a significant hazard to the PFSF. Military aircraft, almost all of which are F-16's, fly in Skull Valley when en route to the Utah Test and Training Range, South Area. F-16 fighter aircraft depart Hill AFB under positive Radar Departure Control en route to the UTTR. They are handed off to Clover Control (Range Control) and fly south passing west of Deseret Peak, near the Stansbury Mountains to practice terrain masking to evade radar, approximately five miles east of the proposed PFSF site. F-16's fly no lower than 1,000 ft. Above Ground Level (AGL) as they transit Skull Valley and are normally at 3,000 ft. to 4,000 ft. AGL. During this phase of flight, the aircraft are not engaging in any threat reaction or tactical maneuvering but rather are simply transiting the area. There is no aggressive maneuvering until they are well south of Dugway, 15 miles south of the PFSF, at which point they turn north and west to proceed to the ranges on the UTTR. See Exhibit 2, pp. 10-11.

14. F-16 traffic passing through Skull Valley varies, but averages approximately 10 aircraft daily. According to the U.S. Air Force, there were 3,871 Skull Valley transits in 1998, and they were almost entirely F-16 flights from Hill AFB to the UTTR

South Area. No run-in headings for weapons delivery transit over the Skull Valley area. When the F-16's complete their work on the UTTR South Area, they fly north to return to Hill AFB and do not pass near the PFSF. F-16's that work in the UTTR Northern Area are not a factor since during ingress, range work, and egress they do not pass near the PFSF. See Map, "UTTR Military Airspace," Exhibit 2, p. 9a; Exhibit 2, p. 11.

15. In the past 28 years, 50 U.S. Air Force fixed-wing aircraft have crashed in the entire state of Utah (82,076 square miles). See Exhibit 2, pp. 10-11. The exclusion of 17 crashes (which are known to have occurred within 10 miles of an airfield) results in a crash rate of 1.18 crashes per year for the entire state. This rate is a conservative number since it includes several older aircraft that were less reliable and had higher accident rates that are no longer flying. The five F-16's that crashed during the past five years all crashed within the UTTR, where they frequently engage in stressful maneuvers in training and testing, unlike the way they fly over Skull Valley. Consequently, the probability of a specific impact on the proposed PFSF site is extremely low. Although approximately 3,900 aircraft transit Skull Valley each year, given the current routes of flight and range procedures, there is no reason to presume any significant risk to the proposed PFSF site from a military aircraft crash. See Exhibit 2, pp. 13-14.

16. Other military aircraft that use the UTTR for a wide variety of training missions include B-52's, B-1's and B-2's dropping bombs or launching cruise missiles, as well as A-10's, F-18's, F-117A's and A-6's. They pose no hazard to the PFSF, however, in that their activities are generally confined to the northern and western portions of the UTTR and are approximately 30 statute miles away from the PFSF. Weapon run-ins, drops, and launches are normally done from north to south or east to west and are thus directed away from the PFSF. See Exhibit 2, p. 12.

17. Takeoffs and landings at Michael Army Airfield on Dugway Proving Ground also do not pose a hazard to the PFSF. The PFSF is located 17.25 statute miles northeast of the airfield. It is outside the crash risk area of near-airport operations (which does not extend more than 10 miles from the airfield) and the direction to the PFSF is at

right angles (90°) to the runway alignment and the direction for takeoff and landing traffic at Michael AAF. Therefore, the PFSF is located under neither the takeoff nor landing flight paths of the airfield and the risk to the proposed PFSF site from takeoffs and landings at Michael AAF is negligible. See Exhibit 2, pp. 15-18.

