



BRIGHAM  
112.9 LHO 7

FOR ADVISORY SERVICE TRANSITING  
THE MILITARY OPERATING AREAS  
CONTACT CLOVER CONTROL ON 118.45

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143.57° W 113°45' 45"  
[CEDAR CITY]

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Michael AAF  
4349 @ 131

MICHAEL  
MJJ 79  
N40°11.50' W112°55.33'

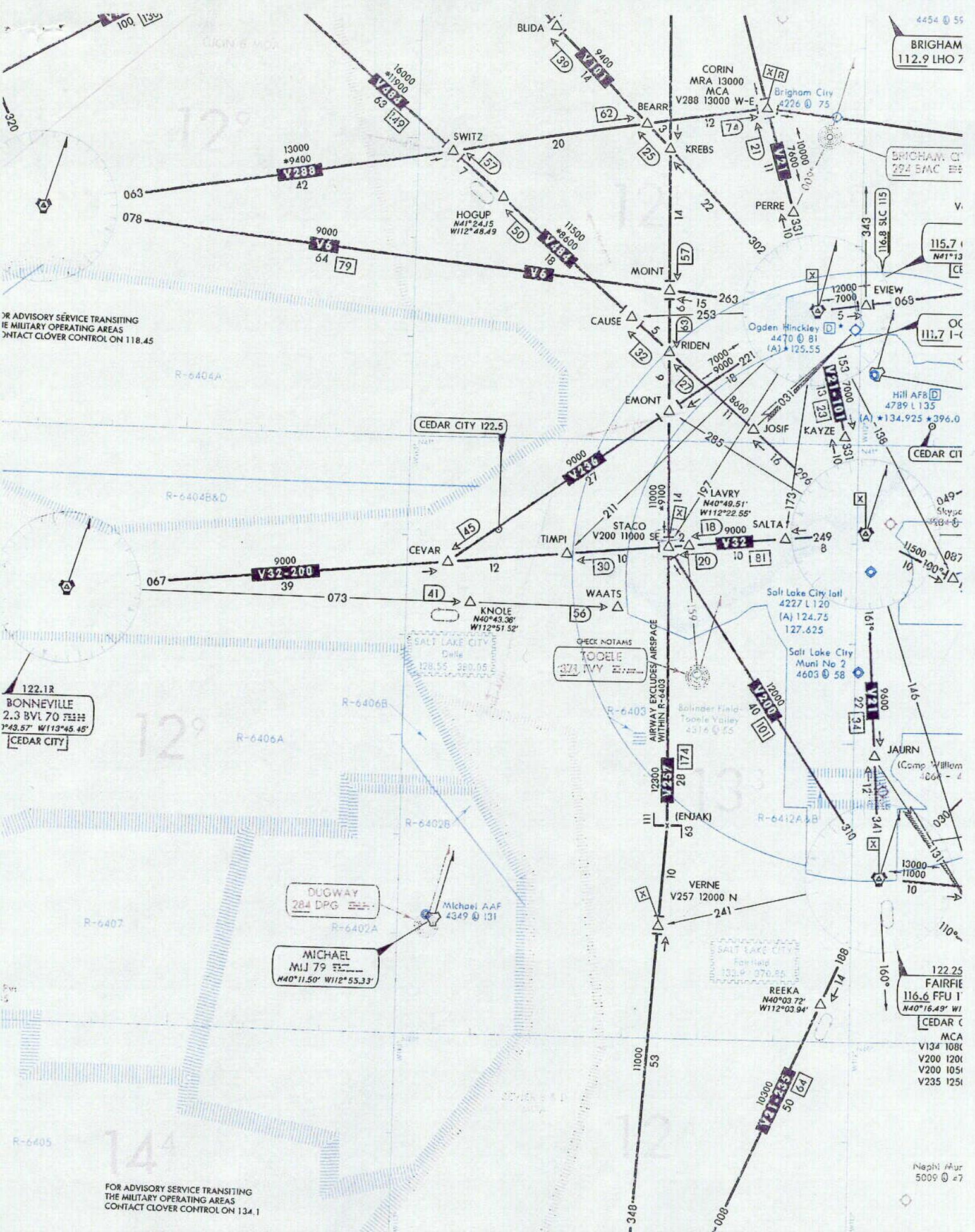
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FOR ADVISORY SERVICE TRANSITING  
THE MILITARY OPERATING AREAS  
CONTACT CLOVER CONTROL ON 134.1

116.1 DTA 108  
DELTA

C01



30 November 1998

MEMORANDUM FOR AIR FORCE REPRESENTATIVE (ANM-900)  
FAA Northwest Mountain Region  
1601 Lind Avenue, S.W.  
Renton WA 98055-4056

FROM: DET 1, 412 TW/TSUR  
388 RANS/AM  
Hill AFB UT 84056-5811

SUBJECT: Annual Military Operating Area Usage Report

1. Sevier D Military Operating Area
2. Period of Report: 1 October 1997 through 30 September 1998
3. Published Hours of Operation: 1200 ZULU to 0300 ZULU, Mon-Sat, other times by NOTAM
4. Published Altitude: 9,500 feet MSL up to but not including Flight Level 180.
5. Activities
  - a. Aircraft Operations
    - (1) Aircraft Type: F15, F16, F111, F4, B52, B1, A10, KC135, EC135, RC135, C130, C141, A4, F18, F117A, A6, A4, and H1.
    - (2) Maximum Altitude/Flight Level: 17,999 feet MSL
    - (3) Activities Conducted: Cruise missile testing and major exercises.
    - (4) Supersonic operations are not authorized.
  - b. Artillery/Mortar/Missile
    - (1) Type: Cruise missile, advanced cruise missile, unmanned vehicles
    - (2) Purpose/Mission: Test, evaluation, and training.
6. Area Coverage Available:
  - a. Communications (Frequencies Available): 118.45, 121.5, 122.9, 134.1, 138.05, 139.6, 142.3, 225.3, 226.0, 229.2, 233.4, 238.9, 243.0, 254.4, 266.3, 271.1, 271.35, 275.9, 279.9, 282.7, 286.25, 287.0, 295.8, 297.1, 298.0, 298.6, 301.7, 308.65, 311.3, 315.9, 319.6, 324.7, 325.7, 325.9, 327.6, 339.0, 344.9, 349.3, 351.0, 354.4, 359.2, 361.4, 375.9, 381.3, 383.0, 383.2, 384.7, 388.1, 389.8, 398.1.

b. Radar/Type: Long Range FAA radar from Battle Mountain NV, Cedar City UT, and Francis Peak UT; Gap Filler Air Force Radar from Cedar Mountain UT, Trout Creek UT, and Bovine Mountain UT.

c. ATC Services: Clover Control Air Traffic Control Facility.

7. Utilization:

a. Air Operations: 215

b. Total number of days area was

Scheduled: 14

Activated: 14

Utilized: 14

c. Total number of hours area was:

Scheduled: 179

Activated: 179

Utilized: 160

8. Released to Controlling Agency for Public Use:

a. Total hours released: 8581

b. Number of weekdays area was not activated: 299

c. Number of weekend/holiday days are was not activated: 52

9. Current chart is applicable.

JET TRAINOR  
388 FW Airspace Manager

30 November 1998

MEMORANDUM FOR AIR FORCE REPRESENTATIVE (ANM-900)  
FAA Northwest Mountain Region  
1601 Lind Avenue, S.W.  
Renton WA 98055-4056

FROM: 388 RANS/EM  
6067 Boxelder Lane  
Hill AFB UT 84056-5811

SUBJECT: Annual Military Operating Area Usage Report

1. Restricted Area Number: R6402A
2. Period of Report: 1 October 1997 through 30 September 1998
3. Published Hours of Operation: Continuous
4. Published Altitude: Surface to FL 580
5. Activities

a. Aircraft Operations

- (1) Aircraft Type: F16, F15, F111, F4, B52, B1, A10, KC135, EC135, RC135, C130, C141, F14, F18, F117A, A6, H1, and B2.
- (2) Maximum Altitude/Flight Level: FL 580
- (3) Activities Conducted: Air-to-Ground bombing, air-to-air training, major exercise deployments
- (4) Supersonic operations are authorized in portions of the area.

b. Artillery/Mortar/Missile

- (1) Artillery Type: 105mm, 155mm, 8 inch  
Mortar Type: 60mm, 81mm, 120mm, 4.2 inch  
Missile/Rocket Type: multiple launch rocket system, Hawk missile, Patriot missile, cruise missile
- (2) Maximum Ordinate: FL 450

(3) Purpose/Mission: Test, evaluation, and training

6. Area Coverage Available:

a. Communications (Frequencies Available): 118.45, 121.5, 122.9, 134.1, 138.05, 139.6, 142.3, 225.3, 226.0, 229.2, 233.4, 238.9, 243.0, 254.4, 266.3, 271.1, 271.35, 275.9, 279.9, 282.7, 286.25, 287.0, 295.8, 297.1, 298.0, 298.6, 301.7, 308.65, 311.3, 315.9, 319.6, 324.7, 325.7, 325.9, 327.6, 339.0, 344.9, 349.3, 351.0, 354.4, 359.2, 361.4, 375.9, 381.3, 383.0, 383.2, 384.7, 388.1, 389.8, 398.1.

b. Radar/Type: Long Range FAA radar from Battle Mountain NV, Cedar City UT, and Francis Peak UT; Gap Filler Air Force Radar from Cedar Mountain UT, Trout Creek UT, and Bovine Mountain UT.

c. ATC Services: Clover Control Air Traffic Control Facility

7. Utilization:

a. Air Operations: 909

b. Total number of days area was

Scheduled: 328

Activated: 328

Utilized: 328

c. Total number of hours area was:

Scheduled: 4633

Activated: 4633

Utilized: 4602

8. Released to Controlling Agency for Public Use:

a. Total hours released: 4127

b. Hours active and non-participating aircraft were permitted simultaneous use: 2386

c. Number of weekdays are was not activated: 10

d. Number of weekend/holiday days are was not activated: 27

9. Current chart is applicable.

JET TRAINOR  
388 FW Airspace Manager

30 November 1998

MEMORANDUM FOR AIR FORCE REPRESENTATIVE (ANM-900)  
FAA Northwest Mountain Region  
1601 Lind Avenue, S.W.  
Renton WA 98055-4056

FROM: 388 RANS/AM  
6067 Boxelder Lane  
Hill AFB UT 84056-5811

SUBJECT: Annual Military Operating Area Usage Report

1. Restricted Area Number: R6402B
2. Period of Report: 1 October 1997 through 30 September 1998
3. Published Hours of Operation: Continuous
4. Published Altitude: 100 ft AGL to FL 580
5. Activities

a. Aircraft Operations

- (1) Aircraft Type: F16, F15, F111, F4, B52, B1, A10, KC135, EC135, RC135, C130, C141, F14, F18, F117A, A6, H1, and B2.
- (2) Maximum Altitude/Flight Level: FL 580
- (3) Activities Conducted: Air-to-air training, major exercise deployments
- (4) Supersonic flight not authorized

b. Artillery/Mortar/Missile

- (1) Artillery Type: Cruise missile, advanced cruise missile, unmanned vehicles
- (2) Maximum Ordinate: FL 550
- (3) Purpose/Mission: Research, test and evaluation, and operational test and evaluation

6. Area Coverage Available:

- a. Communications (Frequencies Available): 118.45, 121.5, 122.9, 134.1, 138.05, 139.6, 142.3, 225.3, 226.0, 229.2, 233.4, 238.9, 243.0, 254.4, 266.3, 271.1, 271.35, 275.9, 279.9, 282.7, 286.25, 287.0, 295.8, 297.1, 298.0, 298.6, 301.7, 308.65, 311.3, 315.9, 319.6, 324.7, 325.7, 325.9, 327.6, 339.0, 344.9, 349.3, 351.0, 354.4, 359.2, 361.4, 375.9, 381.3, 383.0, 383.2, 384.7, 388.1, 389.8, 398.1.

b. Radar/Type: Long Range FAA radar from Battle Mountain NV, Cedar City UT, and Francis Peak UT; Gap Filler Air Force Radar from Wendover UT, Cedar Mountain UT, Trout Creek UT, and Bovine Mountain UT.

c. ATC Services: Clover Control Air Traffic Control Facility

7. Utilization:

a. Air Operations: 909

b. Total number of days area was

Scheduled: 328

Activated: 328

Utilized: 328

c. Total number of hours area was:

Scheduled: 4623

Activated: 4623

Utilized: 4602

8. Released to Controlling Agency for Public Use:

a. Total hours released: 4127

b. Hours active and non-participating aircraft were permitted simultaneous use: 2386

c. Number of weekdays area was not activated: 10

d. Number of weekend/holiday days area was not activated: 27

9. Current chart is applicable.

JET TRAINOR  
388 FW Airspace Manager

30 November 1998

MEMORANDUM FOR AIR FORCE REPRESENTATIVE (ANM-900)  
FAA Northwest Mountain Region  
1601 Lind Avenue, S.W.  
Renton WA 98055-4056

FROM: 388 RANS/EM  
3067 Boxelder Lane  
Hill AFB UT 84056-5811

SUBJECT: Annual Military Operating Area Usage Report

1. Restricted Area Number: R6406
2. Period of Report: 1 October 1997 through 30 September 1998
3. Published Hours of Operation: Continuous
4. Published Altitude: Surface to FL 580
5. Activities
  - a. Aircraft Operations
    - (1) Aircraft Type: F16, F15, F111, F4, B52, B1, A10, KC135, EC135, RC135, C130, C141, F14, F18, F117A, A6, A4, and H1
    - (2) Maximum Altitude/Flight Level: FL 580
    - (3) Activities Conducted: Air-to-Ground bombing, air-to-air training, major exercise deployments
    - (4) Supersonic operations are authorized in portions of the area.
  - b. Artillery/Mortar/Missile
    - (1) Artillery Type: Cruise missile, advanced cruise missile, unmanned vehicles
    - (2) Maximum Altitude: FL 550
    - (3) Purpose/Mission: Test, evaluation, and training
6. Area Coverage Available:
  - a. Communications (Frequencies Available): 118.45, 121.5, 122.9, 134.1, 138.05, 139.6, 142.3, 225.3, 226.0, 229.2, 233.4, 238.9, 243.0, 254.4, 266.3, 271.1, 271.35, 275.9, 279.9, 282.7, 286.25, 287.0, 295.8, 297.1, 298.0, 298.6, 301.7, 308.65, 311.3, 315.9, 319.6, 324.7, 325.7, 325.9, 327.6, 339.0, 344.9, 349.3, 351.0, 354.4, 359.2, 361.4, 375.9, 381.3, 383.0, 383.2, 384.7, 388.1, 389.8, 398.1.
  - b. Radar/Type: Long Range FAA radar from Battle Mountain NV, Cedar City UT, and Francis Peak UT; Gap Filler Air Force Radar from Cedar Mountain UT, Trout Creek UT, and Bovine Mountain UT.

c. ATC Services: Clover Control Air Traffic Control Facility

7. Utilization:

a. Air Operations: 6,679

b. Total number of days area was

Scheduled: 325

Activated: 325

Utilized: 325

c. Total number of hours area was:

Scheduled: 4585

Activated: 4585

Utilized: 4562

8. Released to Controlling Agency for Public Use:

a. Total hours released: 4199

b. Hours active and non-participating aircraft were permitted simultaneous use: 2354

c. Number of weekdays are was not activated: 10

d. Number of weekend/holiday days are was not activated: 27

9. Current chart is applicable.

JET TRAINOR  
388 RANS/AM

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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In the Matter of: )  
PRIVATE FUEL STORAGE, L.L.C ) Limited Appearance  
(Independent Spent Fuel Storage ) Hearing  
Installation). ) Volume 1  
)  
Docket No. 72-22  
ASLBP No. 97-732-02-ISFSI

The above-entitled matter came on for hearing,  
pursuant to notice, at 9:30 a.m. before:

- THE HONORABLE G. PAUL BOLLWERK, III  
Administrative Judge  
Atomic Safety & Licensing Board Panel
- DR. JERRY R. KLINE  
Administrative Judge  
Atomic Safety & Licensing Board Panel
- DR. PETER S. LAM  
Administrative Judge  
Atomic Safety & Licensing Board Panel

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Diana Kent, C.S.R., R.P.R.

1 welcome. You have a choice: You can sit in a chair  
2 or stand at the podium, whatever you prefer.

3 MR. KESTER: I will stand here. That's  
4 fine.

5 JUDGE BOLLWERK: All right.

6 MR. KESTER: I'd like to read a statement  
7 of Utah First Congressional District Congressman James  
8 Hansen to the Atomic Safety and Licensing Board.

9 As the Representative of the First  
10 congressional District of Utah, as a senior member of  
11 the House Arms Services Committee, and as the Chairman  
12 of the House Subcommittee on National Parks and Public  
13 Lands, I most vigorously oppose the licensing,  
14 construction, and operation of any high level nuclear  
15 waste storage facility in Skull Valley, Utah. I  
16 believe this proposal is bad public policy, dangerous  
17 to our national security and the economy of Utah,  
18 fundamentally unsafe, and possibly illegal.

19 I believe strongly that it is bad public  
20 policy to consider any "temporary" high level storage

21 facility before final determination of the permanent  
22 depository location is concluded. Moving this waste  
23 twice will greatly increase both the costs and risks  
24 of the entire program. In addition, there is no  
25 guarantee that this facility will be temporary and as

Diana Kent, C.S.R., R.P.R.

1 such any determination should be made with the full  
2 rigor of a permanent depository. The Skull Valley  
3 proposal does not meet that much higher standard.

4         Locating a high level nuclear waste  
5 storage facility under a critically important and very  
6 active military test and training range that is not  
7 already burdened with such restrictions is harmful to  
8 national security and dangerous to the local  
9 population. The Secretary of the Air Force and the  
10 Air Force Chief of Staff have repeatedly testified  
11 that the Utah Test and Training Range, UTTR, including  
12 the airspace over the proposed facility site, is an  
13 irreplaceable testing and training area. The  
14 continued unrestricted availability to this unique  
15 national asset is critical to the Air Force's military  
16 readiness.

17         With this in mind, I was shocked to see  
18 that the agencies consulted for the Draft EIS did not  
19 include the Department of Defense or the Department of  
20 the Air Force. The NRC did consult the Census Bureau,

21 but not the Pentagon. I find this to be a gross  
22 oversight and reason enough to reject the entire  
23 draft.

24           With or without air space restrictions,  
25 the nature of the proposed facility creates an

Diana Kent, C.S.R., R.P.R.

1 unacceptable risk that the Air Force will be forced to  
2 curtail operations in the area in the future. Any  
3 loss of access in this area will have a significant  
4 and negative impact on the United States Air Force  
5 mission and military readiness. For instance, if the  
6 area is identified on an area planning guide, thereby  
7 requiring the Air Force to implement special flight  
8 restrictions, then it would likely result in an  
9 "avoidance" standing order. While the NRC would not  
10 technically have restricted the air space, the Air  
11 Force would restrict use to ensure compliance.

12       In addition, tests of unmanned long-range  
13 cruise missiles and other emerging, large footprint  
14 weapons are permitted and have been conducted within  
15 one mile of the site. By the nature of these tests,  
16 accidents do happen. Just last year, a cruise missile  
17 crashed in the same military operating area beneath  
18 which the PFS facility is proposed. Over the last  
19 decade, there have been over a dozen crashes of F-16  
20 fighters and other military aircraft within the UTTR.

21 Nuclear waste storage and military bombing and test

22 ranges simply should not be mixed.

23 I passed a law in 1999, section 2815 of

24 the National Defense Authorization Act, which directed

25 the Secretaries of Defense, Interior, Air Force, and

Diana Kent, C.S.R., R.P.R.

1 Army to conduct a study to evaluate the impact upon  
2 military training, testing, and operational readiness  
3 of any proposed changes in land management of the Utah  
4 national defense lands, which includes all of the land  
5 beneath the UTTR. That study has not been completed,  
6 and as such no planning by the Department of Interior  
7 for any purpose can proceed on these lands. I have  
8 attached a letter from the Department of Interior's  
9 Office of the Solicitor which clearly states this  
10 legal opinion.

11       In addition to its impact on military  
12 readiness and national security, restrictions on the  
13 operation of the UTTR would have devastating  
14 consequences for the economy of Utah. Weakening of  
15 the UTTR will cripple the military value of Hill Air  
16 Force Base and subject it to possible closure in a  
17 future round of base closures. With nearly 15,000  
18 direct employees and billions of dollars in annual  
19 economic impact, any negative impact on Hill Air Force  
20 Base must outweigh any marginal economic benefit of

21 the Skull Valley facility.

22           As many others have pointed out, this  
23 proposal is risky and unsafe. The combination of  
24 nearby military ranges, questionable seismic data, and  
25 its vicinity to the chemical weapons storage and

Diana Kent, C.S.R., R.P.R.

1 demilitarization facility in Tooele is a recipe for  
2 disaster. Dry cask storage at the generating reactor  
3 sites until a permanent storage facility, such as  
4 Yucca Mountain, can be completed is clearly the safer  
5 and less expensive alternative.

6           Lastly, I am very concerned about the  
7 financial irregularities of this deal. I will be  
8 bringing the full and proper oversight powers of the  
9 House of Representative's Resources Committee to bear  
10 on this request. I am also initiating action to begin  
11 a legal review of the financial deal struck between  
12 PFS and some members of the Skull Valley Band of  
13 Goshutes. This legal investigation will also examine  
14 the failure of the Bureau of Indian Affairs to ensure  
15 all aspects of this proposal complied with federal  
16 law, DOI and BIA regulations.

17           This brief overview only begins to outline  
18 my objections to this proposal. I will continue to do  
19 all that is within my power to ensure that no  
20 temporary high level nuclear waste storage facility

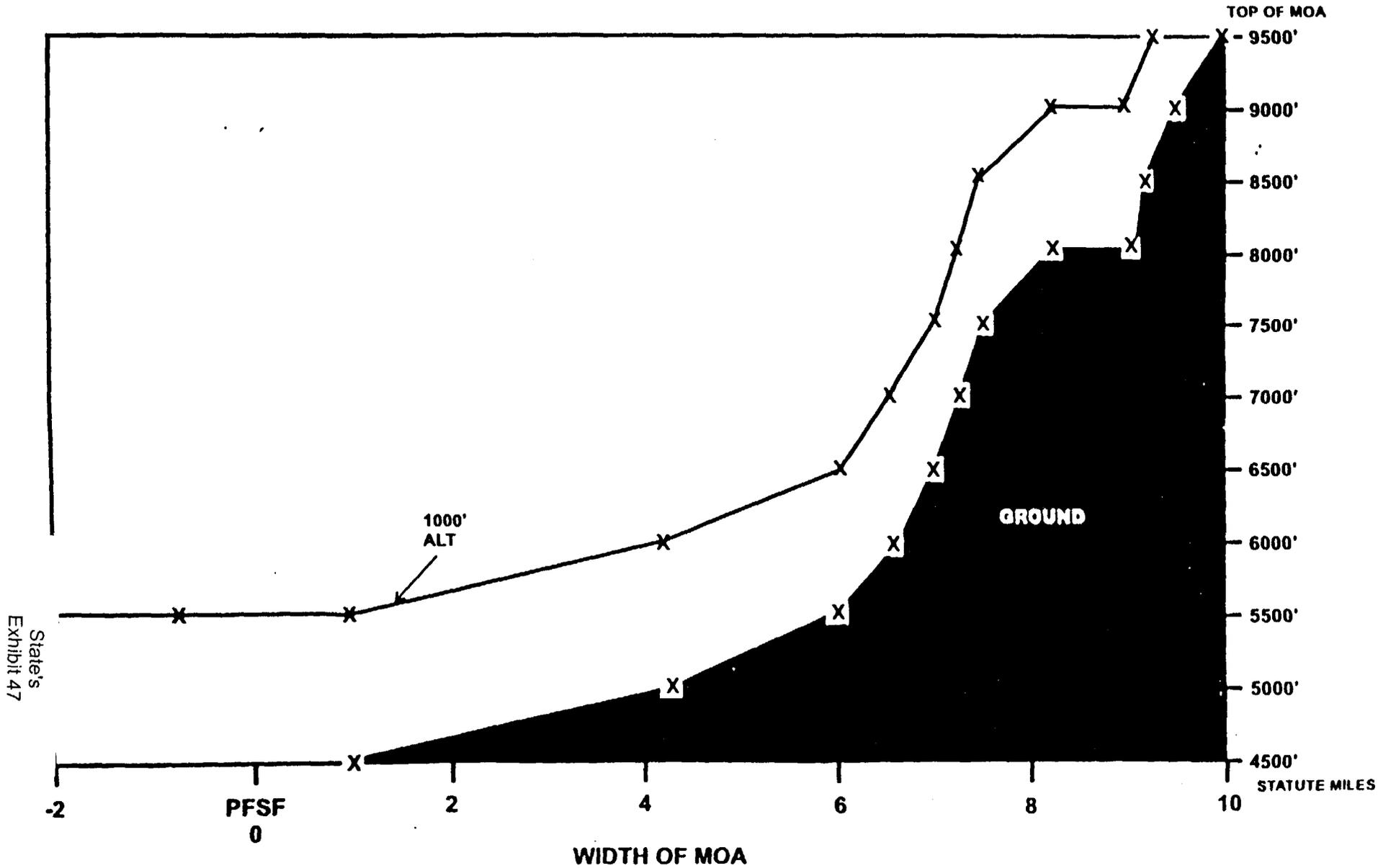
21 will be located in Skull Valley, or indeed anywhere in  
22 the state of Utah.

23 JUDGE BOLLWERK: The next speaker I have  
24 is Mr. Steve Erickson, E-R-I-C-K-S-O-N, on behalf of  
25 the Downwinders, Incorporated.

Diana Kent, C.S.R., R.P.R.

# SEVIER B MOA

## CROSS SECTION AT LATITUDE OF PFSF

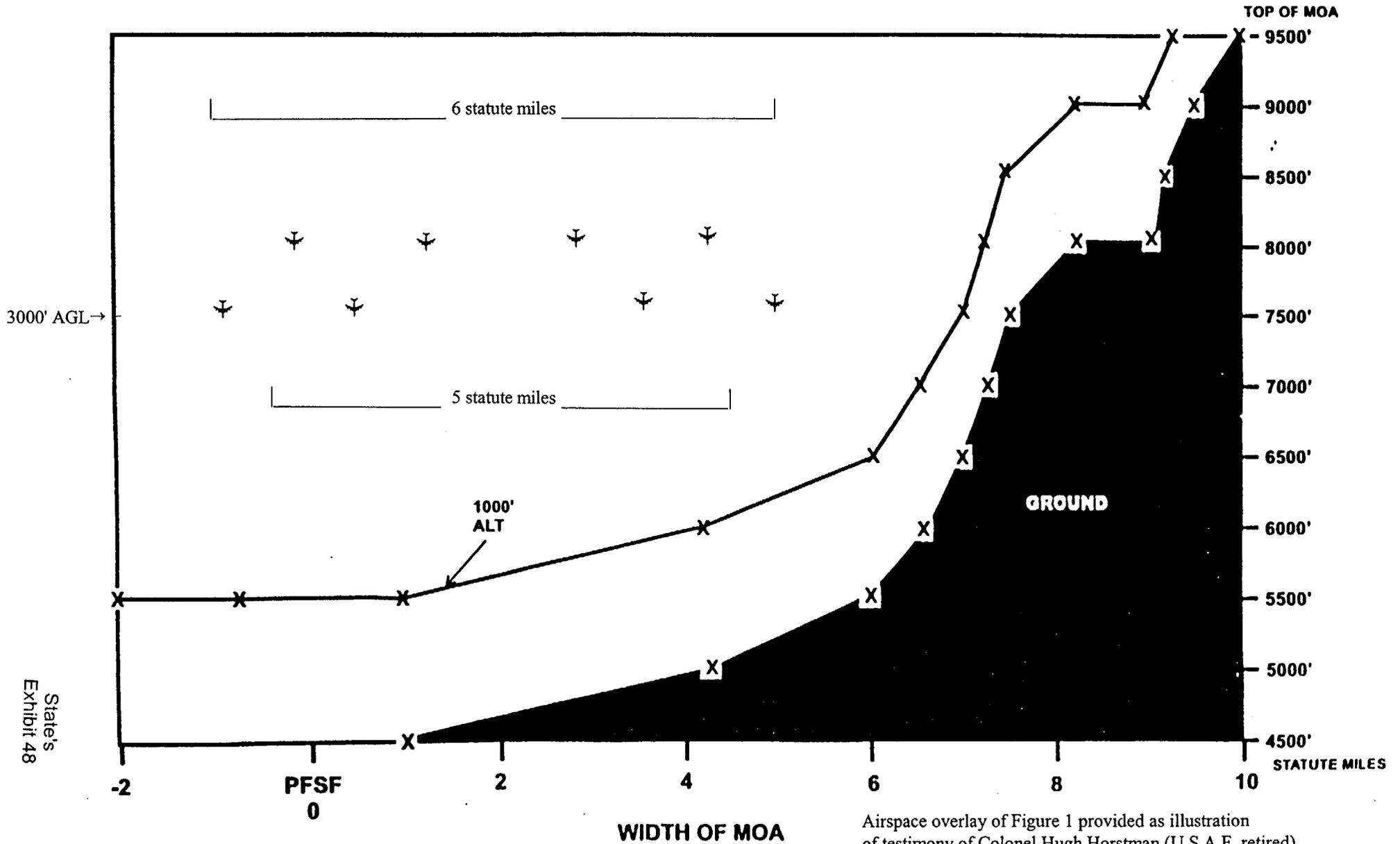


State's  
Exhibit 47

Figure 1

# SEVIER B MOA

## CROSS SECTION AT LATITUDE OF PFSF



Airspace overlay of Figure 1 provided as illustration of testimony of Colonel Hugh Horstman (U.S.A.F. retired)

**Capt. S.**

**UTAH**

Hill AFB -- Depot workload decreases result in the loss of 49 civilian positions in the Depot Maintenance Activity Group. EAF implementation drives an increase of 73 military authorizations. Gains of 78 military and two civilian authorizations support the 388th Wing fighter squadrons' ability to independently deploy to separate locations. The 388th Wing gains 12 F-16s, increasing military manpower by 134 positions. The 729th Air Control Squadron gains 57 military and one civilian position from the inactivation of the 71st ACS at Moody AFB, Ga. The establishment of a new logistics group and new logistics management directorate leads to an increase of 22 military and a decrease of three civilian positions. Twelve active-duty military positions in the 514th FTS transfer to the Reserve, resulting in an increase of eight military and five drill authorizations. Base support workload adjustments and other base support changes increase 17 military and 92 civilian positions. Other minor adjustments add four military and decrease five civilian positions. Total impact is an increase of 381 military, 38 civilian, and five drill positions.

