

RAS 4428

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: Private Fuel Storage, LLC

Docket Number: 72-22-ISFSI; ASLBP No. 97-732-02-ISFSI

Location: Salt Lake City, Utah

Date: Thursday, April 11, 2002

DOCKETED
USNRC
2002 MAY 15 AM 9:25
OFFICE OF THE SECRETARY
RULEMAKING AND
ADJUDICATIONS STAFF

Work Order No.: NRC-281

Pages 3482-3867

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:)
PRIVATE FUEL STORAGE, LLC,) Docket No. 72-22
(Independent Spent Fuel) ASLBP No.
Storage Installation) 97-732-02-ISFSI
)

U. S. Nuclear Regulatory Commission
Utah State Capitol
Salt Lake City, Utah 84114

On Thursday, April 11, 2002 at 9:00 a.m. the
above-entitled matter came on for hearing, pursuant to
notice, before:

MICHAEL C. FARRAR, CHAIRMAN
Administrative Judge
U. S. Nuclear Regulatory Commission

DR. JERRY R. KLINE
Administrative Judge
Atomic Safety & Licensing Board Panel

DR. PETER S. LAM
Administrative Judge
Atomic Safety & Licensing Board Panel

A P P E A R A N C E S

FOR THE STATE OF UTAH:

Denise Chancellor, Esq.
Connie Nakahara, Esq.
James L. Soper, Esq.
ASSISTANT ATTORNEYS GENERAL
Office of the Attorney General
160 East 300 South, 5th Floor
P. O. Box 140873
Salt Lake City, Utah 84114

FOR PRIVATE FUEL STORAGE, LLC:

Jay Silberg, Esq.
D. Sean Barnett, Esq.
Paul Gaukler, Esq.
SHAW PITTMAN
Attorneys at Law
2300 N Street, N.W.
Washington, D.C. 20037

FOR THE U.S. NUCLEAR REGULATORY COMMISSION:

Sherwin E. Turk, Esq.
Catherine Marco, Esq.
Office of the General Counsel
Mail Stop - 0-15 B18
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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I N D E X

E X A M I N A T I O N

Witness Panel:
 Brigadier General James L. Cole, Jr.
 Major General Wayne O. Jefferson, Jr.
 Colonel Ronald E. Fly
 Mr. Stephen Vigeant

Cross Examination by Mr. Soper	Page 3490
Redirect Examination by Mr. Gaukler	Page 3556
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E X H I B I T S

No.	MRKD/ADMTD
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State's Exhibits

156-A	3492
Exhibit 156, with vertical and horizontal lines	
156-B	3725 3725
Exhibit 157-B, with vertical and horizontal lines extended	

Applicant's Exhibits

MMM	3569 3656
Cartoon-type Drawing from Technical Order -1	
NNN	3579 3657
Pages 1-133 and 1-134 from Technical Order 1F-16C-34-1-1	
OOO	3579 3657
Page 1-94 from Technical Order 1F-16C-1	

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E X H I B I T S (cont.)

No.	MRKD/ADMTD
Applicant's Exhibits	
PPP T. O. 1F-16C-1	3603 3657
QQQ AF Instruction 51-503	3628
RRR U.S. NRC Standard Review Plan	3686 3690
SSS DOE Standard 3014-96	3690
TTT U. K. Atomic Energy Authority, Safety and Reliability Directorate	3715 3723
UUU F-16 Accident Statistics/100,000 Flight Hours	3726 3733
VVV F-16 Destroyed Aircraft Rates FY89-01	3735 3739
WWW E-mail from Walter Boyne to Jack Cole dated 3-15-02	3757
XXX E-mail from Gene Frank to Jack Cole, 3-17-02	3757
YYY E-mail from Francis Woods to wboyne 3-13-02	3757
ZZZ E-mail from Richard Noonan to Walter Boyne 3-11-02	3757

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E X H I B I T S (cont.)

No.		MRKD/ADMTD
Joint Exhibits		
1	Summary of Facts, Part 1, Kunsan Air Base, 26 December 1989	3741 3745
2	Authority and Purpose, 22 March 1990	3741 3745
3	Aircraft Accident Investigation Report, 20 February 1991	3741 3745
4	Aircraft Accident Investigation Report, 16 December 1991	3741 3745
5	Aircraft Accident Investigation, 31 May '92	3741 3745
6	Summary of Facts, 18 September '92	
7	Aircraft Accident Investigation, 2 February '94	3741 3745
8	Aircraft Accident Investigation, 20 January 1996	3741 3745
9	AFI 51-503 Accident Investigation Report, 7 June '96	3741 3745
10	Aircraft Accident Investigation, 11 July 1996	3741 3745
11	AFI 51-503 Accident Investigation Report, 21 November 1996	3741 3745
12	Executive Summary, Aircraft Accident Investigation Report, 15 December 1998	3741 3745

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E X H I B I T S (cont.)

No.

MRKD/ADMTD

Joint Exhibits

- | | |
|---|-----------|
| 13 | 3741 3745 |
| Executive Summary, Aircraft Accident
Investigation Report, 7 January 1999 | |
| 14 | 3741 3745 |
| Executive Summary, Aircraft Acccident
Investigation Report, 12 July 1999 | |
| 15 | 3741 3745 |
| US Air Force Aircraft Accident
Investigation Board Report,
31 August 2000 | |

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1 April 11, 2002

9:00 a.m.

2
3 P R O C E E D I N G S

4
5 JUDGE FARRAR: Good morning everyone.

6 I see that all the counsel and all the witnesses
7 are here, so we'll get right to business.

8 We have preliminary matters to take up.
9 There's been a lot of news recently about eminent
10 historians who didn't give proper credit to their
11 sources, and those of you who read this morning's
12 paper saw my brilliant statement about -- it's
13 about attitudes not arithmetic. I hasten to say
14 that was not original with me, it was part of the
15 good advice Judge Kline gave me, so I want that to
16 be straight.

17 But seriously, the reason for
18 mentioning that is I wish you all could hear the
19 advice I get up here. These two gentlemen at my
20 left and right are not lawyers, but they've been
21 through a number of these hearings, have a good
22 common sense feel for how the record should be
23 developed, and when we consult, it's not just me
24 making sure that what I want to do is correct. I
25 really get excellent advice from them. And the

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1 record should reflect that.

2 Second thing, how are we doing with
3 Major Smith?

4 MR. SOPER: We've contacted Major Smith
5 and he is available. He's on vacation right now,
6 so it might even be an opportune time. Would the
7 goal, your Honor, be to get him here during some
8 part of this hearing?

9 JUDGE FARRAR: Yeah, it doesn't have --
10 I suppose it would be preferable this week, when
11 everyone else is here, but we would -- that would
12 be preferable, but having him at any point would
13 be better than not having him.

14 MR. SOPER: If it were during another
15 contention, we would recess and do him and then go
16 back?

17 JUDGE FARRAR: Right.

18 MR. SILBERG: We would prefer,
19 obviously, if we could, to do it this week when
20 all the witnesses are here.

21 JUDGE FARRAR: In case there would be
22 follow-up to his testimony?

23 MR. SILBERG: Correct. And as I
24 mentioned both to counsel for the State and to the
25 Board, we think we have a time this afternoon for

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1 a telephone hookup with another one of the pilots
2 who is in California, and I understand we're
3 trying to get a telephone in here at that time and
4 see if we can make that happen.

5 JUDGE FARRAR: It looks like we will be
6 able to make those arrangements. The State's
7 people, the State Capitol people are working with
8 us on that, so we think we'll have that.

9 Now, who is that person, what's his
10 name?

11 COL. FLY: Colonel -- that's Colonel
12 Bill Coots. He's the one that referred to in the
13 accident report as the F-111 pilot that ejected at
14 150 knots at 150 feet with total hydraulic good.

15 JUDGE FARRAR: Do you have a page
16 reference to that.

17 COL. FLY: I'm sorry, your Honor,
18 that's actually Lieutenant Colonel Horstman's
19 testimony. I think it's page 18.

20 MR. SILBERG: He was one of the four
21 pilots identified in the Lieutenant Colonel
22 Horstman's testimony.

23 JUDGE FARRAR: And that's to be at what
24 time?

25 MR. SILBERG: Three o'clock, I think is

1 the nominal correct.

2 COL. FLY: That's the correct time. I
3 have a phone call in to try to confirm that, your
4 Honor.

5 JUDGE FARRAR: Okay. Then work with us
6 on details during breaks and we'll make sure we
7 have a phone number and stuff.

8 And Mr. Silberg, I understand you'll be
9 leaving partway through the proceeding today to
10 attend the Federal District Court argument on the
11 Utah -- the laws of the State of Utah that affect
12 the project?

13 MR. SILBERG: That's correct.

14 JUDGE FARRAR: All right. Any other
15 preliminary matters?

16 MR. SOPER: Yes, your Honor. I would,
17 pursuant to Mr. Turk's fine suggestion, we've
18 added vertical and horizontal lines to Exhibit
19 156, and we would offer that now. No one has seen
20 it yet, so I'll pass it out.

21 MR. SILBERG: Can I suggest that we
22 look at this during the course of the morning and
23 during a break just to make sure we don't have any
24 problems with it, rather than doing it now. Just
25 save some time.

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1 JUDGE FARRAR: Fine. Then we'll mark
2 it -- let's mark it 156-A.

3 MR. SOPER: Very good.

4 JUDGE FARRAR: Does that hurt anyone's
5 numbering system? Just so the record -- it will
6 be fairly obvious what the difference is, but
7 let's have them both. Since a lot of the
8 testimony yesterday dealt with all of us
9 eyeballing the graph.

10 We'll have this marked as 156-A.

11 (EXHIBIT-156-A MARKED.)

12 (A discussion was held off the record.)

13 JUDGE FARRAR: Back on the record.

14 Mr. Soper, the exhibit has been marked for
15 identification as has its parent, 156, and if you
16 don't -- you can proceed with those now, but we'll
17 wait to have them admitted until everyone has had
18 a chance to check the grid.

19 MR. SILBERG: Just during the next
20 break, we'll take an eyeball view. I'm sure it's
21 not a problem.

22 JUDGE FARRAR: Fine.

23 MR. SOPER: So -- may I proceed, your
24 Honor?

25 JUDGE FARRAR: Yes.

1 MR. SOPER: So the status of the record
2 is that 155 and -- or excuse me, 156 and 156-A
3 have been moved, and the decision is under
4 advisement.

5 JUDGE FARRAR: Yes.

6 MR. SOPER: Thank you.

7 MR. SOPER: Your Honor, I'm handing out
8 a document for the convenience of the Board and
9 witnesses and parties. This is already an
10 exhibit, so we'll not have it marked. I would
11 represent to you this is certain pages from the
12 addendum, revised addendum to the crash report.
13 It's dated July 2001, which is Exhibit O.

14

15 CROSS EXAMINATION (Resumed)

16 BY MR. SOPER:

17 Q. General Jefferson, good morning, sir.

18 GEN. JEFFERSON: Good morning.

19 Q. In connection with your calculation of
20 impact probabilities in Skull Valley, you're
21 aware, are you not, that a certain number of F-16s
22 transiting the Skull Valley will carry ordnance?

23 GEN. JEFFERSON: Yes, I am.

24 Q. And tell us what ordnance means, if you
25 would, please.

1 GEN. JEFFERSON: Ordnance means those
2 type of weapons that are bombs or missiles or
3 bullets.

4 Q. And we don't have any way to precisely
5 know the number of F-16s or the percentage of
6 F-16s in the future that might carry bombs, do we?

7 GEN. JEFFERSON: No, we know what's
8 happened in the past. We can project, but
9 that's --

10 Q. We only know what's happened in the
11 past and in the future, those concerns are, for
12 example, matters of national policy; is that
13 correct?

14 GEN. JEFFERSON: Yes, and in terms of
15 munitions, it would be strategy and tactics, as
16 well.

17 Q. And it may depend on the state of
18 conflict in the world?

19 GEN. JEFFERSON: Yes, to some degree,
20 although training takes place all the time.

21 Q. I see. So the best indication we would
22 have is what has occurred in the past, is that
23 your testimony?

24 GEN. JEFFERSON: Yes, it is.

25 Q. Let me show you, sir, if you'd direct

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1 your attention to page 13, and it appears that
2 there is following the bold heading response, a
3 table described as the ordnance carried in fiscal
4 year '98 by the 388 fighter wing as listed in
5 table four on page 81 of the report, revision
6 four, August 10, 2000. The table below compares
7 the two sets of data. That would be the data from
8 '98 and FY 2000; is that correct?

9 GEN. JEFFERSON: That's correct.

10 Q. Under the column headings, Sorties
11 FY '98, the total at the bottom would be 678 and
12 that would be the total for the various types of
13 ordnance shown there as indicated for the FY '98
14 year; is that correct?

15 GEN. JEFFERSON: That's correct.

16 Q. And under the headings sorties FY 00 at
17 the bottom of the column, totals 128, that is the
18 total of the various type of ordnance carried
19 during FY 2000; is that correct?

20 GEN. JEFFERSON: No, that's the total
21 of the number of sorties flown in the FY 00?

22 Q. I'm sorry, total sorties flown that
23 carried ordnance?

24 GEN. JEFFERSON: That's correct.

25 Q. And it appears that it's approximately

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1 four times greater in '98 than 2000, or something
2 roughly like that, is that -- the comparison,
3 let's say exactly is 678 sorties carrying ordnance
4 in '98 and 128 sorties carrying ordnance in 2000?

5 GEN. JEFFERSON: It's about five times.

6 Q. About five times. And, of course, we
7 would want to be as safe as possible with respect
8 to this site in evaluating its risk due to
9 ordnance, would we not, sir?

10 GEN. JEFFERSON: Within reasonable
11 limits, yes.

12 Q. I see. And from just a layman's point
13 of view, looking at this, I would suggest if we
14 have experienced in the past 678 sorties carrying
15 ordnance, we ought to be prepared for the fact in
16 the next 20 years, maybe that's going to be
17 repeated, wouldn't you say?

18 GEN. JEFFERSON: What we've done was
19 respond to a question from the NRC Staff --

20 Q. Would you answer my question first,
21 sir?

22 GEN. JEFFERSON: Restate it, please.

23 MR. SOPER: Could you read it back,
24 please.

25 (Requested portion of record read.)

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1 GEN. JEFFERSON: No, I don't think
2 that's the right way to do it.

3 Q. You think it will be repeated in the
4 future, this number of sorties carrying ordnance?

5 GEN. JEFFERSON: I doubt it, but I
6 cannot assure that?

7 Q. I see. There's no question that this
8 number of sorties carried ordnance in '98, is
9 there?

10 GEN. JEFFERSON: No, that's the data we
11 got from the Air Force at Hill.

12 Q. And there's no question that you don't
13 have any way to determine for certain what the
14 number of sorties will be in the future?

15 GEN. JEFFERSON: Not for certain. I
16 can make an educated guess, but I --

17 Q. I see. And your guess is that fiscal
18 year -- FY 2000 is a better estimate than FY '98;
19 is that right?

20 GEN. JEFFERSON: Yes. In fact, FY '99
21 was very close to the 00 numbers.

22 Q. I see. So in the event of situations
23 in the world call for increased training with
24 ordnance, the number shown in FY '98 is certainly
25 possible in the -- Hill Air Force Base is

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1 certainly capable of producing sorties with that
2 many aircraft carrying munition ordnance?

3 MR. SILBERG: Could I ask a
4 clarification of the question.

5 MR. SOPER: Well, you --

6 MR. SILBERG: So it's clear on the
7 record, are we talking about a one time or one
8 year number or an average consistent number over a
9 20-year period in your question?

10 MR. SOPER: If the witness understands
11 the question, your Honor, I would like him to
12 answer it. If Mr. Silberg can recross or redirect
13 on any questions he has.

14 MR. SILBERG: I think it's important
15 that we have questions that are understandable for
16 the record, because as the judge -- as the Board
17 has said on several times, this is a record that
18 may go other places in the next three years.

19 MR. SOPER: I'll ask the question
20 again, Mr. Silberg.

21 MR. SILBERG: Thank you.

22 JUDGE FARRAR: Mr. Soper, without
23 necessarily indicating that your previous question
24 was bad, Mr. Silberg's point is a good one, so I'd
25 ask all counsel for exactly the reasons

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1 Mr. Silberg said, to be as precise as possible
2 without again ruling that you weren't precise. If
3 we could all keep our eye on that, that would be
4 helpful.

5 MR. SOPER: Okay, thank you, your
6 Honor.

7 Q. (By Mr. Soper) Let me just be very
8 simple and to the point, General. There's no
9 question that Hill Air Force Base is capable of
10 flying a number of sorties, to be precise, 678
11 carrying ordnance in a single year through Skull
12 Valley, isn't that true?

13 GEN. JEFFERSON: I have no doubt of
14 that.

15 MR. SOPER: That's all I have. Thank
16 you.

17 That concludes our cross-examination of
18 these three witnesses, your Honor.

19 JUDGE FARRAR: Mr. Soper or somebody,
20 how come when I look at -- maybe I'm confused, but
21 how come when I look at the revised addendum, my
22 page 13 is not the page 13 I was just given?

23 MR. GAUKLER: The page that Mr. Soper
24 gave you actually is from tab 8H to the revised
25 addendum.

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1 JUDGE FARRAR: Thank you, Mr. Gaukler.
2 Give me just a minute here.

3 MR. SOPER: That's identified on the
4 second page there, your Honor. It doesn't jump
5 out at you. I'm sorry, I should have mentioned
6 that.

7 JUDGE FARRAR: Oh, there it is. Right,
8 I just didn't see it.

9 Mr. Soper, were you ready to leave that
10 point?

11 MR. SOPER: Yes. In fact, this is the
12 end of the cross -- my cross-examination for these
13 three witnesses.

14 JUDGE FARRAR: Okay. General
15 Jefferson.

16 GEN. JEFFERSON: Yes, your Honor.

17 JUDGE FARRAR: Why did Hill's numbers
18 drop so dramatically from '98 to '99 and '00.

19 GEN. JEFFERSON: I don't know that,
20 sir.

21 JUDGE FARRAR: So all you all did was
22 get from them the numbers?

23 GEN. JEFFERSON: We got the information
24 the same way we did the flying hours, and that's
25 what they gave us, so that's what we used.

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1 JUDGE FARRAR: Colonel Fly.

2 COL. FLY: Your Honor, if I could
3 expand a little bit on training requirements and
4 sorties. The training -- the requirement to drop
5 live munitions is actually very small. At Hill,
6 because it was an air-to-ground depot, there were
7 occasions when they had munitions -- let me back
8 that up there. Hill is a major repair and storage
9 facility for the Air Force -- for the Air Force.
10 We refer to that as a depot. There were times
11 when I was there, and I can't quantify this for
12 you, but I can tell you that I had the people that
13 worked in the depot tell me this, that they
14 occasionally had weapons that they needed to have
15 dropped because they were running out of shelf
16 life. So it was additional training for our guys.
17 But I know it happened on at least one occasion
18 because I had the guy tell me that but I can't
19 tell you how frequently that was.

20 But the requirement to actually drop
21 live weapons is pretty small, in terms of the
22 pilots. Because in terms of avionics and training
23 for the pilot, generally you can do the same thing
24 with a -- if we're talking now about bombs, if you
25 need to drop a bomb for score, we have these

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1 little 25-pound, they're called BDU, that's bomb
2 dummy unit 33. They weigh about 25 pounds, they
3 have a small spotting charge in them so that when
4 they hit, a little puff of smoke, and either the
5 remote sensing cameras or the people in the
6 scoring towers off to the sides can triangulate
7 the position and give you a score on how close you
8 were to the proposed target.

9 You can drop those to maintain the
10 proficiency. You don't need to drop necessarily a
11 large 500-pound bomb whether it's concrete or
12 wheel.

13 JUDGE FARRAR: And those would not be
14 listed in this table?

15 GEN. JEFFERSON: No, sir, they were in
16 the data we got, but because it's a 25-pound
17 chart, the BB, as we talked about earlier, we
18 didn't include those.

19 COL. FLY: For a lot of the -- well, we
20 talk about laser guided bombs. Hill was at the
21 time, and I believe it still is, the largest Air
22 Force F-16 wing that's capable of dropping those
23 laser guided bombs. You can do all the things as
24 a pilot you need to do without -- in terms of
25 bombing proficiency, without even having a laser

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1 guided bomb on the airplane. So you can maintain
2 your proficiency, but you'll never see the bomb
3 hit because clearly there is nothing to drop.

4 So when you start talking about
5 training requirements, those are fairly high
6 because we have a very high standard for our Air
7 Force pilots in terms of what we expect for
8 proficiency regardless of what type of airplane
9 they're flying. But in terms of requirements to
10 actually carry the large heavy weapons, I don't
11 have a number for you, but those numbers are
12 fairly small.

13 JUDGE FARRAR: Two follow-up questions,
14 then. So looking at this table, it's not that the
15 trainees at Hill were getting only 20 percent of
16 the practice they got the previous year -- I think
17 that's clear from what you just said, because
18 they're using the 25 --

19 COL. FLY: The smaller bombs or some
20 other type of training mechanism, yes, your Honor.

21 JUDGE FARRAR: Okay. In terms of
22 possible risk to the proposed PFS facility, are
23 these 25-pound dummy bombs, can we entirely
24 disregard those in terms of any possible impact on
25 the facility?

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1 COL. FLY: Your Honor, if I could -- I
2 don't know that it was admitted, but there was
3 that letter that talked from the Air Force about
4 things that would not hurt the cask. Those things
5 are all much, much bigger than this little
6 25-pound one.

7 JUDGE FARRAR: Mr. Soper, if you want
8 to follow up, even though you said your cross was
9 finished, if what we just asked gives you anything
10 you want to follow up on -- let me have Judge
11 Kline follow up first.

12 JUDGE KLINE: I've got a few questions
13 concerning the mode in which aircraft crash, and I
14 want to pick up from where we were yesterday with
15 the scenario where we have a jet aircraft with the
16 engine failed and the pilot having departed. And
17 yesterday, we talked about the pilot's frame of
18 mind. Now I want to know what happens to the
19 airplane. So starting with the scenario that the
20 engine has failed and the pilot is gone, I am
21 trying to enlarge my understanding of the
22 statistical probability of events that follow, and
23 so it's going to get a little complicated. And
24 first I want to know, do any of you have formal
25 training in statistics or probability theory?

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1 GEN. JEFFERSON: I do, sir.

