

July 12, 2004

Michael C. Farrar, Chairman  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dr. Peter S. Lam  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dr. Paul B. Abramson, Esq.  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

In the Matter of  
Private Fuel Storage L.L.C.  
(Independent Spent Fuel Storage Installation)  
Docket No. 72-22-ISFSI

Dear Administrative Judges:

In accordance with the schedule adopted by the Licensing Board in this proceeding, the NRC Staff is filing this evening its testimony and exhibits concerning aircraft crash consequence issues. The testimony consists of the following seven items:

1. Storage Cask NRC Staff's Testimony of Gordon Bjorkman, Robert Shewmaker, Robert Kalan, and Kenneth Gwinn Concerning the Consequences of an Accidental F-16 Aircraft Crash Into a HI-STORM 100 Cask at the Proposed PFS Facility.
2. CTB NRC Staff's Testimony of Gordon Bjorkman, Robert Shewmaker, and Gustavo Aramayo Concerning the Consequences of an Accidental F-16 Aircraft Crash Into the Canister Transfer Building at the Proposed PFS Facility.
3. Utah Cask Reports NRC Staff's Testimony of Gordon Bjorkman and Gustavo Aramayo Concerning the State of Utah's Analyses of the Consequences of an Accidental F-16 Aircraft Crash or Munitions Impact Into a HI-STORM 100 Storage Cask at the Proposed PFS Facility.
4. Jettisoned Ordnance NRC Staff's Testimony of Robert E. Shewmaker, Concerning Jettisoned Ordnance Impact Effects on the Proposed Private Fuel Storage Facility.

5. Jet Fuel Fire NRC Staff's Testimony of Christopher S. Bajwa, Carlos Lopez and Robert J. Kalan Concerning a Potential Jet Fuel Fire at the Proposed Private Fuel Storage Facility in an Accidental F-16 Crash Event.
6. Probability NRC Staff Testimony of Dr. Dennis R. Damon Concerning Aircraft Crash Probability Assessment.
7. Angles & Speeds NRC Staff's Testimony of Kazimieras M. Campe and Amitava Ghosh Concerning F-16 Crash Impact Speeds and Angles for Skull Valley Type Events.

In addition, the Staff is filing copies of the exhibits it will offer into evidence. A list of the Staff's proposed exhibits is enclosed herewith. The enclosed list indicates which of the exhibits may contain safeguards information (SGI). Copies of the testimony and exhibits have been transmitted by Federal Express to Counsel for the State and Counsel for the Applicant earlier today.

Unfortunately, the Staff has encountered unexpected difficulties in producing electronic copies of five exhibits, involving computer graphics and computer-generated Figures. On the enclosed list, these are Staff Exhibits 76, 77, 85, 86, and 87. The Staff expects to complete its copies of these exhibits tomorrow, and will promptly forward them to the Licensing Board and Counsel for parties.

Sincerely,

*/RA/*

Sherwin E. Turk  
Counsel for NRC Staff

cc w/Encl.:

Paul Gaukler, Esq.  
Denise Chancellor, Esq.  
Emile Julian, Esq.