F-16 HISTORY

YEAR	CLASS A		CLASS B		DESTROYED		FATAL		HOURS	CUM HRS
	#	RATE	#	RATE	A/C	RATE	PILOT	ALL		
CY75	1	621.12	0	0.00	0	0.00	0	0	161	161
CY76	1	442.48	0	0.00	0	0.00	0	0	226	387
CY77	0	0.00	0	0.00	0	0.00	0	0	856	1,243
CY78	0	0.00	0	0.00	0	0.00	0	0	1,402	2,645
CY79	2	30.64	0	0.00	2	30.64	0	0	6,527	9,172
CY80	5	18.65	2	7.46	4	14.92	0	0	26,803	35,975
CY81	5	8.86	0	0.00	4	7.09	1	1	56,423	92,398
CY82	17	15.83	0	0.00	16	14.90	4	4	107,389	199,787
CY83	11	7.30	0	0.00	9	5.97	5	6	150,728	350,515
CY84	10	5.01	0	0.00	9	4.51	6	6	199,761	550,276
CY85	10	4.55	0	0.00	11	5.01	5	5	219,647	769,923
CY86	11	4.32	2	0.79	11	4.32	3	3	254,491	1,024,414
TY87	8	3.43	4	1.71	8	3.43	3	3	233,560	1,257,974
FY88	23	6.80	5	1.48	20	5.92	5	8	338,039	1,596,013
FY89	14	3.63	1	0.26	14	3.63	3	3	385,179	1,981,192
FY90	13	3.19	4	0.98	14	3.43	4	7	408,078	2,389,270
FY91	21	4.55	2	0.43	21	4.55	5	5	461,451	2,850,721
FY92	18	4.04	1	0.22	19	4.27	7	8	445,201	3,295,922
FY93	18	4.15	2	0.46	18	4.15	4	5	433,949	3,729,871
FY94	16	4.00	2	0.50	15	3.75	3	27	400,474	4,130,345
FY95	9	2.33	1	0.26	9	2.33	1	1	386,429	4,516,774
FY96	8	2.14	5	1.34	7	1.87	0	1	374,517	4,891,291
FY97	11	3.00	0	0.00	11	3.00	1	1	367,045	5,258,336
FY98	14	3.89	1	0.28	12	3.33	5	6	360,245	5,618,581
FY99	18	5.11	3	0.85	16	4.54	2	2	352,275	5,970,856
FY00	9	2.62	8	2.33	9	2.62	2	2	343,085	6,313,941
<b>LIFETIME</b>	<b>273</b>	<b>4.32</b>	<b>43</b>	<b>0.68</b>	<b>259</b>	<b>4.10</b>	<b>69</b>	<b>104</b>	<b>6,313,941</b>	

FILE NAME F16MDS\_00.XLS  
 PREPARED 01-APR-01

ABOVE REFLECTS CLASS J FY99 AND CLASS X FY00 REDESIGNATION

State's  
 Exhibit 50

## F-16A HISTORY

YEAR	CLASS A		DESTROYED		CLASS B		CLASS C		CLASS X		FATAL		HOURS
	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	PILOT	TOTAL	
FY75	1	847.46	1	847.46	0	0.00	0	0.00	0	0.00	0		118
FY76	1	478.47	1	478.47	0	0.00	0	0.00	0	0.00	0		209
FY77	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0		707
FY78	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0		930
FY79	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0		2,029
FY80	3	23.03	3	23.03	0	0.00	0	0.00	0	0.00	0		13,024
FY81	5	14.45	4	11.56	0	0.00	0	0.00	0	0.00	1	1	34,602
FY82	11	14.27	10	12.97	0	0.00	0	0.00	0	0.00	2	2	77,094
FY83	12	10.16	10	8.47	0	0.00	126	106.67	0	0.00	6	7	118,121
FY84	10	6.06	9	5.46	0	0.00	134	81.23	0	0.00	5	5	164,962
FY85	8	4.65	8	4.65	0	0.00	140	81.39	0	0.00	4	4	172,004
FY86	6	3.56	6	3.56	2	1.19	96	56.92	0	0.00	3	3	168,647
FY87	6	3.43	6	3.43	2	1.14	82	46.82	0	0.00	2	2	175,147
FY88	9	5.39	8	4.79	4	2.40	89	53.31	0	0.00	1	2	166,961
FY89	6	3.91	5	3.26	0	0.00	110	71.66	7	4.56	0	0	153,507
FY90	4	2.91	5	3.64	1	0.73	83	60.40	5	3.64	1	2	137,410
FY91	8	5.97	8	5.97	1	0.75	73	54.44	4	2.98	2	2	134,085
FY92	7	5.98	7	5.98	1	0.85	50	42.73	4	3.42	2	2	117,008
FY93	6	5.23	6	5.23	1	0.87	72	62.81	6	5.23	0	0	114,632
FY94	3	3.55	3	3.55	0	0.00	22	26.06	3	3.55	2	3	84,405
FY95	1	2.16	1	2.16	0	0.00	3	6.49	1	2.16	0	0	46,242
FY96	0	0.00	0	0.00	1	3.03	3	9.09	2	6.06	0	0	33,016
FY97	2	7.54	2	7.54	0	0.00	6	22.63	0	0.00	1	1	26,516
FY98	0	0.00	0	0.00	0	0.00	3	13.44	0	0.00	0	0	22,315
FY99	0	0.00	0	0.00	0	0.00	4	19.50	1	4.87	0	0	20,516
FY00	0	0.00	0	0.00	1	4.96	2	9.92	0	0.00	0	0	20,167

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<b>TOTAL</b>	<b>109</b>	<b>5.44</b>	<b>103</b>	<b>5.14</b>	<b>14</b>	<b>0.70</b>	<b>1098</b>	<b>54.78</b>	<b>33</b>	<b>1.65</b>	<b>32</b>	<b>36</b>	<b>2,004,374</b>
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FILE NAME F016A.XLS

DOES NOT INCLUDE HAP/EVENTS

CLASS X FOD DISCONTINUED FY00

## F-16B HISTORY

YEAR	CLASS A		DESTROYED		CLASS B		CLASS C		CLASS X		FATAL		TOTAL	HOURS
	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	PILOT			
FY78	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	297
FY79	1	56.92	1	56.92	0	0.00	0	0.00	0	0.00	0	0	0	1,757
FY80	1	12.94	1	12.94	1	12.94	0	0.00	0	0.00	0	0	0	7,730
FY81	2	17.06	2	17.06	1	8.53	0	0.00	0	0.00	0	0	0	11,724
FY82	1	5.31	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	18,828
FY83	2	10.08	2	10.08	0	0.00	30	151.27	0	0.00	0	0	0	19,832
FY84	1	3.46	1	3.46	0	0.00	18	62.29	0	0.00	1	1	1	28,897
FY85	1	3.11	1	3.11	0	0.00	30	93.17	0	0.00	0	0	0	32,199
FY86	2	6.13	3	9.20	0	0.00	16	49.05	0	0.00	1	1	1	32,623
FY87	0	0.00	0	0.00	0	0.00	24	73.52	0	0.00	0	0	0	32,643
FY88	1	3.15	1	3.15	1	3.15	30	94.51	0	0.00	0	0	0	31,741
FY89	0	0.00	0	0.00	0	0.00	19	70.38	0	0.00	0	0	0	26,996
FY90	0	0.00	0	0.00	0	0.00	21	75.13	1	3.58	0	0	0	27,950
FY91	1	4.17	1	4.17	0	0.00	16	66.65	1	4.17	0	0	0	24,005
FY92	2	8.52	2	8.52	0	0.00	10	42.60	1	4.26	3	4	4	23,472
FY93	1	4.40	1	4.40	0	0.00	15	66.01	0	0.00	0	0	0	22,724
FY94	1	5.08	1	5.08	0	0.00	10	50.81	2	10.16	0	0	0	19,683
FY95	1	6.44	1	6.44	0	0.00	7	45.11	0	0.00	0	0	0	15,518
FY96	0	0.00	0	0.00	0	0.00	9	75.45	0	0.00	0	0	0	11,928
FY97	1	8.94	1	8.94	0	0.00	4	35.77	0	0.00	0	0	0	11,182
FY98	1	10.87	0	0.00	0	0.00	4	43.47	0	0.00	1	2	2	9,202
FY99	0	0.00	0	0.00	1	11.54	7	80.79	0	0.00	0	0	0	8,664
FY00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	9,033
TOTAL	20	4.67	19	4.43	4	0.93	270	62.99	5	1.17	6	8	8	428,628

\*CLASS

PREPARED 01-APR-01

REPORT EXCLUDES HAP/EVENTS  
CLASS X FOD DISCONTINUED FY00  
FILE NAME F016B.XLS

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**F-16C HISTORY**


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	CLASS A DESTROYED		CLASS B		CLASS C		CLASS X		FATAL		PILOT TOTAL		HOURS
	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE			
<b>FY85</b>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	6,139
<b>FY86</b>	1	2.58	1	2.58	0	0.00	0	0.00	0	0.00	0	0	38,791
<b>FY87</b>	5	6.14	5	6.14	2	2.46	0	0.00	0	0.00	3	3	81,418
<b>FY88</b>	13	10.45	12	9.64	2	1.61	0	0.00	0	0.00	4	6	124,418
<b>FY89</b>	7	4.12	8	4.71	0	0.00	0	0.00	0	0.00	3	3	169,814
<b>FY90</b>	5	2.44	6	2.93	3	1.46	0	0.00	5	2.44	2	2	204,883
<b>FY91</b>	10	3.78	10	3.78	1	0.38	10	3.78	10	3.78	2	2	264,417
<b>FY92</b>	8	3.07	8	3.07	0	0.00	8	3.07	8	3.07	1	1	260,723
<b>FY93</b>	10	3.92	10	3.92	1	0.39	10	3.92	10	3.92	3	3	254,945
<b>FY94</b>	11	4.36	9	3.57	2	0.79	13	5.16	13	5.16	1	2	252,018
<b>FY95</b>	6	2.16	6	2.16	1	0.36	6	2.16	6	2.16	1	1	277,321
<b>FY96</b>	8	2.85	7	2.49	3	1.07	57	20.29	8	2.85	0	1	280,886
<b>FY97</b>	5	1.73	4	1.39	0	0.00	60	20.79	7	2.43	0	0	288,603
<b>FY98</b>	10	3.52	9	3.17	0	0.00	45	15.85	1	0.35	2	2	283,938
<b>FY99</b>	13	4.65	10	3.58	2	0.72	41	14.68	4	1.43	2	2	279,339
<b>FY00</b>	8	2.97	8	2.97	3	1.11	39	14.49	0	0.00	2	2	269,077
<b>TOTAL</b>	<b>120</b>	<b>3.60</b>	<b>113</b>	<b>3.39</b>	<b>20</b>	<b>0.60</b>	<b>289</b>	<b>8.66</b>	<b>72</b>	<b>2.16</b>	<b>26</b>	<b>30</b>	<b>3,336,730</b>

PREPARED 01-APR-01  
 REPORT EXCLUDES HAP/EVENTS  
 FILE NAME F016C.XLS  
 CLASS X FOD DISCONTINUED FY00

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### F-16D HISTORY

YEAR	CLASS A		DEST	CLASS B		CLASS C		CLASS X		FATAL		TOTAL	HOURS
	#	RATE	#	RATE	#	RATE	#	RATE	RATE	PILOT			
FY85	0	0.00	0	0.00	0	0.00	3	170.26	0	0.00	0	0	1,762
FY86	0	0.00	0	0.00	0	0.00	4	75.96	0	0.00	0	0	5,266
FY87	1	9.55	1	9.55	0	0.00	1	9.55	0	0.00	0	0	10,468
FY88	0	0.00	0	0.00	0	0.00	5	33.51	0	0.00	0	0	14,919
FY89	1	4.13	1	4.13	0	0.00	14	57.83	0	0.00	0	0	24,207
FY90	4	11.82	3	8.86	0	0.00	30	88.62	1	2.95	1	3	33,852
FY91	2	5.14	2	5.14	0	0.00	20	51.36	1	2.57	1	1	38,944
FY92	1	2.27	2	4.55	0	0.00	24	54.55	2	4.55	1	1	43,998
FY93	1	2.40	1	2.40	0	0.00	9	21.61	1	2.40	1	2	41,648
FY94	1	2.26	1	2.26	0	0.00	9	20.30	1	2.26	2	3	44,337
FY95	1	2.11	1	2.11	0	0.00	3	6.34	1	2.11	0	0	47,285
FY96	0	0.00	0	0.00	1	2.06	12	24.74	0	0.00	0	0	48,507
FY97	3	6.42	3	6.42	4	8.56	5	10.71	0	0.00	0	0	46,707
FY98	3	6.70	3	6.70	1	2.23	4	8.94	1	2.23	2	2	44,763
FY99	5	11.43	5	11.43	0	0.00	6	13.72	1	2.29	0	0	43,730
FY00	1	2.24	1	2.24	3	6.71	5	11.19	0	0.00	0	0	44,683
<b>TOTAL</b>	<b>24</b>	<b>4.49</b>	<b>24</b>	<b>4.49</b>	<b>9</b>	<b>1.68</b>	<b>154</b>	<b>28.78</b>	<b>9</b>	<b>1.68</b>	<b>8</b>	<b>12</b>	<b>535,076</b>

PREPARED 01-APR-01  
 REPORT EXCLUDES HAPS/EVENTS  
 FILE NAME F016D.XLS  
 CLASS X FOD WAS DISCONTINUED

F-16 HISTORY  
GLOC

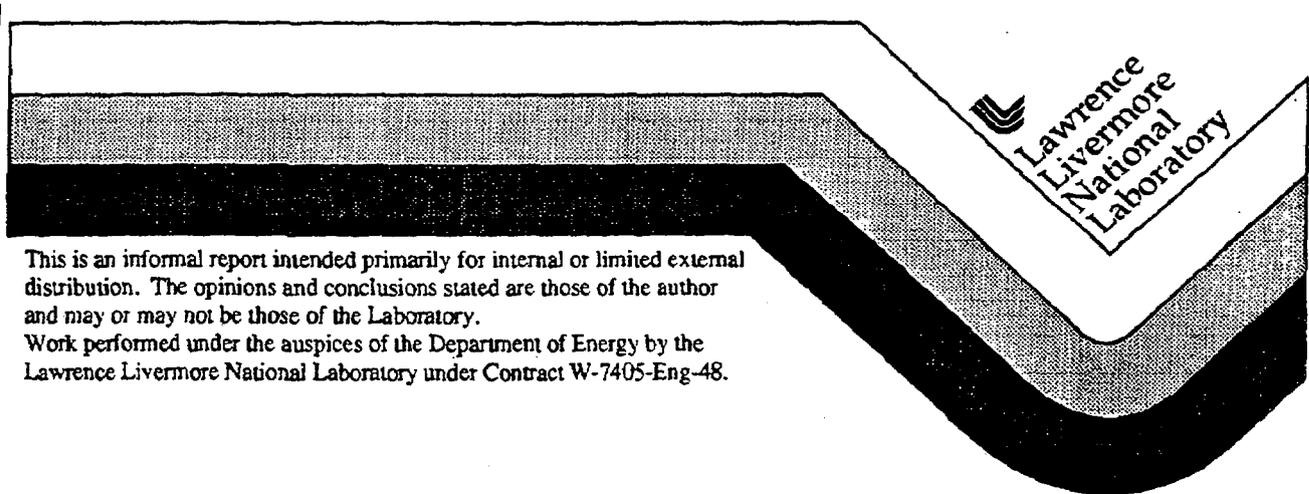
YEAR	#	GLOC		DESTROYED			CUM	RATE	PILOT	ALL	HOURS	
		RATE	#	RATE	A/C	RATE					CUM	RATE
CY75	1	621.12	0	0.00	0	0.00	0	0.00	0	0	161	161
CY76	1	442.48	0	0.00	0	0.00	0	0.00	0	0	226	387
CY77	0	0.00	0	0.00	0	0.00	0	0.00	0	0	856	1,243
CY78	0	0.00	0	0.00	0	0.00	0	0.00	0	0	1,402	2,645
CY79	2	30.64	0	0.00	2	30.64	2	21.81	0	0	6,527	9,172
CY80	5	18.65	0	0.00	4	14.92	6	16.68	0	0	26,803	35,975
CY81	5	8.86	0	0.00	4	7.09	10	10.82	1	1	56,423	92,398
CY82	17	15.83	0	0.00	16	14.90	26	13.01	4	4	107,389	199,787
CY83	11	7.30	2	1.33	9	5.97	35	9.99	5	6	150,728	350,515
CY84	10	5.01	2	1.00	9	4.51	44	8.00	6	6	199,761	550,276
CY85	10	4.55	1	0.46	11	5.01	55	7.14	5	5	219,647	769,923
CY86	11	4.32	0	0.00	11	4.32	66	6.44	3	3	254,491	1,024,414
TY87	8	3.43	0	0.00	9	3.85	75	5.96	3	3	233,560	1,257,974
FY88	23	6.80	2	0.59	20	5.92	95	5.95	5	8	338,039	1,596,013
FY89	14	3.63	0	0.00	14	3.63	109	5.50	3	3	385,179	1,981,192
FY90	13	3.19	0	0.00	14	3.43	123	5.15	4	7	408,078	2,389,270
FY91	21	4.55	1	0.22	21	4.55	144	5.05	5	5	461,451	2,850,721
FY92	18	4.04	0	0.00	18	4.04	162	4.92	7	8	445,201	3,295,922
FY93	18	4.15	1	0.23	18	4.15	180	4.83	4	5	433,949	3,729,871
FY94	16	4.00	2	0.50	15	3.75	195	4.72	3	27	400,474	4,130,345
FY95	9	2.33	1	0.26	9	2.33	204	4.52	1	1	386,429	4,516,774
FY96	8	2.14	0	0.00	7	1.87	211	4.31	0	1	374,517	4,891,291
FY97	11	3.00	0	0.00	8	2.18	219	4.16	1	1	367,045	5,258,336
FY98	14	3.89	0	0.00	13	3.61	232	4.13	5	6	360,245	5,618,581
FY99	18	5.11	1	0.28	16	4.54	248	4.15	2	2	352,275	5,970,856
FY00	9	2.62	0	0.00	9	2.62	257	4.07	2	2	343,085	6,313,941
<b>LIFETIME</b>	<b>273</b>	<b>4.32</b>	<b>13</b>	<b>0.21</b>	<b>257</b>	<b>4.07</b>	<b>257</b>	<b>4.07</b>	<b>69</b>	<b>104</b>	<b>6,313,941</b>	<b>6,313,941</b>

PREPARED 01-APR-01  
FILE NAME F16GLOC.XLS

**DATA DEVELOPMENT TECHNICAL SUPPORT DOCUMENT FOR  
THE AIRCRAFT CRASH RISK ANALYSIS METHODOLOGY (ACRAM)  
STANDARD**

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Andrew B. Barto  
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August 1, 1996



**DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED**

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## 4. MILITARY AVIATION

### 4.1 INTRODUCTION

For the ACRAM Standard [Ref. 4.1], military aviation is defined as the broad categorization of aviation activities performed by military personnel in fulfillment of their official duties. Such activities include passenger and cargo transport, in-flight refueling, flight training, etc. Activities associated with military operations areas (MOA) and training ranges, such as air combat training, low level navigation, personnel and stores drops, are not included. However, cruise phase of flight between an originating airfield and the MOAs, as well as training associated with takeoff and landing at an airfield, including touch and go's; simulated emergency landings, e.g., no flap, flameout; and missed approach/go-arounds, are included.

To quantify the risk of a military aircraft crashing into a facility it is necessary to estimate the number of military flights in the vicinity of the facility, the frequency of military aircraft crashes and the probability that the aircraft crashes into the facility. The latter requires knowledge about the location of aircraft crashes, given an incident leading to a crash, as well as some crash kinematics, e.g., glide or impact angle, heading angle, and skid distance.

To estimate military aircraft crash frequencies, relevant crash and flight information was solicited from the U.S. Air Force, Army and Navy safety agencies. Useable information for fixed wing and rotary wing (helicopter) aircraft were received from the Air Force. The Army provided data on Army helicopters. Data received from the Navy was judged to be of limited value for this application, and is not included in the estimates presented here. Analysis of available crash data and the resulting estimates of military aircraft crash frequencies are presented in Section 4.2.

Crash kinematic and crash location data were derived by reviewing Air Force aircraft mishap reports from 1976 to 1993. A database of aircraft crash data was developed as part of the DNA supported W76/W87 Minuteman III Weapon System Safety Assessment (WSSA) [Ref. 4.2]. That formed the basis for developing crash kinematics and crash location probability distributions. Data analysis and distributions are summarized in Section 4.3.

Section 4.4 includes a summary of some of the appropriate characteristics of military aircraft which are necessary for the structural analyses.

## 4.2 MILITARY AVIATION CRASH FREQUENCIES

Development of estimates of aircraft crash frequencies is based on an analysis of aircraft crash and flight data supplied by Air Force and Army safety agencies [Ref. 4.3-4.6] and the database of Air Force mishaps developed for the DNA supported Minuteman III WSSA [Ref. 4.2].

For the ACRAM Standard, the flight phases of interest for military aviation are  
Takeoffs at airfields in the vicinity of the facility of interest  
Landings at airfields in the vicinity of the facility of interest  
Overflights, during the cruise phase of flight, in the vicinity of the facility of interest

Analysis of the military crash data required the identification of the phase of flight in which the crash occurred as well as screening of crashes to delete those not applicable to crashes into structures, e.g., crashes involving taxiing and/or parked aircraft. This required a review of the individual accident reports/summaries to assign each accident to the proper phase and, occasionally, involved judgments in the applicability of an accident. Thus, there is some uncertainty in the estimates of crash frequencies in addition to inherent "statistical" variation due to the limited amount of historical data. Although recognized, this uncertainty is neither quantified nor included in the provided estimates of crash frequencies. Rather, the estimates provided are considered plausible point estimates of the appropriate frequencies.

Two analyses were considered in developing estimates for crash frequencies. One analysis is based on a review of the brief summaries of mishaps as provided by the Air Force/Army safety agencies. This approach is discussed and the resulting estimates of crash frequencies are presented in Section 4.2.2. The second analysis is based on the Air Force mishap database developed for the Minuteman III WSSA. This analysis and the resulting estimates are discussed in Section 4.2.3.

This Standard is expected to be applicable to facilities off an airfield and not in the immediate vicinity of a runway. Therefore, military takeoff and landing crashes were identified as "on runway" (i.e., crashes in which the initial impact occurred on the runway and the rolling/skidding aircraft departed the runway or remained on the runway) or "off runway" (i.e., the initial impact occurred off the runway). Although the off runway crashes include some that occurred on an airfield, the off runway crash frequency estimated from the historical data is considered a reasonable conservative estimate applicable for this Standard.

For military aviation the cruise phase of flight involved a number of different types of operations in addition to "normal" flight from one base to another. A significant part of the cruise portion of flight, particularly for military attack, fighter and trainer aircraft, involved maneuvers. Since this type of activity is not expected to affect facilities covered by this Standard, accidents occurring during maneuvers, air shows, and other special operations were not included in developing the estimated inflight crash frequencies. Deleting those accidents from consideration required that the mileage flown, which is the denominator of crash frequencies, be adjusted. Since the available military flight information is in flight hours, considerable judgment was involved in developing estimates of the number of miles flown during "normal" flight. Again, this needs to be recognized in using the provided estimates of crash frequencies.

Ideally, estimates of crash frequencies can be developed for each type of military aircraft. This was the goal in the second analysis (Section 4.2.3). Due to limited data and the reasonable expectation that actual frequencies are comparable for some subsets of aircraft, estimated crash frequencies are provided per aircraft type or group of types. The philosophy of this Standard is to use three subcategories of military aircraft:

Large aircraft: bomber and cargo aircraft such as the B-1, B-2, B-52, C-5, C-9, KC-10, C-21, C-130, KC-135 and C-141

Small aircraft: attack, fighter and trainer aircraft such as the A-7, A-10, A-37, F-4, F-5, F-15, F-16, F-106, F-111, F-117, T-33, T-37, T-38, T-39 and T-41

Helicopters: H-1, H-3, H-53 and H-60

Estimates of crash frequencies are provided for each subcategory as well as for all military aircraft. These combined estimates are based on a weighted average of the individual frequencies, weighted by the respective normalized number of takeoffs/landings and number of miles flown during "normal" flight. Application of the combined frequencies is appropriate only when (1) the distribution, among the different types of aircraft (e.g., T-38, F-16, B-52, ...), of the number of takeoffs/landings at the airfield of interest and (2) the distribution, among aircraft types, of the enroute overflights in the vicinity of the facility of interest are comparable to the distributions in the historical data. If operations at a given location are much different than the overall distribution in the historical data, alternative estimates of crash frequencies, based on the appropriate mix of aircraft at the location, should be considered.

#### 4.2.1 ESTIMATES OF CRASH FREQUENCIES BASED ON AN ANALYSIS OF IMPACT ACCIDENTS

Air Force mishap data solicited from the Air Force Safety Agency [Ref. 4.3-4.5] provides one basis for estimating crash frequencies for military aviation. Air Force classification of mishaps is based on the economic costs of damage to the aircraft and personnel costs and are defined as follows:

- Flight Mishap - A mishap involving an Air Force aircraft when intent for flight exists.
- Class A - A mishap in which the resulting total cost of property damage, injury and illness is \$1,000,000 or greater; or an Air Force aircraft is destroyed; or a fatality occurs.
- Class B - A mishap in which the resulting total cost of property damage, injury and illness is \$200,000 or more, but less than \$1,000,000.
- Class C - A mishap in which the resulting total cost of property damage is \$10,000 or more, but less than \$200,000 or injury or occupational illness resulted in a lost workday case involving days away from work.
- Destroyed - Destroyed means uneconomical to repair, defined by the number of man-hours estimated as needed to repair the aircraft. Repair time varies depending on the type of aircraft.
- Mishap Rates - Rates are computed on basis of the number of mishaps per 100,000 flying hours.
- Flight Related - When there is a mishap with little or no damage to the aircraft, the incident does not affect the mishap rate.

One set of data provided by the AFSA is based on the lifetime mishap history, up to the early 1994 time frame, of a large number of Air Force aircraft. A total of 5171 Class A, 2450 Class B, and 3598 Destroyed mishaps are included in this data set. A summary of these mishaps, by aircraft type, is given in Table 4.1. Related flight information included in the table is the total flight hours for each type of aircraft. Also included in the table are estimates of mishap rates, given as rates per 100,000 flight hours.

The various aircraft types were grouped by the three subcategories of military aviation, small aircraft, large aircraft, and helicopter. The mishap data for the three subcategories are summarized in Tables 4.2 to 4.4. Again, estimates of mishap rates are per 100,000 flight hours. Since T-33 aircraft have been out of the Air Force inventory for some time, mishap rates for small aircraft are estimated excluding the T-33 data as well.

The mishaps recorded in Tables 4.1 to 4.4 include a large number of mishaps not applicable to crashes into off airfield facilities, e.g., nonimpact mishaps, on airfield crashes, etc. Therefore, the mishap rates provided in these tables may be over estimates of crash rates into off airfield structures. In addition, takeoff and landing incidents are likely to be significant contributors to crashes into structures; thus, it is appropriate to develop crash rates per takeoff and landing. To do this it is necessary to have a more detailed description of the mishap.

A second set of data provided by the AFSA included summary information for mishaps in the 1979-1993 time period. Useable information was derived from 1426 mishaps. To develop crash frequency estimates, the 1426 mishaps were classified either as impact or non-impact mishaps. Impact mishaps included accidents involving ground, runway, water, midair, terrain, vehicle, and building impact. Non-impact mishaps included incidents involving foreign objects, birds, etc., and parked aircraft fires and other such incidents. Non-impact mishaps are considered not applicable. There were 1093 impact mishaps. Those mishaps included all classes of damage to the crashing aircraft. The mishaps were partitioned by aircraft "size" (large, small and helicopter) and by flight phase (takeoff, landing and inflight). Takeoff and landing were further partitioned into "on runway" and "off runway" mishaps. In-flight mishaps were partitioned into "normal" and "special", i.e., low altitude and maneuvering operation mishaps. A graphical description of the classification of the mishaps is shown in Figure 4.1. For this analysis, takeoff includes takeoff roll, abort/discontinue, and initial climb portions of a flight; landing includes the pattern, final approach, flare

and rollout portions; normal in-flight includes climb to cruise, cruise between an originating airfield and an operations area, if applicable, and cruise descent portions; and special in-flight includes low level and maneuvering operations in restricted airspace.

The number of impacting mishaps for each subcategory of aircraft and flight phase, appropriate flight information and the resulting estimates of crash frequencies are summarized in Table 4.5.

Crash frequencies for takeoffs and landings are per takeoff/landing. Crash frequencies for "normal" inflight operation, are "per mile." The estimated mileage derived to estimate inflight rates is based on an analysis of the expected number of miles flown during "normal" flight. This analysis attempted to account for the time in the takeoff and landing phases of flight as well as the time in maneuvers and other special operations. This required a considerable amount of judgment by the analyst.