2 JUDGE KLINE: Oh, you do, sir. Oh,
3 that's fine, that's going to be helpful. Okay.
4 When the aircraft is at some low altitude, let's
5 say, two or three thousand feet unmanned, I'm
6 going to give you two possible scenarios for what
7 happens to it. You tell me which you like better.

8 In the first scenario, after the pilot
9 departs, the aircraft goes into wild gyrations and
10 flies off in the chaotic directions and its impact
11 point is unpredictable. In the second scenario,
12 the aircraft continues to fly wherever it was
13 pointed when the pilot left, and impacts somewhere
14 along the projected flight path that it was on
15 when the pilot left. Now, which of those two
16 scenarios do you prefer as the more likely?

17 GEN. JEFFERSON: Sir, that depends on
18 the aircraft type, but for the F-16 --

19 JUDGE KLINE: Yes, the F-16.

20 GEN. JEFFERSON: It goes straight
21 ahead. But Colonel Fly is really the expert on
22 it.

23 COL. FLY: Your Honor, in terms of the
24 two scenarios that you just laid out, for what we
25 were talking about with an engine failure leaving

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1 the pilot in control of the airplane, giving him
2 some amount of time to do things --

3 JUDGE KLINE: Yeah.

4 COL. FLY: -- the second scenario is
5 the one that is likely. The airplane will tend to
6 go and hit in the general vicinity of where it was
7 pointed. The one that you described where it's
8 out of control, that is not typical for F-16s
9 where the pilot was in control at the time of
10 ejection.

11 JUDGE KLINE: So let's just establish a
12 ground rule, then. All of my questions have this
13 sort of statistical underpinning, so I'm really
14 interested in what's most likely to happen, not --
15 I'm not exploring the laws of physics of what
16 conceivably could happen, I just want to know in
17 the real world what's likely.

18 Now, let's imagine a second scenario
19 where, unhappy as it is, we have 10 hypothetical
20 aircraft similarly situated, and one after the
21 other, they go down this pathway, get in trouble,
22 the pilot exits and the aircraft impacts
23 somewhere. Now, we have two possible scenarios.
24 One, I would call the scatter scenario. The other
25 I would call the cluster scenario for the impact

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1 point. And in the scatter scenario, again we get
2 a chaotic situation where one aircraft crashes 10
3 miles to the east and another 10 miles to the
4 left, and the impact points are unpredictable. In
5 the cluster scenario, the aircraft tend to form a
6 cluster on the ground somewhere along where they
7 were -- the aiming point, the point that they were
8 originally pointed at when the pilot departed.
9 Now, which of those two scenarios do you prefer;
10 the cluster or the scatter?

11 GEN. JEFFERSON: I think the cluster is
12 the appropriate one, sir. The reason that the
13 F-16 goes straight ahead is because it has an auto
14 pilot. It has electronic controls, and when the
15 pilot leaves, the aircraft will go straight ahead,
16 tend to go straight ahead, and also it will
17 maintain -- it wants to maintain level flight.
18 Since it has no power, it can't. But it will
19 establish an attitude until it slows down until it
20 can't stay up, and then the computers bring it
21 into a glide and that's how it hits.

22 JUDGE KLINE: Okay. Now, let's take a
23 step toward reality and go back to Skull Valley.
24 Imagine Skull Valley laid out on a piece of graph
25 paper, and what I'm going to construct is

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1 something that would mean to me a probability
2 distribution function, okay? And what it means
3 is, we're going to have a graph, and on the X axis
4 of the graph are going to be flight paths. Let's
5 say a zero flight path directly overflying the PFS
6 site, and then flight paths successively offset so
7 that there's a one-mile offset say to the east and
8 then a two-mile offset, and these are lines, grid
9 lines on the ground on the X axis. And the Y axis
10 is going to be risk, risk of striking the PFS, the
11 site if it's go. Now, I understand -- first let
12 me ask, does the Air Force have graphs like that
13 that have been quantified that we know how risk
14 varies with offset from the flight path?

15 GEN. JEFFERSON: I have not seen those,
16 sir. I think the model you're describing would be
17 a normal curve centered over the --

18 JUDGE KLINE: That's where I'm going.
19 You're anticipating where I'm going. That is,
20 even if we don't know the numbers, can we say that
21 there is some kind of a distribution that peaks
22 over the site, let's say, and then it drops off at
23 some function.

24 GEN. JEFFERSON: Yes, sir. If you
25 assumed that all the planes were going over the

1 site and then drew a curve for that.

2 JUDGE KLINE: Yes.

3 GEN. JEFFERSON: Actually, I looked at
4 something like that early on, where I did a
5 distribution over the realistic course that we
6 have from the Air Force.

7 JUDGE KLINE: Yeah.

8 GEN. JEFFERSON: The problem was I
9 didn't have a standard deviation for --

10 JUDGE KLINE: Yeah, I understand we
11 can't quantify it. What I'm trying to do is
12 simply assist my understanding in case we need it.

13 GEN. JEFFERSON: Yes, sir. I have not
14 seen scattered diagrams for that.

15 JUDGE KLINE: Okay.

16 GEN. JEFFERSON: In the accident
17 reports, they don't have information like that
18 because they haven't -- they didn't have the
19 starting point for the pilot ejecting.

20 JUDGE KLINE: Sure, I understand.
21 That's why I'm sort of doing it hypothetically,
22 because I want to form a conceptual construct, you
23 might say.

24 Okay. Colonel Fly, if you have a
25 comment.

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1 COL. FLY: Your Honor, we'll talk more
2 about this later, but in the accident report,
3 there are statements to the effect, and I'm -- if
4 you'll just kind of take it in the sense in which
5 it's offered -- where it will say, the pilot
6 pointed toward an uninhabited area, and then it
7 will say the airplane impacted in an uninhabited
8 area or words to that effect. So you get the
9 sense, I'm pointing the airplane over there, it's
10 clear and then they'll say something like, it hit
11 in an uninhabited area or no damage was done or
12 things like that.

13 Now, I also want to say, your Honor,
14 that -- and we'll talk more about this later, the
15 accident reports are not required to make that
16 statement. They are required to report any damage
17 done. And there's probably 15 or so out of the
18 120 plus we looked at that make those types of
19 statements.

20 JUDGE KLINE: But the whole point of
21 assuming that the pilot is going to give a
22 steering signal to the airplane before he goes, is
23 the airplane will go where it's steered, or that
24 assumption. And that's -- I mean the pilot even
25 knows that, doesn't he? He's expected to -- you

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1 know, if he says you got to give it a steering
2 signal before you go, he wants to assume that it's
3 going to go where he steered it, right?

4 GEN. JEFFERSON: That's correct.

5 JUDGE KLINE: So let's get back to our
6 graph. Is it fair to say that the maximum risk to
7 the PFS site that occurs for the aircraft that
8 directly fly over it or that are on that flight
9 path or at some place close --

10 GEN. JEFFERSON: That would be the
11 maximum risk.

12 JUDGE KLINE: Maximum risk. And that
13 in this function, the risk -- if I said okay,
14 imagine an aircraft on a one-mile offset, and I'd
15 say -- I'll give you two scenarios again. The
16 risk remains exactly the same as the direct
17 flyover or the risk diminishes by some amount that
18 we don't know.

19 GEN. JEFFERSON: Well, there's another
20 factor in there, and that is what is the pilot
21 doing.

22 JUDGE KLINE: I'm assuming the pilot is
23 gone. He's done everything.

24 GEN. JEFFERSON: Oh, he's gone. And
25 he's still pointed towards the site, is that --

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1 JUDGE KLINE: No, no, it's pointed
2 towards its original flight path.

3 GEN. JEFFERSON: And one of these --

4 JUDGE KLINE: It's a parallel flight
5 path. On the graph, it's parallel.

6 GEN. JEFFERSON: I don't know the
7 scatter, but I'd say one mile is plenty of a --

8 JUDGE KLINE: Is a good offset?

9 GEN. JEFFERSON: Good offset.

10 JUDGE KLINE: To reduce the risk rather
11 than keep it the same?

12 GEN. JEFFERSON: Oh, yes, sir.

13 JUDGE KLINE: So that if we worked our
14 way down that graph, the two-mile offset would
15 be --

16 GEN. JEFFERSON: Would be virtually
17 zero.

18 JUDGE KLINE: Would be less than the
19 direct flyover; is that correct?

20 GEN. JEFFERSON: Correct.

21 JUDGE KLINE: Okay.

22 JUDGE FARRAR: Could I interrupt one
23 second. I love to see debate where you're both
24 talking at once because I rarely get in one. But
25 there's one person in the room who does not like

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1 that. And it's very natural, no criticism, but if
2 you can, you know, wait until each other is
3 finished, even though we wouldn't do that if we
4 didn't have a reporter, let's do it for her
5 benefit.

6 JUDGE KLINE: Anyway, keep in mind that
7 our hypothetical graph has parallel flight paths
8 to the one that's the direct flyover.

9 GEN. JEFFERSON: Yes, sir.

10 JUDGE KLINE: Because we're making a
11 graph, right? And we're trying to figure out how
12 the -- how the probability of hitting the site
13 diminishes with offset from the direct flyover.
14 Okay. So imagine a pilot, then, on a one-mile
15 offset flying parallel to the flight path that
16 directly overflies the site. Is it fair to say
17 that it wouldn't matter if he gave a steering
18 signal or not before he left, since the aircraft
19 continues on its flight path anyway?

20 GEN. JEFFERSON: Yes, sir, if it's
21 already on that flight path parallel to the one
22 that goes over the site, then he can't do anymore.

23 JUDGE KLINE: He can't do anymore.

24 GEN. JEFFERSON: It will go straight --

25 JUDGE KLINE: And the same is true as

1 we work our way down the curb then, three-mile
2 offset, four-mile offset, no steering signal is
3 needed; is that correct?

4 GEN. JEFFERSON: I would say it drops
5 off very rapidly.

6 JUDGE KLINE: Now, is there a point
7 where we could say -- and you alluded to this
8 yesterday, but didn't develop it. At some point,
9 with the sufficient offset, the probability goes
10 to zero because there's no energy left to carry
11 the aircraft back to the site, no matter what
12 happens, even if it's a chaotic flight. And the
13 question is, how far distance -- I mean, assuming
14 low altitude, what's the distance at which the --
15 you know, we want to tie down the curb as the
16 outer edge. What's the distance at which the
17 aircraft simply couldn't reach the site and the
18 probability of zero that there's any risk?

19 GEN. JEFFERSON: My first analysis,
20 sir, used that five-mile distance that you were
21 given.

22 JUDGE KLINE: Okay.

23 GEN. JEFFERSON: And I did calculations
24 based on the glide charts that are in the dash one
25 for the F-16, assuming the pilot zooms, hits the

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1 peak, slows down to his best glide speed and then
2 glides and stays in control of the airplane, all
3 the way down to zero, because that gives you your
4 maximum distance.

5 JUDGE KLINE: Yeah.

6 GEN. JEFFERSON: And at five miles,
7 they couldn't hit it if they were below 5,000
8 feet. That's why we have such a low probability,
9 and that's why I think the NRC Staff reacted and
10 said, don't use that assumption, spread them out.

11 JUDGE KLINE: Well, this is what I'm
12 trying to do is enlarge my understanding of the
13 probabilistics basis because in the NRC model, it
14 appears that they're distributing the aircraft
15 equally across the whole corridor, and if we, in
16 fact, look at the probability distribution, we get
17 a different kind of picture, don't we?

18 GEN. JEFFERSON: Yes, sir, there's a
19 huge conservatism in that process of spreading
20 everything out.

21 JUDGE KLINE: All right.

22 GEN. JEFFERSON: But that's what we
23 were asked to do.

24 JUDGE KLINE: Yeah, I understand, I
25 understand. I'm not criticizing your testimony.

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1 I'm just trying to enlarge my understanding of it.
2 And that should be part of the ground rules. This
3 is not cross-examination, you understand.

4 GEN. JEFFERSON: I understand.

5 JUDGE KLINE: I'm just trying to
6 determine if experts can help the decision maker.
7 So we have -- as I understand it now, on this
8 probability distribution, we have plenty of points
9 on it where the factor R doesn't come into the
10 equation; is that correct?

11 GEN. JEFFERSON: That's right. There's
12 places where it's just physically impossible for
13 the plane to get there.

14 JUDGE KLINE: Or even if it's not
15 impossible, it's a diminished risk even if the
16 pilot does nothing?

17 GEN. JEFFERSON: Yes, sir.

18 JUDGE KLINE: So let's ask another
19 question. Suppose there is now, as there must be,
20 a General sitting in an office at Hill Air Force
21 Base and he gets a chance -- he gets the chance to
22 write an order to his pilots and he has
23 jurisdiction to do so, and he writes an order that
24 says, pilots, continue to do exactly what you're
25 doing now as far as flying down Skull Valley, and

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1 that's really -- that's not a very hard order to
2 follow. They do it -- they fly preferentially
3 down the east side, is my understanding from the
4 testimony. Therefore, but in his order,
5 hypothetically, he says, oh, incidentally, while
6 you're doing things that you like to do anyway,
7 just don't fly over the site. Does that remedy,
8 this problem of risk to the site, in your mind, or
9 do anything that would adjust the likelihood of an
10 aircraft striking the site?

11 GEN. JEFFERSON: Certainly it would,
12 sir. We have -- because of our Air Force
13 background, would hate to see restrictions put on
14 the UTTR, because it's of national resource.

15 JUDGE KLINE: Well, that's why I worded
16 it as I did. This hypothetical order is hey,
17 guys, keep doing what you're doing except when you
18 get near PFS, don't fly over it.

19 GEN. JEFFERSON: I think that would be
20 a minimal disruption on it, because they don't.
21 You know, it's not something they do now anyway.
22 They don't fly over that area.

23 JUDGE KLINE: I understand. Okay.
24 Well, and anyway, that ends my line of inquiry and
25 I would welcome, you know, hearing from the other

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1 witnesses. But we need to get this out while
2 you're here, so thank you very much.

3 JUDGE FARRAR: General Jefferson, let
4 me just follow up on the beginning of that last
5 answer you gave about not -- I take it, you all
6 don't like any kind of civilian interference, even
7 if it seems -- would seem to me as a civilian
8 minimal, you add up enough of these minimal
9 inconveniences and you've limited your ability to
10 carry out your mission?

11 GEN. JEFFERSON: Exactly. Colonel Fly
12 can speak more to it, but the Utah Test Range is a
13 national resource. There's nothing like it
14 anywhere else. And if you keep chopping away
15 little pieces here and there, pretty soon you've
16 limited it a good deal. But I don't see where
17 this would do it. And even if you put an order
18 out, don't fly directly over it, I don't think
19 that would really limit the use of it.

20 JUDGE FARRAR: You don't see it,
21 sitting in that chair today, but if you were
22 sitting in the Base Commander's chair, you might
23 have a different opinion?

24 GEN. JEFFERSON: Having been a
25 Commander, I don't think that. I think that would

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1 have been a common sense for pilots, anyway. But
2 as best we can tell -- Jack, you looked in the
3 flight information -- the FLIP, maybe General Cole
4 could speak to that.

5 JUDGE FARRAR: Sir.

6 COLONEL COLE: May I add something,
7 your Honor. I had an extensive discussion on this
8 very topic in October of 1999 with the Vice
9 Commander and the Range Commander, and I basically
10 told them at that time, repeating General
11 Jefferson's words, that the UTTR is a national
12 treasure. We see no requirement to put any
13 restrictions on over flight of the site at all,
14 and then we discussed the why. The comment that
15 General Jefferson made about if it was there, they
16 probably wouldn't fly over it. There's no need to
17 fly over it, and if, underline if, sir, the Wing
18 Commander said just do it as you're doing it, but
19 don't fly over it, I don't believe that would
20 impact operations.

21 Secondly, in a document that's known as
22 FLIP, flight information planning of the United
23 States Air Force, there's an appendix back there
24 that lists nuclear power plants, and it says don't
25 fly over nuclear power plants, I believe the

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1 altitude is below 1500 feet. But it has a list of
2 storage sites, and it puts no restrictions on them
3 at all. It just lets you know that they are
4 there.

5 JUDGE KLINE: Yeah, I don't mean to
6 suggest that this would be necessary.

7 GEN. COLE: No, sir.

8 JUDGE KLINE: The probabilistic
9 calculation would have to be done. I just want to
10 establish that it's an open possibility. It's one
11 of the things that might happen, or could happen.

12 GEN. JEFFERSON: Yes, sir, if that were
13 done, I think it would be reduce that small
14 probability even further.

15 JUDGE KLINE: Okay.

16 JUDGE FARRAR: But even if the Base
17 Commander were willing today to say, listen
18 fellows, we don't need to go there, keep away if
19 you can, if for some reason his training required
20 that you do something that would coincidentally
21 bring you over the site, the Base Commander is
22 going to say, sorry those things are there, but we
23 need -- we happen to need to fly over them to get
24 to some other point?

25 GEN. JEFFERSON: I suspect that would

1 be the case, but that would be sort of remote to
2 need to do that. I mean from what we know about
3 operations going down Skull Valley, they don't
4 enter the ranges from there, they go straight on
5 down the valley and go south. They don't normally
6 fly up there. They don't really need to.

7 JUDGE KLINE: But let's just be -- just
8 to make sure we're clear on the record on it. The
9 flight down Skull Valley is merely a transit
10 corridor; is that right? And the training takes
11 place some place else in the south Utah training
12 range?

13 GEN. JEFFERSON: That's correct.

14 JUDGE KLINE: So that there really
15 isn't anything vital to the training mission going
16 on in Skull Valley, is there?

17 GEN. JEFFERSON: I'll let Colonel Fly
18 speak to it.

19 COL. FLY: Your Honor, I would -- of
20 course before I forget, General Cole mentioned the
21 Department of Defense flight -- the FLIP.

22 GEN. COLE: Flight information.

23 COL. FLY: Flight information. I
24 remember looking at that exact same thing and I
25 remember -- I can't specify the altitude, but I do

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1 remember that when I looked at it in the
2 restriction that's in there for nuclear power
3 plants, I remember thinking when I read the
4 restriction, there was an altitude associated with
5 it.

6 JUDGE KLINE: Sure.

7 COL. FLY: And I thought well, that's
8 no impact at all because pilots are required to
9 maintain a thousand feet now throughout Skull
10 Valley, so there would be no altitude change if it
11 was a power plant.

12 JUDGE KLINE: Yeah.

13 COL. FLY: For storage facilities,
14 there are no altitude restrictions listed for
15 storage facilities, it just lists the location of
16 them for informational purposes.

17 JUDGE KLINE: Okay.

18 COLONEL FLY: To get back to your
19 question, if I can kind of recage my mind here.

20 GEN. JEFFERSON: Training in the Skull
21 Valley.

22 COL. FLY: Yes, sir, as we tried to
23 describe in the testimony, most of the activity
24 that takes place in Skull Valley is as we talked
25 previously, that's kind of the entry part to the

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1 beginning of the tactical portion of the mission.
2 We, as pilots flying fighter aircraft, are
3 required to do a variety of many different things.
4 Those include things such as operations checks.
5 That's where you look around and say, is my engine
6 working okay, is the oil where it should be, is
7 the nozzle position about right, are my hydraulic
8 pressures where they should be? I'll do things
9 like check my fuel. On the F-16, you have fuel
10 that's distributed in tanks both internal to the
11 airplane and external. We have a fuel quantity
12 select, I think it's called, and I can get the
13 exact phrase for you, but there's a knob you
14 rotate, and we check the fuel quantity in all of
15 the different tanks to ensure that the fuel system
16 is working properly and then it's moving from the
17 external tanks into the internal tanks. So that's
18 part of an operations check. We typically refer
19 to that as op check or ops check. We'll do things
20 such as a G awareness maneuver, which we tried to
21 describe in the testimony. We'll put the flight
22 out there. This is to -- we'll put the flight out
23 there to do a four G turn just to kind of warm up
24 to see, hey, am I doing okay again, is the G suit
25 working properly? Is the system that powers the G

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1 suit working properly? And then we will roll out,
2 we'll do another 90 degree turn again, and it's
3 those two 90 degree turns. But that's a fairly
4 benign environment. I think there's a note in
5 there from the Chief of Safety combat command that
6 says the type of maneuvering is benign and no
7 risk.

8 We would do what we call a fence check.
9 It's typically one of the things that we could do
10 in Skull Valley. On a combat mission, you draw a
11 line that's referred to as a bunch of different
12 things, but good guys and bad guys, and as you get
13 ready to cross the fence in the bad guy land, you
14 will do a fence check. You will do things like,
15 say, is my electronic counter measures pod turned
16 on, is it set properly for the environment in
17 which I'm going, is my radar warning receiver up?
18 Do I have all my armorment things set up properly?
19 Is the airplane ready to go, am I ready to go into
20 combat? So those are the types of things that
21 typically we will do in Skull Valley.

22 JUDGE KLINE: Okay. And would the
23 discussion we've had up till now about flight
24 paths, would that interfere at all with any of
25 those operations, or interfere seriously?

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1 COL. FLY: You mean don't fly directly
2 -- don't overfly overfly?

3 JUDGE KLINE: Yeah.

4 COL. FLY: My personal opinion is that
5 that would have minimum impact, if any at all.

6 JUDGE KLINE: Thank you.

7 JUDGE FARRAR: I know Judge Lam has
8 some questions, but let me follow up a couple of
9 things. A few minutes ago, we talked about the
10 aerodynamics of the plane after the pilot has
11 ejected. You talked about still being on auto
12 pilot. What's the power -- what powers the auto
13 pilot after engine failure?

14 COL. FLY: Your Honor, it's the flight
15 control computer system. It's electrically
16 powered by -- there's a variety of different
17 sources that -- primarily at that point, I would
18 expect it would be the emergency power unit, which
19 is high -- it's powered by fuel called Hydrazine.

20 JUDGE FARRAR: So that's independent of
21 the engine?

22 COL. FLY: Of the engine, yes, sir.
23 It's one of the backup systems in the event the
24 engine quits. It's a way to provide electrical --
25 it's one of a couple of ways to provide electrical

1 power to different components.

2 JUDGE FARRAR: How many things would
3 have to fail in addition to the engines so that
4 you had no auto pilot?

5 COL. FLY: So that you had no
6 electrical power to the flight controls at all --

7 MR. SOPER: Excuse me, I think there's
8 some concern. I'd like to clarify the question.
9 The auto pilot is not used at all your Honor. I
10 think you're assuming that is the auto pilot. I
11 think that was wrong information from the General,
12 and Colonel Fly, I think will admit that.

