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)	)	

AFFIDAVIT OF CARLTON BRITTON

CITY OF LUBBOCK	)	
COUNTY OF LUBBOCK	)	SS:
STATE OF TEXAS	)	

I, Carlton Britton, being duly sworn, state as follows:

1. I am a professor in the Department of Range, Wildlife, and Fisheries Management at Texas Tech University. In that position I perform research in and teach subjects including fire ecology and range management. I am providing this affidavit in support of a motion for partial summary disposition of Contention Utah K in the above captioned proceeding to describe the nature and magnitude of wildfires that could occur in the vicinity of the Private Fuel Storage Facility (PFSF) and steps that may be taken to protect the facility from their effects.

2. My professional and educational experience is summarized in the curriculum vitae attached as Exhibit 1 to this affidavit. I have extensively studied and am knowledgeable about the effects of wildfires that can occur in semi-arid, rangeland regions such as Skull Valley, Utah. I have conducted numerous test fire burns over the past 30 years in fuel types which include shortgrass prairie, juniper woodlands, tall grass prairie, and sagebrush-bunchgrass in eastern Oregon, some of which are very similar to the fuel types that occur in the Skull Valley. I have been involved in an estimated 500 experimental burns conducted under a wide variety of weather conditions and fuel loads.

3. I have reviewed information and data concerning the potential hazard of wildfires to the PFSF and I have prepared a report which PFS submitted to answer a Request for Additional Information made by the NRC Staff concerning the hazard posed by wildfires. My report is attached as Exhibit 2.

4. Based on my general knowledge of wildfires in rangeland regions of the western United States, my review of project specific documentation, and my inspection of the Skull Valley site on May 13, 1999, I am knowledgeable of the nature of the vegetation present in and the climate of Skull Valley relevant to their effects on the occurrence and characteristics of wildfires. I found the Skull Valley site to be dominated by an old growth cheatgrass community with isolated stands of greasewood and other plants. Sand dropseed occurred as a subdominate on the better soils of the site. The growing season of 1998 was evidently excellent as the cheatgrass standing litter was estimated at 2,400 lbs/ac. This is an exceptional amount of grass fuel considering the approximate 7-inch precipitation zone. My opinion is that this represents the maximum grass fuel loading possible for this site. Greasewood was the only shrub present on the site in significant quantities. Plants were widely spaced on the rare sites conducive to their presence. The densest stands, which were less than 0.1 acre in size, had a canopy cover of less that 10%. Therefore, fire behavior and rate of fire spread would not be influenced by the shrub component. Grass fuel would be the only significant contributor to fire behavior and rate of fire spread.

5. The residence time of a wildfire, the time it remains above some predetermined elevated temperature, is a direct function of the fuel available for combustion. In rangeland regions, like the area surrounding the PFSF, wildfires do not tend to burn for a long time at any one point because the fuel loading is not high. Tests fire burns conducted where the fuel loading varied between 1,500 and 13,500 lbs/acre (which would encompass the available fuel loading in Skull Valley) show that the temperature at the soil surface (the most stable reference point for temperature measurement) would exceed 200 °F for no more than about 5.4 minutes at any one point (see Wright and Bailey, 1982; pg. 10-11). During late April 1999, I conducted several experimental burns at fuel loads above 5,000 lbs/ac. The maximum temperature at the soil surface reached about 1,200°F, and the duration above 200°F was only about 2.5 minutes. Above the height of the dominant fuel supporting the fire. temperature duration diminishes

rapidly with height (see Wright and Bailey, 1982; pg. 11-14). With the cheatgrass fuel at the PFS site, I am confident that fire temperatures and the duration of those temperatures would not exceed those referenced above. This conclusion applies to conditions which would include the absolute maximum fuel loading that could be expected in any year in combination with the most extreme atmospheric conditions generally present during the fire season for this region of the United States.

6. Furthermore, the climate and vegetation in Skull Valley is similar to the Horse Haven study site near Ely, Nevada, discussed in my report, where Phil Range conducted studies on the temperatures produced by wildfires. The Horse Haven study site, however, was more productive with greater fuel loads than Skull Valley. Thus, Range's data is at the upper limit compared to what might be found in Skull Valley. Range indicated that the Horse Haven study site had a fuel load of 5311 lbs/acre. The fires measured burned in August, with the following atmospheric conditions: air temperature 86 to 92 °F; relative humidity of 13 to 17 percent; and wind speed of 8 to 10 mph. While these are not the maximum for extreme wildfire condition, they are sufficient to produce close to maximum fire behavior characteristics. Study measurements indicated that the peak temperatures close to the soil averaged about 1466 °F over a number of different locations. At mid-canopy of the sagebrush (18 inches) the average maximum temperature was 1220 °F. The fire spread at a rate between 50 and 100 ft./min with a maximum of 590 ft./min.