For some facilities, particularly hardened structures, a more appropriate estimate of a crash frequency may be one based on only considering impact mishaps in which the crashing aircraft was destroyed. Of the 1093 impact mishaps, a crashing aircraft was classified as "destroyed" in 819 mishaps. These impact destroyed mishaps were partitioned in the same way as impact mishaps as shown in Figure 4.1. A summary of this data and the resulting estimates of crash frequencies are given in Table 4.6.

Basic mishap data, flight information and partitioning of mishaps by aircraft subcategory and flight phase were developed by T. Lin at Sandia National Laboratory [Ref. 4.6]. Development of estimated miles flown during "normal" inflight operations is based on an analysis of aircraft operations by Logicon RDA [Ref. 4.7].

#### 4.2.2 ESTIMATES OF CRASH FREQUENCIES BASED ON AN ANALYSIS OF THE MISHAP DATABASE DEVELOPED FOR THE MINUTEMAN III WSSA

Another source of mishap information is the mishap database developed for the DNA-supported Minuteman III WSSA [Ref. 4.2]. This database was developed from data extracted from individual mishap reports, also available from the AFSA. Its primary use was as a resource for crash location and crash kinematic information, but it is also useful as a basis for estimating crash frequencies. Development of crash frequency estimates using this database is based on identifying mishaps involving a "crash" which is defined as "An aircraft mishap associated with flight that prevents the aircraft from coming to a full stop landing on its gear." In addition, for this analysis, flight phases are defined as:

**Takeoff:** The phase of flight from the application of takeoff power on the runway to the point where the aircraft altitude is not affected by its proximity from the departure runway.

**Landing:** The phase of flight from the point where the aircraft altitude is affected by its proximity from the approach runway to its departure from the runway under a controlled taxi.

**In-flight:** The phase of flight where the aircraft altitude is not affected by its proximity to the runway.

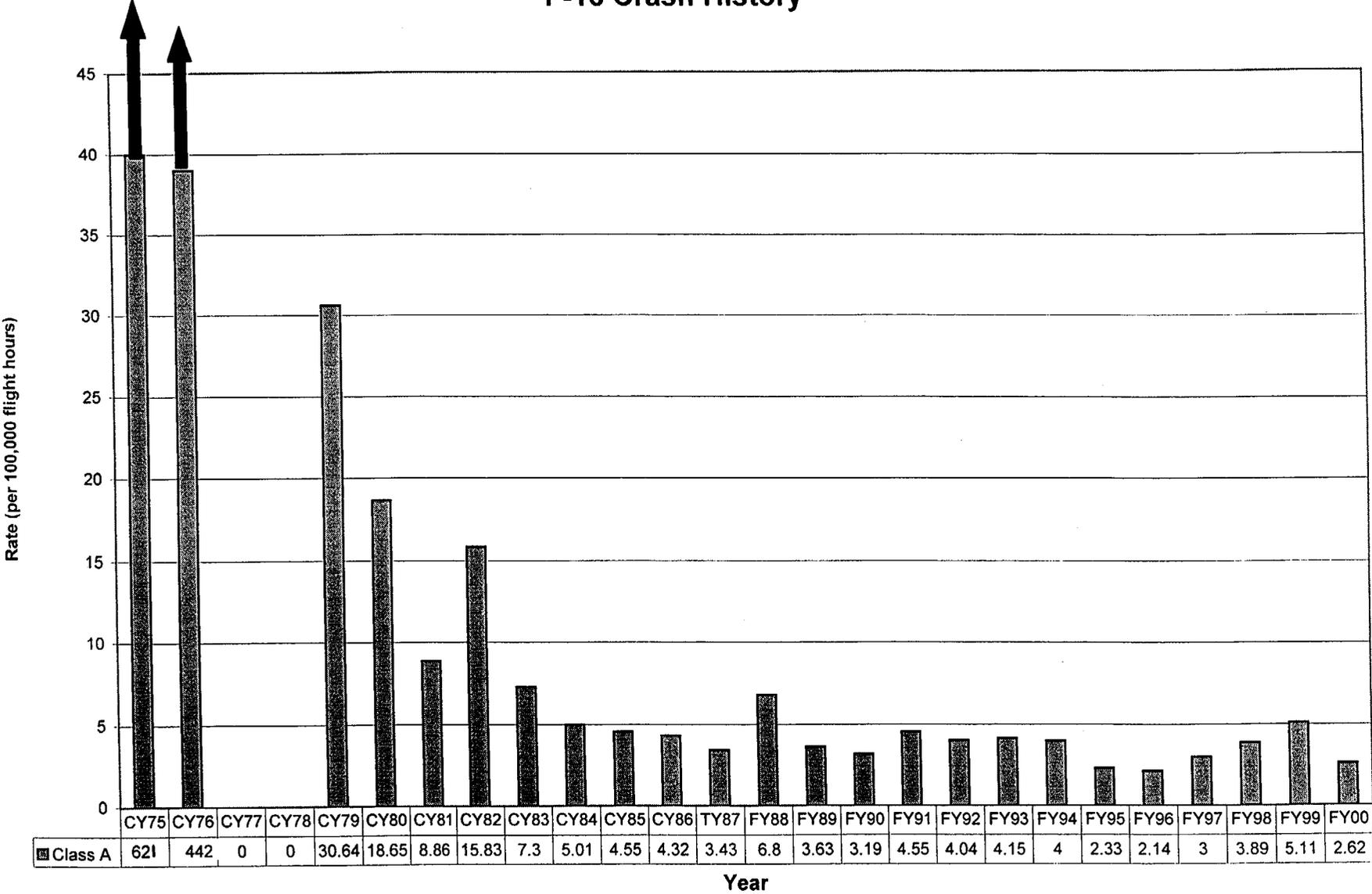
A summary of the crash data, estimated crash frequencies and applicable flight information for individual aircraft types and groups of aircraft types, as well as for the three subcategories of aircraft, is presented in Tables 4.7 and 4.8.

The basic crash data and flight information were developed by M. Fuentes at Sandia National Laboratories [Ref. 4.6]. The estimated miles used for estimating crash frequencies during the in-flight phase of flight is based on analysis of military aircraft operations by Logicon RDA.

**Table 4.8**  
**Crash Data and Estimates of Crash Frequencies Based on the Minuteman III Mishap Database**

			Number of Sorties	Flight Hours	Normal Flight			Special Operations			
					Estimated Miles	No. of Crashes	Crash Rate /Mile	Estimated Miles	No. of Crashes	Crash Rate /Mile	
Large	Bombers (Bs)	B1, B52, B57	343,000	2,177,000	5.00E+08	2	4.00E-09	5.00E+08	6	1.20E-08	
	Cargo (Cs)	C130	2,669,000	6,343,000	1.50E+09	4	2.67E-09	1.50E+09	10	6.67E-09	
		KC135	1,123,000	4,728,000	1.10E+09	1	9.09E-10	1.10E+09	0	<9.09E-10	
		Other Large Cs	2,333,000	7,738,000	1.80E+09	2	1.11E-09	1.80E+09	1	5.56E-10	
		Small Cs	821,000	1,535,000	3.50E+08	1	2.86E-09	3.50E+08	1	2.86E-09	
		All Cargo	6,946,000	20,344,000	4.75E+09	8	1.68E-09	4.75E+09	12	2.53E-09	
	All Large (Bs, Cs)	7,289,000	22,521,000	5.25E+09	10	1.90E-09	5.25E+09	18	3.43E-09		
Small	Attack (As)	Single Engine	A7	925,000	1,387,000	2.40E+08	9	3.75E-08	2.60E+08	43	1.65E-07
			F16	2,675,000	3,730,000	8.30E+08	32	3.86E-08	9.30E+08	104	1.12E-07
			All Single-engine	3,600,000	5,117,000	1.07E+09	41	3.83E-08	1.19E+09	147	1.24E-07
	Fighters (Fs)	Multiple Engine	A10	1,740,000	2,962,000	5.10E+08	16	3.14E-08	5.60E+08	47	8.39E-08
			F4	3,882,000	5,162,000	1.20E+09	20	1.67E-08	1.30E+09	139	1.07E-07
			F15	2,082,000	2,864,000	6.40E+08	4	6.25E-09	7.10E+08	60	8.45E-08
			F111, FB111	658,000	1,648,000	3.70E+08	9	2.43E-08	4.10E+08	40	9.76E-08
			All Multiple-engine	8,362,000	12,636,000	2.72E+09	49	1.80E-08	2.98E+09	286	9.60E-08
			Other As, Fs	1,530,000	2,079,000	4.50E+08	12	2.67E-08	5.00E+09	73	1.46E-08
	All As, Fs	13,492,000	19,832,000	4.24E+09	102	2.41E-08	9.17E+09	506	5.52E-08		
	Trainers (Ts)		Subsonic: T37	4,154,000	5,212,000	7.00E+08	4	5.71E-09	7.80E+08	11	1.41E-08
			Supersonic: T38	5,109,000	6,038,000	1.20E+09	11	9.17E-09	1.40E+09	27	1.93E-08
			Other Ts	1,347,000	2,254,000	3.90E+08	3	7.69E-09	4.30E+08	7	1.63E-08
			All Ts	10,610,000	13,504,000	2.29E+09	18	7.86E-09	2.61E+09	45	1.72E-08
			All Small (As, Fs, Ts)	24,102,000	33,336,000	6.53E+09	120	1.84E-08	1.16E+10	551	4.68E-08
Helicopter			1,028,000	1,449,000	8.30E+07	17	2.05E-07	9.30E+07	9	9.68E-08	
All Military Aircraft			32,419,000	57,306,000	1.19E+10	147	1.24E-08	1.71E+10	578	3.38E-08	

# F-16 Crash History





Saturday, June 24, 2000

## **Cohen: Joint Strike Fighter program must stay on schedule**

*By Chuck Vinch  
Washington bureau*

WASHINGTON — Defense Secretary William Cohen sent a letter to senior House and Senate lawmakers Thursday urging them to keep the funding and schedule for the Pentagon's Joint Strike Fighter aircraft on schedule.

The letter is a rear-guard action to beat back proposals that have surfaced in various congressional committees to scale back funding, production or both of what Cohen called "the cornerstone of tactical aircraft modernization."

Jacques Gansler, the Pentagon's acquisition chief, said at a briefing that the current schedule is crucial because the Marine Corps and Air Force have "serious scheduling problems" with their tactical aircraft that loom around the 2009-2010 timeframe, when both the AV-8B Harrier and F-16 Falcon will be reaching the end of their lifespans.

The F-22 Raptor, which is due to replace the F-15 as America's front-line air-to-air fighter, has never been designed to plug that gap, Gansler said.

"We have a serious need for an upgraded airplane that can't be filled with the F-22 because of its high cost and low volume," he said. "This airplane [the JSF] is designed to be a very high performance, stealthy, low-cost aircraft."

The Pentagon plans to buy about 330 F-22s, but more than 2,800 JSFs. The winning contractor — either Boeing or Lockheed Martin — could get orders for as many as 6,000 total planes, depending on foreign military sales.

The Pentagon plans to obtain a total of 2,852 aircraft — 1,763 for the Air Force, 480 for the Navy and 609 for the Marine Corps. If the program unfolds as planned, the Joint Strike Fighter would be the largest single military procurement program in history, worth between \$200 billion and \$400 billion.

"The JSF is our only affordable solution to providing the large number of modern, highly capable aircraft that the Air Force, Navy and Marine Corps must have to sustain their tactical fleets through the first half of the 21st century," Cohen wrote in his letter.

Lawmakers have had two main concerns — that the United States cannot afford to plunge into near-simultaneous production of the JSF, the F-22 and the Navy's new F/A-18 D and E, and that the Pentagon's procurement strategy for the JSF allows too small a degree of competition between the potential contractors.

The Pentagon plans on a "winner take all" concept for design of the plane.

"The winner-take-all program is what we had planned all along and we still have assessed it as the one that seems to make the most sense to us," Gansler said.

The Pentagon wants the eventual contractor to be able to produce three variations of the JSF — a carrier version with heavier landing gear, a Marine Corps version for close-air support that can perform vertical takeoffs and landings, like the current Harrier can, and the conventional Air Force version for air-to-air and air-to-ground missions.

Lawmakers — and some military officials — have been concerned that because the JSF program is so large and so significant, the winner-take-all approach could drive the loser out of the fighter aircraft business completely, leaving the United States with just one major manufacturer, which could hinder future cost efficiencies and technological innovations.

Cohen said in his letter that both Boeing and Lockheed Martin will have "a full opportunity to demonstrate the benefits of its approach to the JSF."

The companies will continue with their concept demonstration programs through next spring, when a final contract for production of the basic airframe is scheduled to be awarded.

Gansler said there will still be plenty of work for the loser in the near term in airframe, avionics radar and engine production. He noted that Boeing will be building the next generation of F/A-18 Super Hornet D and E models for the Navy, while Lockheed Martin will be making the new F-22 and will continue to produce F-16s for a number of years.

Even so, Gansler said Cohen has asked the RAND Corp., a military think tank in California, to assess the winner-take-all approach and various alternatives for the production phase of the program once the concept demonstration ends. A report is due back by Dec. 1.

"If it turned out that there was some clear direction that we should be taking that's different, "we have plenty of time to modify this in December after their report comes in," Gansler said.

But he and Cohen stressed that the most important issue from the Pentagon perspective is keeping the program on schedule.

"At this key juncture, keeping the JSF program on schedule is essential to sustaining the future readiness and force levels of our tactical aviation units as existing aircraft reach the end of their service lives," Cohen wrote in his letter.

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**Subject:** JSF Contractor Award

NEWS RELEASE from the United States Department of Defense

No. 543-01  
(703)697-5131(media)  
IMMEDIATE RELEASE  
October 26, 2001  
(703)697-5737(public/industry)

#### JSF CONTRACTOR AWARD

Under Secretary of Defense for Acquisition, Technology and Logistics Edward C. "Pete" Aldridge Jr. announced this afternoon the decision to proceed with the Joint Strike Fighter program. This approval will move the program to the next phase, the System Development and Demonstration phase. The Secretary of the Air Force James G. Roche announced the selection of Lockheed Martin teamed with Northrop Grumman and BAE to develop and then produce the Joint Strike Fighter (JSF) aircraft. The contract, for \$18,981,928,201, will produce aircraft to be used by the U.S. Air Force, Navy, and Marines, as well as the United Kingdom's Royal Air Force and Navy.

Also, Pratt and Whitney Military Engines, East Hartford, Conn., has been awarded a contract for more than \$4 billion to develop the F135 propulsion system. This contract will cover ground and flight testing and production qualification of the Pratt & Whitney propulsion system.

The Joint Strike Fighter acquisition strategy also calls for the development of two propulsion systems. The Pratt & Whitney system will compete, in production, with one developed by the team of General Electric and Rolls Royce. GE/RR are expected to receive a contract for the next phase of development of that system in the next few weeks. The P&W and GE/RR engines will be physically and functionally interchangeable in both the aircraft and support systems. All JSF aircraft variants will be able to use either engine. The competition starts in fiscal 2011 and continues through the life of the program to reduce risks.

The Joint Strike Fighter is a multi-Service/international cooperation warplane. The cornerstone of the program is affordability based on a next-generation, multi-role strike fighter aircraft that will have a 70 to 90 percent commonality factor for all the variants, significantly reducing manufacturing, support and training costs. First delivery of operational aircraft is anticipated in fiscal 2008.

During this Systems Development and Demonstration phase, the program will focus on developing a family of strike aircraft that significantly reduces life-cycle cost, while meeting the operational requirements for the Services. The requirements represent a balanced approach to affordability, lethality, survivability and supportability. The program will use a phased block approach that addresses aircraft and weapons integration and provides a validated and verified air system for the Service Initial Operational Capability requirements. Also during this phase of the contract Lockheed Martin teamed with Northrop Grumman and BAE will implement innovative management and business practices focusing on achieving affordable unit flyaway costs and reduced life-cycle cost for future production of the Joint Strike Fighter.

The source selection culminates a highly successful joint process with the Air Force, Navy, Marine Corps, and United Kingdom Ministry of Defence. A number of agreements between the U.S. and foreign governments are in place for this phase of the program.

The United Kingdom became a full collaborative partner in the program in 1995. Denmark, Norway, The Netherlands, Canada and Italy subsequently joined the program as cooperative partners. Singapore, Turkey and Israel are foreign military sales participants for this phase. The United Kingdom has signed an agreement to participate in the System Development and Demonstration (SDD) phase of the program. Agreements with additional countries for SDD participation are in progress.

For the U.S. Navy, the JSF will be used in a "first day" of war, as a survivable strike fighter aircraft to complement F/A-18E/F.

The U.S. Air Force will employ it as a multirole aircraft, primary-air-to-ground, which will replace the F-16 and A-10 and to complement the F-22. The Marine Corps will use the Short Takeoff and Vertical Landing (STOVL) variant of the aircraft to replace the AV-8B and F/A-18A/C/D. The United Kingdom's Royal

Navy and Royal Air Force multirole aircraft will replace the Sea Harrier and GR7.

Additional information on the Joint Strike Fighter Program can be found on the web at <http://www.jast.mil>. Further information on the contract announcement can be accessed at [http://www.defenselink.mil/news/Oct2001/c10262001\\_ct544-01.html](http://www.defenselink.mil/news/Oct2001/c10262001_ct544-01.html).

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**Subject:** Under Secretary Aldridge Interview with CNN MoneyLine

NEWS TRANSCRIPT from the United States Department of Defense

DoD News Briefing  
Edward C. "Pete" Aldridge, USD ATL  
Friday, October 26, 2001 - 6:35 p.m. EDT

(Live interview with Lou Dobbs, CNN MoneyLine.)

Dobbs: Today's announcement from the Pentagon completes years of competition, and the program to build an aircraft that will be shared by three branches of the military changes the landscape of the defense industry.

Joining me now the man leading many of those changes, the under secretary of Defense for Acquisitions, Technology and Logistics, Edward "Pete" Aldridge. It is good to have you with us, Mr. Secretary.

Aldridge: Hello, Lou. Glad to see you again.

Dobbs: Good to see you.

In this award today, is there a built-in, if you will, provision for the disappointed competitor?

Aldridge: Well, I'd just like to say both teams did a great job on the concept demonstration phase. The winners, of course, have their own teammates. They formed teammates with British Aerospace and Northrop Grumman. But if Lockheed Martin wants to partake of the technology that's available in Boeing, they're permitted to do so. It is their choice of how to proceed. We would not object to anything that they would like to join on any new technology area.

Dobbs: What was, if there was one specific aspect of this competition, that tilted the award in the favor of Lockheed Martin?

Aldridge: Well, Lou, that decision, of course, on the

source selection was the secretary of the Air Force's, not mine. I think you heard today the secretary looked at a variety of things. I don't think you can point to any one factor that swung the results one way or the other. The source selection process is very, very thorough. It has many factors that go into the process of deciding, from the performance to the manufacturing, reliability, management, past performance. All those factors go into the decision. I don't think you can point to any one factor that made the choice. It was a combination that said, according to Jim Roche, the best value for the Department of Defense and for the nation; in fact, for the United Kingdom, as well.

Dobbs: How soon will we see these aircraft in operation?

Aldridge: The first flight's about four years away. We're now going through the design, final design of the development program. And so first flight is expected about four years from now.

Dobbs: And how soon will the money start moving from the federal government to Lockheed Martin?

Aldridge: I think Lockheed Martin would like to see some right away. The contract --

Dobbs: I suspect you're right. [Laughter.]

Aldridge: The contracts have been signed. And as soon as the work starts, they can start billing the government for the work that they're producing. And so I would expect it's a matter of a few months away. But very soon.

Dobbs: Okay. Mr. Secretary, good to have you with us.

Aldridge: Thank you, Lou.

Dobbs: Thank you.

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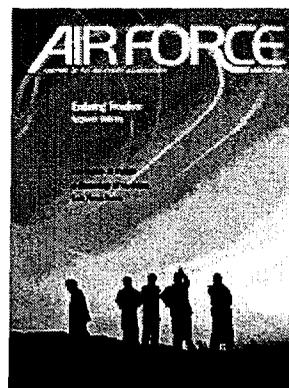
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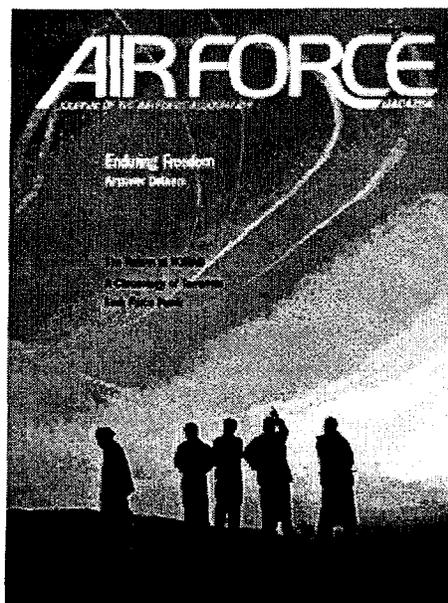
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# Air Force Association

*The Force Behind The Force*

February 2002 Vol. 85, No. 2



*AIR FORCE Magazine* is the monthly journal of the Air Force Association and one of the world's foremost publications in the fields of defense and aerospace. From Air Force operations, programs, and people to the exploits of Air Force heroes, the award-winning *AIR FORCE Magazine* reports on important aerospace news and developments, and provides authoritative background material. *AIR FORCE Magazine* is the reference for the Air Force and aerospace. Its special issues and features include the Air Force Almanac and Space Almanac, special aircraft, and informative charts.

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likely to accept the discipline and uniformity that a tour in the military requires.

Pay and pension increases now moving through Congress could help. Sen. John W. Warner (R Va.), chairman of the Senate Armed Services Committee, has another idea: shorten enlistments, despite the fact that such a move would raise training costs considerably.

In a March letter to service chiefs, Warner urged them to consider reducing enlistment time from four years or more to 18 months.

The Army already allows two-year enlistments in a number of combat arms specialties. The Navy has a handful of two-year slots available. The Air Force, and the Marines, have continued to insist on a four-year minimum.

### **F-16 Crash Rate Rising**

F-16 crash rates are rising again after years of decline, and worried Air Force officials can see no obvious cause for the spike.

In 1996, the Class A accident rate for the lightweight fighter jet was a record-low 2.14 per 100,000 flying hours. In 1997, it climbed to 3.0 and in 1998 to 3.89. As of mid-February, the Fiscal 1999 F-16 crash rate was 5.83 per 100,000 flying hours.

Engine trouble may be one reason. Of the nine 1999 crashes, six were caused by engine failure. Five of 1997's 11 Class A accidents were engine-related.

But officials caution that "engine failure" is a broad term that can cover everything from design problems to poor maintenance. And engines have not been failing in the same manner--each has been a unique and isolated problem.

Still, Air Force officials had an informal meeting at Luke AFB, Ariz., this winter to discuss the possibility of acute F-16 engine problems.

Over time, about 52 percent of the F-16's Class A accidents have been caused by pilot failure, according to manufacturer Lockheed Martin. Some 36 percent have been engine related.

### **For the Record**

"The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defense recognized by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area."

**-Article 5 of the Washington Treaty, basis of NATO, signed April 4, 1949.**

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ALSAFECOM 002/1996  
COMNAVSAFECEN NORFOLK VA//SE//  
INFO HQ USAF WASHINGTON DC//XO/SEI//

UNCLAS

SUBJECT: MUTUAL SUPPORT DURING EMERGENCIES & THE EJECTION DECISION

1. RECENT MISHAPS HAVE IDENTIFIED THREE CRITICAL SAFETY CONCERNS THAT NEED TO BE BROUGHT TO THE ATTENTION OF CREWMEMBERS IMMEDIATELY.

2. FIRST, THERE IS AN ALARMING INCREASE IN THE NUMBER OF CREWMEMBERS EJECTING BELOW PUBLISHED MINIMUM EJECTION ALTITUDES. IN THE LAST

12 MONTHS, THERE WERE 27 SUCCESSFUL EJECTIONS FROM 24 AIRCRAFT. OVERALL, THIRTY SEVEN PERCENT (10 EJECTIONS) OCCURRED BELOW

PUBLISHED MINIMUMS AND 3 OCCURRED AT THE 2000 FOOT AGL CONTROLLED EJECTION ALTITUDE. SEVENTY THREE PERCENT (8 OF THE 11 EJECTIONS)

IN THE PAST SIX MONTHS WERE BELOW MINIMUMS. THE MAJORITY OF THE ABOVE EJECTIONS OCCURRED IN AIRSPACE FOR WHICH THE CREW HAD MISSION

PLANNED AND BRIEFED MINIMUM EJECTION ALTITUDES.

3. A CREWMEMBER THAT EJECTS AT THE 2000 FOOT AGL CONTROLLED EJECTION ALTITUDE HAS APPROXIMATELY ONE MINUTE AND FORTY

SECONDS IN THE PARACHUTE. A WELL TRAINED AND DISCIPLINED

ROBERT LEE, LT COL, USAF  
HQ AFSC/SEFI 6-0853

ORIN L. GODSEY, BRG GEN, CC  
CRC: 27980

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Exhibit 57

UT-48483

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NO

CREWMEMBER, WITH NO COMPLICATIONS, CAN COMPLETE THE REQUIRED POST EJECTION STEPS AND PERFORM A SAFE PARACHUTE LANDING FALL IN THE AVAILABLE TIME. UNFORTUNATELY, THAT SELDOM HAPPENS. CREWMEMBERS FREQUENTLY BEGIN THEIR PROCEDURES AND CAN BECOME DISTRACTED UNTIL THEY REALIZE GROUND IMPACT IS IMMINENT. THEY SELDOM MANEUVER THEIR PARACHUTE TO THE BEST LANDING SITE OR ORIENT THEMSELVES INTO THE WIND. WHEN THE CREWMEMBER IS NOT IN CONTROL OF HIS OR HER PARACHUTE LANDING, THE PROBABILITY OF INJURIES INCREASES. ANY INJURY CAN LEAD TO DELAYED RESCUE, INCREASED INJURY, CAPTURE, OR DEATH. PRESSING BELOW MINIMUM EJECTION ALTITUDES AND NOT COMPLETING VITALLY IMPORTANT POST EJECTION PROCEDURES BEFORE LANDING ARE UNSAFE PRACTICES THAT MUST BE CORRECTED.

4. ANOTHER SIGNIFICANT PROBLEM HAS BEEN INADEQUATE COMMUNICATIONS BETWEEN LEAD, WINGMEN, AND/OR OTHER CREWMEMBERS THAT PREVENTED CORRECT ASSESSMENT OF VARIOUS AIRBORNE SITUATIONS AND TIMELY EJECTION DECISIONS. RECENT FLIGHT MISHAP REPORTS REVEALED A DOWNWARD TREND IN THE QUALITY OF MUTUAL SUPPORT DURING NORMAL OPS OR WHEN FACED WITH AN AIRCRAFT MALFUNCTION OR IN-FLIGHT EMERGENCY (IFE). THE WELL-PROVEN CHALLENGE AND RESPONSE METHOD APPEARS TO HAVE BROKEN DOWN. CRITICAL CHECKLIST ACTIONS HAVE BEEN MISSED BY FORMATION

ROBERT LEE, LT COL, USAF  
HQ AFSC/SEFL, 6-0853

ORIN L. GODSEY, BRG GEN, CC  
CRC: 27980

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NO

MEMBERS AND UNCHALLENGED BY OTHER PARTICIPANTS. ERRONEOUS ASSUMPTIONS AND POOR AIRMANSHIP HAVE FLOURISHED WITHOUT CHALLENGE. EVEN MORE DISTURBING IS THE FACT THAT IN ALMOST ALL POORLY HANDLED IFE(S), AT LEAST ONE FORMATION MEMBER NOTED THE DISCREPANCIES AND HAD THE SMARTS, THE SOLUTION(S), OR THE TIME TO GET MORE INFORMATION, BUT DID NOT SPEAK UP. THE EXCUSES FOR FAILING TO SUPPORT THE IFE FLIGHT MEMBER INCLUDED: "IT WAS NOT MY AIRCRAFT" OR "I WAS JUST A STUDENT, A WINGEE, OR A BACKSEATER." ALSO, INAPPROPRIATE CHASE FORMATION POSITIONING DURING AN IFE SIGNIFICANTLY DEGRADED THE ABILITY TO SUPPORT THE IFE PILOT AS NOTED ABOVE. FUTILE REPEATED ATTEMPTS TO RECOVER FAILED ENGINES ARE DRIVING CREWS TO CONTROLLED EJECTIONS WELL BELOW THE RECOMMENDED 2000 FEET AGL MINIMUM. IN RECENT MISHAPS, THESE DELAYS WERE NOT CHALLENGED BY CHASE PILOTS OR BACKSEATERS. BECAUSE OF A RECENT CONTROLLED EJECTION AT LESS THAN 400 FEET AGL, A PILOT SUFFERED SEVERE INJURIES. IT IS IMPERATIVE THAT ALL FORMATION MEMBERS PROVIDE ACTIVE AND FULL FLEDGED SUPPORT DURING IFE(S). HUMAN FACTORS SPECIALISTS INDICATE THAT CREWMEMBERS, WHEN CONFRONTED WITH IFE INDUCED STRESS, MAY NEED EXTERNAL OR INTERPERSONAL INTERVENTION TO ALTER THEIR INAPPROPRIATE PERFORMANCE/ACTIONS.

ROBERT LEE, LT COL, USAF  
HQ AFSC/SEFL, 6 0853

*ORL*  
ORIN L. GODSEY, BRG GEN, CC  
CRC: 27980

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NO

5. FINALLY, RECENT SEARCH AND RESCUE COMBAT AIR PATROL (SARCAP) PERFORMANCE FOLLOWING AN EJECTION HAS BEEN POOR. IN SOME INSTANCES, THE SARCAP AIRCRAFT CAME VERY CLOSE TO CRASHING. FAILURE TO MONITOR ALTITUDE AND AIRSPEED HAS CAUSED LOW ALTITUDE WARNINGS IN THE HUD AND VOICE INDICATORS. ANOTHER PROBLEM HAS BEEN CAPPING TOO HIGH, WHICH LIMITS ASSISTANCE TO THE DOWNED CREWMEMBER. ADDITIONALLY, ONE AIRCRAFT PREMATURELY DEPARTED THE SARCAP WITHOUT INSURING THAT THE DOWNED CREWMEMBER WAS VISUALLY ACQUIRED BY RESCUE FORCES. THE PROCEDURES ARE IN PLACE. STRICT ADHERENCE WILL MAXIMIZE AIRCREW SAFETY IN FUTURE MISHAPS/INCIDENTS.