13 COL. FLY: I tried to correct that.

14 GEN. JEFFERSON: I used the wrong term.

15 COL. FLY: He used auto pilot. It's
16 really the flight control computer system.

17 JUDGE FARRAR: Okay. Then the same
18 question as clarified. How many other things have
19 to fail?

20 COL. FLY: Your Honor, it would be
21 several. I'd have to get into the book to --

22 JUDGE FARRAR: But it's not just the
23 one?

24 COL. FLY: No, your Honor, there are
25 other sources of power for things, and I'll have

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1 to get that.

2 JUDGE FARRAR: The next question is
3 after the canopy is gone, that doesn't seriously
4 affect the aerodynamics?

5 COL. FLY: Your Honor, the history has
6 been -- the short answer is no. The plane is
7 going to hit where they were pointed when the
8 pilot ejects.

9 JUDGE FARRAR: So the absence of the
10 canopy doesn't create turbulence and chaos?

11 COL. FLY: Not that it's going to give
12 you the -- you're still going to have your
13 cluster, not this wide scatter.

14 JUDGE FARRAR: Okay, fine, thanks.
15 Judge Lam.

16 JUDGE LAM: General Jefferson, Colonel
17 Fly, General Cole, good morning, gentlemen.

18 Let me ask you a generic question
19 first. In two days of testimony, I understand
20 there has been a great deal of expert opinion
21 exercised here in your testimony and your analysis
22 of the risk due to aircraft crashes. I'd like to
23 ask each one of you gentlemen if there's only one
24 point that you would like to make in your direct
25 testimony, which point would it be? By which I

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1 mean, what is the most important thing that you
2 would like me to see in your 114 pages of direct
3 testimony?

4 MR. SILBERG: Excuse me, that sounds
5 like an English exam.

6 JUDGE LAM: Well, that may be an unfair
7 question, gentlemen. Because I remember what
8 President Reagan had done while he was in the
9 White House, all politicians, if you could
10 summarize on a one-page memorandum, I'm sure you
11 gentlemen are aware of that. If I were to go this
12 document here, where should I go look?

13 GEN. JEFFERSON: Just off the top,
14 Judge, from my -- I might reconsider later if I
15 had more time or something, but just off the top,
16 where I think was your question directed at expert
17 opinion or was it just at findings in the report?
18 Are you asking where we think expert opinion was
19 most valuable or are you asking in our opinion,
20 what's the biggest point?

21 JUDGE LAM: May I have both?

22 GEN. JEFFERSON: I was told not to make
23 statements like that.

24 I would say the point where our expert
25 opinion came in, and it's not just opinion, it's

1 based on a lot of close study of the facts of the
2 accident reports and so forth, is our point about
3 what pilots do to avoid a ground site.

4 JUDGE LAM: General Cole?

5 GEN. COLE: I can't remember what I --
6 just a minute.

7 JUDGE LAM: Are you done, General
8 Jefferson?

9 GEN. JEFFERSON: I'll still thinking
10 about what's the most salient point in the report.
11 And I'd like to -- a second to review that.

12 JUDGE LAM: General Cole.

13 GEN. COLE: Judge Lam, yes, sir. Faith
14 in the United States Air Force, in the pilots of
15 the United States Air Force to do the right thing
16 and have the level of training, proficiency, skill
17 and dedication to make the right things happen the
18 right way.

19 Between the three of us, we have nearly
20 90 years of Air Force flying. Between the three
21 of us, we have nearly 15,000 hours of total flying
22 time. Between the three of us, we have nearly
23 1,500 hours of time in combat, air-to-ground,
24 gunnery and ordnance delivery. And we've been
25 chief pilots, operations officers, commanders and

1 we've dealt with lieutenants, we've dealt with
2 lieutenant colonels, and I've got a lot of faith
3 in them. They're good. That's what I'd like you
4 to carry away, sir.

5 JUDGE LAM: Thank, you General.
6 Colonel Fly?

7 GEN. COLE: Sir.

8 COL. FLY: Your Honor, I think I would
9 like to piggyback on what both the gentlemen said
10 and to carry on with what General Cole said. I
11 pass the rate suit on now, but in my heart it's
12 blue, Air Force blue. I have tremendous faith in
13 the Air Force and the people in the Air Force. We
14 view ourselves as servient people, protectors of
15 the national defense. We would not do something
16 to put the U.S. civilian population at risk. It's
17 contrary to everything -- to the blood that flows
18 in our vein. I just don't believe it poses a
19 risk. I think it's safe.

20 JUDGE LAM: Thank you, Colonel.
21 Because in my hearing of your testimony, I see
22 attempts to be realistic in your analysis. Now,
23 in the business of risk assessment, one always
24 weighs and balances two competing interests. Are
25 you being realistic in your analysis and are you

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1 being conservative in your analysis because they
2 are competing interests? You cannot have both.
3 When I see selection of data, that in the label of
4 being realistic, I do see that we tend to have an
5 impact on the outcome one way or the other.
6 Realistic data usually means that would give you a
7 lesser margin of safety. One good example is in
8 our crash data, if one were to exclude the first
9 100,000 hours of data, then the crash data would
10 come down dramatically. Now, it is in our
11 testimony, in your testimony, that Mr. Soper was
12 trying to get at, why were you selecting the 10
13 years of data that appear to be lowest within the
14 history of the F-16 crashes? I need to weigh and
15 balance of this consideration, where is
16 appropriate safety margin? So this I'm sharing
17 with you why I am, you know, asking you that type
18 of question.

19 Now, let me go to the next one. Has
20 any one of your analysis been peer reviewed? By
21 which I mean, reviewed by somebody else other than
22 you?

23 GEN. JEFFERSON: The NRC Staff has very
24 closely looked at it, and we have no influence
25 over them at all.

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1 JUDGE LAM: That's fair. Have you
2 gentlemen conducted any sensitivity analysis in
3 your study?

4 GEN. JEFFERSON: In our study in Tab H
5 of the report, we approached the ability -- the
6 pilot's ability to avoid in three different levels
7 of detail, one of which was using all the accident
8 reports that -- that we thought were in the
9 parameters of a plane flying down Skull Valley,
10 altitude speed, that sort of thing, and then we
11 did another one of all aircraft that were in the
12 normal flight mode, whether they were in that
13 environment or not. And then we did another one,
14 a much bigger one that encompassed all aircraft
15 that could have been -- where the accident could
16 have happened in Skull Valley, whether it was, you
17 know, in those parameters or not, in those
18 altitudes, that sort of thing, and those all three
19 came out very close to what -- you know, the
20 bigger the sample, the more sure you are about
21 what you've got. But they are all very close.

22 JUDGE LAM: Thank you.

23 MR. SOPER: Judge Lam, could I ask a
24 question that might elaborate on your interest
25 there?

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1 JUDGE LAM: Please do.

2 MR. SOPER: You're talking about,
3 General Jefferson, an analysis of coming up with
4 the 90 percent factor?

5 GEN. JEFFERSON: Yes, I am.

6 MR. SOPER: You're sensitivity analysis
7 you just described has nothing to do with the 95
8 percent factor, does it?

9 GEN. JEFFERSON: It has to do with the
10 pilot's ability to avoid, which is one of those
11 factors, I believe. Is that your question?

12 MR. SOPER: No, it's not my question,
13 sir. I'd just like a straight answer now. What
14 you just described has to do with coming up with
15 the 90 percent figure not the 95 percent figure;
16 isn't that true?

17 MR. SILBERG: Could you just describe
18 so the record is clear again, what the 90 percent
19 figure is and the 95 percent figure? And I really
20 -- I've been very restrained, but I really object
21 to counsel's characterization of the witnesses as
22 avoiding answers, when the questions are really
23 very unclear. I think we've had very good
24 cooperation at this hearing, but I think some of
25 the remarks really are uncalled for.

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1 MR. SOPER: Do you have questions --

2 JUDGE FARRAR: Wait, wait, wait, let me
3 deal with that. Mr. Silberg, that's a good point,
4 but as good and as intense an advocate as
5 Mr. Soper is, these gentlemen have faced more
6 difficult situations in their lifetimes, and I
7 think they're able to put -- to deal directly with
8 the question even if the phraseology for some
9 justification is -- might be offensive to you.
10 I'll ask Mr. Soper to the extent possible, not to
11 characterize -- be as intense as you want, but not
12 to characterize the previous answers unless it's
13 essential. By the same token, Mr. Silberg, if he
14 goes over that line, we don't have a jury here, we
15 can characterize ourselves. So hold the
16 interruptions to situations that you think are
17 over -- you know, over the line.

18 MR. SILBERG: And I've been trying to
19 do that.

20 JUDGE FARRAR: Which you have. And,
21 you know, no criticism of both, but, you know, we
22 don't have a jury and sometimes, you know, we
23 don't want to interrupt the give and take, but we
24 also don't want fortuitous characterizations that
25 may not be appropriate.

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1 MR. SILBERG: My point on the record,
2 though, I think it's very helpful if we know what
3 the 90 percent is, the 95 percent is. I don't.
4 Because frankly, Mr. Soper knows it intimately, I
5 suspect the witnesses do, I don't. I don't know
6 if the judges do and the record won't.

7 JUDGE FARRAR: And I was not addressing
8 that part of your objection. And I will admit
9 that I was quickly trying to recall which is the
10 90 and which is the 95, so your point is well
11 taken. Go ahead, Mr. Soper, having now
12 interrupted you at great length.

13 MR. SOPER: Thank you, your Honor. If
14 we might refer to State Exhibit 149. I apologize,
15 but this is sort of planted in my mind. I thought
16 perhaps as well in the witnesses.

17 But the R factor, General, is the
18 product of two numbers, 90 percent and 95 percent.
19 It seems to me that you were describing for Judge
20 Lam where you'd done a sensitivity analysis, and
21 my recollection of your testimony is that's in
22 connection with determining the 90 percent. In
23 other words, the number of flights where a pilot
24 would be able to control the aircraft. And if you
25 have, sir, done a sensitivity analysis with

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1 respect to the 95 percent, your judgment that a
2 pilot will avoid the site, would you please direct
3 us to that analysis in the crash report or
4 elsewhere.

5 GEN. JEFFERSON: You are correct, that
6 the one I talked about had to do with the 90
7 percent factor. I'll have to think a minute on
8 the 95 percent. That was a determination from
9 looking at the accident reports themselves, we did
10 not do a sensitivity on that.

11 MR. SOPER: Thank you.

12 JUDGE LAM: Thank you, Mr. Soper.

13 MR. SOPER: Thank you, Judge.

14 JUDGE LAM: General Jefferson, Colonel
15 Fly and General Cole, what about uncertainty
16 analysis; what type of uncertainty analysis, if
17 any, have you done for this study?

18 GEN. JEFFERSON: We've used central
19 values for our analysis and then conservatisms to
20 support that throughout. Does that answer it? Is
21 that responsive to your question, sir?

22 JUDGE LAM: Yes, yes. Perhaps more
23 specifically, have you considered -- you see, one
24 of the most difficult issues in any risk
25 assessment is the issues of what we don't know.

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1 From what we know, you gentlemen are eminently
2 qualified to know how does a pilot react to
3 certain situations. Collectively, you gentlemen
4 have distinguished military careers. I have no
5 doubt for what you know, you do a good job. But
6 my question is, do you know what you don't know?
7 Or for that matter, are you on guard, you know,
8 looking for things that we don't know? The issue
9 is of omission. There is always errors of
10 omission, knowing what you know and you do your
11 analysis. What about things that you have not
12 considered? Now, that's a key point in any
13 uncertainty analysis.

14 GEN. JEFFERSON: Short answer --

15 JUDGE KLINE: Just to put it another
16 way, what are you still uncertain about?

17 JUDGE LAM: Exactly.

18 JUDGE KLINE: If anything, of course.

19 GEN. JEFFERSON: Well, sure, when you
20 talk about the future, you have to be uncertain,
21 because you don't know. I don't know of any big
22 factors that -- I can't think of one right now,
23 but you have to admit to that, that there are
24 things out there. We've tried to see everything
25 we can. But, you know, I don't know what I don't

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1 know.

2 JUDGE LAM: Okay. Now, General Cole?

3 GEN. COLE: I was going to try to
4 address you -- go ahead with General Jefferson
5 first, sir, and I'll follow if you like.

6 JUDGE LAM: Okay. One reason I ask
7 that, because I hear in this testimony that the
8 dominant failure mode of the F-16 is the loss of
9 engine. I do remember a couple of years ago, we
10 had a civilian aircraft that was flying with
11 everybody in the cockpit unconscious for a day,
12 two days or for a long period of time and then it
13 finally crashes. Now, that's one of the very rare
14 events in aviation. But we are dealing with a
15 number of 10 to the minus six, 10 to the minus
16 seven here, that these are rare events too, where
17 you're dealing with events that happened once in a
18 million years. Is that type of failure fair game
19 to be included or to be excluded?

20 GEN. JEFFERSON: Sir, that particular
21 accident, that was the golf player?

22 JUDGE LAM: Yes.

23 GEN. COLE: Payne Stewart.

24 GEN. JEFFERSON: He had an untrained
25 crew, basically. They hadn't checked their stuff,

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1 I guess. But the transits in Skull Valley are low
2 enough where lack of oxygen is not a problem, even
3 systems not working, you can breathe normally. So
4 I don't think that one would be a particular
5 problem. But I don't know what else it might be.

6 JUDGE LAM: General Cole.

7 GEN. COLE: I have one other one to
8 add, sir. We touched on it a bit, and it's come
9 up, is what is the Air Force going to look like
10 10, 20, 30 years from now. We have struggled with
11 that. We've been through periods of peaks and
12 valleys in the Air Force. That one, it's
13 difficult. If I could see into the future -- boy,
14 I wish I could. We know what we know. We sort of
15 have a feel for what we think we don't know. But
16 if you look at the improvements in technology and
17 the improvements in accuracy and precision guided
18 weapons, and then you set that in the context of a
19 fore structure, basically, a number of airplanes
20 that's gone down by about 20 percent as the
21 quality of the airplane improves and the ordnance
22 delivery improves, then you look at personnel --
23 in a 10-year period, the United States Air Force
24 went from 607,000 people down to 375,000 people,
25 you know, with the equivalent decrease in

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1 airplanes, but yet the proficiency and the
2 capability is still there. And then you look at
3 the buy of F-16s, 2,230, but yet the proposed
4 replacement is going to be an Air Force buy of
5 1,763. To try to predict on that basis, that's
6 imprecise, but that's an unknown that we struggled
7 with a lot and based on what we see in the trend
8 numbers, that one is about the best we can give to
9 you.

10 GEN. JEFFERSON: Sir, may I add.
11 Throughout our study, we've done excursions to
12 look at the outside numbers that -- to see what
13 would happen if we used those numbers. They're
14 not the numbers we think we should use, but we did
15 it just to see. You'll find those in the
16 footnotes generally or in the sections that are
17 called conservatisms that are sprinkled throughout
18 this.

19 On the unmanned or the I presume dead
20 pilots that were in that other plane, there were
21 chase planes up ready to shoot it down if it
22 looked like it was going threaten us or something.
23 And I think that's how you handle something.

24 JUDGE LAM: Thank you, gentlemen.

25 GEN. COLE: Thank you, sir.

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1 COL. FLY: Your Honor, if I could just
2 add. As an example, on page 36 of the revised
3 addendum to the Aircraft Crash Impact Hazard at
4 the Private Fuel Storage, there's a discussion
5 about what happens if you use the higher sortie
6 rates. So that's one of those excursions, those
7 sensitivity analysis you discussed, or you asked
8 about.

9 JUDGE LAM: Thank you.

10 MR. GAUKLER: And that's PF Exhibit 0.

11 JUDGE FARRAR: The more I listen to you
12 gentlemen, the more it tends to change the
13 thoughts I had yesterday about the pilots and what
14 they're feeling during the emergency. I mean I
15 recall a line of questions yesterday about their
16 concern about their life, there's evidence that
17 they don't complete their checklist and you all
18 dealt with that. Now listening to you, there's a
19 basis for having the opposite feeling that an
20 engine failure in a single engine yet is not the
21 big deal that I -- I as a civilian would have
22 thought it was. I mean you don't practice
23 ejections, but I assume you practice engine
24 failures. Just take this as an open-ended
25 question and help me with what's going on during

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1 an engine failure at high altitude.

2 MR. SILBERG: I'm sorry, high altitude
3 or Skull Valley altitude?

4 JUDGE FARRAR: At Skull Valley
5 altitude, yeah.

6 MR. GAUKLER: Your Honor, we were going
7 to cover this in redirect, and maybe Colonel Fly
8 could cover this. We have an exhibit -- not
9 exhibit, but it's a page from the aircraft crash
10 report that might be useful in answering your
11 question. If I could just hand it out. It's just
12 a page from the report, Exhibit 10.

13 JUDGE FARRAR: Okay. We were trying
14 not to interfere with the thrust of Mr. Soper's
15 cross. Now I find that I've interfered with the
16 thrust of the applicant's redirect.

17 MR. GAUKLER: This is figure three from
18 the crash report.

19 MR. SOPER: Your Honor, I don't know
20 what stage we're at here, if we started redirect.
21 I have a matter that I would like to present
22 before we start that.

23 MR. GAUKLER: I still review this as
24 the answers to the questions raised by the Board,
25 and I just thought this might be useful.

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1 MR. SOPER: I thought we were still in
2 cross-examination as the Board having a few
3 questions before we left that subject.

4 JUDGE FARRAR: I thought you had
5 stopped your cross and we were asking Board
6 questions, which I was going to give you an
7 opportunity to follow up on before we started
8 redirect.

9 MR. SOPER: That's what I was thinking,
10 your Honor, and I didn't know where -- that's my
11 question is, I don't know if we have passed that
12 point now or where we are. I just wanted to make
13 an observation, not ask any more questions,
14 actually.

15 JUDGE FARRAR: Okay, go ahead.

16 MR. SOPER: I think it is admirable, in
17 fact, quite impressive that Your Honors have these
18 questions, very detailed questions and some very
19 general questions of this panel. This is, of
20 course, an adversarial proceeding and these
21 witnesses are, of course, the witnesses of PFS,
22 and it's no secret that experts for each side are
23 going to testify consistently in favor of their
24 client. And this has given these witnesses an
25 opportunity to make a long general argument in

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1 favor of their client. Two of the gentlemen have
2 never flown F-16s, and our expert has flown an
3 F-16 more recently than Colonel Fly, and he has a
4 much different view than this. So I think it
5 would be appropriate if the Board would ask these
6 same questions -- if the purpose was, as I
7 understand, to get a oh, now, we have an
8 understanding of how this works, I think that
9 before you get to that point, you ought to hear
10 someone who's recently flown there, because the
11 views, I assure you, will not be the same.

12 JUDGE KLINE: Mr. Soper, I was going to
13 make that very point, and not so much as an
14 option, but as a request to the other parties, to
15 address the same line of questioning that I
16 addressed.

17 MR. SOPER: Oh, very good, thank you.

18 JUDGE KLINE: So that I would expect
19 both the Staff and the State to be prepared to
20 address those same questions.

21 MR. SOPER: Thank you, your Honor.

22 JUDGE FARRAR: In fact, Mr. Soper, to
23 expand on that, rather than thinking this type of
24 questioning puts you at a disadvantage, I would
25 assume it puts you at an advantage, because the

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1 more we indicate about what the things are that
2 are on our mind, the better opportunity you have
3 to use your witness to make sure you address
4 those. And when we say what we're thinking or
5 what we're feeling, that's good for that moment
6 only, you know. Those are questions that are in
7 our mind. We want to lay them out. I put them in
8 terms of here's what I'm thinking so the witness
9 has the best possible opportunity to respond. But
10 that's what I'm thinking then and based on what
11 that witness says or what your witness says, next
12 August, the three of us might be thinking
13 something entirely different.

14 So we view this -- you know, our goal
15 is to get from all witnesses and all sides all of
16 their thoughts, and if your witness addresses
17 these same matters and convinces us that his
18 expertise is better on the subject, you know, so
19 be it. We just want to make sure that everything
20 that's on our mind gets to go.

21 Having said that, I'd like, you know,
22 these witnesses to tell me what their opinion is
23 of what's going through the mind of the pilot when
24 not having been shot at and having his plane
25 damaged by the enemy, you know, an engine fails at

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1 Skull Valley altitudes.

2 JUDGE LAM: Before the witnesses
3 answer, Mr. Soper, let me give you my assurance,
4 as well, your expert will be granted the courtesy
5 of providing the most compelling point to this
6 Licensing Board.

7 MR. SOPER: Thank you, your Honor.

8 COL. FLY: Your Honor, I believe the
9 question was, the low altitude engine failure in
10 Skull Valley. Your Honor, I think one point I
11 would like to make is, to really assess and
12 understand, you need to start at the beginning of
13 the incident, not at the point of ejection,
14 because there's an entire sequence of events that
15 have led to the decision to eject. And to really
16 kind of scope it, I think it's important to kind
17 of back up and think, okay, what am I doing and
18 how am I doing? If you're flying along in Skull
19 Valley at the representative altitudes that we
20 were told by the Air Force, and we can talk about
21 excursions using this chart, if you'd like to, and
22 the engine quits, you're going to go through a
23 series of steps. You're going to zoom the
24 airplane, which means you're going to establish
25 about a 30-degree nose high attitude so you're

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1 going to pull the nose up, and what we're trying
2 to do now is take our air speed, convert it to
3 altitude, and in the long run, that's going to
4 give us more time aloft. So we're exchanging
5 kinetic potential and using that to increase our
6 time aloft. So that's what the basic dash one,
7 that pilot manual is going to tell you to do.

8 The next thing it will tell you to do
9 is to jettison your stores. There's a button that
10 sits right about here in the cockpit. It's kind
11 of right above your left knee on the glare shield,
12 that we refer to commonly as the panic button or
13 the emergency storage jettison button. You push
14 that button in and you hold it and all the
15 ordnance that can be jettisoned will jettison from
16 the airplane. Typically, if you've got those
17 heavy weight bombs underneath the wings, the heavy
18 weight bombs will fall off the airplane at that
19 time. If you've got the small 25-pound bombs,
20 those typically will not fall off the airplane
21 when you hit the emergency storage jettison
22 button.