18. Aircraft flying to and from Michael AAF use military airway IR-420 which passes over the PFSF. Nevertheless, because the number of aircraft doing so is small and the types of aircraft that fly into Michael AAF exhibit particularly low crash rates, they do not pose a significant hazard to the PFSF. I did a safety analysis using the methods of NUREG-0800, section 3.5.1.6 to determine the risk and probability of aircraft using IR-420 impacting the PFSF. Using an in-flight crash rate of 4E-10 per mile (from NUREG-0800) and the number of flights per year (414), along with the area of the PFSF Restricted Area (0.1546 square miles), and the width of the airway 10 nautical miles (11.5 statute miles), the probability of an aircraft crashing into Restricted Area (where the spent fuel will be located) was computed to be 2.23 E-9 per year. The crash rate of 4E-10 per mile is applicable to the aircraft flying into Michael AAF because they are mostly C-5's, C-141's, C-17's, C-130's, C-12's, C-21's and other transport aircraft that exhibit crash rates similar to those of commercial jetliners. Consequently, there is very low risk and a very low probability of a crash into the PFSF by aircraft flying into Michael AAF. See Exhibit 2, pp. 18-20.

19. The State has also alleged in the bases for Contention Utah K that the use of air-delivered munitions (e.g., bombs and missiles) in testing and training on the UTTR and Dugway Proving Ground would pose a hazard to the PFSF. I have reviewed the use of air-delivered munitions on the UTTR and Dugway and have concluded that they would not pose a significant hazard to the PFSF.

20. First, no aircraft over-flying Skull Valley are allowed to have their armament switches in a release capable mode, and all switches are "safe" until inside DOD land boundaries, which are 9 statute miles to the southwest (Dugway Proving Ground) at the closest point. In addition, each weapon tested on the UTTR has a run-in heading (ap-

proach to the target) established during the complete safety review process conducted prior to flight. Footprints (impact area), time of fall, altitude at release and release air-speed dictate the release locations and headings allowed. The UTTR has never experienced an unintended munitions release outside of designated launch/drop/shoot boxes. The boxes are at least 30 statute miles from the proposed PFSF site. Wildcat Range is the range closest to the proposed PFSF site where live ordnance is expended, and it is 30 statute miles west by northwest of the proposed site. See Map, "UTTR Military Air-space." As indicated above, aircraft do not make run-ins for weapon delivery over Skull Valley and after aircraft are finished on the range, they return to Hill via a northerly route, away from the PFSF. Therefore, air-delivered weapons use on the UTTR is simply too far away to threaten the PFSF. See Exhibit 2, pp. 11, 22.

21. Cruise missile launches, which occur within military airspace around the UTTR, would also not pose a significant hazard to the PFSF. Cruise missile launches are infrequent, their intended target areas are far from the PFSF, and special precautions are taken to ensure that the missiles do not cause harm outside their intended target areas. There are approximately six cruise missile launches per year on the ranges in Utah. Missile launches are generally confined to the northern and western portions of the UTTR and are approximately 30 statute miles away from the PFSF. Run-ins, drops, and launches are normally done from north to south or east to west and are thus directed away from the PFSF. Most cruise missiles used in testing and training do not carry live warheads. Five cruise missiles have been lost in crashes in Utah in the past five years. Of those, only one carried a live warhead. None impacted anywhere near the proposed PFSF site. See Exhibit 2, p. 23.

22. Furthermore, cruise missiles that have a capability of exceeding range boundaries are required to have a Flight Termination System (FTS) installed prior to testing on the UTTR. The FTS systems are designed to destruct the weapons and terminate the weapon flight path in the event of a weapon anomaly. Before an aircraft launches a cruise missile, the Mission Control Center verifies that the missile's remote

control and flight control systems are working properly. At all times throughout the flight the cruise missile's FTS must detect a signal that in effect permits the missile to keep flying. If the missile does not detect the signal for a preset time, the FTS destroys the missile automatically. Safety officers, who monitor the flight of the missile continuously, can also activate the FTS, if required, at any time. The Range Safety Officer at Mission Control and the Airborne Range Instrumentation Aircraft are also both capable of terminating missile flight almost immediately. The UTTR has never experienced a FTS failure. Therefore, it is highly unlikely that a cruise missile would fly off the UTTR and strike the PFSF. See Exhibit 2, pp. 23-24.