6. REQUEST YOU BRING THESE ISSUES TO THE ATTENTION OF ALL CREWMEMBERS IMMEDIATELY.

ROBERT LEE, LT COL, USAF  
HQ AFSC/SEFL, 610853

*RL*  
ORIN L. GODSEY, BRG GEN, CC  
CRC: 27980

UNCLASSIFIED

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UT-48486

**In The Matter Of:**

*PRIVATE FUEL STORAGE, L.L.C.*

---

*RONALD E. FLY*

*December 12, 2000*

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*Beta Reporting*

*910 17th Street, N.W.*

*Suite 200*

*Washington, DC 20006*

*(202) 638-2400 or (800) 522-2382*

*Original File AAFLYTXT, 182 Pages  
Min-U-Script® File ID: 1906863169*

**Word Index included with this Min-U-Script®**

State's  
Exhibit 58

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD  
In the Matter of  
PRIVATE FUEL STORAGE, : Docket No. 72-22  
L.L.C., : ASLB No. 97-732-02-ISFSI  
Applicant.

Washington, D.C.  
Tuesday, December 12, 2000

Deposition of  
RONALD E. FLY  
a witness, called for examination by counsel for the State of Utah pursuant to notice and agreement of counsel, beginning at approximately 8:20 a.m. at the law offices of Harmon & Curran, 1726 M Street N.W., Washington, D.C., before Joan V. Cain of Beta Reporting & Videography Services, notary public in and for the District of Columbia, when were present on behalf of the respective parties:

APPEARANCES:

On behalf of Applicant:  
PAUL A. GAUKLER, ESQUIRE.  
D. SEAN BARNETT, ESQUIRE  
Shaw Pittman  
2300 N Street N.W.  
Washington, D.C. 20037-1128  
(202) 663-8304  
On behalf of State of Utah:  
CONNIE S. NAKAHARA, ESQUIRE  
Department of Environmental Quality  
State of Utah  
168 North 1950 West  
Salt Lake City, Utah 84116  
(801) 366-0253  
On behalf of the Nuclear Regulatory Commission:  
CATHERINE MARCO, ESQUIRE  
Office of General Counsel  
United States Nuclear Regulatory Commission  
11555 Rockville Pike  
Rockville, Maryland 20852  
(301) 415-3052  
ALSO PRESENT:  
Hugh L. Horstman

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Counsel for Applicant	180
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[1] **PROCEEDINGS**  
[2] Whereupon, [3] RONALD E. FLY [4] was called as a witness and, having been [5] first duly sworn, was examined and testified [6] as follows:  
[7] **EXAMINATION BY COUNSEL FOR THE STATE OF**  
[8] **UTAH**  
[9] **BY MS. NAKAHARA:**  
[10] **Q:** Good morning, Colonel Fly. Would [11] you state your full name for the record, [12] please?  
[13] **A:** Ronald Edrington Fly.  
[14] **Q:** For the record I'm Connie Nakahara, [15] and I represent the state in the Private Fuel [16] Storage case before the Nuclear Regulatory [17] Commission Licensing Board. If at any time [18] during your deposition you don't understand [19] me please ask me to clarify.  
[20] How did you prepare for your [21] deposition today?

[22] **A:** Over the course of the last couple

[1] of days or so I've reviewed portions of the [2] report, revision — report to Nuclear [3] Regulatory Commission, Aircraft Crash Impact [4] Hazard, Revision 4, and sections in what's [5] commonly referred to as the F-16-1, the [6] Emergency Procedures Section, Chapter 3.  
[7] **Q:** Did you review Tab H in the report?  
[8] **A:** Do you mind if I look real quick?  
[9] **Q:** No, go ahead.  
[10] **A:** I want to say yeah, but I want to [11] make sure it's the tab I think it is. Yes, [12] ma'am.  
[13] **Q:** And except with counsel who have [14] you discussed your deposition with?  
[15] **A:** Major General Wayne Jefferson, [16] retired, Air Force, and I think Brigadier [17] General Jack Cole was involved in some of [18] that conversation. He kind of — I remember [19] him giving me over the phone about a week [20] ago — he said, you know, this is kind of [21] what a deposition is like because I've never [22] done this before. I don't think he and I,

[1] you know, went back and forth about any [2] specific areas but I could be wrong.  
[3] **MS. NAKAHARA:** Mark that as Exhibit [4] 11.  
[5] (Deposition Exhibit No. 11 was [6] marked for identification.)  
[7] **BY MS. NAKAHARA:**  
[8] **Q:** Is Exhibit 11 a copy of your CV or [9] resume?  
[10] **A:** Yes, ma'am.  
[11] **Q:** And is it current?

[12] **A:** I'll have to look. I'm not sure [13] when I provided this to anybody. It's a good [14] encapsulation of my Air Force career. It [15] doesn't talk about what I've done since then.  
[16] **Q:** Is anything that you've done with [17] respect to your professional career since you [18] left the Air Force relevant to this [19] proceeding or the issues that you're going to [20] testify on?  
[21] **A:** Only to the extent that I've helped [22] prepare portions of this report and provide  
[1] information to Private Fuel Storage.  
[2] **Q:** And who is your current employer?  
[3] **A:** I'm self-employed so I guess I work [4] for myself. This is — the arrangement with [5] the Private Fuel Storage facility is through [6] a company called Burdeshaw Associates, Ltd. [7] They're in Bethesda,

Maryland. They are — [8] Shaw Pittman contacted Burdeshaw for [9] assistance on the aircraft accident — I'm [10] speaking a little bit for Shaw Pittman. This [11] is my understanding is what I should say.

[12] Shaw Pittman contacted Burdeshaw [13] for assistance in trying to prepare the [14] response for the aircraft accident portion of [15] the application process, and Burdeshaw [16] eventually wound up contacting me some months [17] — I don't have any real sense for how long [18] that was from when they first got this [19] contract. So I work as a subcontractor to [20] Burdeshaw Associates.

[21] **Q:** And what type of other contracts do [22] you take on?

[1] **A:** I'm working on a — this one also [2] is a subcontract arrangement with Burdeshaw [3] with the National Imagery and Mapping Agency [4] or commonly referred to as NIMA. I'm doing [5] some work for them. There was one or two [6] meetings in — I think July was the first one [7] and since about probably October — sometime [8] in September-October I've been working [9] basically full time. That's not quite true, [10] but, I mean, that's been the bulk of my [11] effort is with the NIMA project.

[12] I also have been doing some work [13] with a company down in Tampa that has [14] absolutely nothing to do with defense [15] industry. Marketing Associates is the name [16] of that.

[17] **Q:** When did you start your military [18] career?

[19] **A:** Well, depends how you define [20] military career. I entered the Air Force [21] Academy in the end of June in 1970. I [22] graduated from the academy in 1974, so I was

[1] commissioned at that time on the 5th of June [2] 1974 as a second lieutenant in the Air Force.

[3] **Q:** And when did you end?

[4] **A:** I left active duty in June of 1998. [5] My official retirement was a couple — they [6] have what they call terminal leave status [7] where you can take accumulated leave and [8] apply that towards so you kind of leave [9] active duty — was the fall of '98.

[10] **Q:** Is there a particular reason you [11] retired?

[12] **A:** Well, I guess, yeah, I'd always [13] known that I was going to need a second [14] career is kind of what it boils down to, and [15] they were talking to me about assignments [16] that — for my next — next assignment [17] opportunities, and I basically kind of looked [18] at what was

being offered, what I had done. [19] I was leaving the last job that I really — I [20] mean, when I joined the Air Force at some [21] point in my career I said there are a couple [22] things I'd really like to do.

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[1] I'd like to fly fighters. I was [2] fortunate enough to do that. I decided I [3] wanted to go to fighter weapons school. I [4] was fortunate enough to do that. I thought [5] I'd like to be a squadron commander, an [6] operations commander, although we called them [7] DOs in my younger days, and a fighter wing [8] commander. I've had the opportunity to do [9] all those things and they were offering me [10] some jobs and I thought maybe now's the time [11] to leave. So it was a great 24 years and I [12] look back with many fond memories.

[13] **Q:** How long have you flown F-16s?

[14] **A:** I first flew it in the fall of [15] 1981. There were a couple of breaks in there [16] when I went to staff and school like that. [17] My first break would have been January of [18] '86, when I left Incirlik Air Base, Turkey, [19] and went to the Pentagon for the first time [20] and worked on the Headquarters Air Force [21] staff.

[22] Then I flew it again a little over

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[1] four years later in 1990, and I don't [2] remember the exact month that I first flew it [3] but it was in 1990. I flew it for about [4] three years until the summer of '93, when I [5] again left active flying and went over to [6] Rome, Italy, to go to the NATO Defense [7] College.

[8] Then in '94, in the spring of '94 [9] — I'll say April or so — I left Rome, went [10] back to Luke, flew the airplane to get [11] requalified for — back in the F-16. That [12] took about five weeks or so, went back to [13] Rome, picked up my family, moved them to the [14] States, and then I went to Korea, where I [15] spent 13 months where I again was actively [16] flying.

[17] Then in August — I left Korea in [18] July, so August of '95 I left Korea, came [19] back to the States to go to work at the Joint [20] Chiefs of Staff at the Pentagon. My total [21] tour there was about 22 months, and I [22] actually went out to Luke while I was still

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[1] on the Joint Staff to get requalified again, [2] and then I went out to Hill in June of '97.

[3] **Q:** And you retired from Hill?

[4] **A:** Yes, ma'am.

[5] **Q:** After Hill. In requalifying to fly [6] an F-16 does that typically take five weeks?

[7] **A:** The short answer is it can be. The [8] little bit more expanded answer is they [9] have [9] a typical requalification course that lasts a [10] little bit longer than that. The first time [11] I went out to requalify it was about a [12] 3-month program, but because I had previous [13] experience in the airplane — it's kind of [14] convoluted.

[15] I was with a group of other fighter [16] pilots, many of whom had never flown the [17] airplane before, so I went through all the [18] same training they did in terms of ground [19] school and simulators, but I probably wound [20] up actually getting about half the number of [21] actual flights in the airplane, and that's [22] kind of a rough guess.

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[1] I flew significantly less than all [2] the other pilots because those pilots had [3] never flown the F-16 before. So they had [4] the requalification program was cut down a [5] little bit after that. I don't remember [6] exactly what the length was. My last two [7] checkouts were about five weeks. Those are [8] called senior officer checkouts for people [9] who had previously flown the airplane going [10] through leadership positions typically at the [11] full colonel rank.

[12] **Q:** And the requalification or [13] qualification includes ground school, [14] simulator training —

[15] **A:** Yes, ma'am, and flying and check [16] rides. So you get a qualification check ride [17] in the airplane while you're still in [18] training.

[19] **Q:** Is a check ride with an instructor?

[20] **A:** Yes, standardization evaluation [21] flight examiner is the official term referred [22] to as SEFE, and he will follow you around in

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[1] another airplane, in a chase airplane, in a [2] very close proximity, so he has a very good [3] idea of what you really did the entire [4] flight.

[5] **Q:** When do you have to requalify? [6] After not flying an airplane for how long, [7] approximately?

[8] **A:** That's a tough question. I think [9] there are — I think, and this is kind of [10] squishy, once you go past the 179-day point [11] then some sort of official requalification is [12] required. I believe there are provisions [13] where that can be done locally. For [14] instance, if I were flying at Hill Air Force [15] Base, say, and I broke a leg and I couldn't [16] fly for six or eight months I believe that [17] Hill would have the authority to do a local [18] requalification for me there.

[19] There's another time frame, I [20] think, and I'm not sure what it is. It's [21] probably at about a year where they

require [22] you — the standard then becomes you would go

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[1] to a formal training base to get requalified. [2] Right now we do our F-16 training at Luke Air [3] Force Base, which is down near Phoenix, [4] Arizona.

[5] **Q:** And what do you do in a local [6] requalifying?

[7] **A:** It would be the same types of [8] things. There are instructor pilots at every [9] base. They would run you through the same [10] types of training. You would have the [11] advantage of still being in the flying [12] environment while you were sitting there with [13] your broken leg, so you don't necessarily — [14] the brain doesn't atrophy and you worry about [15] all the things you worry about when you're [16] filling a staff position.

[17] **Q:** When was the last time you flew an [18] F-16?

[19] **A:** I believe that was probably April [20] of '98.

[21] **Q:** Then your CV indicates that you [22] were a formal course instructor?

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[1] **A:** Yes, ma'am.

[2] **Q:** When were you a formal course [3] instructor?

[4] **A:** Two different occasions. When I [5] first had the good fortune of getting the [6] airplane back in 1981 it was a very new [7] airplane in the inventory. I mean, it was [8] just coming into the inventory. I was [9] stationed at McDill Air Force Base, which at [10] the time was primarily an F-4 base, but they [11] were in the process of converting that to an [12] F-16 training base, converting from F-4s to [13] F-16s.

[14] So I showed up at Hill — or, I'm [15] sorry, at McDill in the summer of '81. I [16] started a — at the time there were four [17] squadrons. There were 61st and 62nd were [18] flying F-16s. The F-16 conversion at the [19] 62nd squadron had just been completed. The [20] other squadrons were 63rd and the 13th.

[21] I was assigned to the 13th squadron [22] as a student pilot but I went to F-16

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[1] academics even though it was an F-4 squadron [2] and then the academic preparation took [3] several weeks, maybe a month, I don't [4] remember, before your first ride.

[5] So in '81 — I'm sorry. There was [6] a Friday when the 63rd squadron flew their [7] last F-4 sorties and then on that Monday it [8] was an F-16 squadron, the following Monday, [9] and my class started to fly that day.

[10] So I went through a TX program, [11]

which stands for transition course program. [12] I finished that late '81. I don't have a [13] specific graduation date for you, and then I [14] entered into an instructor pilot training [15] program immediately thereafter and finished [16] that sometime in early '82.

[17] So I spent almost all of 1982 and [18] 1983 as a formal course instructor at McDill [19] Air Force Base.

[20] Q: And that's for F-16s or —

[21] A: F-16s.

[22] Q: And then the second time you were

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[1] an instructor?

[2] A: That also happened to be at McDill, [3] was from '90 to '93. Checkout process didn't [4] take nearly so long since I had so much [5] experience on my belt. So I got back to [6] McDill summer of '90, and I don't remember [7] when I completed all my requalification and [8] instructor checkout, but I basically spent — [9] you know, if you say four, five months to do [10] all of that stuff while I was flying there, [11] then I spent the rest of the time as an [12] instructor pilot until summer of '93, when I [13] left to go to Rome.

[14] Q: And that was an F-16 pilot?

[15] A: F-16.

[16] Q: And is there a difference between a [17] formal course instructor and an instructor?

[18] A: Yes, ma'am, there is. A formal [19] course instructor goes through a different [20] checkout program, and we'll call them formal [21] course and we'll call them operational to [22] kind of differentiate between the two.

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[1] The formal course instructor goes [2] through a formal checkout program run by a [3] training wing. You know, the wing's job is [4] to train people to fly the F-16. One of [5] their ancillary jobs is to train people who [6] are already qualified in the F-16 to be [7] instructor pilots, so they have a special [8] course, an IP course, and there are a couple [9] of different tracks based upon what you've [10] done in your previous experience.

[11] But you were taught — the purpose [12] of that program is to give you the flying [13] skills but also the teaching skills so that [14] you can teach somebody who's never flown an [15] F-16 — I mean, that's the most — often [16] times the most — well, I won't say it's the [17] most challenging but sometimes it's a [18] lot of other time and other airplanes and [19] comes with his own preconceived ideas. [20] That's the most difficult.

[21] But the idea is that you can take [22] somebody — you have in-depth know-

ledge of

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[1] how the airplane works, and you have in-depth [2] skills in terms of flying the airplane, and [3] at least as important is your ability to [4] communicate effectively so that people can [5] impart — you can impart the knowledge that [6] others have passed on to you so they can [7] learn adequately and safely and effectively [8] fly it and deploy the airplane.

[9] Q: An operational course instructor?

[10] A: An operational course instructor [11] will go through a local syllabus. I mean, [12] like, instead of at a formal training base he [13] will go through, like, at Hill Air Force [14] Base, for instance, that's an operational [15] wing. Their emphasis is on maintaining [16] combat capability to support the national [17] command authority.

[18] So that's what they do, and the [19] training they do is geared to doing that. [20] They don't take people as a routine function [21] who have never flown the airplane before to [22] teach them how to fly the airplane. They

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[1] take people that are graduates of a formal [2] course who are qualified to fly the airplane, [3] and they kind of show them the local area, [4] how we do things here, any unique aspects of [5] your mission at your base, and that's [6] normally done under the supervision of an [7] instructor.

[8] So a local check-out is provided to [9] those instructor pilots. They don't do all [10] of the things that you would expect them to [11] do at a formal course because that's not [12] their task. Their task is to instruct in [13] terms of operational employment of the [14] airplane. I mean, that's their primary [15] focus, not how do I fly this, how do I drop a [16] bomb, how does this work, how does that work [17] type of thing. So it's kind of a follow-on.

[18] Q: Were you an operation course [19] instructor?

[20] A: When I was Incirlik air base in [21] Turkey, I was assigned to Incirlik but there [22] were no airplanes there. There was a unique

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[1] flying position there called the weapons [2] liaison area officer who was — there were no [3] airplanes permanently stationed there, but I [4] maintained currency by flying the F-16s that [5] rotated in and out of Hahn Air Base in [6] Germany or Torrejon Air Base in Spain. They [7] were rotating in and out to use the [8] facilities there. I would fly those [9] airplanes to maintain currency and if [10] necessary I would go back to Spain and

fly at [11] Torrejon to maintain currency. While I was [12] there I also maintained instructor pilot [13] status.

[14] Q: I think you already told me but [15] when were you in Turkey?

[16] A: December '83 to December '85.

[17] Q: And have you led a formation of [18] F-16s in training exercises? That's probably [19] not the correct term.

[20] A: Was I flight lead?

[21] Q: Yes, thank you.

[22] A: Yes.

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[1] Q: When was the last time you were a [2] flight lead?

[3] A: At Hill.

[4] Q: And can you describe how the 388th [5] fighter wing's organized generally?

[6] A: Yes, ma'am. It's a — you have the [7] command section, which is run by the wing [8] commander. Underneath the wing commander you [9] have two groups. You have the operations [10] group. The operations group is composed of [11] the fighter squadrons, the air control [12] squadron, and the operational support [13] squadron.

[14] The logistics group has got the [15] logistics support squadron and the [16] maintenance squadron. I don't think I'm [17] missing anything else in the logistics group. [18] And then there's also the 388th range [19] squadron, and that reports directly to the [20] wing commander. That's unusual in an Air [21] Force structure for a squadron to report [22] directly to the wing commander.

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[1] Squadrons are normally subordinate [2] to a group. Each one of those other [3] organizations I mentioned to you has their [4] own commander as well, so there's kind of a [5] waterfall effect downward, if you will.

[6] Q: And the deputy wing commander [7] reports directly to you?

[8] A: Vice wing commander, yes, ma'am.

[9] Q: Was the 388th range squadron [10] created during your tenure as commander of [11] the 388th?

[12] A: It was. When I first arrived at [13] Hill in the summer of '97 the range was [14] operated by a detachment. It was DET 1, I [15] think Detachment 1, of the Air Force Flight [16] Test Center out of Edwards Air Force Base. [17] So the guy that really owned the range, if [18] you will, was in California.

[19] Then on 1 October of '97 — I [20] remember the date because it was a change of [21] the fiscal year — the range — that [22] detachment stood down and the

388th range

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[1] Squadron stood up. So at that point, the [2] range squadron became a part of the 388th [3] wing.

[4] **Q:** And what were the duties of the [5] 388th range squadron?

[6] **A:** They basically were responsible for [7] targets, having the right kinds of targets up [8] there, supporting the test — the test [9] portion of the UTTR, Utah Test and Training [10] Range. They maintain and operate a lot of [11] the equipment to monitor and support the [12] test.

[13] Also, the system that's used to [14] monitor — there's a thing often referred to [15] as ACMI, air combat maneuvering [16] instrumentation, where you can put a special [17] pod on an airplane and it transmits data on [18] position, performance, what the airplane's [19] doing. That's all collected — you can do [20] this on a bunch of different airplanes, and [21] you can figure out where they are on the [22] range, and you can kind of evaluate how the

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[1] flight went, and you can — from that you can [2] go back and replay those tapes, and you can [3] come back and reconstruct the fight that you [4] just had or the training exercise that you [5] just had to enhance your learning and more [6] accurately recreate the last training mission [7] you were just on, and not all the airplanes [8] fly with those pods all the time but that's [9] one of the other things they do.

[10] **Q:** Are they responsible for scheduling [11] on the range?

[12] **A:** Yeah. I mean, they're overall [13] responsible for range scheduling. There is [14] also a scheduling component in the operations [15] group. The 388th operations support squadron [16] handles kind of the squadron wing level [17] scheduling. They're responsible for doing [18] the range scheduling, but they might give the [19] 388th wing this block of four hours that the [20] OSS would divvy up as they saw fit kind of a [21] thing. But like the B-52s that would fly up [22] from Barksdale, the B-1s, the B-2s, they all

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[1] coordinated and got range time from the range [2] squadron.

[3] **Q:** While commander of the 388th how [4] often did you perform F-16 training [5] exercises?

[6] **A:** My standing orders to my exec, who [7] was kind of responsible for getting me to the [8] right places at the right time, were to try [9] to schedule me for two activities a week. [10] That could

be a simulator and a flight. It [11] could be two flights. If I had to give you a [12] number, I'd probably say something around one [13] and a half times a week I'm guessing I flew. [14] I haven't sat down to try to count that up.

[15] **Q:** And how did the amount of training [16] that this one and a half times to two times a [17] week compare to your average fighter pilot?

[18] **MR. GAUKLER:** Objection, unclear, [19] but go ahead and answer if you can.

[20] **THE WITNESS:** It's less. I'd have [21] to sit down and try to do some math to figure [22] out how much less. Your line pilot, who's

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[1] called a RPI-1 — rated position identifier I [2] think is what it stands for — there are [3] different categories. Your line pilot who is [4] a combat-ready kind of guy, the bulk of the [5] fighting force, if you will, the RPI-1s, fly [6] the most. Then as you move up into the [7] squadron leadership — the wing [8] leadership, because of the leadership tasks [9] that they have, they don't fly quite as much. [10] I think —

[11] **BY MS. NAKAHARA:**

[12] **Q:** Can you estimate how often —

[13] **A:** Well, I think — and this is the [14] pendant. There was a matrix that you used to [15] have to use based on whether the pilot was [16] experienced, inexperienced, whether he had [17] special qualifications. But as a number what [18] kind of comes to mind is that an [19] inexperienced RPI-1 had to fly I think 60 [20] times a half or roughly ten times a month.

[21] If he was experienced, that number [22] was less. If I had to give you a number I'd

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[1] say 45 to 50 for an experienced guy would be [2] his minimum. For a RPI-6, which is what I [3] was, what Colonel Horstman was, what your [4] leadership is, I believe that the minimum [5] requirement on a per-half basis was 36 [6] sorties, but if that's not the number it's [7] certainly within the ballpark.

[8] **Q:** And are you familiar with the term [9] "mission and tactics"?

[10] **A:** Yes, ma'am.

[11] **Q:** Can you explain what mission and [12] tactics mean?

[13] **A:** Mission to me is what is my job, [14] okay? Today's mission is to go back to World [15] War II stuff to bomb the ball bearing factory [16] in Schweinfurt, Germany. That's your [17] mission. The tactics would be what am I [18] going to do with the assets that are given [19] me, the

airplanes, the support, et cetera. [20] How am I going to try to get there to [21] accomplish the mission?

[22] Am I going to go in at high

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[1] altitude with everybody at this formation, or [2] am I going to go in at low altitude or mix [3] it, have some guys up high, have other people [4] down low? So the tactics would be my plan of [5] execution, maybe, as a way of trying to [6] maximize my strengths to accomplish the [7] mission or the mission objectives of the day.

[8] **Q:** And is it correct that the tactics [9] of an F-16 fighter wing would change over [10] time?

[11] **A:** It's correct to say that they [12] might. It kind of depends on what else [13] happens. For instance, your tactics, if you [14] pick up a block 40 airplane, which is the [15] ones that are flown at Hill by the 388th, you [16] also pick up the capability called LANTIRN, [17] low altitude navigation tactical infrared [18] night. LANTIRN is the abbreviation.

[19] With the LANTIRN capability comes [20] the capability to drop precision guided bombs [21] referred to as either PGMs, which is a [22] generic term meaning precision-guided

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[1] munition, of which bombs are only a subset, [2] or laser-guided bombs, LGBs.

[3] So because you now have this [4] capability that you didn't have in the past [5] your tactics will probably change to support [6] the new mission because you have different [7] capabilities even though it is still an F-16. [8] There are other changes in technology that [9] could happen that could drive a change in [10] tactics as well.

[11] **Q:** Is this LANTIRN capability part of [12] the reason that the 388th fighter wing flies [13] low level altitude training runs?

[14] **A:** That's one of the reasons, yes. [15] There's I would say two reasons. The low- [16] altitude environment is generally [17] considered — if you've got a very high [18] threat area, enemy air defense systems that [19] you don't think you can take out before you [20] have to go there to destroy them, neutralize [21] them somehow, whether it's electronically or [22] whether it's attacking them with some sort of

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[1] a munition, that would be one reason you [2] would go in low, kind of threat-driven. The [3] LANTIRN system does give you the capability [4] to not only go in low but to do it under [5] conditions of reduced visibility or darkness.

[6] You have two different pods on the [7] airplane. One is what's referred to as the [8] targeting pod. That's the one that gives you [9] the capability to precisely guide one of [10] those laser-guided bombs we talked about to a [11] specific point. The other pod that goes with [12] it is what's referred to as the navigation [13] pod. That gives you two capabilities. One [14] is that it will give you imaging infrared display [15] referred to as IIR. If I say it later, I'm [16] sorry. But it will give you a projection, a [17] IIR image, basically, up on the HUD so you [18] can see this IIR depiction of what's around [19] you or out in front of you more specifically [20] generally is where it's looking to give you [21] some idea of where the terrain is and those [22] types of things. So that's one capability

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[1] the targeting pod has.

[2] The other capability it has is the [3] TFR, terrain following radar. I was never [4] qualified to fly the TFR part. I could do [5] the targeting pod and I knew how to operate [6] the LANTIRN pod, the navigation pod, but [7] there were very people in the wing qualified [8] at low altitude with TFR. That was a special [9] capability that we kept a small corps of [10] people in the wing qualified to do and that [11] was it because it's pretty demanding.

[12] So the terrain-following radar you [13] had two modes, and I'm not talking as a [14] subject matter expert on this because I never [15] flew that particular capability. One is a [16] manual mode where you will get displays up or [17] indications up in your head-up display of [18] what you need to do in terms of altitude to [19] maintain your desired altitude above the [20] ground and not hit anything in front of you.

[21] The other is an automatic TFR, [22] where you will actually couple that terrain

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[1] following radar into the flight control [2] system of the airplane and at that point you [3] run the throttle but other than that you're [4] along for the ride.

[5] Q: Under your command did the 388th [6] fly training missions using night vision [7] goggles?

[8] A: Not when I was there.

[9] Q: Do you know if the 388th flies [10] currently with night vision goggles?

[11] A: I don't know if they fly with NVGs [12] or not. I know that NVGs were something the [13] Air Force was looking at when I left active [14] duty. They had flown with them in the [15] reserves but that was — I'm sorry. It was [16] probably the guard, the guys down in Panama, [17] that would go down for drug inter-

diction [18] profiles. They did it under special [19] circumstances. I'm not familiar with that.

[20] It was, like, two-seat airplane, [21] this, that, and the other, and they were [22] trying to help intercept the people flying

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[1] the drugs up into the U.S. at night, and that [2] was the first use that I know of of NVGs in [3] the F-16.

[4] Q: So I assume you were not qualified [5] to fly F-16s with night vision goggles?

[6] A: That's correct.

[7] Q: And did you work with Lieutenant [8] Colonel Hugh Horstman?

[9] A: Yes, ma'am, I did.

[10] Q: Did you work with Lieutenant [11] Colonel Hugh Horstman prior to your command [12] at the 388th fighter wing?

[13] A: No, ma'am.

[14] Q: And what was your professional [15] relationship with Lieutenant Colonel [16] Horstman?

[17] A: It would be a standard Air Force [18] relationship of subordinate to superior by [19] position and rank. It was an excellent [20] relationship, I think.

[21] Q: He was deputy commander of the [22] operations?

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[1] A: Yes, ma'am.

[2] Q: And was Lieutenant Colonel Horstman [3] qualified as an F-16 flight instructor?

[4] A: You know, I think so but I really [5] don't remember. I never flew with him in [6] that capacity. If I had to name all the IPs [7] in the wing I probably couldn't have done [8] that, so I apologize. It's been two and a [9] half years or so.

[10] Q: Did you evaluate Lieutenant Colonel [11] Horstman at the 388th?

[12] A: Indirectly. His immediate superior, [13] Steve Bozarth, wrote his performance [14] report. I would have been the reviewing [15] official.

[16] Q: And how would you rate Lieutenant [17] Colonel Horstman's knowledge with respect to [18] flying F-16s in the Utah Test and Training [19] Range?

[20] A: I would consider Hugh Horstman to [21] be extremely well qualified to talk about [22] flying F-16s in the UTTR. He's an

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[1] excellent officer and credit to the [2] profession.

[3] Q: Are you familiar with the 419th [4] fighter wing stationed at Hill Air Force [5] Base?

[6] A: Yes, ma'am, I am.

[7] Q: In general are you familiar with [8] the training missions flown by the 419th?