23 But the things that can come off, will
24 come off when you do that. You're going to take
25 the throttle from wherever it was, you're going to

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1 move it into the off position and then you're
2 going to move it right back into what we refer to
3 as mid range. So the throttle is going to come
4 back into the off position, you're going to put it
5 into the mid range position. That sets some logic
6 and restarts the engine, if you will, and starts
7 the actual restart sequence. As you approach
8 about 50 knots above --

9 JUDGE FARRAR: Am I nervous at this
10 point? Or is this -- I'm a pilot, this is
11 routine?

12 COL. FLY: I don't want to leave you
13 the impression that this is a normal event,
14 because it's not a normal event. Now, I've had
15 engine failures before, but the good news was, it
16 was always in an airplane that had another engine.
17 So, you know, this would be a little different
18 because once that engine quits, I'm flying a very
19 expensive glider and I could either glide it to an
20 airport, I can get the engine restarted or I can
21 step over the side.

22 JUDGE LAM: Can you glide to another
23 airport?

24 COL. FLY: Yeah, there are procedures
25 to do that. It's a function of where am I and

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1 where's the nearest suitable landing field? I've
2 known people that have landed airplanes -- F-16s
3 without an engine.

4 JUDGE LAM: Because I'm always nervous
5 flying on a twin engine jet, because I only have,
6 what I call a single redundancy. I want to fly in
7 a four-jet engine.

8 COL. FLY: Single redundancy. We're
9 used to flying in the F-16 with zero redundancy.

10 JUDGE FARRAR: Can you land not in an
11 airport?

12 COL. FLY: You are not -- you are not--
13 the short answer is no. It's not recommended to
14 land the F16 anywhere other than on a prepared
15 surface, an airfield.

16 JUDGE FARRAR: The salt flats wouldn't
17 do or --

18 COLONEL FLY: The book says don't do
19 it. Okay. The only place you're supposed to land
20 an F-16 according to the book is on the runway.

21 As you approach about 50 knots above
22 your desired air speed, and that's a function, I
23 could pull it out here, but somewhere around 250
24 to 300 knots, you're going to push the nose of the
25 airplane over and establish this rate of decet we

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1 talked about yesterday to maintain your air speed.
2 You're also in there going -- there's a thing
3 called a jet fuel starter. This is the way we
4 always start the F-16. Sitting on the ground at
5 Hill Air Force Base, at Luke Air Force Base,
6 anywhere you want it, it's the way you start the
7 airplane. There's a switch called a jet fuel
8 starter, you're going to move to that to what's
9 called start two. It's a position of the switch.
10 What that does is it's going to discharge some
11 stored charges to spin the motor -- or I'm sorry,
12 to get the JFS, the jet fuel starter on line.
13 Okay. What the JFS will do, it will spin the
14 motor. I'm trying to explain it to you without
15 building the airplane for you.

16 If we can kind of -- just take a mental
17 break and I'm sitting at the ground at Hill Air
18 Force Base. Part of my start sequence is to move
19 the jet fuel starter switch to start two. That
20 starts the jet fuel starter. It's a little motor,
21 if you want to think of it that way. It will come
22 up to speed, then it will clutch in and it will
23 turn over the big motor, and it will get the big
24 motor up to above 20 percent rpm, it will
25 typically stabilize around 25 to 27 percent is

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1 what the JFS is capable of spinning the big motor
2 at. But the percentages are really irrelevant.
3 It's just the start process. You have to get the
4 big motor spinning fast enough that when you put
5 fuel into the burn section and then put a spark
6 back there, it will have adequate airflow that
7 will catch fire, it will start to function as an
8 engine and spool up.

9 In this process, somewhere in here, if
10 you're below 20,000 feet, 400 knots, that's the
11 envelope for the jet fuel starter, you will move
12 that start -- the JFS starter to start position
13 two. At this point, you're probably coming
14 back -- to go through that whole thing in terms of
15 the switches you have to throw at low altitude, if
16 you're proficient, you can get that done in 10
17 seconds. How far up you're going to go and how
18 long it's going to take you to push over is going
19 to be primarily a function of what air speed did
20 you start with. If I'm starting down here with
21 500 knots, that gives me one energy profile. If
22 I'm starting down here with 350 knots, that's a
23 different energy profile, okay.

24 As I'm coming down -- while all this is
25 going on, you're paying attention -- well, first,

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1 when it all happens, you knew where you were.
2 It's not like you just woke up in the morning and
3 said, where am I? You knew where you were, you
4 knew the general operating environment that you
5 had. You're obviously spending some of your time
6 inside looking at the switches, making sure you're
7 putting things in the correct position. You're
8 also looking outside, what's in front of me,
9 what's off to the side, where am I, can I make it
10 to a divert field, can I not make it to a divert
11 field? You're thinking about all these different
12 things. And the heart rate is probably up a
13 little bit.

14 One of the other things you'll think
15 about is where am I? If you're in Skull Valley
16 and you're over on the eastern side of the valley,
17 you're not going to start a turn toward the left
18 because that's going to put you into the high
19 terrain. If you've got high terrain around,
20 you're probably going to want to point toward
21 lower terrain, if you don't think you can clear
22 the terrain. Why point myself toward a hazard
23 that's just going to complicate my problem? So
24 depending where I am and where I'm pointed in
25 Skull Valley, I know from low altitude, I do not

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1 have adequate energy to make it to Michael Army
2 Airfield unless I can get that engine restarted.
3 I just don't have enough push on the airplane at
4 that point.

5 So getting to Michael's is probably not
6 my immediate concern; although, I may start to
7 turn that way, I probably wouldn't, depending on
8 where I was, again I'm thinking terrain, what's my
9 situation. Then you're coming downhill and you're
10 looking at the engine, is it starting to come back
11 to life, not coming back to life? If you've got
12 indications of a start, you can start to monitor a
13 thing called the FTIT, which is kind of your
14 exhaust gas temperature. It tells you how hot the
15 engine is running. If it gets too hot, then you
16 have to shut it off and start it over again.

17 But this whole time, you're looking at
18 where am I, what am I doing, how's the airplane
19 doing, what are my options? And it's a constant
20 decision point as you go through. Somewhere in
21 here, to get back to the point we were trying to
22 make earlier, if you see built-up areas in front
23 of you, the natural instinct is not to continue to
24 point at them with a -- if you think -- because
25 somewhere in here, if the engine hasn't shown

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1 starts of life, you're going to start thinking
2 about ejection, okay. And you're going to start
3 thinking about how am I doing?

4 So you're going to continue to follow
5 the procedures, try to get the engine started,
6 you're going to continue to monitor where am I,
7 what am I doing, where am I going, what's
8 happening around me as you come on down. If the
9 engine starts, great. You know, at that point, I
10 would probably get the nose up, start climbing and
11 I would point toward Michael Army Airfield.
12 Because it quit once, you know, I was fortunate
13 enough to get it relit, I'm not going to push this
14 any further than I would absolutely have to. If
15 I'm successful, I would go to Michael, I'd put the
16 jet on the ground and I'd call for a taxi back to
17 Hill. If I was not successful, then as I come on
18 down to chute, I would start thinking about
19 ejection and I'm going to do those things that we
20 talked about in the checklist, I'm going to think
21 about the proper body position. I might reach
22 down, and yeah, I fly with a tight lap belt, but
23 I'm going to snug it down real quick if I have the
24 chance. I'm going to look at where's the airplane
25 going. And if there's something out there, I'll

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1 turn it left or right to try to avoid whatever's
2 out there. And then as I approach 2000 feet, if
3 there's no signs of life out of the engine, I'll
4 slow it to the minimum and let it go and take a
5 ride.

6 So if we could just look very quickly,
7 your Honor -- that's kind of the thought processes
8 I think I would go through if I were actually in
9 an engine out F-16 as opposed to the simulator,
10 which is the best that we can do for training.

11 JUDGE FARRAR: And thank you for that
12 excellent explanation. Your last comment has to
13 do with a question I was going to ask. Do you
14 practice engine failures live or only in a
15 simulator?

16 COL. FLY: Due to the fact that it's a
17 zero redundancy system, to quote -- paraphrase
18 Judge Lam, we never turn off the motor until we're
19 back in the --

20 JUDGE FARRAR: Because I've heard from
21 people who -- you know, private pilots who fly
22 small planes, and one of the things you do after
23 you've learned enough is the instructor goes up
24 with you and turns off the engine and says, hey,
25 you're on your own here.

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1 COL. FLY: As a matter of procedure in
2 the F-16, we would never turn off -- in the
3 operation unit, we would never shut down the
4 engine while we're aboard. Now, the test pilots
5 could do silly things like that, but that's their
6 job.

7 JUDGE FARRAR: So when it happens to
8 me, that's the first time it's actually happened
9 to me?

10 COL. FLY: Unless you're unfortunate
11 enough to have it happen to you twice.

12 MR. SILBERG: Judge Farrar, could I
13 just ask a question for clarification. If you're
14 a pilot in a two-engine trainer, two-engine
15 fighter plane, did they train by deliberately
16 turning off one engine while you're flying? Have
17 you got a redundant engine?

18 COL. FLY: No, we would never do that.
19 What we would do is we would fly simulated single
20 engine approaches where we would bring one
21 throttle back to idle so there's no significant
22 amount of power coming out of it, and we would fly
23 the airplane all the way through with a single
24 engine.

25 MR. SILBERG: Okay, thanks.

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1 JUDGE FARRAR: There was one part of
2 your answer where I think you said the first --
3 one of the very first things you do when this
4 happens is you jettison the stores. If I'm over
5 the proposed PFS facility at that moment, does my
6 location override the fact that the first thing
7 the manual told me was, was get rid of those
8 stores and I'm getting rid of them wherever I am?

9 COL. FLY: Your Honor, there's nothing
10 in there that tells you not to jettison. I mean,
11 so you can make the assumption that I should
12 jettison immediately. As you'll see in the
13 accident report summaries that we were going to
14 pass out later, there are a couple of documented
15 instances where the pilot intentionally left the
16 stores on because he was over a populated area and
17 he wanted to get to a clear area. So the answer
18 is, if you follow the procedures and jettison and
19 nobody would ever criticize you for that.

20 JUDGE FARRAR: Okay.

21 JUDGE LAM: But would that be a career
22 ending move?

23 COL. FLY: In my opinion, no. I don't
24 know anybody who had his career ended, and there
25 might be an exception out there, for following

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1 written procedures. If you're doing what the book
2 tells you to do, what you were trained to do, that
3 is probably not going to be a career ending move,
4 but...

5 JUDGE FARRAR: Mr. Soper, as you've
6 undoubtedly gathered for yourself, this last
7 question is one that we'd be certainly delighted
8 to hear from your witness on.

9 MR. SOPER: At the appropriate time --

10 JUDGE FARRAR: At the appropriate time.

11 Mr. Soper, we've got our change of
12 court reporters ready. We've been at it a while,
13 but if you have some additional cross based on the
14 Board's questions that would only take a few
15 minutes, we could do that now, or we could take a
16 break and let you decide.

17 MR. SOPER: Let's take a break and
18 decide. I think I probably don't.

19 JUDGE FARRAR: Okay. Then it's almost
20 35 after. Let's be back at quarter of. Does that
21 give the reporter time enough to switch? Thanks.

22 (A break was held.)

23 JUDGE FARRAR: Okay. We're back on the
24 record.

25 And I believe, Mr. Soper, we were at

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1 the point of asking you if the Board's questions
2 had triggered a desire on your part for some
3 further cross.

4 MR. SOPER: No. I think I'll just take
5 the Board's offer up to have our witness respond
6 to those questions when he's testifying.

7 Thank you.

8 JUDGE FARRAR: Okay. Applicant got any
9 redirect?

10 MR. GAUKLER: Yes. We have some
11 redirect. I'll be dividing the redirect with my
12 co-counsel, Sean Barnett. I'll start off.

13

14 REDIRECT EXAMINATION

15 BY MR. GAUKLER:

16 Q. First, since we just were discussing
17 it, Colonel Fly, could you look at the Figure 3
18 that we handed out -- from the air crash report we
19 handed out just at the end. And could you -- it's
20 specifically for the engine F110-GE-100. What
21 does that show in terms -- how does it relate to
22 your testimony just prior to the break?

23 COL. FLY: In a general sense, what
24 this does is give you an idea of where you would
25 need to be flying at the time of engine failure in

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1 order to have enough time airborne to successfully
2 get a restart, assuming that you went through all
3 the procedures and the engine did restart.

4 You can see there are three colored
5 areas. There's the red which means the
6 probability of -- you just won't have enough time
7 before the airplane meets the ground to get the
8 engine started again.

9 You have the yellow area which says
10 you'll have time to get the engine started, but
11 you will descend below the 2,000-foot minimum
12 recommended altitude for a controlled ejection.

13 This is one of those cases, your Honor,
14 where -- we talked about the other day. If I have
15 indication that the engine is coming back to life
16 and starting to spool up, I may just decide to
17 hang in there for a little while to see if it
18 does, in fact, reach usable thrust.

19 The green area -- and this is many
20 copies. In the original book it was green --
21 that's an area where you will have adequate time
22 to accomplish your procedures and have the engine
23 restart, obtain what we define as usable thrust
24 prior to reaching 2,000 feet.

25 A couple of things. To read the chart,

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1 it's an X-Y diagram basically. Along the X axis
2 you have your indicated airspeed at the time of
3 engine failure, and you can see it starts at zero
4 and goes all the way up to 440 knots. Your
5 vertical axis is the altitude you're flying at in
6 terms of thousands of feet. For instance, if you
7 were to assume that you were at a thousand feet
8 AGL, which is the minimum altitude for Skull
9 Valley, and follow that line across to your --
10 where am I? -- at the intersect green, you'd see
11 that you would be somewhere around 350 knots or
12 so. So if you're 350 knots at a thousand feet,
13 you have adequate time to perform all those
14 prescribed maneuvers, and that allows you -- if
15 you'll look up in the upper right-hand corner of
16 the chart, there's that bullet that says, 45
17 seconds assumed after throttle advance to achieve
18 usable thrust and assumes an aircraft air start
19 initiation at 25 percent rpm.

20 JUDGE FARRAR: And the reason I'm going
21 to have -- the reason I'm going to have time is
22 the first thing I'm going to do is go up?

23 COL. FLY: Yes, your Honor. That buys
24 you time.

25 If -- now, the book -- and we can go

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1 into this. I'll find the appropriate section in
2 the emergency procedures if you'd like. But the
3 book does give different procedures for high
4 altitude, and it does say if you're below 310
5 knots they recommend at the initiation that you
6 not zoom because that will actually decrease your
7 amount of time airborne. But at 310 knots, you
8 could still -- if your altitude is not a whole lot
9 higher, 2,000 feet roughly -- and I'm just kind of
10 eyeballing that -- you can see that still puts you
11 in the green.

12 So there's a variety of different
13 circumstances, and it's difficult to say, I will
14 have this much time. But if you're in the green
15 area, because they allow some time to accomplish
16 them, and then they give you 45 seconds for the
17 engine to actually spool up and provide you
18 thrust. That gives you some sense that if you're
19 anywhere in the green, you have a minimum of 45
20 seconds from engine failure to hitting the
21 2,000-feet AGL. In almost all cases I suspect
22 it's more than that because they do make some
23 allowance, although it's not specified how much,
24 for the time required to accomplish the different
25 steps that we talked about.

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1 JUDGE FARRAR: Do these engines spool
2 up essentially the same as a commercial jet engine
3 or are they -- is there a different design to them
4 that lets them spool up faster?

5 COL. FLY: I am probably not the best
6 person to ask because I don't have a lot of time
7 flying commercial aircraft. It's a turbofan,
8 which means it's a bypass engine. It's not an
9 instant start. I don't want to leave that
10 impression with you. 45 seconds is a pretty
11 reasonable amount of time to have usable thrust,
12 you know, and, in fact, I seem to recall -- and
13 I'll look in the books if you'd like me to try
14 to give you a number. But it's not a turn the
15 switch on and bang, I've got usable thrust. It
16 does take a while for the engine to motor up to
17 get into the usable thrust range.

18 Once you get up into the idle, the
19 engine responds fairly quickly, but it's that
20 starting from 25 or 30 percent to get up to the 60
21 percent that it takes a while to happen. It's
22 that initial spool up. But once it's up at idle
23 power, the engine accelerates fairly rapidly, from
24 idle to military power I would say 3, 4 --
25 probably 3 to 5 seconds, somewhere in there.

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1 So -- but that -- the time required to start is
2 not insignificant.

3 Q. (By Mr. Gaukler) Just one question --
4 a couple more questions for clarification.

5 COL. FLY: Yes.

6 Q. This chart, where do you find this
7 chart?

8 COL. FLY: Oh, I'm sorry.

9 Q. Except for -- and then I'm going to ask
10 you what did you do or teach to do in terms of
11 preparing this chart for use in this hearing.

12 COL. FLY: This comes out of the -- if
13 you look at this portion, it comes out of that
14 bible, the Tech Order 1F-16C-1, the pilot's
15 operating manual. I believe this is page 3-94, if
16 you look at the bottom. The 3 indicates that it's
17 an emergency procedure chapter. All of Chapter 3
18 is dedicated toward emergency procedures.

19 Q. And did you add anything to this
20 chart -- was anything added to this chart to put
21 it into the air crash report?

22 COL. FLY: Oh, you mean the F-16s in
23 Skull Valley --

24 Q. Yeah.

25 COL. FLY: I'm sorry. We've put the

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1 box in here to show the typical area for where --
2 based on what the people at Hill had told us,
3 that's where F-16s in Skull Valley -- that's your
4 3 to 4,000 feet, 350 to 400 knots. That puts you
5 into that area.

6 Q. And what if you assume you're going at
7 a faster speed than 400 knots?

8 COL. FLY: If you're going faster than
9 400 knots, that's going to give you more time
10 aloft and increase the time available to do
11 whatever you need to do to restart the engine, to
12 maneuver, et cetera. So it's a combination of
13 airspeed and altitude. If you increase either
14 one, you make the time available, the time aloft,
15 greater.

16 MR. TURK: Can I ask for a
17 clarification of that last question and answer? I
18 wanted to ask for a clarification of that last
19 answer, if I may.

20 JUDGE FARRAR: Yes, go ahead.

21 MR. TURK: The witness was discussing
22 the fact that he added the box that shows F-16s in
23 Skull Valley. I had assumed that was just the
24 label, but do I now hear that that's actually
25 representative of the airspeed and altitude --

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1 COL. FLY: It's about right. That's
2 right. If you'll look at the bottom of the scale
3 in the left-hand edge of the box that corresponds
4 to about 350 knots and it moves over to about the
5 400-knot scale. So if you use the 350 to 400
6 knots and the altitude of 3 to 4,000 that we were
7 told by the people at Hill that the airplanes
8 typically transit, that's representative of that
9 box. I don't want to say that's the only place
10 they fly. I'm trying to say that's representative
11 of where they will be on this chart there.

12 JUDGE LAM: So it's not a label. It --

13 COL. FLY: Well, it's also -- I mean
14 you can consider it a label if you want to, but
15 it's an approximation. And, I mean, we can --

16 JUDGE FARRAR: But, in effect, it is
17 part of -- it directs me to look at this part of
18 the graph.

19 COL. FLY: To that extent, yes, sir.
20 That's representative of the approximate area in
21 which we were told by the people at Hill that they
22 would operate.

23 JUDGE FARRAR: Thank you, Mr. Turk.
24 Good question and good clarification.

25 Q. (By Mr. Gaukler) Just another point of

1 clarification --

2 JUDGE FARRAR: Let me ask one more.

3 MR. GAUKLER: Yeah, go ahead.

4 JUDGE FARRAR: The diagonal box in the
5 green that says time to achieve usable thrust,
6 what does the s-e-c stand for? Is that seconds --

7 COL. FLY: No, your Honor. That
8 refers to secondary mode. There's a primary and a
9 secondary mode in the F-16.

10 JUDGE FARRAR: At first we thought it
11 said seconds, and there was no --

12 COL. FLY: I'm sorry.

13 JUDGE FARRAR: -- there was no axis on
14 here that said seconds. Okay.

15 Q. (By Mr. Gaukler) Another point just
16 for potential future clarification, there is
17 another chart in the report, Figure 3-A, for a
18 different type of engine, the Pratt & Whitney
19 engine. Are they largely the same?

20 COL. FLY: The charts are about the
21 same. There are some differences. The Pratt &
22 Whitney engine is not used for the airplanes at
23 Hill. The GE -- the F110 is the engine that's
24 used at Hill, so that's why we're talking about
25 this chart.

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1 Q. So this chart is the typical chart --

2 COL. FLY: Yes.

3 Q. -- for the F-16s used at Hill?

4 COL. FLY: Yes. And as I said, they're
5 not identical charts, but there's some --

6 MR. GAUKLER: I'd like to pass out,
7 first of all, copies for convenience of State
8 Exhibit 144 as well as another exhibit that will
9 be -- I will ask to be introduced and marked as
10 PFS Exhibit MMM.

11 JUDGE FARRAR: While your colleague is
12 doing that, and following up again on Mr. Turk's
13 question, these other labels on there are just
14 labels? Those aren't --

15 COL. FLY: Your Honor, let me
16 double-check that, but I believe those are all
17 original markings from the technical order itself.
18 Let me double-check that.

19 JUDGE FARRAR: No. On this --

20 COL. FLY: On this, your Honor?

21 JUDGE FARRAR: Yeah. That those
22 labels -- the descriptions of what the three
23 colors are are not intended to be like the F-16
24 thing, they're not -- they're just labeling that
25 whole colored area, they're not -- they're not

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1 designed to fit in the grid in a certain place.

2 COL. FLY: That's correct.

3 JUDGE FARRAR: That yellow label could
4 have been anywhere in the yellow.

5 COL. FLY: Yes, your Honor, that's
6 correct. I'm sorry.

7 JUDGE FARRAR: Never underestimate how
8 simple our question may be.

9 MR. SILBERG: While we've been
10 discussing, I've also been handing out a two-page
11 document, in the top right-hand corner of which in
12 faint writing it says T.O. 1F-16C-1, page 11 --

13 COL. FLY: That's ii.

14 MR. SILBERG: ii. I'm sorry. Page ii?

15 COL. FLY: It's little i, little i.

16 MR. SILBERG: Okay. And the second
17 page of this is labeled T.O. 1F-16C-1, page 1-13,
18 and we would like to have this marked for
19 identification as Exhibit Triple M, MMM.

20 JUDGE FARRAR: Okay. Let's take a
21 moment and have the court reporter do that,
22 please.

23 (APPLICANT EXHIBIT-MMM WAS MARKED.)

24 JUDGE FARRAR: All right. I think
25 we're ready to proceed.

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1 Q. (By Mr. Gaukler) Back on Tuesday when
2 you were first testifying, there were some
3 questions with respect to the heads-up display, I
4 believe, and the general visibility on the F-16.