**In the Matter of: PRIVATE FUEL STORAGE, LLC  
(Independent Spent Fuel Storage Installation)  
Docket No. 72-22-ISFSI**

**NRC Staff Hearing Exhibits**

Staff Exh. No.	Description	Witness	Contention	Offered --- Admitted
<b>SAFETY HEARINGS - AUGUST-SEPTEMBER, 2004</b>				
<b>66</b> <b>SGI</b>	<b>G.S. Bjorkman, R.E. Shewmaker</b> , "NRC Staff 's Evaluation of the Structural Consequences of an Accidental F-16 Aircraft Crash Event at the Proposed [PFS] Facility," May 11, 2004 (revised through May 19, 2004)	Bjorkman Shewmaker Kalan Gwinn (CASK)	Utah K (crash)	<b>SGI</b>
<b>67</b> <b>SGI</b>	<b>R.J. Kalan, K.W.Gwinn, K.E. Metzinger, D.J. Ammerman</b> , "Confirmatory Structural Analyses of an Accidental F-16 Crash Event onto the Proposed [PFS] Facility (HI-STORM 100 Dry Cask Storage System), May 11, 2004 (revised through May 19, 2004)	Bjorkman Shewmaker Kalan Gwinn (CASK)	Utah K (crash)	<b>SGI</b>
<b>68</b> <b>SGI</b>	<b>R.J. Kalan, K.W.Gwinn</b> , Disk (Exhibits 68 - 69) Animations of Confirmatory Structural Analyses of an Accidental F-16 Crash Event onto the Proposed [PFS] Facility (HI-STORM 100 Dry Cask Storage System), by Sandia National Laboratories	Bjorkman Shewmaker Kalan Gwinn (CASK)	Utah K (crash)	<b>SGI</b>
<b>69</b> <b>SGI</b>	<b>R.J. Kalan, K.W.Gwinn</b> , Disk (Exhibits 68 - 69) Animation of F-16 Crash Event into a Concrete Wall, Compared to Test of an F-4 Aircraft Crash into a Concrete Wall by Sandia National Laboratories	Bjorkman Shewmaker Kalan Gwinn (CASK)	Utah K (crash)	<b>SGI</b>
<b>70</b> <b>SGI</b>	<b>G.A. Aramayo</b> , "Confirmatory Analysis of an Accidental F-16 Crash Event onto the Proposed [PFS] Facility - Canister Transfer Building," May 11, 2004	Bjorkman Shewmaker Aramayo (CTB)	Utah K (crash)	<b>SGI</b>
<b>71</b> <b>SGI</b>	<b>G.S. Bjorkman</b> , "NRC Staff's Evaluation of the State of Utah's Report: Structural Evaluation of Impacts from F-16 Aircraft and Military Ordnance on Holtec HI-STORM 100 Overpack and Multi-Purpose Canister," May 11, 2004	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>

<b>Staff Exh. No.</b>	<b>Description</b>	<b>Witness</b>	<b>Contention</b>	<b>Offered --- Admitted</b>
<b>72</b> <b>SGI</b>	<b>G.A. Aramayo</b> , "Review of State of Utah's Analysis of the [PFS] Facility for Impact from MK-84 Ordnance and F-16 Aircraft," May 11, 2004	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
<b>73</b> <b>SGI</b>	C.M. Hoffmann, M. Sozen, S. Kilic, "Structural Evaluation of Impacts from F-16 Aircraft and Military Ordnance on Holtec HI-STORM 100 Overpack and Multi-Purpose Canister," Sept. 2003 (cover page only; complete report to be provided later)	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
<b>74</b> <b>SGI</b>	<b>G. Bjorkman</b> , Preliminary hand calculations of kinetic energy for a rigid MK-84 bomb impact into the HI-STORM 100 cask lid	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
<b>75</b>	Naval Air Systems Command, drawings of 2000 lb class bomb body, Drawings Nos. 1380527 and 1380528 (July 2000)	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
<b>76</b> <b>SGI</b>	<b>G. Bjorkman, G. Aramayo</b> , Disk Computer graphics showing NRC Staff/ORNL computer runs with State of Utah's LS-DYNA F-16 aircraft crash and munitions impacts into the PFS Facility	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
<b>77</b> <b>SGI</b>	<b>G. Bjorkman, G. Aramayo</b> , Disk Films (AVI format) showing computer graphics of the NRC Staff/ORNL computer runs of the State of Utah's analyses	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
<b>78</b>	Excerpts from LS-DYNA Examples Manual	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
<b>79</b>	Excerpts from LS-DYNA Keyword Users and Theoretical Manual	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
<b>80</b>	J.D. Riera, "On the Stress Analysis of Structures Subjected to Aircraft Impact Forces, Nuclear Engineering and Design 8 (1968), pp. 415-426	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
<b>81</b>	T. Sugano, et al., "Full-scale Aircraft Impact Test for Evaluation of Impact Force," Nuclear Engineering and Design 140 (1993), pp. 373-385	Bjorkman, Aramayo (UTAH)	Utah K (crash)	