[9] A: I can say in general I'm familiar [10] with the training missions that they were [11] flying at the time I was at Hill. If that's [12] changed I'm not privy to that information.

[13] Q: Is it correct that the 419th also [14] flies training missions in the Utah Test and [15] Training Range?

[16] A: That's correct.

[17] Q: Is it correct that the 419th also [18] flies training missions through the Sevier B [19] MOA?

[20] A: Yes.

[21] Q: And during your command how did the [22] training missions for the 419th fighter wing

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[1] differ from those flown by the 388th [2] fighter wing?

[3] A: I'll speak in general terms because [4] I never got into the bowels of their training [5] program, but basically it was similar in the [6] things that they did air-to-air training like [7] we did. They did air-to-ground training like [8] we did. Those are the two primary missions [9] of the F-16.

[10] It would be different in the sense [11] that at the time I was there they had no [12] precision guided capability, no LANTIRN-like [13] capability, so they would not have done those [14] types of things. But in terms of general [15] training or general purpose use of the F-16 [16] it would have been very similar, I would [17] think, so what we did.

[18] Q: In comparison to the amount of [19] training per fighter pilot would the 419th [20] fighter wing complete as many training runs [21] as the 388th?

[22] A: I can't speak with great authority

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[1] to that because, again, I was never in the [2] reserve unit. It is my understanding that [3] their requirements were less than ours, and [4] so their typical pilot would fly less than [5] our typical pilot.

[6] Q: I have a couple more general [7] questions about your CV. Where was the 8th [8] operations group?

[9] A: Kunsan Air Base, Korea.

[10] Q: And where was the 63rd fighter [11] squadron located?

[12] A: When I had command of the 63rd it [13] was at McDill Air Force Base in Florida.

[14] Q: And what time frame were you at [15] McDill as commander?

[16] A: I was there twice — oh, as a [17] commander I was there from — I took

command [18] of the squadron in '92, and then the squadron [19] moved to Luke Air Force Base in '93 as part [20] of the Base Realignment and Closure [21] Commission action, or the BRAC, so I gave up [22] command in '93. The original — well, I

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[1] don't know what the original plan was. [2] That's not what happened.

[3] **Q:** Have you ever assessed the [4] probability of an aircraft crash before your [5] assistance in the PFS project?

[6] **A:** In terms of calculating [7] probabilities the answer is no. The first [8] time I was at McDill I was the investigating [9] — not the investigating officer, I was the [10] pilot member of an investigation that [11] involved an actual F-16 that crashed at [12] but that was what caused this one to go down? [13] Is there anything we need to change in the [14] F-16 to make it better kind of a thing, so [15] that was the limited scope that I had in [16] that.

[17] **Q:** Have you ever evaluated aircraft [18] accidents for the Air Force other than the [19] McDill?

[20] **A:** No, I've not been involved in that [21] process.

[22] **Q:** Next I'd like to talk about your

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[1] familiarity with the Private Fuel Storage [2] proposal. What is your familiarity with the [3] Private Fuel Storage proposal?

[4] **A:** Can you help me out with [5] "familiarity"?

[6] **Q:** You understand that they're [7] proposing to build a nuclear waste storage [8] facility in Skull Valley?

[9] **A:** What is it they're proposing to [10] build?

[11] **Q:** Yes.

[12] **A:** As I understand it, the proposal is [13] to build an above-ground storage area for [14] casks that will contain spent or used nuclear [15] reactor fuel for the purpose of holding the [16] overflow, basically, that's being generated [17] now by the atomic energy facilities around [18] the country that are producing power until [19] such time as the Department of Energy [20] completes the Yucca Mountain long-term [21] storage facility. That's probably not the [22] right term.

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[1] And then they'll start moving those [2] casks down to Yucca Mountain for permanent [3] storage, and after they're all off of the [4] proposed PFS site that will all be cleaned up [5] and restored to some natural state or [6] whatever the arrangement is with the Indian [7] tribe.

[8] **Q:** And when were you hired by [9] Burdeshaw to participate in the PFS project?

[10] **A:** I believe it was October of last [11] year. I had indirectly helped prior to that. [12] I didn't really know what was going on, to be [13] perfectly honest with you, but to try to give [14] you a complete answer some months before [15] that, and I couldn't even tell you when it [16] was, several months before that I'd gotten a [17] couple of phone calls from Major General [18] Jefferson. He asked me some general [19] questions about the range and about F-16s. [20] That's about the extent of my memory.

[21] I suggested that one of the things [22] that he could do would be to contact the

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[1] people at Hill because he was asking me what [2] about this airspace, what about that [3] airspace, and I said they have a local flying [4] regulation that kind of delineates a lot of [5] that. That might be a lot more useful than [6] my memory over the phone.

[7] So I provided him some very general [8] information like that, and then I didn't hear [9] anything else about it and that was fine. A [10] couple of months later I got a couple phone [11] calls from Brigadier General Cole, and he [12] asked me some general F-16 questions, general [13] Utah Test and Training Range questions. I [14] answered them as best I could.

[15] Then I didn't hear anything for a [16] little while, and then there was a phone call [17] where there were a group of Shaw Pittman — I [18] believe it was Mr. Gaukler, Mr. Barnett, and [19] I think both generals Cole and Jefferson were [20] in some kind of a meeting probably in the [21] Shaw Pittman building. That's speculation. [22] I don't remember.

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[1] They gave me a call and I answered [2] some questions and they asked if I could come [3] up to provide them face to face contact. So [4] I flew up to Washington in I believe it was [5] the end of October of last year for what I [6] thought would be a one-or-two-day this is [7] what I know and that would be the end of it.

[8] That's when I — that's the point [9] at which I would say I was hired by Burdeshaw [10] because up until then I didn't even realize [11] that General Jefferson or General Cole were [12] associated with Burdeshaw. I didn't even [13] know what Burdeshaw was, to be perfectly [14] honest.

[15] **Q:** To the extent you can, describe [16] your duties under your current contract with [17] Burdeshaw.

[18] **A:** I don't have a contract with [19] Burdeshaw. I don't think I've got a

contract [20] with Burdeshaw. The way the Burdeshaw [21] company is organized, constructed, operated, [22] there are probably 15 to 20 permanent staff

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[1] members in Burdeshaw. They maintain an [2] associate roster of — I've heard numbers of [3] anywhere from 300 to over 600 associates who [4] are — most of whom are retired general [5] officers from the services. There is a [6] percentage — it's a relatively small number, [7] 10, maybe 15 percent — that are full [8] colonels such as myself, and then there's a [9] smaller number of former civilian employees [10] of the Department of Defense or government [11] service.

[12] And when Burdeshaw takes on a [13] project for, say, Lockheed Martin or pick a [14] company what they'll do is they'll — it's [15] generally task-specific. You know, this is [16] what we're expecting you to do, here is the [17] time frame that we expect it, and this is the [18] deliverables. Then they go down their list [19] of rosters of associates, and they've got a [20] database that says this person is familiar [21] with these types of things, has expertise in [22] these things, and they just start matching

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[1] up, and they call you up and say we have a [2] project with company X. We think it will be [3] about two months in duration. We're [4] estimating at so many man days. Here is the [5] scope of work. Are you interested? And you [6] say yes, I'm interested or no, I'm not.

[7] Then if you're interested they say [8] are you available, and you say yes, no, or [9] maybe. If the answer to everything is yes [10] and the contract goes through, then you would [11] work on that project. Does that explain it?

[12] **Q:** So what's your scope of work for [13] the PFS project?

[14] **A:** That's probably something I would [15] have to go back to Burdeshaw and ask. I can [16] tell you verbally what I was told by Mr. Jim [17] Connolly, who is the first person that I [18] talked to that I knew was from Burdeshaw and [19] at this point I knew there was such a thing [20] at Burdeshaw. Jim was one of the vice [21] presidents at the time. He has since stepped [22] down from that capacity and is a — I think

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[1] he's an associate now like me. [2] But what he said was — this was [3] after I had the phone call with these guys. [4] Jim called to follow up and said I'm with [5] this company called Burdeshaw. This is kind [6] of what we do. This is how it works. Would [7] you come.

up and work for this weekend? And I [8] said yeah.

[9] So that was kind of the extent of [10] the explanation for that project. I fully [11] expected it to be a weekend deal and I [12] thought that would be it. They continued to [13] ask me questions, and I continued to provide [14] answers as best I could.

[15] Q: This is a copy of a safety analysis [16] report from Private Fuel Storage, page 2.2-1 [17] to 2.2-24. Have you seen this document [18] before?

[19] A: No, ma'am. This is the NRC [20] document?

[21] Q: That's the document prepared by [22] Private Fuel Storage.

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[1] MR. GAUKLER: It's not the NRC [2] document. It's part of the PFS application. [3] It's called safety analysis report.

[4] BY MS. NAKAHARA:

[5] Q: You may have not seen that short of [6] a version.

[7] A: This is — is that in here?

[8] Q: No.

[9] A: Then I probably haven't seen it.

[10] Q: Then you are familiar with the —

[11] A: Aircraft crash impact hazard at the [12] Private Fuel Storage facility?

[13] Q: Yes, Revision 4.

[14] A: Yes, ma'am.

[15] Q: Did you participate in preparing [16] that report?

[17] A: Yes, ma'am.

[18] Q: In what capacity did you [19] participate?

[20] A: Source of information, source of [21] analysis. Somewhere along the line — I [22] don't think I was here for Revision 0. I

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[1] mean, I don't remember but initially they [2] just sent me stuff and asked me to review and [3] comment, so I kind of had an editorial [4] function at the beginning. As time went on [5] there were parts of sections that I wrote or [6] drafted and that were subsequently edited or [7] added in, deleted, modified as incorporated [8] for the report.

[9] Q: Between Revision 0 and Revision 4 [10] do you recall which revision you started [11] drafting parts of the document, 1 or 2, 3?

[12] A: I'm just trying to remember what [13] came out when. I really haven't been very [14] involved with this project at all since this [15] — you know, since this revision was ready to [16] go to press. I would be guessing to tell [17] you. I mean, I really don't remember which [18] re-

vision it was.

[19] Q: Do you have a time frame guess when [20] you started to become more involved?

[21] MR. GAUKLER: Don't speculate. [22] Answer what you know.

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[1] THE WITNESS: If "more involved" [2] means provided editorial comment on things [3] that somebody else prepared that would have [4] been whatever came out after that late [5] October meeting when I was in Washington, [6] D.C., but that's all I did initially in terms [7] of really doing things. Now, I did provide [8] that one memorandum that kind of talked about [9] how I typified the flying in the Skull Valley [10] area. That's one of the tabs in there. I [11] don't remember which tab. It's one of the [12] tabs in the report. [13] So that would have been probably [14] the very first thing I authored, if you will, [15] but in that revision I don't remember writing [16] a lot of original content. Whatever [17] publication came out with that tab in it, I [18] don't remember writing a lot of — much [19] original content other than that memorandum. [20] So it would have been sometime after that, [21] and I just don't — I didn't keep up with the [22] revisions.

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[1] Q: That's fine. And the tab you're [2] referencing is tab E dated October 21, 1999?

[3] A: Yes, ma'am.

[4] Q: And if you'll look at the table of [5] contents on page Roman numeral i in general [6] can you identify the areas that you have [7] drafted or were responsible for the initial [8] draft of this document?

[9] A: Parts of the introduction but I [10] probably couldn't put my finger and say that [11] right there is Ron Fly's words. So parts of [12] the introduction — I'm trying to get my [13] introduction straight from my part 3. Just a [14] second here.

[15] Q: Well, if it's easier —

[16] A: I may have had little to do with [17] the introduction now that I actually read the [18] introduction.

[19] Q: If it's easier, maybe you can just [20] generally describe the areas that you were [21] responsible for.

[22] A: Sure. We talked about how they

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[1] operate F-16s on the UTTR. That's something [2] I would have talked about. I just flipped [3] and I saw a page in there that talked about [4] the BDU-33 that has a 25-pound practice bomb [5] and a small spotting charge. That's probably [6] information that I provided. The difference [7] between an inert and a live

bomb, that may [8] have been something that I contributed.

[9] So anything that's unique to the [10] F-16 in terms of how it performs or what a [11] pilot would do with it is probably — I was [12] at least a contributor if not the person that [13] first put pen to paper, although I may very [14] well have been the person that put pen to [15] paper on those particular sections.

[16] Things I did not do: Any of the — [17] like the Kimura et al. methodology, I didn't [18] get involved with that. Calculation of the [19] impact area, I didn't do those types of [20] things. So the statistical analysis was done [21] by others.

[22] A lot of the data research like the

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[1] aircraft crash histories or accident [2] statistics, whatever they call it in here, [3] for all those different types of airplanes [4] that was looked at as a tab yesterday — I [5] remember that color chart — I didn't get [6] that data. Somebody else generated that data [7] from other sources.

[8] So generally I was the person that [9] talked about how do you fly F-16s, how do you [10] fly in UTTR, what do you do in Skull Valley, [11] what are the F-16 aspects of this thing, if [12] you will. I brought the F-16 operational [13] flavor and knowledge of the UTTR to it.

[14] I assisted with the categorization [15] of the aircraft — you remember we talked [16] about the 120-some-odd — I think it's 121. [17] That may be the wrong number. I was one of [18] the three folks that independently reviewed [19] those things and helped to decide — you [20] know, put it in the different categories that [21] are discussed in the report. So I was [22] involved in that process.

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[1] I did not do the calculations with [2] — that drives this number to this, you know, [3] and you wind up with this probability. I did [4] not do the probability calculations. I [5] didn't do the research into traffic at [6] Michael Army Airfield. That was done by [7] somebody else.

[8] I didn't do military helicopters. [9] I didn't do Airway J-56 or commercial [10] aircraft. I didn't do that data. Does that [11] to your satisfaction answer what kinds of [12] things I did?

[13] Q: Yes, thank you. [14] Who did you work with in preparing [15] the crash report?

[16] A: The principal people that I would [17] work with I would say would be Major General [18] Jefferson and Brigadier General Cole. That's [19] probably who I had the most contact with. It [20] was also done with teleconferencing, phone [21] calls, some e-mails to Mr. Barnett and [22] Mr. Gaukler as well.

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[1] So my activity in terms of [2] preparing the report was done principally [3] with those guys. There was nobody else that [4] had a significant role with whom I dealt in [5] terms of generating data that I contributed, [6] edited, or any of that type of thing.

[7] Q: Do you work with anybody employed [8] at Stone & Webster?

[9] A: Mr. John Donnell, who was the [10] project manager, I believe, is his title —

[11] MR. GAUKLER: Project director.

[12] THE WITNESS: He was involved with [13] a couple of meetings. I met him at Shaw [14] Pittman. I didn't work with him really in [15] terms of preparing the report, if that's the [16] question. As the project director he's [17] obviously concerned about how all the [18] different things are going on, so he stayed [19] apprised of it. But I don't remember getting [20] involved with discussions on John on is this [21] a this, is that a that kind of thing, if [22] that's the question. I know him. I've met

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[1] with him a couple of different times, but it [2] wasn't to sit down necessarily and try to [3] generate tab X, Y, Z, or anything like that.

[4] BY MS. NAKAHARA:

[5] Q: To your knowledge, does General [6] Jefferson have any F-16 flight experience?

[7] A: I believe that he does not. I'll [8] say I'm certain that he's not. Of course, [9] then he's going to show where he rode in the [10] backseat one time for half an hour 12 years [11] ago.

[12] Q: To the extent you know, does he [13] have any other single-engine fighter pilot [14] experience?

[15] A: I don't know. I don't know what [16] his flying background is. I know the last [17] airplane he flew was the B-52. He may have [18] flown the F-105. I don't know why I just [19] said that. I know that's speculation. I [20] know he flew the B-52. What other airplanes [21] he's flown I don't know. Maybe that's the [22] best way to explain it.

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[1] Q: Also to the extent you know, does [2] General Cole have any F-16 pilot experience?

[3] A: No.

[4] Q: And to the extent you know, does [5] General Cole have any single-engine fighter [6] aircraft —

[7] A: I know he flew the C-141. What [8] other airplanes he's flown I don't know but I [9] suspect his military career was spent flying [10] C-141 or other cargo

airplanes. What they [11] were, I don't know.

[12] Q: To the extent you know does [13] General Jefferson or Cole have any [14] experience flying training missions in the [15] Utah Test and Training Range?

[16] A: I'm not aware of any.

[17] Q: Who had primary responsibility for [18] the crash report?

[19] A: I don't know. I mean, it was very [20] much a collaborative effort. I certainly [21] would not consider myself the primary person. [22] You know, there are tabs in there that I

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[1] basically had never looked at. I guess that [2] I would say that it was done under if I [3] had to put a finger at somebody it would be [4] Mr. Gaukler as the lead for Shaw Pittman on [5] this. That's who we worked for — that's who [6] Burdeshaw's under contract to is Shaw [7] Pittman, but I would say it's very much a [8] collaborative effort to try to pull upon the [9] various strengths that each individual on the [10] team had to try to use their expertise in the [11] areas where it was needed.

[12] Q: If the three experts had a [13] difference in opinion who would decide which [14] opinion to describe in the crash report?

[15] A: I don't — I can't think of a case [16] where we had a disagreement among ourselves [17] that we weren't able to resolve among [18] ourselves. I mean, we never got into this [19] one, he said A, he said B. I mean, they [20] might look at something one way or somebody [21] — you know, one of the individuals might [22] read a report or this or that, somebody else

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[1] might read the same thing and have a [2] different take, but, you know, once we sat [3] down and discussed it we kind of go oh, okay, [4] we agree that this is correct, that whatever [5] the resolution was.

[6] So I don't — I can't think of a [7] case that we had to adjudicate up to the [8] Supreme Court or anything else. We would [9] probably not go to the Florida Supreme Court [10] but, I mean, there was no strong areas of [11] disagreement, you know.

[12] Q: Were you asked to evaluate the [13] probability of an aircraft crash into the [14] intermodal transfer facility?

[15] MR. GAUKLER: Objection, [16] irrelevant. You can answer if you can.

[17] THE WITNESS: I can answer?

[18] MR. GAUKLER: Go ahead.

[19] THE WITNESS: I did not do those [20]

calculations. It is my belief and [21] understanding that when they did the area [22] calculations of affected area and potential

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[1] strikes that that was included as part of the [2] area. I remember that I believe was a [3] discussion at the meeting we had with the [4] staff from the NRC on how to do that. I'd be [5] a little fuzzy to tell you exactly what the [6] discussion was in terms of whether you add [7] the areas, subtract the areas, multiply them [8] by the square root of your age, or what.

[9] MR. GAUKLER: For the record, I [10] think there's a confusion. She's talking [11] about the intermodal transfer point near [12] Raleigh Junction and Interstate 80 which for [13] the record we never did consider.

[14] THE WITNESS: Please disregard my [15] comment. I thought you were talking about [16] that building next to the storage facility.

[17] MR. GAUKLER: Ron was talking about [18] the transfer building.

[19] THE WITNESS: I did not look at [20] that.

[21] BY MS. NAKAHARA:

[22] Q: Are you familiar with the proposed

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[1] rail spur that PFS has proposed to install in [2] the middle of Skull Valley down to the PFS [3] facility?

[4] A: I am familiar that that is one of [5] the proposals. I think they were also [6] looking at some sort of a ground [7] transportation. You know now the extent of [8] my knowledge of the rail spur.

[9] Q: With that statement I assume you [10] did not evaluate the probability of an [11] aircraft crash into a train on the rail spur?

[12] A: To the best of my knowledge that [13] was not included as part of any calculation.

[14] Q: Are you familiar with the UTTR land [15] boundaries of the south range?

[16] A: Generally, yes, ma'am.

[17] Q: And have you flown F-16 training [18] exercises over the UTTR?

[19] A: Yes, ma'am, I have.

[20] Q: And are you familiar with the [21] UTTR's airspace boundaries?

[22] A: Yes, ma'am.

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[1] Q: And are you familiar with the [2] location of Skull Valley, Utah?

[3] A: Yes, ma'am.

[4] Q: And is it correct that the Sevier B [5]

MOA is in part located over Skull Valley?

[6] **A:** Yes, ma'am, that's correct.

[7] **Q:** And have you flown over Skull Valley?

[9] **A:** Yes, ma'am.

[10] **Q:** Under what circumstances?

[11] **A:** The only time I ever flew it was in [12] an F-16.

[13] **Q:** Have you flown in the Sevier B MOA [14] over Skull Valley?

[15] **A:** Yes.

[16] **Q:** Have you flown above the Sevier B MOA over Skull Valley?

[18] **A:** I don't believe that I've ever [19] flown down Skull Valley above the MOA [20] altitudes.

[21] **Q:** Did you see any birds while flying [22] through Skull Valley?

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[1] **A:** No, ma'am.

[2] **Q:** Are you familiar with the term [3] "sortie"?

[4] **A:** Yes.

[5] **Q:** Will you please explain the term [6] "sortie"?

[7] **A:** A sortie is in essence a flight.

[8] **Q:** One sortie is counted from the time [9] that you take off until you land?

[10] **A:** Yes.

[11] **Q:** What type of training sorties would [12] a pilot fly over the UTTR?

[13] **A:** Over the UTTR a pilot would fly [14] basically any type of training sortie that we [15] fly in the F-16 at the 388th. That could be [16] from a basic instrument ride, which we do a [17] few of. We have requirement to do that, to [18] maintain basic instrument proficiency. And [19] given the fact that we're talking about the [20] entire UTTR here you could fly intercept [21] missions, you could fly what is generally [22] referred to as dog fights where you — kind

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[1] of World War II movies that you see, you [2] know, the airplanes going all around the sky, [3] that type of thing.

[4] You could fly low levels, you could [5] drop ordnance on the range, you could use [6] your LANTIRN pod, the targeting pod, either [7] for practice or for a real LGB, laser-guided [8] bomb. If you were one of those few people in [9] the wing that were qualified, you could use [10] the LANTIRN system to fly the low altitude [11] automatic TFR. I think I've hit all of them [12] in terms of the broad categories.

[13] **Q:** Now, on page 34 of the crash [14] document it generally states that a pilot [15] would generally fly one type of training [16] sortie, correct?

[17] **A:** Generally. You have a primary [18] mission on every —

[19] **Q:** Under what circumstances would a [20] pilot fly more than one type of training [21] sortie?

[22] **A:** Maybe — let's say a pilot was

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[1] coming up for his annual qualification check, [2] for instance. You might go to the area, into [3] one of the areas designated in the UTTR. You [4] might do some sort of training, whether it [5] was air-to-air or air-to-ground. Then you [6] might discontinue that type of training and [7] go down to Michael's Army Airfield to shoot a [8] practice approach because you know tomorrow [9] you're going to have your check or this could [10] be done in conjunction with a check.

[11] So you go fly the S-run approach to [12] Michaels and then you go back to Hill Air [13] Force Base and complete the required [14] instrument check for an annual instrument [15] check ride. I mean, that could be an [16] instance.

[17] You could conceivably, say, have a [18] low altitude mission to one of the bombing [19] ranges, and that could be your primary [20] mission, and then when you get out there [21] where the weather is a little questionable [22] and you say well, I can't fly low altitude

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[1] and the range is cloud covered, so what we'll [2] do is we'll go into one of the working areas [3] and we'll fly a pre-briefed alternate mission [4] of intercepts. That would be an instance of [5] where you might — and that could actually [6] happen where you could fly low level and [7] you go the weather to the west is looking too [8] bad; we'll discontinue this and go to our [9] alternate mission.

[10] **Q:** If you'll look at tab H, page 10, [11] there's a category B or a paragraph B, normal [12] in-flight. Are you familiar with that term [13] as used in this crash report?

[14] **A:** Yes.

[15] **Q:** What type of training activities [16] would you classify as normal in-flight?

[17] **MR. GAUKLER:** Objection, lack of [18] foundation. Go ahead, you can answer if you [19] can.

[20] **THE WITNESS:** What I would put a [21] normal flight, this was — if you go back to [22] the page before, page 9, these were

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[1] categories out of the ACRAM study, and to be [2] perfectly honest with you I don't remember [3] what ACRAM stands for. But this was a study [4] that was referenced in one of the — in the [5]

meeting — I believe it was the meeting here [6] in Washington with the NRC staff, and that [7] was a study that I believe that they were [8] familiar with, and so the attempt was to try [9] to follow that methodology as one of the ways [10] that the reports would be — that the [11] accident data would be reported.

[12] I guess your real question was what [13] types of things would be in there. Cruise [14] climb, cruise, cruise between, you know, [15] point A and point B, low-level navigation [16] above 500 feet, G-awareness terms, things [17] that we do in the fighter business that we [18] would consider routine, administrative, not [19] high-risk, not complex, demanding tasks, just [20] kind of stuff you do.

[21] **BY MS. NAKAHARA:**

[22] **Q:** And are you familiar with the term

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[1] "terrain masking"?

[2] **A:** Yes, ma'am.

[3] **Q:** And please describe terrain [4] masking?

[5] **A:** The idea behind terrain masking is [6] that — to use the terrain to your advantage. [7] A typical case would be there are some [8] mountains, ridge lines, some sort of [9] significant vertical development. You would [10] try to place that significant vertical [11] development between you and an enemy radar [12] site, whether it's real or simulated, the [13] idea being that the mountain is going to [14] block his radar energy and he won't be able [15] to track you or detect you.

[16] **Q:** And what horizontal range would a [17] pilot need to fly with respect to vertical [18] development practicing terrain masking?

[19] **MR. GAUKLER:** Objection, unclear. [20] You can answer if you can.

[21] **THE WITNESS:** It's dependent in [22] terms of where would the — the key is line

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[1] of sight. That radar transmitter is located [2] somewhere, and as such it has a capability to [3] look, you know, in whatever number of degrees [4] — typically 360 is not unreasonable, [5] although a lot of them have got smaller [6] scans. But it becomes a trigonometry [7] problem. As long as that mountain is between [8] the line of sight from the radar site to my [9] aircraft I have effectively terrain masked.

[10] **BY MS. NAKAHARA:**

[11] **Q:** So for practicing terrain masking [12] in Skull Valley where would a pilot assume [13] the radar was located?

[14] **A:** Well, I mean, different flight [15] leads brief different places. I mean, some

[16] will put them east, some will put them west. [17] You know, I can't say that this was the [18] designated point from which all simulated [19] emitters or radars were located. But the [20] idea is to get comfortable with flying in the [21] vicinity of hills and ridges and things like [22] that. You don't need to be right next to it

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[11] to where you're worried about hitting it, [12] but, you know, there are — does that answer [13] the question?

[14] **Q:** So if a flight lead would put the [5] radar to the west, could 388th fighter wing [6] pilots use the mountains to terrain mask?

[7] **A:** Yes.

[8] **MR. GAUKLER:** Do you want to look [9] at the map?

[10] **THE WITNESS:** Yes. I mean, you [11] could put a radar over here and then you [12] could say as long as I'm on this side of the [13] mountain and at an altitude such that you [14] don't have line of sight to the wherever [15] location you want, you could use this to help [16] frame that. There is an aside that you've [17] got restricted airspace here that you're [18] going to have to avoid.

[19] **BY MS. NAKAHARA:**

[20] **Q:** To the extent you can, can you [21] estimate the minimum length of time an [22] air-to-air combat sortie flown in the UTTR

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[1] would last?

[2] **MR. GAUKLER:** Objection. Sortie [3] from the time you take off to the time you [4] land? Is that what you're saying?

[5] **MS. NAKAHARA:** From the time you [6] enter over the UTTR land range.

[7] **THE WITNESS:** I'm sorry. What kind [8] of sortie again?

[9] **BY MS. NAKAHARA:**

[10] **Q:** Air-to-air combat?

[11] **A:** Are you talking about a dog fight [12] type of a thing?

[13] **Q:** Anything that you —

[14] **A:** If you're doing aggressive within- [15] visual type of things where you're going to [16] be very aggressively man- euvering the airplane [17] you will be using a lot of afterburner, which [18] is the maximum power setting available to the [19] airplane. So your fuel consumption rates [20] while you're using AB — AB is afterburner, I [21] apologize — are going to be very high.

[22] So if — kind of taking the —

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[1] operating under the assumption that we're [2] going to do all of our man-

euvering to include [3] the setups within visual range of each other [4] and for sake of discussion we can say 3 [5] miles — I mean, some guys have got better [6] eyes and they can see farther out than that, [7] but about 3 miles for a number — you could [8] probably plan to get three, maybe four [9] engagements in the area itself. If you're [10] really good you might get five.

[11] Out of that I'd say probably your [12] typical engagement — you'd probably be in [13] the area itself somewhere between 20 — [14] within the working area, not trying to get [15] there or going home, probably 20 minutes [16] would be a good number. Probably 30 minutes [17] would be a long time in the area because of [18] your consumption of fuel and stuff but [19] somewhere in the 20-minute area, 25, maybe [20] down to 17, somewhere in there I think would [21] be representative in terms of your actual [22] area time that you are engaged in either

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[1] setting up or this aggressive type maneuver.

[2] **Q:** For a training mission in the work [3] area that would not use as much fuel what [4] would be a maximum amount of time you'd spend [5] in the work area?

[6] **A:** The answer to that could be a long [7] time, and that's going to depend on several [8] things. Probably your most fuel-efficient [9] sortie would be an intercept mission where [10] you were running up in the 15-, 25-, [11] 30,000-foot area. The higher you go, [12] generally speaking, the more fuel efficient [13] the F-16 or any airplane is.

[14] So if I went out there with an [15] airplane that had two external tanks — [16] external fuel tanks, I'm sorry — and I was [17] just doing what I would consider to be benign [18] intercepts, kind of basic level intercepts, I [19] don't think it would be unreasonable to say I [20] could be in the area for an hour.

[21] **Q:** How long would a typical surface [22] attack mission to the south UTTR last?

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[1] **A:** I would say that the takeoff to [2] landing a typical surface attack mission [3] would be a 1.3 to a 1.5 hour, somewhere in [4] there, a gouge. It might be longer. It [5] depends on what you do. When we talk about [6] these times I would like for just make sure [7] you understand there are a lot of variables [8] that can come into play that will affect the [9] mission duration.