5 Focusing first on Utah Exhibit 144,
6 which I passed around copies of, could you
7 describe generally what you see when you sit in
8 the cockpit of an F-16?

9 COL. FLY: Yes. It's -- the intent of
10 the picture, Your Honors, was just to show you
11 approximately what it looks like from the outside
12 and to the pilot give you some kind of an idea of
13 what he can see from the inside.

14 As you'll notice, the F-16 -- the pilot
15 actually sits fairly high for a fighter aircraft.
16 When I flew the F-4, just by way of comparison,
17 the rails that you see that are well below the
18 pilot's shoulder, would hit me at about the
19 shoulder level. So, you know, I kind of had my
20 head sticking up, and that was about it. In the
21 F-16 it's several inches below that. And that
22 allows you excellent visibility all around.

23 And the canopy itself is a single piece
24 that lowers and raises, and we'll talk more about
25 that in one of the following diagrams. And then

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1 behind you can see that there's that one band that
2 sits behind the pilot that goes over the top of
3 the pilot. That doesn't move. They call that
4 area the opera house, if anybody cares. I have no
5 idea why they do that, but they've been doing that
6 for as long as I flew the airplane. You can also
7 see the pilot, and you can see the ejection seat
8 behind the pilot.

9 In general, visibility out of the F-16
10 is excellent. I flew the F-4, F-5, I flew a
11 modified AT-38 for several years, and I flew the
12 F-16 first in 1981. Of the other fighters I flew,
13 there's no comparison. You just feel like, man,
14 this is great, I can see everything, is kind of
15 your perception. Clearly you can't see
16 everything.

17 As you look over the nose, you can see
18 the nose of the airplane sticks out a reasonable
19 distance out there, and that's where the radar is
20 housed. The actual front end of the airplane is
21 called the radome as in radar dome. And that will
22 blank the pilot's vision down below him
23 approximately 11 degrees, so he can see the
24 horizon and down to about 11 degrees before the
25 nose then starts to interfere. The nose itself is

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1 shaped -- it's fairly streamlined. It comes back
2 to its -- that 11 degrees applies most
3 appropriately, essentially, right up front. As
4 you start to move toward the side, you can start
5 to see down below you quite easily, until you get
6 back toward the wing area itself. And, obviously,
7 the wings are at about a 45-degree sweep. I don't
8 remember the exact angle, but that's fairly close.
9 So all the way down on the sides you've got
10 excellent visibility.

11 We'll talk -- I think that was the
12 point we were really trying to make with this
13 slide, just give you some idea of what the pilot
14 can see and what might possibly be in his way or
15 an obstruction.

16 Q. I next would like to have you look at
17 what's been marked as PFS Exhibit MMM, and would
18 you describe for the Board and the parties what --
19 where this comes from and what this depicts?

20 COL. FLY: Yes. The first one's out of
21 the front of that technical order, the -1. It's
22 just a cartoonish diagram we've blown up a little
23 bit just to give you some idea of what it really
24 looks like.

25 You can see how the canopy raises. You

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1 can see the solid band of metal back there that
2 separates the opera house area from the canopy bow
3 or from the canopy itself. You can see that
4 ejection seat, which is kind of that black area
5 with the vertical stripes on it. So that's where
6 the pilot will get into.

7 As you move a little forward of the
8 ejection seat, just to the left of the boarding
9 ladder, you can see -- it's kind of an odd-shaped
10 thing that sticks up. Most of that is what we
11 refer to as the glareshield, and the next page
12 will help bring that out.

13 And then you see that rectangular thing
14 that kind of springs out of the top. That is the
15 cartoonish representation of the heads-up display.
16 If this were the glareshield in front of me, your
17 Honor --

18 Q. (By Mr. Gaukler) Would you show --
19 you're just pointing to the --

20 COL. FLY: I'm pointing to the top of
21 the table in front of me. If this were the HUD,
22 it would look something like this, and it actually
23 -- you know, you're looking through the HUD, is
24 the point I'm trying to make.

25 MR. GAUKLER: Can I have the record

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1 reflect that Colonel Fly put a tablet, an
2 8-and-a-half-by-11 tablet on the ledge --

3 COL. FLY: 8-and-a-half-by-11 tablet on
4 the ledge to try to represent the idea of the HUD
5 and the approximate position of it.

6 Now, if you'll flip the page, your
7 Honor, this is out of page 1-13 out of the
8 F-16-1. And we've blown this one up a little bit
9 also to try to make things a little bit easier to
10 see, and we've also put a few markings on it.

11 You can see -- where we've written the
12 word "HUD," that rectangular area is the physical
13 HUD itself. You'll also hear it referred to as
14 the combining glass. It's a thick piece of glass,
15 but it's only glass. And it's situated right in
16 front of the pilot. You can see off to the side
17 you've got some things that stick up. Those tell
18 the pilot different things. And then you can see
19 the glareshield clearly there, and you can see how
20 the glareshield slopes down and then drops down
21 vertically.

22 And that's when you start to get into
23 some of the instruments that the pilot is going to
24 use to fly and control the airplane.

25 JUDGE FARRAR: I'm not sure I know

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1 which part is the glareshield.

2 COL. FLY: I'm sorry, your Honor.

3 When we refer to the term
4 "glareshield," we're generally referring to this
5 area here, to the top portion, this area up here
6 at the top -- the very -- you see where it's
7 double banded, your Honor?

8 JUDGE FARRAR: Right.

9 COL. FLY: It actually -- there's a
10 little shelf-like that sticks out to try to
11 provide a little bit of glare protection from some
12 of the instruments.

13 May I approach your Honor and try to
14 show you?

15 JUDGE FARRAR: Yes.

16 (A discussion was held off the record.)

17 MR. TURK: May we go off the record for
18 a moment?

19 COL. FLY: We'll get a copy of the
20 page, your Honor, but basically we're talking
21 about the glareshield. We're talking about this
22 area here. It's just a black surface, the top
23 surface, if you will. It -- unfortunately, your
24 Honor, we're looking at this from the top -- or
25 from the front instead of from the side. But just

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1 this area right up here is called the glareshield.
2 It's just the black thing that sticks on top, not
3 the -- not the instruments.

4 JUDGE FARRAR: Above the instruments.

5 COL. FLY: Yes.

6 JUDGE FARRAR: Okay.

7 MR. GAUKLER: Why don't you show
8 counsel, both the parties, also.

9 (A discussion was held off the record.)

10 JUDGE FARRAR: Thank you for that
11 pictorial clarification --

12 COL. FLY: Yes, sir.

13 JUDGE FARRAR: -- Colonel Fly.

14 MR. GAUKLER: And we'll get copies of
15 that and redistribute when we mark the exhibit.

16 JUDGE FARRAR: Fine.

17 COL. FLY: Your Honor, you'll see -- I
18 don't want to go into great detail about all the
19 instrumentation, but you'll see these two
20 rectangular areas that are blank --

21 JUDGE FARRAR: Above the word --

22 COL. FLY: Above the word "foot."

23 JUDGE FARRAR: On both sides.

24 COL. FLY: Those are multifunctional
25 displays. The pilot calls up a variety of

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1 different things such as radar pictures and this
2 sort of stuff in there.

3 When you sit in the airplane -- where
4 you see the word "foot," your feet -- there's like
5 a little tunnel on either side of the center
6 pedestal. And your feet literally go down these
7 tunnels, and you've got this center pedestal
8 between your legs. You sit on the ejection seat
9 which is aft of all of that. And then off to the
10 right I've written the words "control stick" and
11 "throttle" just to give you some idea about where
12 they are. Please don't think that is a to-scale
13 drawing, or anything like that.

14 If you look at -- go back to the
15 State's exhibit of the F-16 picture, you can get a
16 pretty good idea of approximate location of the
17 HUD by where that really bright spot is in the
18 picture in front of the pilot. That's about where
19 the HUD sits. So that gives you some idea. It's
20 not a very close-up picture, but it gives you an
21 approximate idea of the approximate location where
22 the HUD is and kind of the general layout of the
23 cockpit, if you will.

24 Q. (By Mr. Gaukler) Colonel Fly, if
25 you're in the F-16, can you see where you're going

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1 if the HUD is not operating and not on?

2 COL. FLY: Yes, yes. The HUD is used
3 primarily as a reference. As we talked about, it
4 projects the screen imagery up based on -- where
5 you have a variety of different cockpit switches,
6 it's going to have a lot to do with what you
7 actually see. But you can turn the HUD off, and
8 the airplane will fly just fine. It would --
9 without any HUD symbology, it would impact your
10 ability to employ ordnance but not to control
11 flying the airplane or anything else. In fact, we
12 had a requirement, when I was still flying, to fly
13 a certain number of HUD-out approaches where we
14 would reach up and turn the HUD off to fly our
15 instrument approaches, just to maintain
16 proficiency in case -- in the unlikely event the
17 HUD did go out. The HUD provides useful
18 information, but the airplane flies just fine
19 without it, and you can still see through it. I
20 mean you see through it all the time anyway.

21 JUDGE FARRAR: But in terms of our
22 vision, it's as though nothing's there.

23 COL. FLY: Nothing's there. You're
24 just looking through a blank piece of glass.

25 MR. GAUKLER: We have an exhibit which

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1 I'd like to have marked as Exhibit NNN to give an
2 idea of how things appear in the HUD. And we'll
3 have marked at the same time another exhibit which
4 we're going to use as Exhibit OOO.

5 (APPLICANT EXHIBIT-NNN AND
6 EXHIBIT-OOO WERE MARKED.)

7 (A discussion was held off the record.)

8 JUDGE FARRAR: All right. We've had
9 those marked as NNN and OOO, Applicant's exhibits
10 for identification.

11 MR. GAUKLER: I would say on the
12 Exhibit NNN there were some extra blank pages that
13 came in there. We went from two sided to one
14 sided. So it should only be a two-page exhibit.
15 It just happens to be the copy from two sides to
16 one side only. You can take that one page out.

17 Q. Colonel Fly, could you please identify
18 what we've handed out and had marked as Exhibit
19 NNN?

20 COL. FLY: Yes. This is pages 1-133
21 and 1-134 from Technical Order 1F-16C-34-1-1.

22 Q. And what does this exhibit show?

23 COL. FLY: What this specific exhibit
24 shows is different representations of some of the
25 HUD symbology that may be projected at any given

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1 time on the HUD. I would like to represent that
2 this is merely representative. It's actual and
3 it's accurate. It's out of the technical order.
4 But there are a multitude of combinations that the
5 pilot has available to him, and this is by no
6 means completely comprehensive.

7 I would like to talk just momentarily,
8 your Honor, about a couple other things. If we
9 could look at the bottom of Figure 1-87, if you
10 look at the top, it says, "Attitude Bars and
11 Horizon Line," and then you look at the one arrow
12 that points to the line that goes across
13 horizontally and has the 5 degrees on it. That
14 would indicate 5 degrees above the horizon. If
15 you drop down to where the second arrow points and
16 you see the big solid bar with the gap in the
17 middle, that would be the horizon line. That
18 indicates the relative position of the horizon.
19 If the airplane rolls into a bank, the horizon
20 line will change its presentation accordingly to
21 show you where the horizon is. If you pull the
22 nose up or down -- the pitch ladders is the phrase
23 that pilots typically use, but those attitude bars
24 will also move accordingly as the pitch of the
25 airplane changes.

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1 If you go down a little further, your
2 Honor, you can see a minus -- or you see a 5 with
3 a dashed vertical line. And I'll show each
4 counsel what I'm talking about.

5 This 5 with the dashed line here.

6 5 with the dashed line there, both
7 sides.

8 That dashed line with a little bit of
9 slant to it as opposed to the level 5 degrees
10 above indicates 5 degrees nose low. So your solid
11 lines that are level with the number off to the
12 side tell you degrees nose high. The dashed lines
13 that have a little bit of an angle tell you
14 degrees nose low. So you can set your pitch angle
15 that way.

16 If you look at -- if we can come down
17 the left side, it says "Velocity Scale." That
18 points over to a thing that has a 1.0 at the top,
19 and then it has scaling down -- you see the 50 on
20 the side, the 450 in the little box and then the
21 400 below it --

22 Q. Excuse me. Is that 400 or 40?

23 COL. FLY: 40. I'm sorry.

24 Those represent a speed scale of 400 to
25 500 knots. That's what the 40 and the 50 mean.

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1 That obviously shifts as your airplane changes
2 speeds. That range will move accordingly. The
3 450 is a digital readout of what your calibrated
4 airspeed is. And if you look just to the side of
5 the 450, you'll see the little C. That stands for
6 calibrated airspeed. The airplane -- you can call
7 up true. You can call up different kinds of
8 airspeed. You can call up ground speed if you
9 want to. So the pilot has the option of
10 controlling what is displayed in terms of
11 airspeed.

12 If you go across to the other side of
13 the HUD, you will see a similar type of scale.
14 And it starts with 20.5 and then there's a box
15 with 20,000 in it and a 19.5. That is the
16 altitude scale. And in this particular case, the
17 pilot is at 20,000 feet.

18 JUDGE FARRAR: Is that 20,000 above sea
19 level or --

20 COL. FLY: Yes, your Honor. That's
21 measured in sea level.

22 There's also -- we had some
23 conversation about this the other day. If you
24 look down the right-hand side, about halfway down
25 you'll see a thing that says steerpoint symbol,

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1 and you follow that to the little diamond on the
2 HUD. That is a representation. If you'll look
3 through that little diamond, you should be able to
4 see whatever your steerpoint is, whether it's a
5 building or road intersection or whatever. If
6 that moves -- if it's not within the HUD field of
7 view, as I attempted to describe the other day,
8 that steerpoint symbol will drive itself as
9 closely as it can to the side of the HUD in the
10 direction it should move to show you the target,
11 and it will put a little X in it to show you it's
12 outside the HUD field of view.

13 JUDGE FARRAR: So that symbol comes up,
14 and when I look through that with my -- it doesn't
15 show me a picture of the steerpoint. I look
16 through that with my eye --

17 COL. FLY: That's correct.

18 JUDGE FARRAR: -- and that's my --

19 COL. FLY: It projects that little
20 diamond onto the HUD and to where it believes, so
21 it's a reference there.

22 JUDGE FARRAR: Before you go on,
23 Colonel, I asked the question about sea level.
24 Just like you convert the left-hand side from
25 airspeed to groundspeed, and you convert the

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1 right-hand scale from sea level to above ground?

2 COL. FLY: You have a radar altimeter
3 capability that you can call up radar altimeter to
4 give you AGL if you would like to do it that way.

5 That's just a general representation,
6 your Honor.

7 Then you can see in the one above it,
8 this guy is set up to shoot a missile. And if
9 you'll flip the page, here's another HUD
10 presentation. This particular pilot is in an
11 air-to-ground mode. There's symbology up there.
12 I can -- he's in a thing called constantly
13 computing release point. It's an automated
14 weapons delivery mode that, when the pilot follows
15 the appropriate things and puts -- drives the
16 airplane to the solution, then the automated
17 systems will compute that and know that he'll get
18 a very good bombing and release it.

19 So lots of different types of
20 information that are available, and it depends in
21 part to what does the pilot want to see. You can
22 select, deselect. It depends in part too, am I in
23 navigation mode, in an air-to-air mode, those
24 types of things.

25 Q. (By Mr. Gaukler) Colonel Fly, we had

1 talked about if the PFSF were programmed as a
2 steerpoint, it would appear in this little diamond
3 symbol, for example, on page 1-133?

4 COL. FLY: That's correct, assuming
5 that it was within the HUD field of view. So if
6 the pilot was pointed in that general direction
7 and it was within -- it could -- if it could put
8 it over the diamond, if the PFSF was off to one
9 side or the other of the HUD, then you would have
10 the diamond.

11 Q. And if you so desired, could you
12 program the site in as a point on the HUD without
13 it being the steerpoint?

14 COL. FLY: No. The -- the steerpoint
15 symbol is a function of the distinction you have
16 selected, and that was programmed into the
17 inertial navigation system.

18 Q. What if the PFSF were not programmed as
19 a steerpoint, would that have any practical effect
20 on the ability of a pilot to see and avoid the
21 PFSF site?

22 COL. FLY: The PFSF site, it's
23 described. The physical dimensions are in there.
24 But whether you have the diamond around it or not,
25 you know you're going to be able to see a facility

1 like that.

2 Q. On Tuesday, I believe it was, we spoke
3 briefly about what would happen to the HUD if the
4 power went off, and what happens if the power goes
5 off in the HUD?

6 COL. FLY: I got to thinking about
7 that, and I actually -- what will happen is that
8 the HUD should recycle. And in the case that was
9 posited about the engine failure, I didn't have an
10 engine failure, but back in the early '80s I was
11 flying an F-16 that was an A model. It had a
12 different electrical system. It wasn't as
13 sophisticated as the electrical system that's in
14 the airplanes that we fly now.

15 But the main generator failed. And at
16 that time we didn't have some of the other backup
17 systems that are on the airplane now, and the
18 emergency power unit fired, as it should. And to
19 try to -- I can't tell you in real time how it
20 happened because it happened so quickly.

21 The generator failed. My first
22 indications of the generator failure were --
23 there's an airflow through the cockpit, just air
24 flowing over the windshield. You can have little
25 nozzles pointed at you for comfort, those types of

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1 things. The ECS shut down basically. I mean
2 there was no airflow. What's that? And then it
3 came right back on. The HUD blinked at me, and
4 then I got a thing called a master caution light
5 which says -- we have a series of warning lights
6 on the caution light panel. And so I looked
7 there, and I got the electrical lights. And I
8 looked down, and I saw that my main generator had
9 failed. I immediately looked back to see if the
10 ERU run light, the emergency power unit run light
11 was on. It was. It was functioning.

12 That took me -- I mean like I said, if
13 you can image these things just cycling, you look
14 around, and it's up and it's running. So it takes
15 a lot longer to say what happened than it did to
16 happen. And so it's very, very quick.

17 Q. I'd like to have you look at what's
18 been marked as --

19 JUDGE FARRAR: Mr. Gaukler, before you
20 do that and so I don't forget and so I give you
21 equal interruption treatment that I gave
22 Mr. Soper --

23 MR. GAUKLER: Fair enough.

24 JUDGE FARRAR: -- you said a moment
25 ago, Colonel Fly, that without the HUD, without

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1 the steering -- the steerpoint, you could see the
2 proposed facility. Could I -- if I were a pilot
3 and there were one cask stored there, would I see
4 that?

5 COL. FLY: Your Honor, you will have
6 the transfer storage building -- is that what it's
7 called?

8 MR. GAUKLER: Canister building.

9 COL. FLY: -- canister transfer
10 building, which I believe has a vertical
11 development of about 90 feet, that will be right
12 next to it. You'll have the boundary of the
13 fences. You will have the pads out there. I mean
14 I've seen abandoned airfields and pads and stuff
15 from a fairly significant distance, so I think
16 that the answer to your question is yes.

17 JUDGE FARRAR: Okay. So you wouldn't
18 see the cask -- in other words, what you would see
19 flying is not there's a cask, but they're in the
20 middle of --

21 COL. FLY: You're going to be able to
22 see the cask. I know that they weigh a hundred
23 and --

24 JUDGE FARRAR: Wait a minute.

25 COL. FLY: Oh, I'm sorry.

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1 JUDGE FARRAR: We could talk that way,
2 but the reporter doesn't like it.

3 You would see, then, out in the middle
4 of where there's not a lot of else, as you said,
5 the 90-foot-tall building and the pads. It's not
6 so much the casks you're seeing as the rest of the
7 facility?

8 COL. FLY: I'm not saying I wouldn't
9 necessarily see a cask. I'm trying to remember
10 what the physical dimensions are of a cask.

11 JUDGE FARRAR: 20 feet high and 10 feet
12 in diameter.

13 COL. FLY: 20 feet high. I will be
14 able to see that at some point. I can't tell
15 you -- I can't give you a measured distance, but,
16 yes, I would be able to see something of that
17 size. You see people walking, you see cars
18 driving. I think that's probably representative
19 of a car. I don't know.

20 JUDGE FARRAR: Thank you.

21 Go ahead, Mr. Gaukler.

22 Q. (By Mr. Gaukler) Would you tell us
23 what's been identified -- marked as PFS Exhibit
24 OOO, what that is?

25 COL. FLY: Yes. This is another page

1 out of the Technical Order 1F-16C-1. It's page
2 1-94.

3 Q. And, Colonel Fly, in your testimony on
4 Tuesday, I believe, you referred to the power
5 coming on maybe in a half a second or 2 to 3
6 seconds. Have you had time to go back and review
7 how long it would take for the emergency power
8 unit to come back on?

9 COL. FLY: Yes. If you will look under
10 the left-hand column, the section that says "EPU
11 Operation" -- and I'll just read it into the
12 record. The first part is going to describe the
13 conditions that will generate an automatic start
14 signal to the emergency power unit, and then the
15 second will talk to that time.

16 "The EPU is designed to operate
17 automatically for main and standby generator
18 failure, dual hydraulic system failure, PTO shaft
19 or ADG failure, and engine flameout or if the
20 engine is shut down in flight. The EPU can also
21 be activated manually. After receiving any start
22 command, the EPU requires approximately 2 seconds
23 to come up to speed."

24 Q. Thank you, Colonel Fly.

25 I'd like to change topics now.

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1 And we've talked a lot about
2 situational awareness the past couple of days,
3 and, General Cole, could you briefly describe for
4 us what is meant by pilot situational awareness?

5 GEN. COLE: Certainly. Situational
6 awareness is an active and engaged cognizance of
7 where you are and where you're going in the
8 airplane, what is around you, what is in front of
9 you, what is your airspeed, what is your track.
10 Pilots use several terms to describe this. A new
11 modern technological marvel, it's called a moving
12 map display, I like to think of it as a moving map
13 display inside your head, where you're going, what
14 your objective is, what are the terrain obstacles,
15 what are the airfields, knowing where you are and
16 where you're going. Other pilots use the term
17 "thinking ahead of the airplane."

18 Situational awareness is a proactive,
19 creative means to keep you out of trouble and make
20 sure that you're flying the airplane and the
21 airplane isn't flying you, that you're the driver
22 and not the passenger. It's very basic. You
23 start learning it and developing it the first time
24 you get into an airplane in undergraduate pilot
25 training, and if you don't get it pretty quickly

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1 and develop it pretty rapidly, you're not even
2 going to make it through pilot training.

3 Now, having said that, once you've
4 finished pilot training, the acceleration of the
5 capability must keep going because, depending on
6 what kind of aircraft you're flying, what speed
7 you're flying, what environment you're flying, if
8 you don't have an active positional, where you
9 are, and situational awareness, even under normal
10 operations, you could get into very awkward
11 situations very quickly. And under emergency
12 situations, that can be compounded.