7. In my estimation, the upper limit of the fuel loading, including shrubs in Skull Valley at or adjacent to the PFSF, would be no more than 4000 lbs/acre, which would allow for significant additional growth beyond that viewed on my visit to the site. This is based on viewing the site and my experience in eastern Oregon. A wildfire at the PFSF site would produce no temperature or duration of temperatures greater than those reported in the literature. A fire would move quickly and residence time over a given point would be very short, less than the maximum 5.4 minutes found in the literature. Smoke from an approaching fire could possibly be dense, reducing vision to 20 to 30 feet, for 5 to 7 minutes depending on how close the wind held the smoke to the ground. For an additional 5 minutes, vision distance would increase to about 100 yards. Even under worst case weather conditions with high wind speeds, smoke should clear the site sufficiently within 30 minutes to see at least 1 mile.

8. The effect of wildfires in areas with vegetative cover of the type present in Skull Valley can be easily mitigated by fuel modification. For example, planting a 300 ft. wide strip of crested wheatgrass around the site outside a 100 ft. fuel-free strip would virtually eliminate the impact of any wildfire. Crested wheat grass is a well known fuel which does not support fire spread easily. Plants typically have leaves close to the ground and are widely spaced. With summer dormancy, many leaves fall to the soil surface. These characteristics are not conducive to fire spread through crested wheatgrass stands. Even if it were to burn, the intensity of the fire and the temperatures produced would be significantly lower than those that would result from a fire involving the fuel type currently in the Skull Valley. These are reasons crested wheatgrass stands are used as fuel breaks in the Great Basin. Furthermore, based on my observation of crested wheatgrass plantings in Utah, a crested wheatgrass barrier could easily be established at the Skull Valley site. A single planting would be sufficient and the barrier would remain fire resistant with little maintenance required afterwards.

9. A 100 ft. wide strip free of fuel would act as a firebreak and would prevent a fire from reaching the fuel-free PFS site. I have used 100 ft. as a safe standoff distance in test burns measuring the effects of wildfires for 30 years. These tests have been done with fuel loads varying from 1,000 up to 15,000 lbs./ac of grass, and under various weather conditions including windspeeds up to 20 mph. I have found that 100 ft. is a sufficient firebreak under these various conditions to stop the progress of the fire and to protect equipment and life. During experimental burns, I always station persons and equipment (pumpers, trucks, etc.) on the down wind side of a 100-ft. firebreak, with no adverse effects from heat, dense smoke, or carbon monoxide produced from burning grass fuel.

10. Therefore, with a 300 ft. fuel modified area (crested wheatgrass) plus a 100-ft. fuel-free firebreak at a site, no heat damage would be possible to normal equipment or structures, such as buildings or vehicles, or to life forms inside the compound. Such a firebreak would also prevent a wildfire from causing diesel fuel stored in a tank inside the compound to ignite or explode. We carry drip torch fuel on our pumper, and the pumper is always stationed 100 ft. down wind from our experimental fires. Drip torch fuel is a 60:40 mixture of diesel:gasoline, and the deck of our pumper is generally covered with spilled fuel. We have not experienced ignition or explosion of drip torch fuel under these conditions in our many test burns.

11. I have reviewed the affidavit of Jerry Cooper regarding the design and layout of the PFSF. The PFSF Restricted Area will be enclosed by two fences and a perimeter road, all of which will have a surface of crushed rock. Cooper Aff. at ¶ 4. A wildfire could not be sustained within the crushed rock area because of the lack of fuel for the fire to burn.

12. In summary, I do not believe any wildfire in the fuel present at the PFS site would present any danger to the facility or personnel, especially with a 100-foot firebreak and proper fuel modification.

Carlton Britton

Sworn to before me this 7th day of ~~May~~ June 1999.

Melanie E. Cobb

Notary Public

My Commission expires _____

MELANIE E. COBB
MY COMMISSION EXPIRES
July 18, 2001