[10] **MR. GAUKLER:** We've been going [11] about an hour and a half. Do you want to [12] take a break?

[13] **MS. NAKAHARA:** Yes, any time you'd

[14] like to take a break.

[15] **THE WITNESS:** I'm ready if you guys [16] are ready.

[17] (Recess)

[18] **BY MS. NAKAHARA:**

[19] **Q:** With respect to the Utah Test and [20] Training Range, are more than one training [21] exercise flown at one time? Can you schedule [22] more than one?

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[1] **A:** Yes. In fact, that's the routine [2] is that when you look at the map you'll have [3] — now that we've put it away we're going to [4] pull it right back out. But it would be a [5] common thing to have people working in [6] different areas, like you might have a flight [7] in this area, another one here. You could [8] have other guys working down here. So you [9] could have different flights.

[10] **Q:** Which, for the record, you're [11] referencing —

[12] **A:** Oh, I showed R6404A, R6406A, R6405.

[13] **Q:** Thank you. On page 34 of the crash [14] report in the first paragraph, second [15] sentence, it states, "Approximately one-third [16] of all fighter sorties involve air-to-air [17] training (as opposed to air-to-ground [18] training)." Do you agree with that [19] statement?

[20] **A:** I would say that's representative [21] of the split as I remember it. That came [22] from somebody who was currently stationed at

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[1] the wing when that number was given to them.

[2] **Q:** If you know, during your command of [3] the 388th did the 419th have a similar [4] percentage of air-to-air combat training?

[5] **A:** I would be speculating to try to [6] give you a break. I can tell you that it was [7] mixed, but I can't tell you — I can't give [8] you a real good feel for how it was [9] different. That may not have been any [10] different. I just really don't know what the [11] mix would have been, and they did them both [12] to some significant degree.

[13] **Q:** On page 37 of the crash report — I [14] may have the wrong page. Are you familiar [15] with the term "spillover"?

[16] **A:** Yes, ma'am.

[17] **Q:** How often do spillouts occur on the [18] Utah Test and Training Range, if you know?

[19] **A:** I would say if they spill out it's [20] a very small percentage of the time because [21] Clover Control — there's a couple reasons. [22] One, you've got some wonderful ground

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[1] references, all those mountain peaks and [2] valleys and water and stuff, that help you [3] maintain visual orientation. There are [4] initial navigation system points, an on- [5] board system that tells you where you are [6] that you can load these points in that will [7] help you keep a reference, and you've got [8] Clover Control, that reserve — or National [9] Guard I guess it really is — unit out at [10] Hill Air Force Base whose job is to monitor [11] and control traffic in the UTTR. So you've [12] got probably three or four different ways to [13] keep you in the area.

[14] **Q:** Have spillouts occurred, to your [15] knowledge?

[16] **A:** I was never involved in a spillout [17] that I know of. Nobody when I had command [18] ever brought a spillout to my attention. [19] Whether one happened or not, I really can't [20] give you any degree of truth to that.

[21] **Q:** On page 39 of the crash report, and [22] hopefully this is a better reference, in the

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[1] first full paragraph it generally discusses a [2] 3-mile buffer zone.

[3] **A:** Mm-hmm.

[4] **Q:** Do you agree with this paragraph [5] that aircraft do not fly within the buffer [6] zone?

[7] **A:** Let me — let's see here. I think [8] we probably need to go back to —

[9] **Q:** That would be sentence two.

[10] **A:** Yeah, when you try to read that [11] paragraph in the context of discussion that [12] precedes and follows it, clearly aircraft are [13] going to enter that area to get in and out of [14] the area, to transit in and out of the area. [15] The intent was to try to show that the [16] aggressive maneuvering, that dog fighting we [17] were talking about, that all generally [18] happens — in whatever area, whether it's [19] 6406A or whatever you're working in, that [20] tends to happen in the center of the area.

[21] So do people fly within three miles [22] of the border? Clearly. They have to get in

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[1] and out of the area so that would be twice in [2] any given flight when they do it. But the [3] aggressive maneuvering that's associated with [4] special operations that are really the high- [5] risk maneuvers that you do in fighters, [6] that's what the intent of that 3-mile buffer [7] was, to say that that type of stuff isn't [8] planned nor does it normally occur near the [9] borders.

[10] **Q:** With the exception of ingress and [11] egress out of the work area have pilots [12] entered the buffer area? You said normally [13] it does not occur.

[14] **A:** The short answer would be yes. The [15] slightly expanded area would be yes, but I [16] would go back to during that aggressive [17] maneuvering that's going on, no, but if it's [18] administrative maneuvering to go — you know, [19] to get the 30 or 40-mile separation to set up [20] for an intercept or something where you're [21] kind of cruising away from each other, trying [22] to gather in your wits, figuring out what

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[1] you're going to do on the next intercept, you [2] might transition into that area, but it's not [3] high-risk maneuvering. It's not the kinds of [4] things that typically lead to accidents [5] during special operations.

[6] **Q:** Are you familiar with the term [7] "major exercise"?

[8] **A:** In a generic sense.

[9] **Q:** Do major exercises in a generic [10] sense occur over the UTTR?

[11] **A:** Occasionally — and I guess now we [12] have to try to come up with some sort of a [13] definition. The LFE, large force employment, [14] exercise or large force exercise, we used to [15] refer to them as an LFE. A typical training [16] mission for a typical day would involve two [17] to four airplanes. That's kind of most of [18] the flying we did. Occasionally — there's [19] nothing that prohibited you from doing bigger [20] ones, but, I mean, that was kind of the [21] routine drill.

[22] Occasionally, maybe once every

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[1] month, maybe every two months — sometimes it [2] got stretched longer than that — we would [3] try to put together a bigger package of maybe [4] 12, maybe as many as 20 airplanes if we could [5] figure out a way to safely .

[6] And the intent here would be to try [7] to put together — since the primary mission [8] of the F-16 was air-to-ground or surface [9] attack we would generally try to put together [10] a large package of, say, 12 airplanes that [11] were bombers, for lack of a better term. [12] They may be carrying actual bombs, they may [13] be carrying inert bombs, they may be carrying [14] practice bombs, those little 25-pounders we [15] discussed earlier, or they may be carrying no [16] bombs, but they are designated for the [17] purpose of the exercise as bombers.

[18] Then you would have — this is an [19] example. Please don't take it as gospel that [20] it was always this way but there might be [21] four F-15s out of, say,

mountain home or [22] F/A-18s out of the Naval Air Station Fallon

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[1] that might agree to participate in the [2] exercise. And so they might fly to Dill the [3] night before or we might telephone or [4] something but they might play — let's say we [5] had four F-15s and four F-18s. We might [6] designate the F-15s as what we would call [7] blue air, meaning blue is good, red is bad. [8] It goes back to the old Cold War days.

[9] So these four F-15s might be [10] designated to fly with — their job might be [11] to fly with the 12 F-16s who are designated [12] bombers to protect the bomber force because [13] at the end of the day those are the guys who [14] are going to do the work to win the war. The [15] F-18s might be given the job of red air or [16] bad guys and so their job might be to come in [17] and there would be a simulated battle area [18] with threat radars and supposed position of [19] enemy ground troops and friendly ground [20] troops. There would be a battle scenario [21] built, if you will.

[22] So the F-18s might be go to bad guy

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[1] land to defend the homeland, if you will, [2] while the blue force came in and attempted to [3] attack the target of the day, whatever it [4] happened to be. So that would be an example [5] of a major exercise I think that fits your [6] scenario.

[7] **Q:** Under what type of weather [8] conditions are F-16 training missions flown [9] in the UTTR south range?

[10] **A:** Primarily what's called VMC, which [11] is visual meteorological conditions.

[12] **Q:** Can you describe VMC?

[13] **A:** Clear of clouds. There are cloud [14] distances that — separation from clouds that [15] you have to maintain and flight visibility [16] normally of five miles.

[17] **Q:** What does clear of clouds mean?

[18] **A:** Not in clouds. I'm not sure —

[19] **Q:** Is there a minimum distance that [20] you have to be clear of clouds?

[21] **A:** A thousand feet above, five hundred [22] feet below, one mile horizontally.

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[1] **Q:** And are those restrictions the same [2] restrictions which apply to flying in the [3] Skull Valley?

[4] **A:** Those are — yes, I guess, is the [5] answer.

[6] **Q:** Can you fly under instrument flight [7] rules in Skull Valley?

[8] **A:** If you have an IFR, which is — IFR [9] is instrument flight rules. You can fly

IFR [10] in Skull Valley if you're on an IFR flight [11] plan which is filed with the FAA, Federal [12] Aviation Administration, and you are under [13] control of an FAA-authorized facility.

[14] Q: Have you flown an IFR flight [15] through Skull Valley?

[16] A: I don't believe I ever flew IFR in [17] Skull Valley.

[18] Q: Are you familiar with the term "sky [19] cover"?

[20] A: With respect to?

[21] Q: Let's see. This is Exhibit 9, [22] International Station Meteorological Climate

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[1] Summary. The very last line has a —

[2] A: Yes.

[3] Q: What does sky cover mean with [4] respect to that?

[5] A: Well, as I explained to Lieutenant [6] Colonel Horstman yesterday — he was kind [7] enough to explain this. I had never seen [8] this prior to I think Sunday. This is off of [9] the automated weather reporting station, and [10] what it reads down there is sky cover GT, [11] which stands for greater than, 5/10, [12] five-tenths percent.

[13] Q: In general, would you expect that [14] the sky cover at Michael Army Airfield be [15] similar to sky cover in Skull Valley?

[16] A: I would expect the weather [17] conditions in those two places to be similar, [18] yes, I would.

[19] Q: If you'll look at Tab H, page 19 — [20] I have my references mixed up again. I'll [21] come back and ask this later after a break.

[22] Pages 48 and 48A of the crash

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[1] report state at the very bottom, "Aircraft [2] fly a Moser Recovery for approach and landing [3] at Hill Air Force Base only when landing [4] night or during marginal weather." Can you [5] describe the marginal weather conditions that [6] pilots would use the Moser Recovery?

[7] A: That would have to do with when the [8] active runway was — because it says in the [9] rest of that sentence — but there are [10] certain weather requirements below which you [11] have to fly an instrument approach to the [12] runway, and the Moser Recovery is a way that [13] leads you to toward that final instrument [14] approach. If the weather is good enough, and [15] I'm trying to remember what the exact [16] minimums were at Hill, then you could — guys [17] would come back and take back their — fly a [18] visual pattern that was quicker,

easier, [19] those types of things.

[20] And I believe the ceiling would [21] have to be — well, I'm kind of going on [22] memory but I'll say a ceiling of something

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[1] less than 3,000 feet or visibility of less [2] than 3 miles. I'd have to go back to [3] documents to try to figure out what the exact [4] minimums were when you could no longer fly an [5] overhead pattern.

[6] Q: If you look on page 49A, the second [7] full sentence attributes to you that although [8] the weather at Hill Air Force Base may [9] require instrument recovery, to paraphrase, [10] visual flight rules could be applied at the [11] UTTR. Do you agree with that statement?

[12] A: I think so. I'm sorry. I can't [13] find it. Page 49?

[14] Q: Page 49A, second full sentence.

[15] A: Yes, I mean, that could quite [16] easily happen that you could operate VMC, VFR [17] out on the range, but the mountains there can [18] catch clouds and do other things where you [19] might need to fly an instrument recovery even [20] though you could still operate under VFR [21] rules once you got out to the range.

[22] Q: Also on page 49A just below that

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[1] previous sentence it states, "The 388th [2] fighter wing will restrict the number of [3] sorties flown if the weather in the UTTR does [4] not provide adequate clear airspace to [5] conduct a full schedule." [6] What does a full schedule mean?

[7] A: There is a daily flying schedule — [8] actually, it's published weekly and adjusted [9] day to day and they put in names and things. [10] But a squadron has a published schedule. If [11] I remember right a typical number for a [12] squadron at Hill would be 20 to 24. That's [13] kind of squishy, but I think those are [14] representative numbers. That would be [15] considered — flying the published schedule [16] would be flying the "full schedule."

[17] So it's worked out basically — I [18] mean, the squadron and the wing have a full [19] year's flying program. Obviously, when you [20] say in the — what we're going to do six [21] months from now, it will be at a fairly high [22] level. We fly about sorties, this,

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[1] that, and the other. As you get closer — [2] the most precise scheduling you'll have is [3] what you're doing tomorrow. [4] The way it would routinely work, [5] the week before you'll sit down and

negotiate [6] and figure out exactly what kinds of sorties, [7] what mix you need, what your training [8] munitions requirements are, if any, what your [9] air space requirements are, those types of [10] things. That gets resolved amongst all the [11] different squadrons and, as we talked about [12] earlier, there's a scheduling function to [13] make sure that there's training air space [14] available for you.

[15] So the squadrons will sit down say [16] here is my schedule and kind of fill in the [17] blanks, put names and ordnance loads, if any, [18] those types of things in the schedule and [19] that becomes the published schedule and the [20] plan is to fly the schedule as published so [21] that if you did that you would have flown the [22] full schedule.

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[1] Q: And if the 388th restricted the [2] number of sorties because it couldn't fly a [3] full schedule does that cancel the training [4] mission?

[5] A: Basically, yes. I mean, if, for [6] instance, all of the south UTTR was not [7] usable, and this is just an exemplar, then [8] you'd say okay, we clearly can't fly the full [9] schedule with basically half the range, so [10] there would be something — you'd sit down [11] and say okay, what else can we do? If the [12] south UTTR was completely unusable, then you [13] would sit down and you would selectively — [14] and that was generally left to the squadrons [15] to try to sort out what their real priorities [16] were and those types of things.

[17] The wing might make the decision [18] not to fly at all because of visibility at [19] Hill Air Force Base. They might say we're on [20] weather hold, in which case nobody flies, or, [21] as was discussed yesterday, you may have had [22] a huge snowstorm and there may be ice on the

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[1] taxiways. In that case the wing might say we [2] need a weather hold till the runway clears. [3] If you know you're not going to get the snow [4] off, you might just as well cancel and let [5] folks go about other things.

[6] So Sometimes the squadron self- [7] selects. Sometimes it's done at the higher [8] level because of a predominant condition such [9] as fuel conditions, take off and landing [10] weather requirements at Hill Air Force Base, [11] or something like that.

[12] Q: If you'll look on page 48A, the [13] very last partial sentence says, "Based on [14] information received from local air traffic [15] controllers, conservatively estimated, Moser [16] recovery would be used less than 5 percent of [17] the aircraft returning to Hill Air Force [18]

Base." Did you review that information [19] received from local air traffic controllers?

[20] **A:** Page 48A?

[21] **Q:** Page 48A, yes.

[22] **A:** I don't specifically remember

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[1] seeing that information. I didn't request it [2] from the local air traffic controllers, I [3] know that, and I don't recall seeing it.

[4] **MS. NAKAHARA:** Did you provide that [5] in discovery?

[6] **MR. GAUKLER:** I don't think there [7] are any documents.

[8] **MS. NAKAHARA:** To the extent there [9] are and to the extent you didn't provide them [10] we'd like a copy of them.

[11] **MR. BARNETT:** Paul, I think that's [12] right. I think there aren't any.

[13] **MR. GAUKLER:** I'm pretty sure there [14] aren't but we'll check.

[15] **BY MS. NAKAHARA:**

[16] **Q:** Could the percentage of aircraft [17] returning to Hill Air Force Base in the Moser [18] Recovery increase based on the changed [19] tactics of the 388th fighter wing?

[20] **A:** I wouldn't say that tactics would [21] affect that. Tactics again has to do with [22] mission accomplishment in terms of your

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[1] mission objective, which is destroy this [2] target, defend this airfield, whatever it [3] happens to be, but, you know, the Moser [4] recovery is really just a recovery. It's an [5] administrative procedure to get aircraft back [6] into the landing pattern.

[7] **Q:** Would an increase in night training [8] missions increase the use of the Moser [9] recovery?

[10] **A:** It could and I'd like to qualify [11] that just a little bit if I could. My [12] suspicion would be that if nothing else [13] changed that your percentage would probably [14] stay about the same. I mean, there was the [15] discussion yesterday about whether the [16] percentage had gone up in the last year [17] because of the addition of the new lighting [18] system. That actually happened after I left [19] the wing and I can't talk to that. You know, [20] if you do — you still have the other [21] constraints and concerns about Salt Lake City [22] and everything else.

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[1] So if all you did was add more [2] airplanes and if I had to speculate, and it [3] would be a speculation, then your percentage [4] would remain about the

same. It just might [5] be a slightly bigger number depending how [6] many airplanes or sorties flew.

[7] The change to the runway lighting [8] system, I have no way to assess the impact [9] that's made because I haven't seen any data [10] on it.

[11] **Q:** What is the minimum altitude [12] authorized in the Sevier B MOA over Skull [13] Valley?

[14] **A:** A thousand feet if you look at the [15] local flying regulation. I believe that in [16] flip it's published at 100 but the local [17] supplement's 1,000 feet.

[18] **Q:** And flip stands for?

[19] **A:** Supplement. It's a Hill Air Force [20] Base supplement to an AFI, Air Force [21] Instruction. It's in here. I'll find it and [22] give you the correct terminology for it.

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[1] **Q:** I'm thinking it might be a tab.

[2] **A:** It is a tab. I'm just trying to [3] find my tab page. Oh, there it is. It's tab [4] B, tab B in the report. It's AFI, which [5] stands for Air Force Instruction, 13-212, [6] UTTR supplement, and my copy doesn't show — [7] it looks like it's Supplement 1 (Test) dated [8] April of '98.

[9] **Q:** What was the minimum altitude flown [10] by the pilots under your command through the [11] Sevier B MOA over Skull Valley?

[12] **A:** Well, I hope it was 1,000 feet, but [13] I in good faith have to tell you I wasn't [14] standing there with my — measuring each one [15] as he went by. Pilots were pretty good about [16] flying — knowing and adhering to local [17] regulations — well, to regulations whether [18] they're local, Air Force, or FAA.

[19] **Q:** Could the minimum altitude change [20] in the future if tactics changed?

[21] **A:** I don't —

[22] **MR. GAUKLER:** Objection, calls for

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[1] speculation. Go ahead.

[2] **THE WITNESS:** I also don't know the [3] source of that 1,000-foot restriction. I can [4] show you in here where it's stated. What [5] drove that initially I don't have personal [6] knowledge of.

[7] **BY MS. NAKAHARA:**

[8] **Q:** What is the altitude ceiling of the [9] Sevier B MOA over Skull Valley?

[10] **A:** Ninety-five hundred feet.

[11] **Q:** What factors determine the altitude [12] in which F-16 pilots fly through the Sevier B [13] MOA over the Skull Valley?

[14] **A:** Well, if they're going to operate [15] in the Sevier B MOA then they're bound at [16] 1,000 feet above ground level to a

top of [17] 9500 MSL, mean sea level. The altitude you [18] would fly depends on what is it you're trying [19] to do. A typical use of Skull Valley was [20] kind of the on-ramp, if you want to think of [21] it that way, into the UTTR.

[22] When I was flying in there, I used

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[1] it primarily for administrative functions, to [2] do things like what's called a fence check, [3] where you would simulate positioning specific [4] switches as if you were going into combat. I [5] would also use that to do what we refer to as [6] a G-awareness maneuver. It's required by Air [7] Force regulation or instruction, and if [8] you're in an air-to-ground configured [9] airplane, which is typically what I flew [10] going through Skull Valley, what that would [11] consist of would be accelerating to something [12] at least 400 knots. Typically I'd accelerate [13] to more than that. I'd do a 90-degree turn [14] in one direction at about 4 Gs, do a roll [15] out, do a 90-degree turn back to basically [16] south to my original heading, and that would [17] constitute my G-awareness maneuver.

[18] I would clean up any other [19] administrative functions or tasks I had to [20] do, position my flight to any of the low- [21] level that what we were going to do, and [22] by that time I'm through Skull Valley because

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[1] it's, as you know, not a very long area.

[2] **Q:** Position yourself to your squadron [3] or formation —

[4] **A:** Flight. Formation, flight. Either [5] would be fine.

[6] **Q:** To enter a low-level route [7] approximately what altitude would a low- [8] level —

[9] **A:** Generally speaking, your low levels [10] are going to be flown at — in the case of [11] Skull Valley 1,000 feet to just a little [12] above 1,000 feet. Once you clear south of [13] the 1,000-foot restriction you're going to [14] drop down to approximately 500 feet AGL, [15] above ground level, the minimum altitude that [16] anybody in the 388th when I was there was [17] cleared and trained and qualified to fly at.

[18] So that would be their minimum [19] altitude. They might fly a little higher [20] than that, maybe 6- or 700, but most guys [21] would favor the 500.

[22] **Q:** Approximately what altitude would

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[1] you do a G-awareness maneuver?

[2] **A:** I would be at a couple thousand [3] feet.

[4] **Q:** And approximately what altitude [5] would you do a defense check?

[6] **A:** I'm sorry, that's fence, as in [7] crossing the fence into bad guy land. I [8] would do that — I would fence in kind of the [9] same altitudes. I mean, there's no minimum [10] altitude specified for a fence check, but I [11] would kind of be at that same kind of couple [12] of thousand feet because I'm just kind of [13] cleaning things up, doing things I need to [14] do, to prepare for the rest of the mission, [15] basically.

[16] **Q:** Will you describe the horizontal [17] and vertical dimensions of a typical flight?

[18] **A:** Sure. If I were flying an air-to- [19] air — I'm sorry, an air-to-ground mission [20] through Skull Valley, which I think is the [21] real question —

[22] **Q:** Yes, thank you.

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[1] **A:** I would fly one of two types of [2] formations, typically, and I'm assuming now [3] that I've got four airplanes. Well, let me [4] cover the two-airplane scenario first because [5] it's real easy. My wingman would be a line [6] of breast basically even with me, level in [7] terms of altitude to slightly above me, and [8] his horizontal split from me would be [9] somewhere around a mile and a half. If the [10] vis is good and life is sweet, then the guy [11] might push out to two miles. If the cloud [12] backgrounds are such, he might move in a [13] little bit closer but somewhere in the mile [14] and a half, plus or minus, line abreast if [15] we're two ships flying.

[16] If I were flying a four-ship one of [17] the two most likely formations I would fly is [18] what I would call an offset box. The lead [19] element, number 1 and 2, would be in that [20] formation I just described to you. Numbers 3 [21] and 4 would be in that same relative to [22] position to each other, line abreast, mile

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[1] and a half apart, and depending on my [2] mission, my ordnance, meteorological [3] conditions, threat expectations, all sorts of [4] other things, they would be anywhere from [5] about two miles behind me to as far back as [6] maybe eight, and again that's kind of [7] dependent on what I'm doing and why I'm doing [8] it. So those would be the formations that I [9] would typically brief or lead.

[10] **Q:** Would three or four be directly [11] behind the —

[12] **A:** Probably not. We call it an offset [13] box because normally what you'll do is — if [14] you can — you're going to have to watch my [15] hands here. If you can envision these two [16] airplanes flying a

mile and a half apart line [17] abreast and then you go back to the trailing [18] element, one of those two guys in that [19] trailing element is going to be somewhere [20] between the lead element if that makes any [21] sense.

[22] **Q:** And it could be anywhere between?

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[1] **A:** If here's one and two, either [2] number three or four is going to be probably [3] somewhere in between them and number four in [4] this case or the other guy would be out here. [5] So it looks like a box but the trail element [6] is offset somewhat. You would not typically [7] fly with the trailing element completely [8] outside the lead element, if you can [9] understand what I'm trying to say.

[10] **Q:** And they could fly either, not an [11] aeronautical term but to the left or right?

[12] **A:** They would position themselves [13] based on terrain, visual acquisition, [14] atmospheric conditions, the threat. So they [15] would hopefully have a reason for being on [16] one side or the other, but those would be the [17] kinds of things that they would consider as [18] they did that.

[19] **Q:** In flying training missions through [20] the Sevier B MOA over Skull Valley have you [21] flown down the middle of Skull Valley?

[22] **A:** Yes. I mean, yeah.

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[1] **Q:** Have you flown to the eastern side [2] of Skull Valley?

[3] **A:** Yes.

[4] **Q:** Have you flown down the western [5] side of Skull Valley?

[6] **A:** Yeah, but, you know, with the [7] exception of I would fudge over to make sure [8] I wasn't going through the restricted areas [9] depicted on the map 6402A and B I think are [10] the numbers, 6406B and 6402B, I'm sorry. [11] Predominantly most guys would figure the [12] middle to the eastern side because of that [13] restricted airspace off to the west.

[14] **Q:** Is it correct that you were present [15] for Lieutenant Colonel Horstman's deposition [16] yesterday?

[17] **A:** Yes, ma'am, I was.

[18] **Q:** Are you familiar with the term [19] "turning point" as Lieutenant Colonel [20] Horstman described it?

[21] **A:** Yes, it was basically a reference [22] point on the ground that would be loaded as a

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[1] INS coordinate, initial navigation system [2] coordinate.

[3] **Q:** Based on your recollection are [4] there any turning points in the Sevier B MOA?

[5] **A:** I can look at the map and tell you [6] this looks like it would show up. That one [7] looks like it would show up. There's some [8] road intersections and things out there. I [9] did not — to try to put it in how did I fly [10] through the Sevier B MOA, I had mountains on [11] the left, mountains on the right. I had some [12] roads I could see. I knew where I was.

[13] I was more interested personally in [14] taking care of those administrative functions [15] of the fence check, the G-awareness, in doing [16] those kinds of things than I was about am I [17] on this point. I don't believe that I — [18] it's speculation — maybe it's better to say [19] I don't recall loading steer points or turn [20] points that were located in Skull Valley, but [21] I also didn't feel a need to do that at that [22] time.

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[1] **Q:** Do you have an opinion with respect [2] to Lieutenant Colonel Horstman's opinion that [3] if the PFS facility is built pilots would use [4] it as a turning point?

[5] **A:** I'm not sure is the real answer. [6] I've kind of thought about that a little bit [7] last night. If you build it, they will come. [8] I don't know because that is not what I used [9] to do during Skull Valley. I would generally [10] keep my — I would use my system updates down [11] elsewhere on the range to try to keep my [12] sensors and INS and all that kind of stuff [13] looking in the same direction as he described [14] yesterday.

[15] You know, would I change what I [16] believe to be the more or less routine use of [17] Skull Valley if there was a prominent [18] structure out there? I don't know. I guess [19] I'd have to think about that a little bit [20] because it would be a change of habit from [21] what I used to do and what according to [22] Colonel Oholendt others would do as well. So

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[1] I guess I'd need to think about that.

[2] **Q:** What factors do F-16 pilots [3] typically consider when determining the [4] airspeed through the Sevier B MOA over Skull [5] Valley?

[6] **A:** I would say there are probably two [7] or three things, maybe four, without counting [8] — we can count them up afterwards and see [9] what we come up with. One would be what is [10] it I'm doing? If I'm doing a G-awareness I [11] need to accelerate to at least 400 knots

and [12] typically I would accelerate to something [13] more than that.

[14] If I'm flying a low level, if I [15] were to get into, you know, low-level flying, [16] then generally I would plan — kind of the [17] minimum I would ever plan a low level would [18] be 420 knots. It's not uncommon to fly 480 [19] for a ground speed, but now you're going to [20] get into things where am I, how close am I to [21] bad guy land? If I'm in — you know, I might [22] fly on my side of the border, for lack of a

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[1] better term. I might fly down at 1,000 to [2] 500 feet knowing hopefully what their radar [3] coverage is and staying below that.

[4] Well, in that case I'd probably [5] throttle back, all things being equal, to 420 [6] because that's a more fuel-efficient speed [7] than 480. If the mission profile allows it, [8] once I go on bad guy land I'm going to [9] accelerate to 480 — well, my planned low- [10] level speed in bad guy land will probably be [11] 480 because the faster I'm going is the [12] harder it is for him to catch me and the [13] harder it is for him to hit me with [14] something, both of which I consider to be [15] good options.

[16] Where I cross the border where our [17] troops are in contact with their troops I'm [18] going to go as fast as I can because there's [19] all kinds of stuff there, and I want to [20] minimize my exposure in that area. So in [21] that case I'm going to park the throttle up [22] there and see what comes out the back end and

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[1] I'm going. If I'm just doing administrative [2] stuff and my low level starts down here and [3] if I was ahead of time — let's say I got off [4] three minutes early — I might get up here at [5] 3- or 4,000 feet or, you know, right under [6] 9500 feet and I might throttle back to 300 to [7] 350 saving gas and letting the clock catch up [8] to where I need to be, still making progress [9] toward my first hard timing point maybe [10] somewhere down in the south of Skull Valley. [11] So, I mean, it's really kind of dependent on [12] lots of things.

[13] **Q:** I would assume that the decision to [14] throttle back is dependent upon the flight [15] leader's decision?

[16] **A:** Basically the flight leader's [17] captain of the ship. Flight lead wants to go [18] fast, he'll go fast and everybody will go [19] with him. If he wants to slow down, [20] everybody will slow down with him.

[21] **Q:** Are there situations when one [22] member of a flight did not take off with

the

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[1] entire flight from Hill Air Force Base?

[2] **A:** Yes.

[3] **Q:** If the flight member who did not [4] take off at the similar time as the rest of [5] the flight had to catch up with the flight is [6] it correct that the flight member that was [7] left behind could fly through Skull Valley at [8] different speeds than the entire flight?

[9] **A:** Yes. Okay, now can I expand on [10] that a little bit?

[11] **Q:** Yes.

[12] **A:** Typically, if it's a matter of a [13] couple of minutes, flight lead will just hold [14] the whole flight while they fix whatever's [15] wrong with whoever's airplane. If you expect [16] it to be more than a couple of minutes, and [17] that — you know, that varies day by day. [18] What is my range time? How much time can I [19] slip my entire flight, this, that, and the [20] other, there comes a point where you just go [21] it's not worth it. I'm costing all these [22] guys training waiting for you get a hydraulic

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[1] nut tightened up or something.