13 So it's something that you start being
14 trained upon from day one, and you actively
15 develop it. You work very hard to improve your
16 skills of perception, assessment, and you do it
17 very high speed. And you don't do it in series,
18 do you it in a series of parallel things. You're
19 looking at a lot of things.

20 That is, you know, a synopsis of
21 situational awareness.

22 Q. How is situational awareness generally
23 integrated into pilot training?

24 GEN. COLE: Well, I'll give you two
25 cases. First I'll start with the simulator.

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1 You can be in a simulator and be given
2 a flight profile. And you take off, and you're
3 flying. And your instructor can provide you with
4 a simulated emergency condition in the simulator.
5 You must remember that the first rule is fly the
6 aircraft, maintain aircraft control, the second is
7 assess the situation and take appropriate action,
8 and the third one is land as soon as conditions
9 permit. If you have that emergency procedure
10 sprung on you and you focus immediately and
11 totally on it and you finally get it under control
12 and you've flown by a convenient place to land,
13 you've lost your situational awareness.

14 You train to that in the simulator.
15 When you're in pilot training and also when you're
16 in checkout in particular airplanes, you'll have
17 an instructor that will drill you on this, coach
18 you, press you, raise your standards at how good
19 you are at it. It's a constant, constant learning
20 process you go through all the time.

21 Q. Colonel Fly, you were a flight
22 instructor for the F-16; is that correct?

23 COL. FLY: That's correct. I had two
24 tours of duty. The first one was for about two
25 and a half years, from the summer of '78 to

1 December of '81, and the second was from summer of
2 '90 to the summer of '93, where I was a formal
3 course instructor pilot.

4 When we talk about instructor pilot, in
5 air force terminology, there are really two types.
6 There's those who are formal course. Their job is
7 to teach others how to fly this airplane, and
8 that's all they do. In the operational world
9 there are also instructor pilots or IPs, and Hill
10 Air Force Base would be an example of an
11 operational base. Those IPs also perform
12 instructional duty, but they tend to be for
13 upgrade training such as if I'm taking a wingman
14 and upgrading him to a flight lead, I would fly
15 him with an IP. If there was specialized training
16 that I would need to get done of some sort, I
17 would generally fly them with an instructor pilot.

18 So, yes, I actually served in both
19 capacities.

20 Q. Where did you serve in the second
21 capacity?

22 COL. FLY: At Incirlik Air Base in
23 Turkey where I was -- I had a variety of jobs, but
24 I maintained instructor pilot status for the
25 airplanes, the F-16s that came in from different

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1 locations around Europe.

2 Q. Based upon your background and
3 experience in training of pilots, do you have
4 anything to add to what General Cole described as
5 situational awareness and how pilots are trained
6 for situational awareness?

7 COL. FLY: I very strongly agree with
8 his concept. It's like where am I, what am I
9 doing, what are my options, what could happen,
10 what's likely, what's next, thinking ahead of the
11 airplane.

12 But we also talk a lot about it when we
13 come in and start talking with -- when we brief
14 missions, we say, you know, I expect this, I
15 expect this to happen then, something else to
16 happen some other time. So you're kind of laying
17 a little groundwork. Well, during the debrief,
18 which is after the mission, it's very similar.
19 You say, Okay, what did we expect, what did
20 happen, was that good, did we react properly,
21 should we have anticipated that, those types of
22 things.

23 So we spend a lot of time talking about
24 what-ifs, how do we handle it, what do we do. And
25 that can be -- when I say "what-ifs," it can be

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1 various -- I mean it could be a single ship,
2 takeoff, go down toward somewhere else in the
3 states, shoot some instrument approaches, or it
4 could be we're going to go out and we're going to
5 do some simulated air-to-air or air-to-ground
6 training. And, you know, what if -- we expect to
7 encounter the bad guys at a certain place, but
8 it's really -- the situation's a lot different.
9 How will we respond to that. Those types of
10 things.

11 Q. General Jefferson, did you ever serve
12 as a flight instructor?

13 GEN. JEFFERSON: No. I was an
14 instructor pilot in the sense of being in an
15 operational unit that Colonel Fly just described.

16 Q. And how long were you an instructor
17 pilot?

18 GEN. JEFFERSON: About two years.

19 Q. And based upon your experience as an
20 instructor pilot and your general experience in
21 the air force, do you have anything to add to what
22 General Cole or Colonel Fly said with respect to
23 situational awareness and on pilots that train for
24 situational awareness?

25 GEN. JEFFERSON: Yes. You have to --

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1 as General Cole said, to fly an airplane safely,
2 you have to be ahead of it. You have to know
3 what's going to happen next. You don't wait until
4 something happens to -- to think about it. You
5 anticipate.

6 We learn that first in pilot training,
7 all of us do, in something called rapid
8 crosscheck. And that's your eye movement, to have
9 crossed all your instruments, all the things that
10 are going on outside, and you have to do that.
11 Your instructor will test you on that
12 periodically. He may -- as you're flying around,
13 he may pull the throttle and say, Okay, you've got
14 a simulated flameout. What are you going to do?
15 So you locate the field that you're going to land
16 at, and at the same time you're going through the
17 procedures to get the engine started. And he may
18 let you start it, he may not. He'd have to see
19 whether you're going to make the runway or not.
20 And if you don't, you're going to get critiqued
21 pretty hard for that.

22 But that's part of the situational
23 awareness stuff. You know, you may have been
24 going out to do formation flying or something like
25 that. And that may be your focus. But you have

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1 to know everything else that's going on around
2 you.

3 Another example, I used to give check
4 rides on instrument procedures, which in the plane
5 I was in, you put the pilot doing the check under
6 a bag, under a cloth canopy so he couldn't see
7 out, and then you ask him to do certain approaches
8 or that sort of thing. And he would -- he would
9 do that. If he didn't know what was going to
10 happen next on his approach, like what frequency
11 he needed to be tuning his radio to or what
12 heading or what altitude he needed to hit at a
13 certain point, then he'd get seriously behind and
14 be in big trouble. So you have to stay ahead.

15 Q. General Cole, how does this general
16 training of situational awareness and situation
17 awareness generally relate to avoiding structures,
18 populated areas on the ground in the event of an
19 emergency?

20 GEN. COLE: Well, it's part of the
21 total moving map concept and staying ahead of the
22 airplane. If you know where you are and where
23 you're going and you have cognizance in a relative
24 situational sense of the things around you and you
25 experience some type of emergency, again, you've

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1 got to prioritize tasks and avoid task saturation
2 and think in parallel lines. You work your
3 emergency procedure while you're maintaining
4 control of the aircraft. Actually, flying the
5 aircraft is first, assess the situation.

6 And as you work through, as you've been
7 flying, you generally know what's ahead of you,
8 what you're passing, where you've been, and so if
9 it's an issue of avoiding something on the ground,
10 you'll have an idea where it is even before you
11 get to the point of having to actually execute on
12 a decision to avoid. As Colonel Fly said earlier,
13 you know what's out in front of you, and if
14 something is out in front of you and you
15 experience an emergency, you've got it in a layer
16 of that decision-making to steer away as you
17 maintain aircraft control.

18 Q. Colonel Fly or General Jefferson, do
19 you have anything to add to what General Cole just
20 described?

21 GEN. JEFFERSON: I don't.

22 COL. FLY: I don't think so.

23 Q. Colonel Fly, you've flown in Skull
24 Valley, correct?

25 COL. FLY: Yes, I have.

1 Q. What would provide a pilot with a
2 situational awareness of the PFSF as he or she
3 were flying through Skull Valley?

4 COL. FLY: Well, first, assuming it's
5 built, you know, they'll have a year or two or
6 three, whatever it is, worth of construction where
7 they see all the dirt being moved around. That
8 will give them some indication of where it's going
9 to be when it's finished. So an opportunity to
10 learn where it is and routine flights through the
11 area, you know, you'll quickly adapt.

12 The fact that in Skull Valley is
13 basically desert, there's nothing there -- I mean
14 it's not like there's a huge number of significant
15 structures. It's wide open spaces except for
16 occasional buildings and that type of thing. This
17 would be the largest structure in the area, as
18 near as I can remember.

19 It's going to be off toward the side,
20 toward the side -- toward the western boundary of
21 the MOA. You'll have the generally flat terrain
22 in which it will be located. If you'll look to
23 the left or the right of Skull Valley, you have
24 some fairly prominent features in terms of terrain
25 and the mountains that help you guide where am I

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1 in Skull Valley, am I at the northern end, the
2 southern end, about where is this all happening.
3 That provides a relationship as well in terms of
4 where, approximately, in the valley the proposed
5 site would be located.

6 Q. Assuming there were cloud cover and you
7 were flying over a cloud cover, how would you
8 maintain situational awareness of PFSF?

9 COL. FLY: It would depend on several
10 things. One, we mentioned the mountains.
11 Depending on where the cloud layers are, they
12 would help give you a good general feel for where
13 the site was located.

14 You will also -- I mean I'm assuming
15 I'm operating over a complete solid undercast
16 where I have no opportunities to see the ground.
17 That's not a very common occurrence over in Skull
18 Valley. The weather, I think we'll talk more
19 about that. You know, you have cumulative cloud
20 layers and all that sort of stuff.

21 But assuming I'm operating over a
22 completely solid undercast, I would have the
23 mountains if they're visible. If the undercast
24 covers all the mountains as well, I would have
25 some of my on-board navigation systems that would

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1 help me. As I described yesterday, for general
2 routes of flight, the way I think you'll find that
3 most people transit Skull Valley is they enter
4 into the northern portion and then they take up a
5 vector toward the narrow neck down at the southern
6 end of Skull Valley. If I were having to do this
7 on instruments, the easiest way to do that would
8 be to have -- when I say "on instruments," I mean
9 relying on on-board instrumentation as opposed to
10 air traffic control direction. I would -- the
11 easiest way to do it would be to have a steerpoint
12 programmed into the inertial navigation system
13 somewhere in the vicinity of the neck or down a
14 couple of miles in that narrow neck and then
15 figure out what my bearing and distance is to
16 that.

17 And I can -- there are instruments in
18 there that would allow me to select a ground track
19 to fly toward that so I could, in essence,
20 maintain that same ground track that we described
21 yesterday. And that would allow me to maintain
22 the same ground track even though I couldn't see
23 the PFSF, but I would have a general idea that
24 it's over here on the right type of thing.

25 Q. We've discussed the R factor, and we

1 discussed two components of the R factor. One is
2 the 90-percent component in which the pilot
3 would -- PFS evaluated whether the pilot would
4 remain in control of the plane. What is the most
5 likely accident to occur in Skull Valley that
6 would leave the pilot in control of the plane?

7 COL. FLY: Well, the most likely
8 accident in an F-16 is generally caused by an
9 engine failure, and I think that's that the only
10 likely or probable one that would happen within
11 Skull Valley would be an engine failure.

12 Q. And you've just described previously
13 for the Board what happens when a pilot is in a
14 situation where his engine fails, correct?

15 COL. FLY: Yes, I have.

16 MR. GAUKLER: I'd like to have marked
17 as PFS Exhibit QQQ -- excuse me. Off the record.

18 (A discussion was held off the record.)

19 MR. GAUKLER: PPP.

20 (APPLICANT EXHIBIT-PPP WAS MARKED.)

21 JUDGE FARRAR: All right. We've marked
22 the exhibit as Applicant PPP.

23 Go ahead, Mr. Gaukler.

24 Q. (By Mr. Gaukler) Colonel Fly, could
25 you please tell me what's been marked as PFS

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1 Exhibit PPP?

2 COL. FLY: Yes. This is another two
3 pages outside of the Technical Order 1F-16C-1,
4 3-42 and 3-43.

5 Q. And what do these sections of the order
6 describe?

7 COL. FLY: The right-hand column on
8 page 3-42 is the beginning of the discussion on
9 ejection in the pilot's manual in the emergency
10 procedure section. The second page, 3-43, is the
11 page that was handed out yesterday by the State
12 that talks about the checklist for ejection.

13 Q. Now, when a pilot ejected from a failed
14 aircraft where the engine had failed, at what
15 speed would you expect him to eject from --

16 COL. FLY: I would expect him to eject
17 at a relatively low airspeed. If you follow the
18 description of what we had talked about before,
19 you know, we're in the 200ish-knot range.

20 Q. And what does this chart or this
21 exhibit say with respect to what a pilot can
22 expect when he ejects from an aircraft at those
23 speeds?

24 COL. FLY: Well, if I could, before I
25 answer that question I'd like to point out at the

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1 very first sentence at the top of the checklist,
2 Ejection should be accomplished at the lowest
3 practical airspeed.

4 I would then like to -- we had -- well,
5 the second to the last bullet -- well, actually
6 the last -- yeah, the second to the last bullet,
7 Windblast exerts medium force on the body, up to
8 450 knots, severe forces causes flailing and skin
9 injuries between 450 and 600 knots, and excessive
10 forces, above 600 knots. The point is that for
11 the likely ejection scenario we've discussed, the
12 flailing and stuff is not even an issue. In fact,
13 when I think about the guys that I've known that
14 have ejected from an F-16 with a failed engine,
15 you know, most of them got out of the helicopter
16 and they walked with a smile on their face. And,
17 you know, they might complain about a little bit
18 of soreness or something but no injuries. They're
19 back at work the next day, that type of thing.

20 Q. We've heard some testimony yesterday
21 about pilots may not complete their checklists, or
22 something like that, which may impair their
23 ability to see the site and avoid the site in the
24 event of an ejection. General Cole, do you have
25 any opinion on those issues, and what is it?

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1 GEN. COLE: Specifically with regard to
2 the ejection --

3 Q. Right.

4 GEN. COLE: Well, back to my comments
5 about situational awareness, as you know generally
6 where the site is, you don't have to physically
7 turn and look at it again as you initiate an
8 ejection procedure and go through your sequence.
9 I don't have much to add beyond that. If you're
10 keeping your situational awareness on target,
11 it -- I won't say it won't be a factor, but it's
12 factored into those parallel thinking circuits I
13 was talking about before.

14 Did that answer your question?

15 Q. Yes, it does. Thank you.

16 Colonel Fly, do you have anything to
17 add to what General Cole said?

18 COL. FLY: I'm sorry, counselor.

19 Repeat the question.

20 Q. I was asking in terms of completing the
21 checklist for ejection. First of all, how long
22 would it take to do the checklist for ejection and
23 at what point in time would you do that?

24 COL. FLY: Not to belabor the point of
25 yesterday, but some of these things you're really

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1 not going to have to do anyway because of where
2 you are in the situation.

3 Q. Could you verify for the record, when
4 you say "some of these things," what are you
5 referring to?

6 COL. FLY: I'm referring to the
7 ejection checklist that we described yesterday.

8 Q. And that's the same as the State
9 exhibit handed out yesterday?

10 COL. FLY: It's the same, yes.

11 I guess my answer would be -- now, I'm
12 not really qualified to talk to No. 5 because I've
13 never flown with night vision devices, but most of
14 those other things can be done very, very quickly.
15 And as I mentioned yesterday, I fly with my lap
16 belt tight anyway. You know, I try not to leave
17 loose things laying around because it's a small
18 cockpit. So in spite of the fact it looks like a
19 fairly big airplane, there's not a lot of room, so
20 keeping only things out that you need and other
21 things stored where you can get to them quickly is
22 kind of one of the tasks of being an F-16 pilot.

23 Q. And, Colonel Fly, do you have an
24 opinion as to whether completing the checklist
25 would preclude a pilot from avoiding a site on the

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1 ground such as the PFS?

2 COL. FLY: I don't believe it would
3 impact the pilot's ability to avoid anything on
4 the ground. I mean if there's some facility out
5 there, whether it's PFSF or a ranch house or
6 anything else that he can see, I don't think that
7 would interfere with his ability to do that.

8 Q. General Cole, we've heard in the past
9 couple of days a lot of talk about stress of a
10 pilot under ejection, and is ejection the only
11 situation where a pilot might experience stress?

12 GEN. COLE: No, it is not. Stress and
13 duress when you're flying goes with the territory,
14 goes with the pilot's wings, depending on the
15 situation, normal operations, emergency
16 operations, weather, and ejection, if, indeed, you
17 should have to do it, is one slice event of the
18 stress.

19 I'll give you a very -- three brief
20 examples that I think will illustrate my point.
21 One is a story of a lieutenant, 24-year-old
22 lieutenant aircraft commander. Place is Da Nang.
23 Got a crew. The enlisted members of the crew were
24 ages 18, two of them 19, one of them 20. They
25 were all new. That particular unit of five crews

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1 -- and not to dive into the mathematical business,
2 but over a running two-and-a-half-year period,
3 their rate of combat losses was five per year, and
4 if you believed in math, it put a little stress on
5 you.

6 Brand-new 18-year-old on the crew said,
7 Lieutenant, I don't know how I got here, but am I
8 going to live?

9 And the lieutenant said, Your job is to
10 become the best aerial gunner and weapons mechanic
11 on the face of this earth, and my job is to be the
12 best pilot on the face of this earth. And we are
13 a crew of seven, and we're in this together.
14 Yeah, you're new. Yeah, you're inexperienced.
15 But you see the 19-year-old there? He is right
16 now the best aerial gunner and weapons mechanic in
17 the world. And when things are bad back there, I
18 expect you to let me know what the problems are so
19 I can adjust, pull off the target, whatever I need
20 to do. And when I'm having problems up front,
21 I'll keep you briefed. And we're going to make
22 it, but we're going to make it together.

23 We did that 300 times in that year,
24 basically going out without the benefit of
25 inertial nav systems or INS, supporting special

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1 forces, green berets under attack, U.S. units
2 spiraling down through the clouds at night without
3 situational awareness, where are you, how do you
4 do this, and we did it successfully. No one
5 claims credit for that, but it was a great deal of
6 stress and duress. But the issue was did you
7 identify it, did you manage it. And the greatest
8 fear anyone had was letting down the person next
9 to you, and the greatest goal everyone had was
10 succeeding together. That's crew resource
11 management, stress management, personnel
12 management, leadership.

13 Two, quick one, lieutenant colonel
14 story. Many of you may not remember April 1980.
15 I remember it well, the fiasco, disaster Desert 1,
16 the Iranian hostage rescue attempt. I was called
17 in by the wing commander, and he said -- very
18 young lieutenant colonel. We flew air-drop in
19 C-141s. It's 150-ton jet. He said, Colonel Cole,
20 you've got 90 days to get three crews qualified in
21 night low-level night vision goggle operations,
22 clandestine flying low level and unannounced
23 arrival at airports, blacked out landings, open
24 the doors on landing and let people out to go do
25 what they had to do. He said, Can you do that?

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1 I said, Well, sir, I will go back, and
2 we'll set about it. Got all the pilots and all
3 the navigators in a room and said, I can't tell
4 you what it is, but I can tell you it involves
5 levels of performance far above what you've been
6 asked to do, what you're used to doing, and it's
7 going to be very different. It's a high priority
8 national interest item, what you may have to do.
9 I think we can do this in 90 days because we've
10 got highly trained crew members. I need
11 volunteers.

12 And, of course, all the hands went up.
13 And I started, All right, leave it to my judgment
14 to pick crews, and anybody can back out of this at
15 any time. And the level I'm asking you to perform
16 at, you know, may be higher than you can do, and
17 if it gets too tough, put your hand up and let me
18 know.

19 So we launched on the training program.
20 At the end of 90 days, we had three combat ready
21 crews. It was the most ferociously fearful
22 peacetime training I've ever done in my life. I
23 had two young men break down and cry, said, I
24 can't do this.

25 Fine. Back to the regular flying. I'm

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1 glad you let me know.

2 It was very high stress on a high
3 national command authority suspense line. The
4 young men and women in the squadron knew what it
5 was about. They gave it 110 percent. I was
6 getting a lot of adult supervision on when are you
7 going to be ready, but they performed to the
8 level. It was very high stress.

9 And, once again, back to what I said
10 before, human factors, leadership, resource
11 management, coordination, communication, reliance
12 on your crew members.

13 Desperately afraid. The worst thing
14 you wanted to do was let your crewmate down. Got
15 through that okay. Didn't bend any airplanes. We
16 were combat ready and ready to go.

17 The last one, very briefly, brigadier
18 general, chief of safety of the air force. The
19 year was 1991. I was very, very concerned in 1991
20 because we'd just finished Desert Shield and
21 Desert Storm. The people were tired, the
22 airplanes were tired. As the brand-new chief of
23 safety, I was seeing indicators out there that
24 bothered me, high maintenance aborts. You talk to
25 the squadron commanders, the troops are tired.

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1 And you'll recall the operational deployments
2 worldwide started going up again, and that had
3 been going on for a while.

4 And I had to sit down and say, This is
5 a high stress for the whole force. What can I do
6 to alleviate it? And this is not a pure flying
7 stress thing. The people that I was dealing with
8 had to deal with flying stress. But there's a
9 phrase that's called human factors, and I liken it
10 to the crucial dimension. And I thought, What can
11 I do very quickly to get ahold of this before the
12 incident rates, maintenance problems go out of
13 site?

14 I offered to get in the room with every
15 group of new squadron commanders. They have about
16 a two-week cram course on how you be a squadron
17 commander. And I go in and I shut the door and
18 say, All right. I'm not here as the chief of
19 safety, and what you say stays in this room and
20 what I say stays in this room. Your people are in
21 a high-stress environment right now, and I want to
22 make sure that you deal with the stress and deal
23 with the issues and not have them collapse upon
24 you.

25 So I told them what I thought as a

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1 former flight commander, chief pilot, operations
2 officer, squadron commander, wing commander on
3 what I thought the risk areas were. And then I
4 say, That's what I think. Now you tell me.

5 And the beauty of all that was they
6 weren't learning so much from me as they were from
7 each other and what's going on there right now.
8 And at the end you'd circle it up and say, Okay,
9 stress in the cockpit, human factors, don't let
10 people exceed their limits, don't let them get out
11 in front of their headlights. You're the
12 commanders who manage that. Depending on the
13 airplane you're flying or where you are, you're
14 the judges, you're the experts. When you need
15 help, you call for it.

16 Now, I've sort of given you a broad
17 range of issues on stress in the cockpit and how
18 you deal with it. Back to Mr. Gaukler's pointed
19 question, I wouldn't presume, as you rack those
20 things up I've described to you, how in the order
21 of magnitude ejecting from an airplane would
22 stack. That too is a stressful issue. But stress
23 is a very far-reaching and broad issue. So those
24 three things.

