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 KRISHNA SINGH

CITY OF MARLTON	)	
	)	SS:
STATE OF NEW JERSEY	)	

Krishna P. Singh, being duly sworn, states as follows:

1. I am President and CEO of Holtec International. In that position I bear the ultimate corporate responsibility for the accuracy and correctness of the company's spent fuel storage systems engineered for dry storage under certification by the USNRC. 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 ability of the Holtec HI-STORM 100 spent fuel storage cask, to be used at the Private Fuel Storage Facility (PFSF), to withstand heat and temperatures under fire conditions.

2. My professional and educational experience is summarized in the curriculum vitae attached as Exhibit 1 to this affidavit. My professional experience in spent fuel system design extends to 1979. Over the past twenty years, I have personally led the design and licensing of spent fuel storage systems for over forty nuclear plants, and for Holtec's HI-STAR 100 and HI-STORM 100 Systems. I am also the inventor of the honeycomb basket design utilized in the HI-STAR 100/HI-STORM 100 MPC Systems (Patent Number 5,898,747). The internal thermosiphon feature of the HI-STORM 100 MPCs, widely recognized as a seminal

contribution to dry storage technology, was conceptualized and implemented under my technical leadership. My professional work in the field of applied heat transfer, to which this affidavit pertains, consists of over 500 industry reports, over fifty published papers in the refereed technical literature, and academic courses taught at the University of Pennsylvania. I have served as the expert witness in two prior ASLB hearings dealing with wet storage of spent nuclear fuel.

3. I participated in, and am knowledgeable regarding, the thermal design of the Holtec HI-STORM 100 spent fuel storage cask, in particular its capability to withstand heat and temperatures under fire conditions. Specifically, the Holtec HI-STORM 100 storage casks, to be used at the PFSF, are designed to withstand a fire induced temperature of 1475 °F for at least 15 minutes, as described in the Topical Safety Analysis Report (TSAR, Revision 4) for the HI-STORM 100, at section 11.2.4 (attached as Exhibit 2). The design capability of the HI-STORM 100 to withstand a fire-induced temperature of 1475 °F for at least 15 minutes is also summarized in the PFSF SAR at 8.2-26.

4. The HI-STORM 100 spent fuel storage cask system consists of a sealed, cylindrical, steel multipurpose canister (containing the spent fuel assemblies and pressurized helium gas) standing on end inside a ventilated, steel-encased, cylindrical concrete storage overpack. The cask is 239.5 in. high and 132.5 in. in diameter. The concrete overpack is 29.5 inches thick. The HI-STORM 100 is depicted in the PFSF SAR in Figure 4.2-1.

5. As described in section 11.2.4 of the HI-STORM 100 SAR, Holtec analyzed the effect of fire on the HI-STORM 100 storage cask using the ANSYS finite element heat transfer code. The use of this code for the thermal analysis of spent fuel dry cask storage systems is recommended by NUREG-1536, Standard Review Plan for Dry Cask Storage Systems. NUREG-1536 at 4-7. The code models both conductive and radiative heat transfer between the structural elements of the cask system and the spent fuel as well as convective and radiative heat transfer between the cask surface and the environment.

6. In analyzing the fire, Holtec assumed that the storage cask was subjected to an ambient air temperature of 1475 °F for 15 minutes. The analysis showed that exposing the storage cask to an ambient air temperature of 1475 °F for this period of time would not cause the spent fuel or the fuel canister to exceed their design temperatures. The temperature increase of

the spent fuel would be negligible, and both the spent fuel and the fuel canister would be well within their design limits (HI-STORM 100 SAR at 11.2-12). Furthermore, while such temperature exposure might cause the concrete within a very small radial extent near the outer cylindrical surface of the cask to lose some neutron shielding capability, the great majority of the 29.5 inch thick concrete cask would experience only relatively minor temperature increases (due to the low concrete thermal conductivity) which would not adversely affect its neutron shielding capability. See Exhibit 2, HI-STORM 100 SAR Figures 11.2.1 to 11.2.5 (concrete temperature profiles as functions of time). Thus, the storage cask would continue to fully meet NRC regulatory requirements.

7. The potential for a Holtec HI-STORM 100 spent fuel storage cask to be damaged by the heat from a fire depends on the total amount of energy absorbed by the cask from the fire. A fire that produced a maximum air temperature at the surface of a storage cask of 1475 °F, or less, for a period of 15 minutes, or less, would in no way threaten the integrity of the casks or the spent fuel inside them.

Dr. Krishna P. Singh

Sworn to before me this 4th day of June 1999.

Maria C. Pepe
Notary Public

MARIA C. PEPE
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 25, 2000

My Commission expires _____