[2] So in that case you're probably [3] talking about a delay in something in excess [4] of five minutes and it may be as many as 15 [5] to 20. Typically you'd say if somebody's [6] delayed then our planned rejoin — and you [7] can modify this as you need to because you've [8] got an in-flight radio frequency that [9] normally nobody else is monitoring so you're [10] not going to confuse the air traffic [11] controllers or anybody else by talking on [12] this — we refer to it as the Victor for VHF [13] radio. So you might change that a little [14] bit.

[15] But typically you would brief some [16] sort of a rejoin point or a plan. Let's say [17] I'm going to the bombing range and I might [18] fly a southern low level up through Skull [19] Valley through Sevier's up through 6405, 6407. [20] I could do any one of a number of things.

[21] Well, in that case if the late [22] takeoff was say, five, ten minutes behind me

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[1] I wouldn't expect him to fly probably the [2] same ground track. I would expect him to cut [3] some corners or maybe get permission from [4] Clover to come through here to rejoin — I [5] pointed to 6406A — to rejoin me in 6407. So [6] yes, he would probably not fly the same [7] speeds I did, but if he's more than just [8] hardly any time at all he's probably not [9] going to fly the same ground track I would, [10] either. Would yes or no have worked?

[11] **Q:** No, but it was helpful, thank you. [12] Based on your experience flying through the [13] Sevier B MOA over Skull Valley what is [14] approximately the maximum distance that you [15] could identify a built-up structure in Skull [16] Valley?

[17] **MR. GAUKLER:** Objection, unclear in [18] terms of what you mean by a built-up [19] structure.

[20] **BY MS. NAKAHARA:**

[21] **Q:** A built-up structure such as the [22] proposed PFS site?

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[1] **A:** That's going to depend on a couple [2] of things. It will vary day by day. Clearly [3] if there's ground fog there is no distance, [4] which I'll assume. If there's no significant [5] restrictions then it's going to depend on [6] vertical development, contrast with the local [7] area, the natural environment, that type of [8] thing. Based on an — and this is guesswork. [9] Based on what I've seen to be called the [10] artist's rendition I would expect you would [11] be able to see that many miles away.

[12] **Q:** Greater than seven miles or —

[13] **A:** You know, I'm guessing. I don't [14] know what's the extent of vertical [15] development. It's going to depend on am I up [16] here or down there? Now you've got to worry [17] about curvature of the earth, line of sight [18] rates. It's hard to say. I would expect to [19] be able to see this if it's as big and as [20] prominent as — really, it's not all that [21] big. The whole area is somewhere between [22] one-tenth and two-tenth square miles which is

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[1] actually going to be developed or about a [2] square mile or so around it.

[3] I would have to see the structure [4] in the environment and it would have to be [5] the colors it's going to be before I could [6] say I can definitely see this. I don't [7] envision it — it's not going to sneak up on [8] me. How about that?

[9] **Q:** Have you flown over a grain silo [10] that's a couple hundred feet in vertical [11] distance?

[12] **A:** I've flown over silos. I've flown [13] over water towers. I've flown over [14] communications towers.

[15] **Q:** Based on your recollection, given [16] you've flown over so many things, do you [17] recall if you had a clear visual sight how [18] far out you could identify a grain silo that [19] was 100 feet tall?

[20] **A:** I would be guessing. I mean, when [21] I think about the things that — a single [22] grain silo that — is un — well, I mean,

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[1] it's kind of like do you know it's there? [2] I think about communications towers that were [3] along some of the low-level routes that I [4] used to fly down in central Florida where the [5] visibility's nowhere near as good as this [6] because it's humid and that moisture cuts [7] down on your visual acquisition and your [8] ability to see. Because I knew the towers [9] were there I could see them many miles away, [10] but occasionally you don't know that there's [11] a structure there and it's a new structure. [12] You kind of go oh, there's something here.

[13] But, you know, a single grain [14] tower? I don't know. I mean, I've seen [15] ranch buildings from several miles away — I [16] mean, ranch houses, so how big around is it? [17] How tall is it? I think you're going to be [18] able to see it based on the vertical and [19] lateral dimensions.

[20] **Q:** Did you hear Lieutenant Colonel [21] Horstman testify yesterday in his deposition [22] that an additional 12 F-16s have been

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[1] assigned to the 388th fighter wing?

[2] **A:** Yes, ma'am. To be correct, I think [3] they will be assigned. I mean, that's in the [4] plan for sometime next year.

[5] **Q:** Did the crash report address any [6] potential increase in sorties through the [7] Skull Valley?

[8] **A:** I don't believe so. Again, I [9] didn't do the actual crash calculations, but [10] I don't think that — I think it was based on [11] what was known at the time to be fact.

[12] **Q:** After the additional 12 F-16s are [13] assigned to the 388th fighter wing how would [14] you expect the number of sorties flown [15] through the Sevier B MOA over Skull Valley to [16] change?

[17] **A:** I would expect that there would be [18] an increase in that activity as well as other [19] flight activity throughout the rest of the [20] UTR.

[21] **Q:** Do you believe it would be at the [22] same ratio?

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[1] **A:** If not at the same ratio I think it [2] would be close to it.

[3] **Q:** If you would look after page 32, [4] Table 3, you've already indicated that you [5] did not do any of the calculations. Did you [6] assist in preparing Table 3?

[7] **A:** No, ma'am.

[8] **Q:** Do you have an opinion on how long [9] the Air Force will continue to use F-16 [10] fighters?

[11] **A:** I do not know the planned [12]

retirement date for the Air Force on the [13] F-16. I would expect, and this is just an [14] expectation, that it will be many more years.

[15] **Q:** Would you expect the F-16 to be [16] retired, if that's the correct term, within [17] the next 40 years?

[18] **A:** Yes, but, you know, I've heard [19] something recently in the Washington area [20] that I found pretty interesting. This gets [21] into the highly speculative, but there's [22] apparently talk — I don't know how serious

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[1] or amongst who, not doing the joint strike [2] fighter, which would be the planned air-to- [3] ground — "skip a generation" is the phrase [4] they used and start the F-16 production line [5] all over again with brand-new airplanes and [6] brand-new avionics which would be more [7] capable than the block 40s and 50s.

[8] Anything that's out there beyond [9] today and the next year or two I'm pretty [10] uncomfortable speculating because I have no [11] idea where any of that stuff is going. But I [12] think it would be reasonable to expect that [13] the airframes that are flying today will [14] probably be retired within the next 40 years. [15] Whether we will have airplanes produced ten [16] years from now that happen to be F-16s, I [17] don't know.

[18] **Q:** If the F-16 is retired would you [19] expect it to be replaced with a single-engine [20] fighter?

[21] **A:** I would expect it to be replaced [22] with the next generation of ground attack

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[1] airplane — let me restate that.

[2] The next generation of fighter [3] aircraft with the primary role of air-to- [4] ground or surface attack — the terms are [5] basically synonymous.

[6] **Q:** If the F-16s are retired how will [7] it be phased out? Would you expect the Air [8] Force to operate the replacement aircraft in [9] addition to F-16s until completion of a [10] phase-out period?

[11] **A:** If we assume that what I remember [12] to be past practice is future practice in [13] terms of aircraft replacement, what will [14] happen is the first thing they will do after [15] it gets through the testing and evaluation [16] phase and moves into production is that [17] they'll establish a training squadron at a [18] training base, and then they'll start to [19] train experienced pilots that have flown that [20] same type of mission and stuff, and they'll [21] generate a cadre of instructor pilots.

[22] They will in turn start to train

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[1] other people, and the first thing you'll do [2] is you'll build your training capacity. Once [3] you have enough trainers, and that would [4] depend on lots of different things, then [5] they'll typically say okay, the next base or [6] the first operational base to get this new [7] airplane is whatever that base is, and they [8] probably will have already identified that, [9] to be perfectly honest with you, because a [10] couple years beforehand once the plans are [11] known they typically have to go into that [12] existing base, whatever it is, and start [13] doing something different.

[14] Maybe they need a new engine test [15] cell because this new engine is not [16] compatible with existing equipment that they [17] use to test the engines. They might need [18] different kinds of hangars to house it [19] because it's — the characteristics of the [20] airplane or the size or something are [21] different.

[22] So typically there's a lead point

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[1] in there where they'll go into the next base [2] and start doing some sort of modification. [3] Sometimes it's a little bit; sometimes it's [4] significant. Then what they'll start to [5] generally do will be they'll start to take [6] some of the people — they will man that base [7] two ways.

[8] They'll take people that are [9] currently stationed at the base, send them [10] TDY to the training base to get qualified to [11] fly the airplane. They will take people from [12] other bases that are up for reassignment [13] anyway, send them to training, and then [14] relocate them to the new base.

[15] They will typically when they go [16] into a new base go one squadron at a time. [17] Squadron number one will go through the [18] transition process, then squadron number two, [19] then squadron number three or how many they [20] have. So they'll kind of complete that base [21] and then they'll move on to the next base.

[22] So that's kind of the process.

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[1] Does the airplane continue to fly? Yes, it [2] does and it tends to be base by base. [3] So none of this happens overnight, and if you [4] look at the planned production rates for, [5] like, the F-22, which will hopefully be the [6] next generation of air superiority airplane [7] for the Air Force to replace the F-15C/D, the [8] production rates are incredibly low. It's, [9] like, 36 or 48 a year. We used to — in the [10] heyday of the F-16 we used to buy 18 to 20 a [11] month.

[12] So we're talking about a [13] procurement process that has slowed down

[14] significantly, and the total buy of the F-15E [15] is I think programmed, and this is kind of a [16] fuzzy number, but it's somewhere around 339. [17] I mean, that's kind of a ballpark figure.

[18] So, you know, you would expect that [19] whatever replaces the next generation [20] aircraft that's surface attack might be a [21] similar deal where it's — you know, it's not [22] 20 airplanes a month. It's 30 or 40 a year

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[1] or something like that, which would really [2] slow down the transition process.

[3] **Q:** During the transition process at a [4] base that had, for example, three fighter [5] wings could you have the first fighter wing [6] trained and actually flying a replacement [7] aircraft, the second fighter wing currently [8] being trained, and the third one flying the [9] fighter aircraft that is being replaced?

[10] **MR. GAUKLER:** Objection, calls for [11] speculation. You can answer it.

[12] **THE WITNESS:** If I understood that [13] correctly I think the answer to that question [14] is yes, and I would go back to the analogy I [15] made when I was at McDill. When I showed up [16] at McDill the first time in the summer of '81 [17] there were two squadrons that had completed [18] their conversion to the F-16. They were — [19] and then they had the other two squadrons [20] that were still flying the F-4, and then what [21] they did is on that Friday night that was the [22] last of the F-4 squadron.

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[1] Those pilots who were F-4 qualified [2] were transferred into the remaining squadron [3] of F-4s, and on Monday morning they moved in [4] instructor pilots who had been prepositioned [5] in the two F-15 squadrons and gave them a [6] different patch on their shoulder and said [7] you're now a member of the 63rd and they [8] started to fly F-16 sorties literally the [9] Monday after the last Friday of the F-4 [10] sortie.

[11] They did a similar thing with the [12] F-15 when they would replace them in Europe. [13] Before they went to Bitburg — this is the [14] mid-'70s so I may get a few of the details [15] wrong — they trained up a squadron's worth [16] of F-15 pilots at Langley — I mean, they [17] sent them to training at Luke, which was the [18] F-15 training base, and then they sent them [19] to Langley for a little while to get some [20] experience and build up while they were [21] moving equipment and stuff into Bitburg over [22] in Germany, and then the airplanes flew over

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[1] one day and the pilots and the maintainers, [2] boom, they just moved the F-4s out and now it [3] was an F-15 squadron.

[4] So they're kind of variations on a [5] theme but yes, they do those types of things [6] and it's not uncommon to have two different [7] airplanes being flown by the same wing. It's [8] not unheard of but it's not common and you [9] typically will do it during transition phases [10] with the exception of General M's [11] composite wings which is an entirely [12] different story.

[13] **Q:** If you'll look after page 9A on [14] table 1 in the crash report, are you familiar [15] with this table?

[16] **A:** The F-16 history?

[17] **Q:** Yes.

[18] **A:** Yes, ma'am, I've seen this before.

[19] **Q:** It has a category 4, class A [20] mishaps, but it doesn't say mishaps. Are you [21] familiar with a class A mishap as used in [22] this table?

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[1] **A:** Yes, ma'am.

[2] **Q:** Is it correct that all class A [3] mishaps may not result in a destroyed [4] aircraft?

[5] **A:** Yes, ma'am.

[6] **Q:** Is it correct that during a class A [7] mishap a pilot may jettison all stores but [8] the aircraft would not result in a destroyed [9] aircraft?

[10] **A:** I think so. I'm trying to [11] understand the linkage between class A and [12] [12] aircraft destroyed, loss of life, or more [14] than a million dollars worth of damage. [15] That's the threshold for a class. I'm pretty [16] confident about that. I can research and get [17] you the exact numbers if those are not [18] correct. That's the threshold you have to [19] cross to get into a class A. It doesn't have [20] to do with whether or not you jettison [21] stores.

[22] **Q:** Could you have a class A mishap

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[1] that did not result in a destroyed aircraft [2] that jettisoned all stores?

[3] **A:** Yes. I think I understand where [4] that's going. If I have a class A accident, [5] the airplane recovers safely somewhere, is it [6] possible that I jettison my stores [7] coincidentally or as part of that sequence?

[8] **Q:** Yes.

[9] **A:** Yes, ma'am. Of course, only the [10] things that are jettisonable will jettison. [11] There are things that hang on the airplane [12] that don't necessarily jettison.

[13] **Q:** Could you jettison stores and not [14] incur a class A or a class B mishap?

[15] **A:** I believe that's correct.

[16] **Q:** Is it correct that you selected a [17] 10-year crash rate in the crash report?

[18] **A:** Yes, ma'am.

[19] **Q:** And why did you select a 10-year [20] crash rate?

[21] **A:** I'm trying to remember all the [22] background to that, but it was basically to

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[1] give a long enough look that it would be [2] representative, that it would not — now, [3] we're getting into statistics and I [4] understand statistics but I'm not a [5] statistician so bear with me a little bit.

[6] To give a big enough look that no [7] one year would inordinately distort the data. [8] It was a topic of conversation at the meeting [9] with the NRC staff, and I don't know — I [10] don't want to say it was — it seems like it [11] was discussed there and it was agreed to that [12] that would be the thing to use. I'm a little [13] soft on that and maybe I shouldn't say that [14] but there may be somebody who has notes or [15] minutes. I don't know.

[16] The whole idea was to take a long [17] enough look that it's representative of what [18] the true accident rate is for the F-16.

[19] **Q:** Are crash rates typically higher at [20] the beginning of the life of a fighter [21] aircraft?

[22] **A:** Based on the chart that was in here

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[1] I would certainly say yes, and that is my [2] common understanding. I can also tell you [3] that I'm not a trained Air Force safety [4] officer, so that's not the kind of stuff I [5] would routinely dig into.

[6] **Q:** Are you familiar with the term [7] "bathtub effect" as Lieutenant Colonel [8] Horstman used yesterday in this deposition?

[9] **A:** Only to the extent that it's come [10] out in the last day or two. That is not a [11] term that I had associated with aircraft. [12] I'd always heard it used in the construct of [13] the Air Force Personnel System. I'm serious.

[14] **Q:** Are you familiar with the phenomena [15] of the bathtub effect with respect to crash [16] rates increasing at the end of the life of [17] a —

[18] **MR. GAUKLER:** Objection, lack of [19] basis in terms of testimony.

[20] **THE WITNESS:** Do I answer or not [21] answer?

[22] **MR. GAUKLER:** To the extent you can

[1] answer, you can.

[2] **THE WITNESS:** Only to the extent it [3] was covered yesterday. I looked very briefly [4] — again, I'm not a statistician but one of [5] the things I noticed as I flipped through [6] whatever one of the those annexes is you can [7] start to run into the law of small numbers [8] where an accident could drive your rate up to [9] some phenomenally high number, but you've [10] only got one airplane and it crashes, then [11] your accident rate is going to be — it will [12] be high but you've only lost one airplane. I [13] have never done any analysis. How about if I [14] say that? To the extent it was covered [15] yesterday is really all I know about it.

[16] **BY MS. NAKAHARA:**

[17] **Q:** How does the F-16 training crash [18] rate compare with the overall F-16 crash [19] rate?

[20] **MR. GAUKLER:** Objection, ambiguous. [21] What do you mean by F-16 training crash rate?

[22] **MS. NAKAHARA:** Accidents that

[1] occurred during F-16 training missions versus [2] nontraining missions.

[3] **MR. GAUKLER:** What do you mean by [4] training missions? Utah Test and Training [5] Range as opposed to war conditions or —

[6] **MS. NAKAHARA:** Yes.

[7] **THE WITNESS:** I don't know. I've [8] never seen a breakout of combat losses versus [9] training.

[10] **BY MS. NAKAHARA:**

[11] **Q:** Do you know how the UTTR F-16 crash [12] rate compares to the F-16 history crash rate?

[13] **A:** I've never done an analysis on [14] that, and I don't believe I've ever seen one.

[15] **MS. NAKAHARA:** It's 11:15. We can [16] take another break or keep going.

[17] **MR. GAUKLER:** It's up to you.

[18] **THE WITNESS:** I'm fine for now but [19] if you guys want to take a break that's okay, [20] too.

[21] **MR. HORSTMAN:** Quick break.

[22] (Recess)

[1] **BY MS. NAKAHARA:**

[2] **Q:** The next area I'd like to ask you [3] about is emergency procedures. Will you [4] please describe the sequence of events which [5] would be typical in an emergency if the pilot [6] remained in control of an aircraft?

[7] **A:** The three basic steps are maintain [8] aircraft control, analyze the situation,

take [9] appropriate action, land as soon as [10] conditions permit. That literally starts [11] probably day one of your first introductory [12] session at pilot training. So those are [13] going to be your predominant thought [14] processes.

[15] Now, you asked me a more specific [16] question than that, and I'm sorry. I kind of [17] lost it.

[18] **Q:** The sequence of events in a typical [19] emergency if there is one?

[20] **A:** Okay, I guess I did answer the [21] question. Little did I realize. That's kind [22] of what you do. You're going to fly the

[1] airplane if you can. You're going to figure [2] out what's wrong, do whatever you can to fix [3] whatever's wrong or mitigate damage or [4] further loss of capability, and then you're [5] going to look for a piece of concrete to [6] land.

[7] **Q:** Is it correct that a pilot's [8] ability to perform emergency procedures is [9] dependent upon availability of time and [10] circumstance?

[11] **A:** That seems like a fairly reasonable [12] statement.

[13] **Q:** How, if any, would a pilot's flight [14] experience factor into determining whether [15] there was adequate time to perform emergency [16] procedures?

[17] **A:** I'm trying to think about that. In [18] the sense that I'm not sure that a pilot — [19] when something happens I don't think a guy [20] says do I have adequate time to perform [21] emergency procedures. I mean, I don't think [22] that's the thought process you go to.

[1] My general thought process when I [2] had emergencies was can I fly this airplane? [3] Oh, good, I can. That's a plus. And then I [4] would start to go — you know, if the [5] airplane is not flifiable that generally is [6] known to you very quickly. When would an [7] airplane not be flifiable? After a mid-air it [8] might not be flifiable. I've known guys that [9] have had mid-airs where both airplanes have [10] come back and landed. I've known mid-airs [11] where neither airplane came back and landed, [12] at least not on a runway. Generally, if the [13] airplane is flifiable, you've got time. The [14] rest of it is all variable.

[15] Somewhere in there the individual [16] that's flying the airplane becomes a factor. [17] Who is that person? How do they react to [18] stress? I mean, all these kind of fuzzy [19] things that I have a difficult time getting [20] my arm around and their individual experience [21] will also be a factor.

[22] In a broad sense I think it's

[1] reasonable to say that up to a point if you [2] are more experienced you're more likely to [3] respond in a cool, calm, collected manner.

[4] **Q:** Yesterday Lieutenant Colonel [5] Horstman testified based on his recollection [6] that approximately 60 percent of F-16 pilots [7] are designated as experienced, have greater [8] than 500 hours of F-16 flying experience. Do [9] you agree with that rough approximation?

[10] **A:** Yes. That is the threshold as I [11] remember it when I was active duty; 60-40 was [12] about right. And the 500 number applies to [13] somebody who went to pilot training, went to [14] intermediate training, and went to the [15] straight to the F-16. For somebody like [16] that, 500 hours is the number.

[17] Just to reiterate the point he made [18] yesterday, that's really a management tool. [19] It's not a qualitative assessment of how good [20] of a pilot is Smith or Jones. It's a trip [21] threshold that — it's a function of hours. [22] When you have 500 hours, by definition you

[1] are experienced. When you have 499 by [2] definition you are not.

[3] **Q:** Could a pilot's flight experience [4] be a factor in determining whether a pilot [5] could avoid the proposed PFS facility?

[6] **MR. GAUKLER:** Objection. You're [7] using "experience" in several different [8] contexts now. We have the one where Colonel [9] Fly has mentioned experience in terms of a [10] management tool whatever may be a [11] person's capability to fly the F-16 and we [12] have experience in a more general sense as [13] that term is understood in terms of actual [14] capability to fly the F-16.

[15] **MS. NAKAHARA:** With respect to [16] experience less than 500 hours of flying [17] time.

[18] **MR. GAUKLER:** Will you repeat the [19] whole question again?

[20] **MS. NAKAHARA:** Will you read it?

[21] (The reporter read the record as [22] requested.)

[1] **MR. GAUKLER:** So you're talking [2] about experience in a generic sense as [3] opposed to the 500-hour management tool?

[4] **MS. NAKAHARA:** No, as the 500-hour [5] management tool.

[6] **MR. GAUKLER:** You're referring to [7] the 500-hour management tool. You're saying [8] is experience as the Air Force designates it, [9] 500 being experienced

and 499 not being [10] experienced?

[11] **MS. NAKAHARA:** Yes.

[12] **MR. GAUKLER:** Do you understand the [13] question now?

[14] **THE WITNESS:** I think so. [15] I guess could be — if that's your [16] operative term, it could. To kind of expand [17] on that a little bit more, you know, I'm of [18] the belief that the Air Force trains their [19] people very well starting at day one and that [20] the average Air Force pilot is a very well [21] trained and will go through the steps [22] prescribed in a timely and reasonable

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[1] fashion. I mean, I would fully expect that [2] if an Air Force pilot saw something on the [3] ground and they knew that they were going to [4] have to eject and it's a matter of a 4-degree [5] turn or a 2-degree turn or a 5-degree turn I [6] think it's very, very reasonable to assume [7] that that's exactly what they're going to do.

[8] **BY MS. NAKAHARA:**

[9] **Q:** What condition would affect a [10] pilot's ability to avoid the facility?

[11] **A:** Probably the first and foremost [12] would be the state of condition of their [13] airframe.

[14] **MR. GAUKLER:** I'll object. It's an [15] ambiguous question. When the pilot's in [16] control? Not in control? You need to give [17] more definition.

[18] **BY MS. NAKAHARA:**

[19] **Q:** If the pilot's in control of the [20] aircraft what factors would affect the [21] pilot's ability to avoid the facility?

[22] **A:** Okay, things that would affect it,

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[1] I guess the first one I would go is do you [2] know where it is? I mean, I would expect [3] that if the pilot's VMC he's going to be able [4] to see it, visual meteorological conditions [5] — I'm sorry. And the airplane is flible [6] because he can control it — I sit here and [7] I, you know, think about the 120-some-odd [8] accident reports we did and whenever that was [9] mentioned in my own — what little experience [10] I've got with the people who have jumped out [11] of airplanes is that whenever there was built [12] up around that's what they did. They just [13] turned away from it. If they don't see it, I [14] guess, and they don't know it's around — I'm [15] kind of speculating.

[16] **Q:** Would a pilot be able to avoid the [17] PFS facility if they knew approximately where [18] it is from experience but could not [19] specifically see it during that flight?

[20] **A:** Without knowing the exact [21]

circumstances that led to the not being able [22] to see it I would say yes because it's going

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[1] to be located next to some relatively [2] significant geographic features. I mean, [3] you're going to have a general sense of where [4] it is and in most of the flight it would just [5] require a small turn. If you know it's over [6] here, you turn a little bit that way. If you [7] know it's over on the right somewhere then [8] you don't care.

[9] **Q:** Are you familiar with the location [10] of the tribal village in Skull Valley?

[11] **A:** Not specifically. I mean, I know [12] that there is a tribal village in Skull [13] Valley, but I couldn't show you and it's [14] located right here.

[15] **Q:** Were you generally aware of the [16] location of the tribal village while you were [17] flying through Skull Valley?

[18] **A:** I'm not even sure I knew that it [19] was a tribal village. I mean, I was aware of [20] buildings in Skull Valley, so I'm not sure [21] that —

[22] **Q:** So you're generally aware of where

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[1] the ranch houses or buildings are in Skull [2] Valley?

[3] **A:** Yeah, and you could generally see [4] them coming, too.

[5] **Q:** Would a pilot have to select [6] whether they would avoid the ranch houses or [7] the PFS facility in the event of an [8] emergency?

[9] **MR. GAUKLER:** Objection, vague and [10] ambiguous.

[11] **THE WITNESS:** That's going to be [12] dependent on several factors that I can't [13] point to on the map and show you, yes. It [14] would depend on what's the heading of the [15] aircraft, what's the proximity of the various [16] facilities, what's your relative approach to [17] the two of them. So I just don't feel like I [18] really have enough information available to [19] me right now to make a qualified assessment [20] one way or the other.

[21] **BY MS. NAKAHARA:**

[22] **Q:** If the relative distance to ranch

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[1] houses with respect to the PFS facility is [2] about the same, could you give an opinion?

[3] **A:** Now we kind of start to get into [4] the relationship aspects of it. I mean, one [5] extreme — I tend to think of things in the [6] extreme because it makes it easier for me. [7] You know, if one of them's three miles in [8] front of me and one of them's three miles [9] behind me it's no

choice but yet the relative [10] position is the same. They're both three [11] miles away.

[12] If they're both out front of me and [13] I'm pointed at one of them and based on what [14] I perceive going to be a problem, you know, [15] could you pick and choose? I mean, there are [16] cases where people have done exactly that. I [17] don't remember the proximity.

[18] I think it's a couple of miles, if [19] I remember right, between the nearest [20] structure, three or four miles. I don't see [21] that really being much of an issue to miss [22] one and hit the other. Three or four miles

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[1] is — I'm not a very good shot, but I could [2] probably do that.

[3] **Q:** On page 17 of the crash report, the [4] very first paragraph, the partial sentence, [5] "However, pilots stay with the gliding [6] aircraft for some period before ejecting [7] while attempting to restart its engine and [8] hence have the opportunity and is trained, [9] time permitting, to point the aircraft away [10] from a built-up area on the ground like the [11] PFS facility."

[12] Could you define what a built-up [13] area is with respect to this report?

[14] **MR. GAUKLER:** I think it defines it [15] right there by PFS facility. Go ahead and [16] answer it.

[17] **THE WITNESS:** Yeah, I mean, you're [18] basically out in the middle of the desert and [19] there's a man-made structure in front of you. [20] There's desert on the left, there's desert on [21] the right, there's desert short, there's [22] desert long. You kind of go — I can easily

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[1] turn a couple degrees left or right and miss [2] this built-up area that I may or may not know [3] is the Private Fuel Storage facility or may [4] or may not know is a ranch house or may or [5] may not know what it is.

[6] For a scenario like Skull Valley [7] where there's very little of anything except [8] a lot of desert — that may be an [9] overstatement. A little tool shed may not be [10] prominent to you from two or three miles away [11] but a structure of any size at all is going [12] to be obvious to you that that's a man-made [13] facility and there might be people there so [14] why don't I park this thing in the desert?

[15] **Q:** If you encountered an emergency [16] while flying next to the Stansbury Mountains [17] would that impact where you steered the [18] aircraft if you had to eject?

[19] **A:** You're assuming I'm flying parallel [20] to the mountains?

[21] **Q:** Yes.

[22] **A:** In terms of coping with the

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[1] emergency, probably not. If I was starting [2] to think that I was going to have to step [3] over the side — eject, I'm sorry — then I [4] would probably say given a choice between [5] landing in a valley and landing on a mountain [6] ridge I would opt for relatively flat terrain [7] versus significant vertical development.

[8] **Q:** What is approximately the maximum [9] and minimum range an aircraft may be turned [10] during an emergency in degrees?

[11] **MR. GAUKLER:** Objection, vague and [12] ambiguous. Overbroad and general.

[13] **THE WITNESS:** The short answer is [14] almost any number. In the case — you know, [15] you might not need to turn it at all, but if [16] you look at the flame-out landing procedures, [17] there's a procedure and I know people who [18] have done it where they do a complete [19] descending 360-degree turn to land at an [20] airfield. So, I mean, it's very much [21] situation-dependent and it could be a lot of [22] maneuvering.

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[1] **BY MS. NAKAHARA:**

[2] **Q:** If you jettisoned stores during an [3] emergency would you expect the stores to [4] strike the ground at near perpendicular?

[5] **A:** I've never studied the ballistics [6] of jettisoned stuff.

[7] **MR. GAUKLER:** Just answer no, then.

[8] **THE WITNESS:** I'm kind of guessing [9] is the short answer, to give you a real [10] answer.

[11] **MR. GAUKLER:** You shouldn't guess.

[12] **THE WITNESS:** It would depend in [13] part what is it. I mean, the different [14] things that you hang on airplanes have [15] different ballistic — some of them aren't [16] really designed to come off, like the [17] external fuel tanks. It's not part of your [18] plan to routinely jettison those. Something [19] like a bomb, you do intend to drop it so it [20] has certain known ballistics, and the bomb — [21] I mean, there's data available on what impact [22] angles will be for the bomb and that depends

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[1] on release conditions. That's the only thing [2] that drives it.