23. In the December 1997 incident, in which a cruise missile tested at Dugway Proving Ground struck a trailer being used for astronomy experiments, the missile guidance system and the missile FTS did not fail. See excerpt from Accident Investigation Board Report, United States Air Force AGM-129 (December 10, 1997), attached as Exhibit 3 to this affidavit. That missile was programmed to fly a test course, release a dummy warhead, and then fly into the ground. Exhibit 3, pp. 11-12. Range personnel planning the test were unaware that the laboratory test trailer was located in the test range for the missile and inadvertently programmed the missile to fly into the ground at the point at which the trailer was located. *Ibid.* During the test, the missile flew its programmed course, released its dummy warhead, flew into the ground as programmed, and struck the trailer. *Ibid.* at p. 14-15. During the test, the missile FTS continuously received a signal (because the missile did not deviate from its programmed course) and therefore never attempted to terminate the flight. At no time did the missile leave the test range on the Dugway Proving Ground. The only error that occurred in the test was the failure of a test engineer to communicate with an airborne missile controller in time for the controller to steer the missile off its programmed course, as had been the plan, to cause the missile to strike the ground at an alternative location on the range. See Exhibit 3, pp. 15-17. That error did not involve the missile and did not increase the chance that the missile would depart from its programmed course or the test range. Thus, the Dug-

way incident does not indicate that cruise missile testing is unsafe or that it would pose a hazard to the PFSF.

24. The State also asserted in the bases for Contention Utah K that aircraft flying and landing at Michael Army Airfield with "hung bombs," i.e., ordnance that failed to release from the aircraft in training or testing, would pose a hazard to the PFSF. I have reviewed this issue and have determined that aircraft flying and making emergency landings at Michael Army Airfield with hung bombs would not pose a significant hazard to the PFSF.

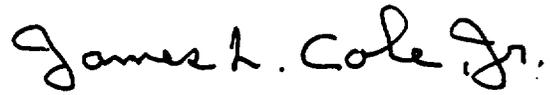
25. First, the number of aircraft doing so each year is very small. According to the U.S. Army, there were only five hung ordnance aircraft diversions/recoveries into Michael AAF during 1998. See Exhibit 2, p. 20. Second, aircraft making hung ordnance recoveries at Michael do not fly over Skull Valley. Ibid. The pilot maneuvers the aircraft to the northwest, approximately 20 statute miles from the PFSF, and proceeds directly to Michael Army Airfield, avoiding rapid or steep turns and abrupt climbs or descents. Test facilities or any populated areas are avoided. A long straight-in approach from the northwest with a shallow rate of descent is established to a full stop landing on runway 12 (to the southeast). After landing, Dugway Proving Ground Explosive Ordnance Disposal personnel inspect and safe the bombs. Thus, such operations take place too far from the PFSF to pose a significant hazard. See Exhibit 2, pp. 20-22.

26. Finally, the State alleged in the bases for Contention Utah K that tests of the X-33 space plane, which is scheduled to land at Michael Army Airfield, would pose a hazard to the PFSF. I have also reviewed this matter and concluded that the X-33 would not pose a hazard to the PFSF. The X-33 is an unmanned half-scale demonstrator launch vehicle planned to test critical components for the next generation space transport system. The X-33 will not pose a hazard to the PFSF because, first, tests for the X-33 at Michael Army Airfield are scheduled to be completed by mid-2000, before the PFSF would be operational, and second, the X-33's flight plan does not take it over Skull Valley near the PFSF. See Exhibit 2, pp. 24-25.

27. In conclusion, air crashes and the use of air-delivered weapons pose no significant hazard to the PFSF. Most aircraft flights in the region and all weapons use take place far enough from the PFSF site that the risk that a crashing aircraft or an errant munition would strike the PFSF is negligible. Those aircraft that fly through Skull Valley near the PFSF site pose no significant hazard because the likelihood of their crashing and impacting the PFSF is extremely low.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 3, 1999.

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James L. Cole, Jr.