25 Q. Colonel Fly, have you ever been in an

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1 emergency event that would encounter stress?

2 COL. FLY: I've had a variety of
3 different opportunities to experience that during
4 my aviation career. Flight control problems.
5 I've lost engines. As I mentioned before, it was,
6 thankfully, in a two-motor airplane. Just a
7 variety of different things, electrical problems,
8 landing gear problems. I'm not sure I could go
9 through the whole list and come up with all the
10 things I've had to deal with.

11 Just by way of an example -- and this
12 kind of ties into situational awareness and as
13 well as stress -- at the time I was a lieutenant
14 flying the F-4, which is a two-seat airplane, and
15 the guy in the backseat was a classmate of mine
16 from college and a dear friend. And there were
17 just the two of us. And our total time in the
18 airplane was not very high at that point, but
19 we're mission ready, combat guys.

20 Stationed at Hahn Air Base, Germany,
21 and we were taking the airplane up to Germany --
22 I'm sorry, to England. We had just leveled off
23 at -- I don't remember the altitude. It was 1977
24 I think. But we were up probably in the 20s, low
25 30s, somewhere in there. And I'd already asked

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1 him if he wanted to fly the airplane, and he said
2 no. I said, Okay, fine.

3 So we were cruising along, and the
4 airplane went into a turn. It just rolled left.
5 So I put in the proper controls to bring it back
6 to wings level, and it didn't respond. So I asked
7 him to quit, please, messing around with the
8 controls back there, or words to that effect, and
9 I brought the airplane back to level.

10 So we were pressing along, and I said,
11 Now, come on, Tony, what were you doing back
12 there?

13 And he said, I wasn't doing anything.

14 I said, Yeah.

15 Well, a little while later the airplane
16 rolls to the right. And I put in the controls to
17 bring it back up, and it's not responding. So I
18 step on the rudder, and it finally comes back up.
19 And I said, Knock it off back there.

20 He said, I'm not doing it.

21 At that time it rolled back to the
22 left, and I had a few other words for him about
23 please discontinue such activities in the
24 backseat. And I was able, after some amount of
25 time, to get the airplane back to wings level.

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1 In the meantime, he's looking through
2 the checklist saying, Where is this in the
3 emergency procedures checklist? And it wasn't.
4 You know, the airplanes arbitrarily decided to
5 roll left, followed by right roll, followed by
6 left roll. So we said, Well, this is not good.
7 We're going back home. So we declared the
8 emergency, turned around and started going back
9 home.

10 And there was really nothing in the
11 checklist that talked to what we had going on. So
12 we did a little on-the-fly situational awareness
13 and said, Okay, what can it be? I'm starting to
14 turn off the stability augmentations. And roll,
15 pitch and yaw are the three axes of maneuver for
16 the airplane. In the F-4, because of the way it
17 was designed, they put in a thing called the
18 stability augmentation system, one for each axis,
19 and since we had no idea what was causing it, I
20 turned off all three of them. And the situation
21 appeared to subside.

22 But now -- the F-4, which was a fairly
23 heavy and generally stable airplane with the stab
24 aug on, now it was like I'm flying this thing
25 balanced on a pencil. And it's just very wobbly

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1 and sloppy. It's not the standard F-4 I was used
2 to. But you kind of go, Okay, here we go.

3 We'd come on back toward Hahn, and we
4 start letting down. And one of the things I said
5 was, Okay, Tony, now let's talk about what happens
6 if this happens at low altitude.

7 And he said, Why did you have to say
8 that?

9 I said, Because we're going that way,
10 buddy. We're heading back to the airport. And so
11 we discussed what we would do.

12 And, fortunately, nothing happened
13 after that, and we were able to bring the airplane
14 in and land it. And it took them a day or two,
15 but they were able to finally isolate the fault
16 and they came up with it.

17 If you want to fast forward just kind
18 of many years, I'm now an instructor pilot in the
19 F-16. This is -- I've got a young lieutenant in
20 the front seat. We were flying out of MacDill Air
21 Force Base in Florida where during the summer you
22 have the opportunity to do some really awesome
23 thunderstorms. We're out over the Gulf of Mexico.
24 We're one of the few planes that are airborne
25 because of the weather conditions.

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1 Then the supervisor of flying calls us
2 and says, The weather's really getting bad. Why
3 don't you come on home?

4 We said, Okay.

5 So we're up in the mid to high 20s, and
6 we start coming back. And SOF calls us again.
7 We're still out over the Gulf. He says, I think
8 you really ought to go down to Homestead, which is
9 about 200 miles away down in -- south of Miami.

10 I said, Okay. We can do that.

11 The weather's okay there, but it's not
12 going to be okay for long, so please feel free to
13 hurry.

14 We said, Okay, we'd be happy to do that
15 too.

16 So we turn south and headed down toward
17 homestead. About halfway to Homestead the SOF
18 calls back up and says, Homestead just went below
19 minimums, meaning we can't land there. How about
20 coming back here? You can land here if you can
21 get here soon enough.

22 I said, Okay.

23 So the guy in the front seat I gave the
24 instructions, and I took control of the radar in
25 the backseat. And there's -- it's just kind of --

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1 we're on top of most of the weather, but it's not
2 good. And we're occasionally in and out of it.
3 And there's a way that you can set up the radar to
4 paint the really thick cells embedded in this
5 stuff. So I told the guy in the front seat, I
6 said, You see those bright spots on the radar
7 scope?

8 He goes, Yes, sir.

9 I said, Don't go there.

10 Okay.

11 Don't go there.

12 So we're flying along, and we finally
13 get back to home plate. But the weather's really
14 bad, and they're having a lot of trouble with air
15 traffic control. MacDill is only located about
16 six or seven miles from Tampa International. And
17 so they're trying to sequence us and bring us in.

18 And then I see a big hole in the
19 clouds, and so I immediately told the backseater,
20 I said, I have control of the airplane. And
21 there's a way that I can electronically take
22 control of all the flight controls.

23 And I asked air traffic control, I
24 said, Can I make an immediate VFR descent to 2,000
25 feet?

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1 He said, Yes, you may.

2 I said, I can get into the traffic
3 pattern.

4 So I took control of the airplane and
5 started a very aggressive -- I had to turn back to
6 the left because that's where the big hole in the
7 clouds was, but I knew exactly where that was
8 because I could see the bay and a piece of land.
9 So I knew exactly where I'd be. And I brought the
10 throttle to idle, put out the speed brakes, which
11 are just what the name implies, they slow you
12 down, started a very aggressive descent, stayed
13 clear of the clouds all the time, got underneath
14 them, entered the pattern, the traffic pattern
15 south of the base.

16 About that time I got a call from the
17 SOF. He said, It's really getting bad. Where are
18 you?

19 I said, I'm about six or eight miles
20 south. I'll be there as quick as I can.

21 So we flew at higher than standard air
22 pattern speeds and came around. And I threw the
23 throttle back at idle, threw the gear out -- I'm
24 sorry, the speed brakes out and the gear down and,
25 as soon as I got to gear speeds, brought it in and

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1 landed it. And about maybe -- well, in fact, by
2 the time -- before we cleared the runway, the
3 great deluge hit, and had we been two, three
4 minutes later, we wouldn't have been landing at
5 MacDill Air Base. We probably would have been
6 trying to find something up around Atlanta,
7 Georgia, if we'd have had the gas to get there.

8 So those are just kind of typical
9 things that you just learn to deal with. It's
10 part and parcel to the job.

11 Q. General Jefferson, can you briefly
12 describe whether you've been involved in emergency
13 events that involved stress --

14 GEN. JEFFERSON: Yes. I'll be very
15 short, but there are a couple that I think are
16 pertinent here. One was flying the T-33, which is
17 a single engine trainer, as we mentioned two days
18 ago, I guess. It has ejection seats in it, a
19 two-person plane.

20 Taking off from Albuquerque where I was
21 assigned at the time, we had just barely gotten
22 airborne. We were going to the west, and we were
23 beginning a turn over Old Town Albuquerque when
24 the fire light came on. A fire light's a red
25 light that's on the dash -- on the control panel.

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1 In that plane, there was a big gas tank
2 right behind the second pilot, and that light was
3 in that -- on a sensor for that area. If you had
4 a fire there, you were in imminent danger of
5 exploding because that's where it was, and that
6 had happened a number of times. People had been
7 killed with that. So the instructions or the
8 general guidance was if you see that light, you
9 bail out immediately because you're just about to
10 be destroyed.

11 We were over town. We decided -- we
12 looked back to see if we were trailing any smoke,
13 which would be an indication of fire. We didn't
14 see any, so we kept on going and said, We'll get
15 out to the north and take another look, and we did
16 that. We decided that we didn't really have a
17 fire. We didn't know that for sure, but we were
18 very tense.

19 We had to drop the tip tanks, fuel
20 tanks on the wings, because we would be too heavy
21 to land coming back. So we had to clear the area,
22 look out north of town and make sure there was
23 nothing below us. We dropped the tanks and then
24 came back around and landed and shut down the
25 engine on the runway and got out of the airplane.

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1 Well, it turned out it was a false
2 alarm, but the stress was there. We were doing
3 everything we could to make sure we were going to
4 be okay, but the stress was very high because
5 that's -- you know, that's a very dangerous
6 situation.

7 Q. And you took into account the location
8 of a populated area in that situation?

9 GEN. JEFFERSON: Yes, we did.

10 The second one -- let me just briefly
11 say I was also in combat in Vietnam. I was flying
12 the C-123 which is a twin engine old cargo --
13 light cargo airplane. The vintage of it might
14 be -- we could fly around with the windows open.
15 We did that to keep cool because Vietnam was hot.

16 We -- the mission -- the unit that I
17 was assigned to was the defoliation mission, and
18 our job was to defoliate the roads and trails and
19 canals where our troops would be in order to keep
20 them from being ambushed. So we did that. And we
21 had to go down to low levels -- it was essentially
22 crop dusting -- go down to 200 feet or so off the
23 ground and spray.

24 Very often we were in the areas where
25 enemy troops were, and you'd take a lot of shots,

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1 hits, because you were so low they could -- in
2 fact, one plane came back with a crossbow arrow in
3 it. But you got hit with just about everything.
4 And you knew that going down, so your stress level
5 was very high.

6 At the same time you were flying in
7 formation. There were usually a couple other
8 airplanes out there. You had to maintain
9 formation. You had to do all the other things
10 that we were doing. The stress level is just
11 something that you had to put up with and get your
12 job done. You couldn't panic. That would be the
13 worst possible thing to do. So that's the way you
14 handled it. You just did it like that.

15 And I think that's the same sort of
16 thing that would be pertinent to going through the
17 steps before you got ready to do the final step of
18 an ejection. You'd go through -- you'd just set
19 that stress -- you know it's there. It helps you,
20 actually. But you set aside concerns for personal
21 safety and handle the airplane.

22 Q. General Cole, you've discussed, I think
23 at various points, the training that pilots
24 undergo for stress and other things. Is there
25 anything you want to add in terms of the things

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1 that pilots undergo for dealing with stress
2 generally, or do you think you've given it a good
3 summary overall?

4 GEN. COLE: I can give you one short
5 example, if I may, showing how you train to deal
6 with stress.

7 In combat crew training, called the
8 schoolhouse, you have instructors that are
9 training pilots that are new to the airplane.

10 When the lieutenant came back from
11 Vietnam, was a brand-new captain and the youngest
12 instructor in the squadron and an assistant flying
13 safety officer of the squadron, an alarming trend
14 started to emerge. They were having significant,
15 in the first operations wing, crew coordination
16 issues where you've got instructors with people
17 very new to the airplane as far as reaching for
18 the wrong switches. We had a couple of rides over
19 the river and through the woods departing the
20 runway. And I was asked to make that my number
21 one priority and devise a course called IOC,
22 instructor orientation course.

23 And I really -- it was a great
24 opportunity. I sat down with one of the most
25 brilliant men I've ever worked with, Bob Layton,

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1 and we sat down and looked at the cockpit
2 environment and where the stresses are in
3 simulated emergency procedures and landings,
4 crosswinds, and then set up a five-day course to
5 train instructor pilots on how to deal with the
6 stress and anxiety of new students and their own
7 stress and anxiety and when to take the airplane
8 when they started taking you off the runway, how
9 to simulate, safely, emergency procedures. For
10 example, in a reciprocating engine like General
11 Jefferson and I have flown, simulated engine laws,
12 throttle, idle, propeller, feather, mixture
13 control off.

14 And we immediately had a spiritual
15 experience with all the instructor pilots that
16 said, Point first to the students before you even
17 touch anything, because some of the students would
18 get nervous and would reach up and literally
19 feather the propeller for you when you didn't want
20 that to happen. We'd just simulate the emergency
21 procedure.

22 And there was stress on both sides, but
23 we managed to sort that out into a pretty good
24 instruction program where the incident indicators
25 started going down. The confidence of the

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1 instructors grew, and the anxiety of the students
2 decreased. And the air force got a lot of
3 dividends from that five-day course that was
4 taught probably for about three years, long after
5 I left there. And it's very hard to prove the
6 accident that didn't happen, but that's just a
7 small example of how you train to deal with stress
8 and duress in the cockpit.

9 MR. GAUKLER: I'd like to have marked
10 as Exhibit QQQ . . .

11 (APPLICANT EXHIBIT-QQQ WAS MARKED.)

12 Q. (By Mr. Gaukler) General Cole, can you
13 describe what's been marked as Exhibit --

14 JUDGE FARRAR: Wait, Mr. --
15 Mr. Gaukler. Mr. Soper wanted to ask something.

16 MR. SOPER: Thank you, your Honor.

17 We are in the phase of redirect, and
18 I've tried to be patient with the history of all
19 the uncertainties we've seen in air travel. But
20 these matters I don't believe were covered on
21 cross-examination, and I don't think they're
22 within the scope of redirect, and particularly
23 what we're about to address now if it relates to
24 the mishap reports. That were not introduced,
25 they were not mentioned. They were just not

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1 inquired about. And I would suggest they're not
2 within the scope of redirect.

3 MR. GAUKLER: Your Honor, I would take
4 issue with that. First of all, the whole issue of
5 stress was raised by Mr. Soper in his
6 cross-examination. And I've gone through and
7 layed the groundwork to show how stress is
8 incorporated into training, et cetera. I'm about
9 to get into the issue of how they evaluate or to
10 take stress into account in developing their R
11 factors.

12 This pertains to that issue which
13 Mr. Soper discussed extensively in his
14 cross-examination, suggesting that these people
15 were, first of all, not qualified because they had
16 not undergone similar stresses themselves, and
17 then, secondly, suggesting that pilots in an
18 emergency situation, because of the stress, would
19 not take actions to avoid a site on the ground.
20 And this exhibit goes precisely to that question.

21 JUDGE FARRAR: Mr. Soper, were you
22 talking about the testimony we just heard or
23 Exhibit QQQ about which the applicant would like
24 us to hear?

25 MR. SOPER: Most specifically about

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1 QQQ, your Honor. As far as I know, if these
2 excerpts from accident reports are in evidence,
3 then they are. There's direct testimony on this
4 as to -- which I didn't refer to, and I object to
5 edited portions of accident reports being produced
6 in a document. Now, it hasn't been offered yet.
7 I understand that. But it seems to me that that's
8 what the examination is about to be.

9 And we haven't been proceeding -- I'm
10 accustomed to proceeding by question and answer,
11 not by narrative, and since we've been going by a
12 narrative and there's no opportunity to object, I
13 take this opportunity to do so.

14 JUDGE FARRAR: All right. Let's hold
15 that -- let's move forward just a little with the
16 preliminary discussion of this exhibit, and then
17 we'll take up your objection, Mr. Soper. So let's
18 have the record develop what this is, and then
19 we'll address your objection.

20 Go ahead, Mr. Gaukler.

21 'Q. (By Mr. Gaukler) General Cole, could
22 you please describe what's been marked as Exhibit
23 QQQ?

24 JUDGE FARRAR: And when he says
25 describe it, tell us what it is. Don't go into

1 discussing its content with us.

2 GEN. COLE: Yes, sir.

3 The title is Air Force Instruction
4 51-503, which is the air force instruction for
5 accident investigation boards, how to put them
6 together and how to do accident investigations.
7 And that has already been introduced into
8 evidence.

9 After the brief synopsis of that
10 comparing to the Safety Investigation Board, which
11 is the privileged investigation that is not
12 released, we basically, from the accident
13 investigation reports which we have had and, you
14 know, introduced, ten years' worth, have
15 documented examples of pilot avoidance in the F-16
16 accident investigation reports that we reviewed.

17 JUDGE FARRAR: Tell me where this --
18 you referred to something having already been
19 introduced.

20 MR. GAUKLER: It was not introduced
21 into evidence. The accident reports themselves
22 were not introduced into evidence. But these
23 accident reports, the great majority of them,
24 comprise the accident reports on which the Tab H
25 of the report was based in terms of evaluating a

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1 pilot's ability -- or evaluating whether a pilot
2 would be in control of the site. The State is
3 well aware --

4 JUDGE FARRAR: Let me find Tab H.
5 That's in the original or the supplemental --

6 MR. GAUKLER: It's in the original.

7 JUDGE LAM: Were these reports in Tab
8 H? Were there in there literally?

9 MR. GAUKLER: They're -- you mean --
10 the Tab H specifically covers accident
11 investigation reports from 1989 through 1998.
12 And, specifically, we evaluate there -- PFS
13 evaluates there the extent to which a pilot would
14 be in control of the plane.

15 These are accident reports that we
16 provided to the State a long time ago. Their
17 expert looked at them. He refers to them in his
18 testimony in terms of taking issue with them.

19 We also had a reference in Tab H to
20 what generally the accident report shows on the
21 pilots -- whether the pilots who were in control
22 of the plane would avoid the site. That's
23 summarized in a footnote but not developed at
24 length.

25 JUDGE FARRAR: Who wrote Tab H?

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1 MR. GAUKLER: It was prepared by our
2 experts here. And this just --

3 JUDGE FARRAR: Well, wait. Let's not
4 argue yet. I'm just trying to find the facts of
5 what we're dealing with. So talk about --

6 MR. GAUKLER: Let me just repeat the
7 facts, then, if I could.

8 JUDGE FARRAR: Well, let me see if I
9 understand where we are. Tab H was prepared by
10 these gentlemen based on some accident reports.
11 Your Exhibit QQQ for identification was written by
12 whom?

13 MR. GAUKLER: The three gentlemen up
14 there.

15 JUDGE FARRAR: And based on some of the
16 accident reports which you had previously looked
17 at to write Tab H?

18 MR. SILBERG: Yes, sir.

19 MR. GAUKLER: And then I'd just say
20 there are some others --

21 JUDGE FARRAR: Mr. Soper, still hold.
22 Mr. Gaukler, go ahead and put some more
23 background --

24 MR. GAUKLER: It's just background
25 facts. Okay. That's the majority of the

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1 descriptions on QQQ.

2 In addition, we, PFS, received some
3 additional accident reports from April 1999 to
4 2000 which were also provided to the State during
5 discovery. We never evaluated them formally, but
6 I think there's some examples in there from those
7 additional accident reports that we have provided
8 to the State during discovery.

9 And then just in terms of developing
10 information in general to -- in response to this,
11 you know, being raised by the State, that pilots
12 will not take action to avoid a site on the
13 ground, which was covered in cross-examination,
14 General Cole has gathered other -- I'm sorry.
15 General Cole gathered some other examples which
16 are at the end of this.

17 JUDGE FARRAR: Okay. As I take the
18 State's objection, it's not that they're unaware
19 of this or weren't provided it, it's that you
20 introduced some direct testimony, the State
21 cross-examined and you can't expand on your direct
22 testimony unless it was the subject of
23 cross-examination. Now, Mr. Gaukler's point,
24 Mr. Soper, is that you did get into the issue of
25 the legitimacy of the panel's assertion that

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1 pilots could -- could and/or would take avoidance
2 action. Mr. Gaukler says this proposed exhibit
3 deals with that. So how do you respond to that?

4 MR. SOPER: Thank you, your Honor.

5 A couple of things. Number one,
6 there's aircraft accidents referred to outside the
7 scope of the ten-year period that they referred to
8 in their direct testimony, '99 and the year 2000,
9 so there's -- as far as I know, there's no
10 reference in the direct testimony to that. And
11 then the pages 6 and 7 are quotes from -- they're
12 just paragraphs with quotes under the title
13 "Historical Examples of Pilot Avoidance," with no
14 indication of where these quotes were lifted from,
15 nothing. They're just narratives and then a quote
16 or -- and I would object to those being reduced to
17 a document and offered as evidence.

18 And, lastly, I would say that the
19 direct testimony makes the reference to anecdotal
20 experience of able to avoid, and I did not pursue
21 any of the anecdotal situations. They are in the
22 direct testimony, and I think that they ought not
23 to be elaborated on. They were not mentioned in
24 my cross.

25 MR. GAUKLER: If I could respond to a

1 couple points, your Honor, first of all, in terms
2 of where the quotes came from, that will be
3 explained in the testimony of General Cole.

4 And -- and, secondly, your Honor, we're
5 entitled to address topics that were raised in
6 cross. And, quite clearly, Mr. Soper asked our
7 witnesses whether they had ever talked to anybody
8 that had ejected from a plane, and some of those
9 quotes down there come from people that ejected
10 from a plane or from people that saw people eject
11 from a plane. So they're directly responsive to a
12 topic that was covered in his cross-examination.

13 MR. SOPER: They certainly weren't
14 mentioned in response to my question when I asked
15 him.

16 JUDGE FARRAR: Mr. Turk, or -- you've
17 had -- you're two for two so far on bright ideas
18 today. Do you or Ms. Marco want to add your
19 thoughts on this?

20 MS. MARCO: I'm trying to find an
21 exhibit I think the State had offered but did not
22 enter into evidence, I think it was 153, which was
23 along the same lines of what we're seeing here.

24 If this sort of -- if this was a matter
25 that was went into during the scope of the

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1 cross-examination, it seems that this sort of
2 testimony would then be appropriate on direct --
3 redirect.