[3] If you've got a bomb that's [4] attached to a TER and you jettison the TER — [5] triple ejector rack is what that stands for [6] — you know, you could have three bombs on a [7] TER. Well, that TER,

whether it's got one [8] bomb or three bombs attached to it, is going [9] to have radically different ballistics than [10] that single bomb would have had if you had [11] released it like you were intending to hit [12] something with it. They're not going to be [13] nearly as favorable in terms of lives and [14] stuff like that. Other than to tell you [15] they're going to be different and it won't be [16] as clean as a bomb I don't have much insight.

[17] **BY MS. NAKAHARA:**

[18] **Q:** Yesterday Lieutenant Colonel [19] Horstman testified that in his opinion any [20] jettisoned stores, including a TER, would [21] fall in essentially a parabola. Do you have [22] an opinion with respect to —

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[1] **A:** You're talking about through space?

[2] **Q:** Yes.

[3] **A:** It will have some forward component [4] and some vertical component? Sure.

[5] **Q:** Is there any established Air Force [6] procedures which state that pilots should [7] avoid populated or built-up areas when [8] jettisoning stores?

[9] **A:** Let me give you a little bit of a [10] draw on that answer. There are two ways to [11] jettison off of an F-16. One is called [12] emergency stores jettison. That's also [13] what's referred to as the panic button. If [14] you hit the panic button or the emergency [15] stores jettison, basically everything that is [16] jettisonable will jettison and it will [17] jettison now.

[18] If you are in a situation that [19] requires an emergency stores jettison I [20] cannot point to any written guidance that [21] says don't emergency stores jettison now [22] because there might be a house below you. I

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[1] can't think of any. It has been my [2] experience that in simulator training and [3] stuff pilots were — attempted to be [4] cognizant of what was around them, but I [5] can't think of any written guidance there.

[6] The other way to jettison is what's [7] called a selective jettison. The selective [8] jettison system is much more controlled. It [9] could be for a variety of reasons, and if [10] you're going to selectively jettison you [11] would have adequate time to go to, and in [12] fact there is written guidance — I'd have to [13] look for it but it implies that you want to [14] go to a designated jettison area or to a [15] clear area if you can't make it to the [16] designated storage jettison area, that type [17] of thing, a for instance of when you might [18] selectively jettison.

[19] There are conditions where you [20] could have a leading edge flap, a mechanical [21] problem with the leading edge flaps of the [22] airplane and you might want to — to help

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[1] compensate for that you might want to say if [2] you had a — I'm kind of making this up as I [3] go along. You might have a 370-gallon tank [4] under each wing. Well, to help control the [5] fact that you have this one flap in the wrong [6] position you might selectively jettison one [7] of those fuel tanks to try to countermand the [8] problem — to help you countermand the [9] problem with the leading edge flaps.

[10] There are certain times — if you [11] had a bomb — let's say you had live bombs [12] and you had a spinner — a spinner is a [13] condition where you've got a fuse that is on [14] the airplane. It's attached to a bomb that [15] is still attached to the airplane and the [16] fuse is armed. That's not good.

[17] Normally the way the systems — the [18] bombs are wired. There's a delay built in [19] there to where the bomb will separate from [20] the airplane. Some predetermined amount of [21] time later, typically four to five seconds, the [22] bomb will go through a fuse arming process.

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[1] So when it first falls off the [2] airplane if it hits something nothing's going [3] to happen. Eight seconds later if it hits [4] something it's going to go off, and that's to [5] give you separation from the aircraft. You [6] might have a spinner, a bomb that's armed on [7] your airplane, and you're thinking I don't [8] like this. What are my options? Maybe in [9] that case you would elect to selectively [10] jettison the TER that had that bomb on it and [11] just get that to come off the airplane. In a [12] case like that clearly you've got time with [13] the idea being let's not try to land the [14] airplane with this bad condition. So when [15] you talk about jettison you have to say am I [16] emergency stores jettison or is it a [17] selective jettison which tends to have more [18] control with it.

[19] **Q:** If you were flying an F-16 and lost [20] engine thrust at low level would that be an [21] emergency stores jettison or selective stores [22] jettison?

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[1] **A:** It would be an emergency stores [2] jettison.

[3] **Q:** On page 19B, Footnote 18B states, [4] "According to Colonel Ronald Fly," according [5] to you, "a pilot flying at low altitudes [6] would always climb to gain attitude in order [7] to allow more leeway to cope with the problem [8] but other

than engine malfunction may not [9] immediately jettison external stores."

[10] **A:** Yes.

[11] **Q:** At what altitudes would they [12] jettison stores at in that situation if you [13] chose to jettison stores?

[14] **A:** That is very much situation- [15] dependent. I can't give you a good number. [16] It's going to depend on what's wrong with the [17] airplane, where am I? What am I doing? Do I [18] even need to jettison the stores?

[19] **Q:** If a pilot were flying under [20] conditions where there was cloud cover 1,000 [21] feet above the flight altitude would a pilot [22] still zoom the aircraft in the event of an

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[1] emergency?

[2] **A:** Probably not. I mean, I would not [3] expect him to. I would expect him to maybe [4] climb a little bit, but you don't want to [5] exacerbate your problem by taking away your [6] visual references with the ground. You're [7] kind of between the devil and the deep blue [8] sea at that point. I would probably go [9] underneath the cloud and let the airplane [10] slow down at whatever rate it was going to [11] slow down.

[12] **Q:** How would not being able to zoom [13] the aircraft that's skirting the cloud cover [14] affect the time a pilot has before ejecting [15] in the event he has to eject?

[16] **A:** Depending on your initial air-speed [17] it would probably decrease it, but at certain [18] airspeeds the dash-1 tells you you're better [19] off not trying to zoom because your time [20] aloft will be decreased. Those tend to be [21] slower than I would expect to fly in Skull [22] Valley. So I think the general question

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[1] would be I will have some reduction probably [2] in time aloft.

[3] **Q:** If you'd look at Tab H, page 12, at [4] the very bottom there's a table which is [5] entitled "Phase of Flight" which shows engine [6] failure and identifies 16 engine failures [7] under normal flight, 26 under special flight, [8] and 16 under takeoff and landing. Is there [9] any reason that engine failure under special [10] flight is higher than under normal flight or [11] takeoff and landing flight?

[12] **A:** I don't have the data to [13] statistically support this, and so to some [14] degree this is a guess on my part. But you [15] tend to be harder on the engine during [16] special operations than you do for cruise [17] operations, for instance.

[18] If you're dog fighting you're in [19] and you're out of afterburner. That not only [20] is a high-power setting which stresses

the [21] components but the cycling of the engine from [22] one power setting to another also adds cycle

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[1] to it. I would say that would be one reason. [2] You're asking more of the engines.

[3] **MS. NAKAHARA:** I've got a few [4] questions on accident reports. I shouldn't [5] say a few, a little more than a few.

[6] **MR. GAUKLER:** How much more do you [7] have overall?

[8] **MS. NAKAHARA:** I'm guessing maybe [9] an hour.

[10] **THE WITNESS:** I'm happy to just [11] keep going if it's an hour. It's your-all's [12] call. I can go either way.

[13] **BY MS. NAKAHARA:**

[14] **Q:** The crash report in Tab H at [15] Footnote 5, I think it's on page 3. It [16] indicates that class A mishaps from FY '89 to [17] '98 were lost and could not be located. [18] Would the Air Force have statistical data on [19] the causes of mishaps other than these [20] accident reports, to your knowledge?

[21] **A:** I don't know what databases the Air [22] Force maintains, if that's the question.

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[1] **Q:** Did you personally review all 121 [2] F-16 accident reports referenced in Tab H?

[3] **A:** Yes, ma'am, but only when I need- [4] ed to go to sleep.

[5] **Q:** To your knowledge, did Generals [6] Cole and Jefferson also personally review [7] all —

[8] **A:** Yes, ma'am.

[9] **Q:** Is it correct that you evaluated [10] the emergency situation to determine whether [11] a pilot could avoid a built-up structure such [12] as the PFS facility under the accident [13] conditions in each report?

[14] **A:** Yes, ma'am.

[15] **Q:** Did the accident reports provide [16] sufficient weather information to determine [17] if the pilot could see a built-up area on the [18] ground?

[19] **A:** In a general statement, yes, and I [20] say that because I haven't reviewed those [21] individually in many months. Generally, if [22] weather was a factor it was addressed in the

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[1] report — I mean, the weather conditions are [2] normally part of the report. Does that [3] answer the question?

[4] **Q:** Would the accident reports identify [5] if there was weather below the pilot if there [6] was no built-up structure

for the pilot to [7] actually avoid?

[8] **A:** They generally describe the weather [9] conditions. They did not always discuss any [10] built-up areas that may have been in the [11] area. When they did — as you know, a lot of [12] our flying is intentionally done over areas [13] where there are no built-up areas or very [14] little built-up areas.

[15] In those cases where it was [16] mentioned the pilot always took evasive [17] action, and in fact if I remember correctly [18] there's at least one case where the pilot was [19] in the weather and asked the air traffic [20] control people for a vector toward the least [21] inhabited or uninhabited — I don't remember [22] the exact term but he said which way to the

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[1] biggest open field I can find is the essence. [2] They told him and he flew to that heading and [3] in fact it landed in an uninhabited area.

[4] So not all of them discussed it and [5] in many cases I would expect that it would [6] not even be an issue because of where the [7] accident took place there was nothing around. [8] But everyone that did a pilot took some sort [9] of action to avoid.

[10] **Q:** Is it true in evaluating the [11] accident reports you identified Skull Valley- [12] type events which could occur in Skull [13] Valley?

[14] **A:** Yes. The category is —

[15] **Q:** Maybe page 11 will help. Do you [16] recall what type of events you categorized as [17] Skull Valley-type events?

[18] **A:** The intent here was to look at [19] accidents that could have happened in Skull [20] Valley based on the type of accident that [21] occurred. I'm not saying that very well.

[22] As you know, Skull Valley — to

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[1] actually be in Skull Valley you've got a [2] pretty finite window in terms of altitude, [3] MSL, AGL. It's a pretty small flight [4] parameter. Skull Valley-type events, we're [5] trying to say could this accident have [6] reasonably occurred in Skull Valley even [7] though it didn't happen at 2,000 feet AGL, [8] 450 knots, this type of thing.

[9] As an example, I think we talk [10] about engine failures. We included — we [11] operated under the assumption that engine [12] failures were mechanical failures of the [13] engine — let me qualify that — were the [14] result of material failure that could have [15] happened anywhere during the flight. They [16] just happened to occur at takeoff. They just

[17] happened to occur in the cruise phase. They [18] just happened to occur while you were on the [19] bombing range.

[20] So we took a look at that and said [21] if it's a mechanical failure of the engine, [22] that could have happened in Skull Valley just

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[1] as easily in area R6406A. Based on the [2] circumstances there, what maneuvering options [3] were available to the pilot, et cetera? If [4] this event had happened in Skull Valley would [5] the pilot — you know, would the pilot have [6] been able to avoid, not avoid, those types of [7] things?

[8] **Q:** Then the Sevier B MOA flight [9] conditions narrow that for your example that [10] if the accident occurred during special [11] flight that would not occur under a Sevier B [12] MOA flight condition; is that how you [13] refined —

[14] **A:** The idea here was to say okay, [15] given the parameters for operating in Sevier [16] B which are pretty limited in terms of [17] altitudes, airspeeds, the things you do, did [18] this happen in those same type of accidents? [19] Let's talk about that engine failure that [20] happened at R6406A. If the pilot was at [21] 15,000 feet AGL he's not going to be within [22] the confines of the defined Sevier B MOA

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[1] airspace. He would have been well above that [2] Sevier B MOA airspace.

[3] So you'd say that doesn't fit the [4] very narrow definition of Sevier B flight [5] conditions, you know, because you're talking [6] about a limited amount of space, limited [7] amounts of different things you could do. So [8] it would be a subset, a much smaller subset, [9] of the bigger.

[10] **Q:** If you'll look on page 12, [11] paragraph 5, the second sentence that starts, [12] "The 'yes' or 'no' in this column is in [13] answer to the question: Did the accident [14] happen in conditions which match the [15] conditions F-16 transiting the Sevier B [16] MOA near the PFS experience in terms of [17] altitude between 1,000 to 50,000 feet AGL?" [18] Did you —

[19] **MR. GAUKLER:** Five thousand.

[20] **MS. NAKAHARA:** Oh, I'm sorry.

[21] **BY MS. NAKAHARA:**

[22] **Q:** Did you categorize Sevier B MOA

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[1] flight conditions between the altitudes of [2] 1,000 to 5,000 feet AGL?

[3] **A:** Yes, basically. The 1,000 feet is [4] the minimum altitudes you're allowed to

fly [5] in Skull Valley.

[6] **Q:** Why did you select a maximum height [7] of 5,000 feet AGL?

[8] **A:** Because the top of the MOA is 9500 [9] feet MSL, you add that to the ground [10] elevation of about 4500 feet.

[11] **Q:** That's my problem is mixing AGLs [12] and MSLs. What range of speeds did you [13] consider as Sevier B MOA flight conditions?

[14] **A:** I think on the low side and this is [15] — I'm not sure that brain cell still exists. [16] On the low side I think we looked at about [17] 300 knots. On the high side we looked at [18] 480.

[19] **Q:** Why didn't you include altitudes [20] over the Sevier B MOA up to 18,000 feet?

[21] **A:** Two-part answer. For that type of [22] thing the question was asked what if you were

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[1] in Skull Valley in Sevier B MOA. That [2] defined that portion of it for us. If you go [3] back to the other one we talked about Skull [4] Valley-like events. If I were cruising over [5] the Sevier B MOA at 17,500 feet, if that [6] would be a correct hemispheric altitude, that [7] would have been captured in that bigger set [8] of data we talked about earlier. So we [9] didn't call it Sevier B MOA flight conditions [10] because it's not, but it would be captured in [11] the larger Skull Valley-type event — I [12] forget the exact title but the one we talked [13] about previously.

[14] So I would contend that we did in [15] fact consider overflight below — overflight [16] of Sevier B above 9500 feet MSL below flight [17] level 180.

[18] **Q:** Did you consider both day and night [19] flights as Sevier B MOA flight conditions?

[20] **A:** Yes, ma'am, because you could fly [21] through Sevier B day or night.

[22] **Q:** And what flight activities did you

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[1] consider as Sevier B MOA flight activity [2] conditions?

[3] **A:** The flight activities that are [4] typically done out there today and were done [5] when I was there.

[6] **Q:** Those that you described earlier?

[7] **A:** Yes, ma'am.

[8] **Q:** If you'll look at Tab H, Table 1, [9] which is essentially after all the text in [10] Tab H, the first table, and look for November [11] 9, 1993, which is item 73 —

[12] **MR. BARNETT:** That's item 76, isn't [13] it?

[14] **MS. NAKAHARA:** Item 76?

[15] **THE WITNESS:** Item 73 is blank on

[16] my sheet.

[17] **MS. NAKAHARA:** On Table 1?

[18] **MR. BARNETT:** Yes.

[19] **THE WITNESS:** Yes, ma'am.

[20] **MS. NAKAHARA:** That's going to [21] answer my question. Maybe I have the old Tab [22] H.

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[1] **MR. GAUKLER:** We sent out a new [2] table with Revision 4.

[3] **MS. NAKAHARA:** My question is for [4] counsel. I don't believe we have the [5] November 9, '93, document in the discovery [6] material. My question was whether this was [7] the same accident report as the 8th because [8] they appear to be different. Whether it was [9] engine failure or not engine failure, and I [10] didn't understand how you classified it.

[11] **MR. GAUKLER:** Excuse me. Which one [12] is that you don't have?

[13] **MS. NAKAHARA:** We don't have [14] November 9, '93.

[15] **BY MS. NAKAHARA:**

[16] **Q:** I apologize for these questions.

[17] **A:** That's all right.

[18] **Q:** Have you ever had the need to [19] relieve yourself while flying through Skull [20] Valley?

[21] **A:** No, ma'am.

[22] **Q:** Are you aware of any other pilot

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[1] who has had to relieve himself while flying [2] through Skull Valley?

[3] **A:** No.

[4] **Q:** Are pilots prohibited from [5] relieving themselves while flying through [6] Skull Valley?

[7] **A:** Not that I know of.

[8] **Q:** And would it be more desirable to [9] relieve yourself while en route to the work [10] area versus while flying through the work [11] area under an air-to-air combat or [12] air-to-ground training mission?

[13] **MR. GAUKLER:** Objection, [14] speculation. Go ahead and answer.

[15] **THE WITNESS:** I guess the short [16] answer is it's most desirable to relieve [17] yourself before you leave the operations [18] building. That would be your best option. [19] The typical mission is really only about an [20] hour and a half. You're talking about two, [21] two and a half hours is all you're really [22] talking about.

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[1] You know, in terms of next best [2] options if you thought you were going to have [3] to go I would do it before takeoff, sitting [4] in the ER, end of runway, where you're [5] sitting and let them check the

airplanes. [6] You're sitting on the ground. It's pretty [7] benign, pretty safe. You've got the parking [8] brake set. You're not going anywhere.

[9] If you absolutely had to do it [10] while in flight you would try to select the [11] least demanding phase of flight to do that. [12] As a matter of routine, I think anybody who [13] attempted to do that below 5,000 feet is [14] asking for trouble. I mean, it's too [15] awkward. I don't think people would [16] routinely do it at anything below — I'm [17] guessing here. [18] I have to tell you in 20 some years [19] of flying in the Air Force the only time I [20] used one was flying an F-4 across the [21] Mediterranean. It was a 6-hour flight. I [22] never even carried one with me in the F-16

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[1] and there were times when I flew nonstop [2] coast to coast. So I kind of go — maybe I'm [3] the wrong guy to ask that question but you [4] would pick the least demanding phase of [5] flight to do it in. You would not do it in [6] the close proximity to the ground. If you [7] read the accident reports where it happened [8] the guys I think were both up in the 20-, [9] 30,000 feet. That's what you're going to be [10] looking for, I think.

[11] Other people may have different [12] opinions, but, you know, close proximity to [13] the ground is not where you want to do that. [14] You want some altitude below you.

[15] **Q:** What is the minimum altitude that a [16] pilot may unstrap himself?

[17] **A:** I'd have to research the [18] regulations on that. I don't remember off [19] the top of my head. I never unstrapped [20] myself in the airplane. Again, I'm the wrong [21] guy to ask. Let me qualify that. I never [22] unstrapped myself while flying. After

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[1] landing I would unstrap and taxi back, but [2] while airborne I didn't unstrap.

[3] **Q:** This is the accident report for [4] September 19, 1990, which if you look at Tab [5] H, Table 1, Item 17 was categorized as being [6] able to avoid the PFS facility. Can you look [7] at that and explain why that was?

[8] **A:** Okay, let me read this, please. [9] Okay. The question. I'm sorry?

[10] **Q:** Can you explain why that accident [11] was categorized as an accident in which the [12] pilot could avoid the PFS facility when the [13] pilot disappeared?

[14] **A:** What number was — I mean —

[15] **MR. GAUKLER:** Seventeen.

[16] **THE WITNESS:** Yes, because if you [17] read — where was it — on page 3, paragraph [18] 5, "Impact: The aircraft

impacted in an [19] undeveloped heavily wooded swampy area 12 [20] nautical miles southwest of Allendale, South [21] Carolina." If the Private Fuel Storage [22] facility is built, as you know, it will be

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[1] well-lit. He was operating out in the middle [2] of nowhere basically where there were no [3] lights, no horizons, nothing to indicate that [4] he was getting close to the ground, no [5] outside visual reference. Regrettably, [6] that's an occurrence that has cost more than [7] one Air Force pilot his life.

[8] In fact, that's exactly what [9] happened to the gentleman that I had to [10] investigate the accident report on. He was [11] pointing southeast off the target in Avon [12] Park which was referred to as the black hole [13] because there was absolutely nothing out [14] there to give you any reference that you were [15] doing well or not doing well.

[16] Out in the Private Fuel Storage [17] facility, again, if it's lit it will be [18] visible from several miles. That will give [19] you, one, awareness that it's there and, two, [20] it will give you, if you will, a sense of [21] ground level because you now have a [22] reasonably large area — one of the things

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[1] that can also — I'm kind of wandering in the [2] desert here.

[3] A single point of light on the [4] ground can be very disorienting, and people [5] have mistaken them for stars and all sort of [6] other things, a single light. When you have [7] an area that is lit that does lots of good [8] things for you. It gives you a sense of [9] horizon both up and down and left and right.

[10] You read that accident report and [11] it's clear that the pilot had no idea that he [12] had picked up a fairly gradual descent rate [13] and just hit the ground completely unaware [14] that the ground was even coming up because [15] there was nothing outside to cue him.

[16] One of the things that you find as [17] you fly airplanes and study is that the body [18] is very sensitive to outside cues and you [19] don't really realize how much. You can be [20] spatially disoriented in the weather, be [21] flying off of instruments, and really [22] fighting hard to try to maintain your sense

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[1] of left, right, up, or down, and then as soon [2] as you come out of that weather and you see [3] those lights at night you go boom, and it's, [4] like, okay, I know where I am and all those [5] problems that you had just went away. That's [6] a long explanation. I apologize for [7] rambling.

[8] **Q:** It helps. This is —

[9] **A:** I don't know if that needs to be an [10] exhibit or not.

[11] **Q:** No. This is an accident report or [12] a mishap report for January 13, 1995, in [13] which the pilot crashed on a golf course. [14] Based on the accident report do you know if [15] the pilot tried to avoid the golf course?

[16] **A:** Again, the question.

[17] **Q:** Do you know if the pilot tried to [18] avoid the golf course and didn't?

[19] **A:** It's not clear from that is the [20] short answer. To expand and try to move that [21] to the Skull Valley scenario, it's clear that [22] the pilot had time to maneuver the airplane

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[1] and he did in fact maneuver the airplane. He [2] zoomed. He did all of the things he was [3] supposed to do and elected to eject prior to [4] reentering the weather.

[5] Having had the opportunity to fly [6] in Europe, I would probably contend that [7] transposing that geography, that population [8] density, the fact that when you go flying [9] through Germany and Europe basically it's [10] very rolling hills and every hill has got — [11] every valley's got a village, every — you [12] know, that's what it is.

[13] You take that and try to say here I [14] am in the Sevier B MOA and you kind of run [15] into a disconnect in terms of what's out [16] there. Could I expect a pilot to know where [17] every golf course, every village, and thing [18] is in Belgium? No, I don't think I could. [19] But when I come to the Sevier B MOA and [20] particular to Skull Valley I've got mountains [21] on the left, mountains on the right. I've [22] got good geo references. I know where I am.

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[1] Now, to pick up a couple degrees to [2] the east if there's any confusion is a very [3] simple matter, and it's clear that he had [4] plenty of time to maneuver the airplane. So [5] that's kind of another long answer to a short [6] question.

[7] **Q:** This is an accident report, [8] September 3, 1990. Will you explain —

[9] **MR. GAUKLER:** What number is it in [10] the tab?

[11] **MS. NAKAHARA:** Number 16. That was [12] categorized as able to avoid the PFS facility [13] not Sevier B MOA flight conditions and not [14] Skull Valley type events.

[15] **THE WITNESS:** My chart shows a [16] little different. The way it reads to me is [17] yes for engine failure, yes for able to avoid [18] PFS, no for Sevier B flight conditions, yes [19] for Skull Valley-type

event.

[20] BY MS. NAKAHARA:

[21] Q: Will you explain why it was [22] categorized as it could avoid the PFS

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[1] facility?

[2] (Pause)

[3] MR. GAUKLER: Ready, Connie.

[4] MS. NAKAHARA: Oh, I'm sorry.

[5] THE WITNESS: Oh, I'm sorry. I was [6] waiting for you. In short the pilot had [7] problems and there was 30 seconds from the [8] initial indications of the problem. He [9] started to climb and 30 seconds later he [10] ejected. Thirty seconds is enough time to [11] turn two or three or four degrees.

[12] BY MS. NAKAHARA:

[13] Q: This one is the last one, and I [14] believe this is an accident report for [15] December 19, 1991, but I don't have the first [16] page. I can't find a correlating accident [17] date on the table.

[18] MR. GAUKLER: December 16, 1991, at [19] number 41.

[20] MR. BARNETT: Hard to tell without [21] the date.

[22] MS. NAKAHARA: And I guess the only

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[1] reason I —

[2] MR. BARNETT: Is it in there [3] somewhere else?

[4] THE WITNESS: Let's see.

[5] MS. NAKAHARA: It talks about a [6] date December 19 and then the above section [7] discusses news articles in February '92.

[8] (Pause)

[9] MR. GAUKLER: I'm going to object [10] to the question because it's ambiguous [11] without the cover page, whatever the question [12] is. I don't think you have a question on the [13] table yet. It's a blanket objection.

[14] MR. BARNETT: It's just hard to [15] tell without the date.

[16] MR. GAUKLER: Also, it would have [17] facts that we don't see here.

[18] MS. NAKAHARA: That's fine.

[19] BY MS. NAKAHARA:

[20] Q: If you'd look back at the crash [21] report on page 19A, the first part states [22] that the Air Force trains pilots to turn

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[1] towards an uninhabited area before ejecting. [2] Does each pilot determine what's an [3] uninhabited area?

[4] A: Yes. I mean, I don't know that [5] there's a definition somewhere of "in-

habited" [6] versus "uninhabited" in terms of an Air Force [7] publication or directive or anything.

[8] Q: If the PFS facility is built do you [9] expect flying patterns to change in Skull [10] Valley in any material way?

[11] A: It would be speculative on my part. [12] As I sit down and think about it, you know, [13] there were things that I used to do when I [14] would fly Skull Valley and we've discussed [15] those before. There were routes which I used [16] to fly which predominantly were centered [17] toward the eastern portion, and I think that [18] was fairly consistent with what most people [19] did.

[20] Are the patterns going to change? [21] Are the tasks that we do there going to [22] significantly change if the PFS is built? I

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[1] don't know. I mean, I would still go through [2] the same routine — I'm guessing I would [3] still go through the same routine that I used [4] to go through to take care of all the [5] administrative things and then just kind of [6] press on from there.

[7] If it was out there, would I use it [8] as was discussed yesterday? I don't know. I [9] mean it's not something I used to do at that [10] phase of my flight. So, I mean, I know what [11] it's used for, how we use it today, and [12] that's kind of what we did all of our studies [13] and our analysis on.

[14] Q: If the PFS facility was in [15] existence while you were wing commander, [16] would you continue to fly through Skull [17] Valley?

[18] A: Sure.

[19] Q: In your opinion could the Air Force [20] elect to declare restrictions around the PFS [21] facility if it's built?

[22] A: Kind of going back to the operative

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[1] phrase "could." I mean, a lot of things [2] could happen. Knowing what I know about the [3] probability of an incident being there, [4] having done a little looking at where other [5] nuclear power facilities — I mean nuclear- [6] generating, active reactors are located with [7] proximity to the airways and things like [8] that, knowing that the DOD prohibits over- [9] flight over those at 1,000 feet, that that's [10] the only restriction to a nuclear power plant [11] where — you know, the potential for a [12] nuclear power plant going amok is [13] significantly greater than casks of spent [14] material sitting out in the desert.

[15] I don't understand why there would [16] be a reason or a good reason to do it, [17] particularly given the probabilities of

[18] anything happening.

[19] Q: If a 1,000-foot restriction was [20] imposed over the PFS facility how if at all [21] would that affect ability to use Skull [22] Valley?

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[1] A: In essence there's one now there. [2] Your minimum altitude in that part of Skull [3] Valley is 1,000 feet today so that's no [4] change.

[5] Q: I basically have one last set of [6] questions if I can find them. I'll just ask [7] it. Are you aware of a meeting between PFS [8] representatives and Tab McCall with the U.S. [9] Air Force that took place approximately this [10] past summer?

[11] A: Yes, ma'am.

[12] Q: Were you in attendance?

[13] A: Maybe, and I say that in the sense [14] that I believe there were two meetings. I [15] was not at the first meeting. I was at a [16] second meeting with Mr. McCall.

[17] Q: At the meeting that you were [18] present what documents, if you recall, did [19] you present to Mr. McCall?

[20] A: The only thing I remember was a — [21] I think whatever the current version of this [22] was was given to him, and I believe that

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[1] there was a — maybe a 3-page or a 3-slide [2] briefing given to him to answer some [3] questions that he had. I didn't have a [4] speaking part. I was there in case he had [5] any questions about the UTTR or F-16 [6] operations.

[7] Q: Do you know if the 3-page slide [8] briefing was included in the discovery [9] materials?

[10] MR. GAUKLER: We haven't produced [11] any documents with respect to that.

[12] MS. NAKAHARA: Can we get a copy of [13] that?

[14] MR. GAUKLER: We'll take it under [15] advisement.

[16] MS. NAKAHARA: I have no more [17] questions. Thank you.

[18] THE WITNESS: You're welcome.

[19] MR. GAUKLER: Take a short break.

[20] (Recess)

[21] EXAMINATION BY COUNSEL FOR APPLICANT

[22] BY MR. GAUKLER:

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[1] Q: Colonel Fly, I have just one very [2] short question. Counsel asked you about how [3] fast you would fly if you're flying low [4] altitude. At one point you stated that when [5] you transitioned from good

guy territory to [6] bad guy territory or vice versa you would go [7] as fast as you can. Would that type of [8] situation occur in Skull Valley?

[9] **A:** No, that would be much further [10] downstream toward what we would call the [11] FLOT, troops. That's kind of where the [12] battle is taking place, where typical [13] southern UTTR — you can draw it just about [14] anywhere you want to, but if this was the [15] area you were attacking and the red — I'm [16] sorry R6407 is an example — then probably [17] well south of there may be in the middle of R [18] 6405, for instance, might be where the [19] simulated edge of the contact is between the [20] two Armies.

[21] So that would be — just short of [22] that is where you would want to accelerate

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[1] and probably north of that is where you would [2] slow down a little bit again.

[3] **MR. GAUKLER:** No further questions.

[4] **MS. NAKAHARA:** I have no questions.

[5] **MS. MARCO:** No questions.

[6] (Whereupon, at 1:07 p.m., the [7] deposition of RONALD E. FLY was [8] adjourned.)

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PRIVATE FUEL STORAGE, L.L.C.

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