<b>Staff Exh. No.</b>	<b>Description</b>	<b>Witness</b>	<b>Contention</b>	<b>Offered --- Admitted</b>
82	"DOE Standard: Accident Analysis for Aircraft Crash into Hazardous Facilities," DOE STD-3014-96 (October 1996), Chapter 6	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
83	Q.A. Hossain, et al., "Structures, Systems, and Components Evaluation Technical Support Document - DOE Standard Accident Analysis for Aircraft Crash into Hazardous Facilities, UCRL-ID-123577 (Jan. 23, 1997)	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
84	R.J. Roark, et al., "Formulas for Stress and Strain," 5 <sup>th</sup> Ed. (1975), pp. 12-13	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
85 <b>SGI</b>	<b>G. Bjorkman</b> , Disk LS-DYNA analyses of State of Utah's "Supplement" report dated May 11, 2004	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
86 <b>SGI</b>	<b>G. Bjorkman</b> , Disk Films (in AVI format) showing Staff's LS-DYNA analyses of State of Utah's "Supplement" report dated May 11, 2004	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
87 <b>SGI</b>	<b>G. Bjorkman</b> , Figures developed in evaluation of State of Utah's "Supplement" report dated May 11, 2004"	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
88	Textbook, "Physics for Students of Science and Engineering," pp. 144-45	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
89	RESERVED			
90	RESERVED			
91	Excerpts from "Engineering Properties of Steel," P. Harvey, Ed.	Bjorkman, Aramayo (UTAH)	Utah K (crash)	
92	RESERVED			
93	RESERVED			

<b>Staff Exh. No.</b>	<b>Description</b>	<b>Witness</b>	<b>Contention</b>	<b>Offered --- Admitted</b>
<b>94</b> <b>SGI</b>	C.M. Hoffmann, M. Sozen, S. Kilic, "Supplement Structural Evaluation of Impacts from F-16 Aircraft and Military Ordnance on Holtec HI-STORM 100 Overpack and Multi-Purpose Canister," May 2004 (cover page only; complete report to be provided later)	Bjorkman, Aramayo (UTAH)	Utah K (crash)	<b>SGI</b>
<b>95</b> <b>SGI</b>	<b>R.E. Shewmaker</b> , "NRC Staff's Evaluation of Jettisoned Ordnance Impact Effects on the Proposed [PFS] Facility," May 11, 2004	Shewmaker (Ordnance)	Utah K (crash)	<b>SGI</b>
<b>96</b>	Letter from Col. L. Bauer (USAF-HQ) to Connie Nakahara (Utah), Dec. 28, 2000	Shewmaker (Ordnance)	Utah K (crash)	
<b>97</b>	Letter from Denise L. King (Eglin AFB) to Connie Nakahara (Utah), Jan. 18, 2001	Shewmaker (Ordnance)	Utah K (crash)	
<b>98</b> <b>SGI</b>	<b>C.S. Bajwa</b> , "NRC Staff's Evaluation of Potential Jet Fuel Fire at the Proposed [PFS] Facility in an Accidental F-16 Aircraft Crash Event," May 11, 2004	Bajwa, Kalan, Lopez (Fuel Fire)	Utah K (crash)	<b>SGI</b>
<b>99</b> <b>SGI</b>	<b>C. Lopez, R.J. Kalan</b> , "Confirmatory Thermal Analyses of an Accidental F-16 Crash Event Onto the Proposed [PFS] Facility (HI-STORM 100 Dry Cask Storage System," May 11, 2004	Bajwa, Kalan, Lopez (Fuel Fire)	Utah K (crash)	<b>SGI</b>
<b>100</b>	<b>K. Campe, A. Ghosh</b> , "NRC Staff's Evaluation of Aircraft Crash Impact Speeds and Angles Considered by [PFS] in Its Analyses of Skull Valley Type Events," April 20, 2003	Campe, Ghosh (Angles & Speeds)	Utah K (crash)	
<b>101</b>	<b>K. Campe</b> , Drawing of aircraft flight angles and related parameters	Campe, Ghosh (Angles & Speeds)	Utah K (crash)	
<b>102</b> <b>SGI</b>	<b>D.R. Damon</b> , "NRC Staff's Evaluation of [PFS] Aircraft Crash Probability Assessment," May 11, 2004	Damon (Probability)	Utah K (crash)	<b>SGI</b>
<b>103</b>	RESERVED		Utah K (crash)	
<b>104</b>	RESERVED		Utah K (crash)	
<b>105</b>	RESERVED		Utah K (crash)	