4 MR. SILBERG: Excuse me. Are you
5 referring to the article on the Bosnia pilot being
6 shot down?

7 MS. MARCO: Yes, I am.

8 JUDGE FARRAR: Article on what?

9 MR. BARNETT: I think it was an F-117.

10 MS. MARCO: Yes. It was State's
11 Exhibit 153. This is the title, "Rescue Pilot
12 Details Evasion."

13 JUDGE FARRAR: Yeah, I've got it.

14 MS. MARCO: Okay.

15 JUDGE FARRAR: Hold on a minute.

16 MR. SOPER: I think Ms. Marco correctly
17 assessed the fact that I did not offer that.

18 MR. SILBERG: But there were questions
19 addressed to it, certainly.

20 MR. GAUKLER: We talked also about the
21 guy landing on the golf course. And one thing
22 I've done here, your Honor -- crashing. One thing
23 I've done here -- you know, one of the things we
24 discussed was the fact we introduce a document and
25 have all this extraneous stuff. So this pulls out

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1 the stuff that we believe to be relevant.

2 These are documents that the State has
3 had in discovery. They can double-check to see
4 whether or not we've correctly described what
5 we've set forth there. So, I mean, it's -- we're
6 trying to make -- put in the essence in evidence
7 without overburdening the record with the whole --
8 with a large number of accident reports from which
9 we could discuss separate. And we could put all
10 the accident reports in if that's --

11 MR. SOPER: I would prefer that because
12 a lot of them will show that they've concluded
13 that these were not Skull Valley type accidents.
14 They specifically stated that. Yet they're using
15 them here to demonstrate just the opposite.

16 JUDGE FARRAR: Mr. Soper, you just said
17 you'd prefer the full accident reports go in as
18 opposed to these excerpts?

19 MR. SOPER: Yes, yes, your Honor.

20 JUDGE FARRAR: Or you would have -- if
21 we let the excerpts in, you would have the right
22 on recross to put those in yourself.

23 MR. SILBERG: Only to the extent that
24 the questions raised those issues on redirect.

25 MR. SOPER: Well, I --

1 MR. SILBERG: If we put a document in
2 to address one fact, which is what we're doing
3 here, Mr. Soper wants us to put in a document
4 which addresses many facts, that should not open
5 up the scope of recross-examination. That would
6 go well beyond --

7 MR. GAUKLER: I have a suggestion to
8 make --

9 JUDGE FARRAR: Number one, the
10 court reporter reminds us that we can't all talk
11 at once, although we like doing things that way.
12 Second, I think we understand the issue.

13 Mr. Gaukler, you said you had one more
14 suggestion.

15 MR. GAUKLER: One thing we've done
16 somewhat with documents that were discussed by
17 Mr. Soper yesterday in cross-examination, we
18 didn't introduce the document into evidence, but
19 it was identified as marked so people could look
20 at and take -- evaluate what was discussed in the
21 context of the document. So one option might be
22 something in between. Instead of not putting the
23 documents in at all or putting them in as
24 evidence, just have them identified as marked --

25 JUDGE FARRAR: Okay. I --

1 MR. GAUKLER: -- and -- but not be
2 admitted. And, therefore, they will provide the
3 context in a similar way like some of the
4 documents that we discussed yesterday in
5 cross-examination without actually admitting them
6 into evidence. They would just remain documents
7 that were identified and marked for the record.

8 JUDGE FARRAR: Okay. Thank you.

9 I've heard from all of you, and now
10 I'll hear from the two people who really matter.

11 (The Board confers off the record.)

12 JUDGE FARRAR: The State had a couple
13 of objections here. One was that these references
14 to pilot behavior are outside the scope of the
15 ten-year period upon which the company's
16 consultants relied to construct an accident rate.
17 But we don't believe that the question of pilot
18 behavior, which is an issue in this case, need be
19 related to the period that they're using for the
20 accident rate. That period for the accident rate
21 may or may not be a good period, and that's an
22 issue in the case. But the question of pilot
23 avoidance of ground features behavior we don't
24 think is a time limited -- time limited concept.

25 So we'll deny or overrule that portion

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1 of the objection.

2 The objection that this is not within
3 the precise scope of the cross, without getting to
4 whether it is, our view is if somebody raises
5 something on cross and says, I -- uncovers five --
6 has five supporting anecdotes or documents, the
7 redirect need not be limited to those five points
8 that were used on cross. It has to be limited to
9 the concept that was raised on cross, and we think
10 this is within that.

11 The third point of the objection is
12 that these are kind of random, limited quotes that
13 may not give the full picture. That may be valid,
14 but that's something that we think should be
15 explored on redirect and on recross. And we would
16 not make -- not allow the document to be admitted
17 into evidence until that happens.

18 So in terms of moving forward now with
19 a document that's been identified but not
20 admitted, we'll allow the Applicant to go forward.

21 Mr. Soper, your objection to its later
22 admission is preserved pending the nature of
23 the -- Mr. Gaukler's and your questions of the
24 panel about what he's -- the quotes represent. So
25 largely the objection is overruled, but some of

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1 it's preserved.

2 MR. SOPER: Thank you, your Honor.

3 JUDGE FARRAR: Speaking of that, and
4 moving forward, it's now 20 to 1:00. It's
5 probably a good time before we start on this
6 document, which I sense may take a little time --
7 it may take more time arguing about it than it
8 takes the witnesses to explain it, but that's how
9 we do business up here. Let's take a lunch break.

10 Before we do that, how do we stand on
11 the gentleman who's going to call in at -- we're
12 going to call at three o'clock?

13 MR. GAUKLER: Is this on the record?

14 JUDGE FARRAR: Yes.

15 COL. FLY: Your Honor, I last spoke
16 with him yesterday evening I will say at
17 approximately 9:00. I'm not sure it was -- it was
18 30, 45 minutes after we adjourned yesterday,
19 whatever time that would have been. He had -- the
20 way it was left was he would try to be available
21 at 3:00 our time for a telephone call, and he
22 asked me to get back to him. I have attempted to
23 establish contact with him twice today, and I've
24 been unsuccessful so far. And hopefully there
25 will be a message on my cell phone when I take a

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1 break.

2 JUDGE FARRAR: Keep trying.

3 Now, tell me again precisely who he is.

4 COL. FLY: Your Honor, he is the pilot
5 who --

6 JUDGE FARRAR: His name.

7 COL. FLY: It's pronounced -- let me
8 look, your Honor. I'll never get the spelling
9 right.

10 Colonel Horstman, do you know the
11 correct spelling?

12 Otherwise, I'll go to Colonel
13 Horstman's testimony and bring it out.

14 JUDGE FARRAR: Well, that was going to
15 be my next question. Before 3:00 I want all of us
16 on the same page. Who is he, why was he
17 mentioned, and why are we talking about him?

18 Colonel Horstman, can you help on this?

19 COL. HORSTMAN: Yes. He's the
20 operations group commander in the 388th Fighter
21 Wing.

22 JUDGE FARRAR: What's his name?

23 COL. HORSTMAN: Colonel Coots.

24 JUDGE FARRAR: K-o-u-t-s?

25 COL. HORSTMAN: It's misspelled in

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1 ours.

2 JUDGE FARRAR: Okay. And he's
3 mentioned where in your testimony?

4 MS. NAKAHARA: I believe it's page 18.

5 COL. FLY: There's a footnote on page
6 18.

7 MR. SILBERG: It's the same place where
8 all four pilots are mentioned, I believe.

9 JUDGE FARRAR: Okay. My page 18 --
10 give me a -- give me a --

11 MS. NAKAHARA: I'm sorry. Colonel
12 Horstman --

13 JUDGE FARRAR: Right, but that's what
14 I'm looking at, and I don't --

15 MR. SILBERG: Footnote 2 at Answer 46.

16 JUDGE FARRAR: Why are the page numbers
17 different?

18 MR. SILBERG: Because of printing from
19 e-mails, probably.

20 JUDGE FARRAR: I knew that.

21 MR. SILBERG: The NRC uses high tech --

22 JUDGE FARRAR: Yeah. I thought we had
23 substituted the hard copy before we came out, but
24 apparently we had not.

25 Give me the question number again.

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1 MR. SILBERG: A 46.

2 JUDGE FARRAR: Okay. For those who
3 have the e-mail version, it's page 20. Okay.

4 MR. TURK: This is Colonel Couter,
5 C-o-u-t-e-r?

6 MS. NAKAHARA: We spelled it wrong.

7 JUDGE FARRAR: Okay. I had found that
8 footnote before, and the reason I'm asking this
9 question is to make sure we're on the same page.
10 I thought somebody this morning had said we're
11 going to talk to him so he can recapture his
12 reputation, but I didn't see anything in this
13 footnote that demeaned his reputation.

14 So help me, Colonel Fly, on why we're
15 talking to him. Or I thought we were talking to
16 him because here's a pilot who ejected --

17 COL. FLY: He is one of those four
18 specific pilots, your Honor.

19 JUDGE FARRAR: Okay. And because of
20 that, we're happy to talk to him, but there was a
21 further comment that something -- that there was
22 something wrong about characterizing him, and I
23 don't see any characterization here.

24 MR. SOPER: That was a different pilot,
25 I think.

1 JUDGE LAM: Major Smith. That was
2 Major Smith.

3 COL. FLY: Your Honor, if I could -- he
4 was -- he also took exception to the way his
5 conversation was characterized.

6 JUDGE FARRAR: But it's not
7 characterized.

8 MR. TURK: It's in the text.

9 COL. FLY: Yes, your Honor. If you
10 look at the last sentence in the Answer 46, all
11 four pilots stated or said that -- I don't have it
12 in front of me.

13 JUDGE FARRAR: Okay. It was riveted on
14 their survival. So it's not he objects to being
15 characterized that way, not -- well, I guess that
16 would --

17 COL. FLY: Well, your Honor, I think
18 you need to read the rest of the sentence. That's
19 what he objected to.

20 JUDGE FARRAR: Okay. I just wanted to
21 make sure before we got him on the phone we knew
22 why he was on and what we were dealing with so
23 this little drill we went through we didn't do
24 while he was on the phone.

25 Okay. Do you all have sandwiches

1 on-site or food on-site?

2 MR. SILBERG: Yes, sir.

3 JUDGE FARRAR: Okay. Then let's come
4 back at -- it's now 10 of. Let's come back at
5 1:30.

6 (Lunch recess was taken.)

7 JUDGE FARRAR: We are back on the
8 record for the afternoon session. We are a little
9 late because we were trying out the phone here,
10 which I have been assured it works but we haven't
11 figured it out yet. But we will have somebody
12 down. Do we know about the telephone witness?

13 COL. FLY: Your Honor, Colonel Coots
14 said he would be available at 3:00. He is not
15 sure exactly where he will be, though. So he
16 asked that we call his cell phone, he will give us
17 a number, and then we can call him back on a land
18 line.

19 JUDGE FARRAR: Fine.

20 MR. GAUKLER: I had some --

21 JUDGE FARRAR: Wait. I'm not to the
22 witnesses yet.

23 MR. GAUKLER: I'm not, either. I have
24 some administrative stuff. Colonel --

25 COL. FLY: Coots.

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1 MR. GAUKLER: Colonel Fly also talked
2 with Colonel Coots about the Moser Recovery and he
3 has some information that he can tell us about the
4 Moser Recovery, also. And we can have Colonel Fly
5 testify to that prior to the call, or however you
6 want to deal with that.

7 MR. SOPER: I beg your pardon, your
8 Honor. I was writing.

9 JUDGE FARRAR: I'll have it repeated
10 because I'm not sure if you will like this or not.

11 MR. GAUKLER: Colonel Fly also talked
12 with Colonel Coots with respect to use of the
13 Moser Recovery, and he has information to provide
14 on the use of the Moser Recovery which he talked
15 to Colonel Fly about and which Colonel Fly would
16 testify to. So I'm going to put that testimony on
17 now before the call.

18 MR. SOPER: I'm sorry, Mr. Gaukler. I
19 still didn't understand. You are going to put
20 what testimony on now?

21 MR. GAUKLER: Colonel Fly talked to
22 Colonel Coots about the use of the Moser Recovery
23 Route. One of the issues raised by the Board
24 yesterday was the estimate that we had used the
25 five percent for the Moser Recovery Route. And

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1 since he is the operations commander --

2 COL. FLY: Operations group commander.

3 MR. GAUKLER: Operations group
4 commander at Hill with respect to that issue,
5 Colonel Fly has some information with respect to
6 that issue.

7 JUDGE FARRAR: Somehow I thought this
8 guy was in California.

9 COL. FLY: He is TDY, temporary duty,
10 in California.

11 JUDGE FARRAR: But he is --

12 COL. FLY: He is stationed at Hill Air
13 Force Base where he is the 388 Fighter Wing
14 operations group commander.

15 JUDGE FARRAR: Okay. Mr. Soper, do you
16 have any problem with that?

17 MR. SOPER: Well, it seems reasonable
18 to me if we are going to have the person available
19 at 3:00 we ought not to try to re-characterize his
20 testimony at this point. Why would we want to do
21 that?

22 MR. GAUKLER: We can ask him directly.
23 I have no problem with that. I just thought --
24 whatever is the desire of the Board and the
25 parties makes no difference to me.

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1 JUDGE FARRAR: And since it is kind of
2 late-breaking material, we will defer to Mr.
3 Soper. If he wants us just not to have Colonel
4 Fly say what this fellow is about to say but let's
5 get it from him directly, that would be fine with
6 us.

7 MR. GAUKLER: That would be fine with
8 me.

9 MR. TURK: May I ask a question about
10 the procedure that will follow this afternoon with
11 the telephone call? Do you envision swearing him
12 in as a witness and then allowing questioning by
13 all parties and the Board?

14 JUDGE FARRAR: Whose witness is he?
15 I'd make him the Board's witness but I think that
16 went out a few years ago. So I'd rather not --

17 MR. GAUKLER: We will submit him as a
18 witness.

19 JUDGE FARRAR: You will?

20 MR. GAUKLER: Yes.

21 JUDGE FARRAR: It will be the
22 Applicant's witness. What I'd like is each set of
23 counsel to decide who is the lead counsel because
24 we will enforce, for the benefit of the witness,
25 the "no tag team" rule, since it's going to be

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1 hard enough to identify voices. So each of you
2 pick one person.

3 MR. SOPER: Your Honor, it seems to me
4 that we mentioned the Coots -- I want to say his
5 name right, if that's right. We are the one that
6 mentioned Coots. It ought to be a State witness,
7 I would think.

8 JUDGE FARRAR: All right. I sense that
9 Mr. Gaukler volunteered that it be an Applicant
10 witness only because no one else spoke up. And so
11 even though you are a moment late, we will give
12 you your preference, Mr. Soper.

13 MR. TURK: May I speak to the issue?

14 JUDGE FARRAR: Certainly. You're three
15 for three.

16 MR. TURK: The difference, I would
17 think, as to who calls him as a witness would be
18 what is the scope of the direct? If Mr. Soper
19 calls him as a witness he may not want to raise
20 the issue of Moser Recovery, in which case it
21 wouldn't be part of the direct.

22 In my own mind, I would think that -
23 personally I don't care who brings him - but I
24 think the testimony should not be limited. And as
25 long as there's an agreement between counsel that

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1 we won't strictly follow the rules of limiting the
2 scope of cross to the direct, I wouldn't have a
3 problem. On the other hand, if we are going to
4 follow that rule, then I would think the
5 Applicant, as the party that made the effort to
6 contact the witness and to schedule the call,
7 should be the party to put him on.

8 MR. GAUKLER: I would prefer that,
9 given the fact that we did take the initiative in
10 this respect.

11 MR. SOPER: I'm sorry.

12 JUDGE FARRAR: Mr. Soper, so as long as
13 your examination of him is not limited by the
14 Applicant's examination, and that you would be, in
15 effect, crossing with no limit on the scope, that
16 should take care of your needs.

17 MR. SOPER: That would be acceptable.
18 I have a feeling that if the Board has a question,
19 like they have, they would ask it, as well. And I
20 think that that is just the way to proceed. I
21 think that's good.

22 JUDGE FARRAR: You haven't known us
23 long, but you know how we --

24 MR. SOPER: I certainly have gotten the
25 picture, your Honor, and I admire your quest for

1 the truth.

2 JUDGE FARRAR: Another point, I'm now
3 even -- go ahead, Mr. Gaukler.

4 MR. GAUKLER: I missed the last
5 exchange. I apologize. I was getting information
6 from my witness about Colonel Coots.

7 JUDGE FARRAR: Mr. Soper was just
8 editorializing about the Board's proclivities.

9 MR. GAUKLER: I thought the Board was
10 going to make him the witness and ask him
11 questions. So I hadn't really thought about whose
12 witness he was.

13 JUDGE FARRAR: Mr. Gaukler knew some of
14 the Board members a long time ago and is no longer
15 surprised by anything we do.

16 MR. GAUKLER: I would make this one
17 point in term of substance on Colonel Coots. He
18 says that he feels he is in a position to talk
19 about the frequency of the use of the Moser
20 Recovery. He is not in position to talk about the
21 precise route that would be used in the Moser
22 Recovery, if I captured what you told me
23 correctly.

24 COL. FLY: Yes.

25 JUDGE FARRAR: What I will try to do

1 is, as best I can, introduce ourselves to him,
2 tell him why we are talking to him, and tell him
3 our ground rules are that when he doesn't know
4 something, or we get into an area that he is not
5 comfortable talking about, we far prefer that he
6 say, "I really don't know anything about that."
7 That he won't insult anybody by not responding to
8 something he is not knowledgeable on.

9 Okay. I'm getting almost -- I'm about
10 as nervous as I was Monday night about ever
11 finishing. We are going long tonight. I mean, we
12 are behind. No one's fault, but we are behind
13 where we hoped to be. This is Thursday, I
14 understand in Salt Lake City you don't meet on
15 Sundays, and we are going to do our best to finish
16 by Saturday night because this is the kind of
17 issue that ought to be wrapped up.

18 Now, I say that. It's obvious this is
19 a significant issue and I don't want anyone to
20 waste time but I'm not telling anybody to hurry
21 because this issue, an issue of this nature on a
22 case of this nature, we want everything in there.
23 But just keep in mind that we need to make
24 progress. But let's plan on going long. And
25 remember when you are passing out exhibits, we are

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1 asking for seven, not six, not leaving Michelle
2 out.

3 MR. GAUKLER: Several administrative
4 matters.

5 JUDGE FARRAR: Yes.

6 MR. GAUKLER: First of all, with
7 Exhibit 156A, we have looked at that. We would
8 like to have the cross-hatching go all the way to
9 the left, the shaded area. Outside that, we have
10 no problem. If the State does that, we would
11 agree to its admission.

12 JUDGE FARRAR: You mean the blacked-in
13 area between 3000 and 4000?

14 MR. GAUKLER: Yes. That's what I'm
15 referring to, your Honor.

16 JUDGE FARRAR: We had pretty much
17 talked about that yesterday, so let's do that.
18 Can you all do one more substitution by tomorrow?

19 MR. SOPER: I think we can do that,
20 your Honor. This will be 156B.

21 MR. GAUKLER: We have every variation
22 possible.

23 JUDGE FARRAR: Again, we understand.
24 But somebody some day is going to pick this up and
25 say, "Ah-ha, this is the exhibit," and they may

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1 get confused.

2 MR. SOPER: All right.

3 JUDGE FARRAR: Mr. Gaukler, before
4 lunch you were about to --

5 MR. GAUKLER: I would like to have a
6 couple other quick administrative things. I
7 forgot to request the admission of PFS Exhibit
8 MMM, which the first page was the cartoon showing
9 of the F-16 and then the cockpit of the F-16. I
10 would move for the admission of that.

11 JUDGE FARRAR: MMM. Any objection?

12 MS. MARCO: No.

13 MR. SOPER: No objection, your Honor.

14 MR. GAUKLER: Then I would move --

15 JUDGE FARRAR: Staff gets a turn, Mr.

16 Gaukler.

17 MS. MARCO: No. No objection.

18 JUDGE FARRAR: Then MMM will be
19 admitted.

20 (APPLICANT'S EXHIBIT-MMM WAS ADMITTED.)

21 MR. GAUKLER: Next I'd like to move for
22 the admission of NNN, which were some examples of
23 the symbology on the heads-up display.

24 JUDGE FARRAR: Any objection, Mr.

25 Soper?

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1 MR. SOPER: No objection, your Honor.

2 MS. MARCO: No objection.

3 JUDGE FARRAR: NNN will be admitted.

4 (APPLICANT'S EXHIBIT-NNN WAS ADMITTED.)

5 MR. GAUKLER: Next I'd like to move for
6 the admission of PFS Exhibit OOO, which was a
7 page from the Dash 1, and particularly referred to
8 the Emergency Par Unit Operation.

9 JUDGE FARRAR: Any objection, Mr.
10 Soper?

11 MR. SOPER: No objection.

12 JUDGE FARRAR: Staff?

13 MS. MARCO: No objection.

14 JUDGE FARRAR: OOO will be admitted

15 (APPLICANT'S EXHIBIT-OOO WAS ADMITTED.)

16 MR. GAUKLER: Then we'd like to move
17 for the admission of Exhibit PPP, which were two
18 pages from the Dash 1.

19 MR. SOPER: No objection.

20 MS. MARCO: No objection.

21 JUDGE FARRAR: PPP will be admitted.

22 (APPLICANT'S EXHIBIT-PPP WAS ADMITTED.)

23 Q. (By Mr. Gaukler) Going back to where
24 we were prior to lunch, Colonel Fly, one of the
25 questions that was asked in cross-examination was

1 the extent to which you evaluated the effect of
2 stress that a pilot might experience prior to
3 ejection in determining one of the factors going
4 into the R factor, which was the ability of a
5 pilot who was in control of a plane to avoid the
6 site, a site on the ground. And we have already
7 discussed various of those factors that went into
8 the judgment. Is there anything else that you
9 rely upon in addition to the discussion we had
10 this morning?

11 COL. FLY: Yes. The accident reports
12 themselves. Here are real people in real
13 situations experiencing real stress. And here's
14 an Air Force record of what happened and what they
15 did. So we felt that that was a very
16 representative database with which to work of what
17 pilots do and how they react under stress and in
18 an emergency situation.

19 Q. In addition, there was questioning of
20 the bases for the use of the 95-percent factor
21 with respect to your determination of whether a
22 pilot who was in control of the plane would, in
23 fact, avoid the site. We have already talked
24 about various issues related to that. In addition
25 to what we talked about this morning, is there

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1 anything else you rely upon in addition to what we
2 talked about this morning?

3 COL. FLY: Yes. I would again refer
4 back to the accident reports. As I mentioned
5 earlier today, they are required to report the
6 damage done to the ground. If something is hit,
7 we relied on them to tell us the cases where the
8 pilot was in control. And it specifically calls
9 out, I believe there's about 15 or so circum-
10 stances where it describes the maneuvers or the
11 things the pilot did in order to minimize the
12 probability of damage to somebody or something on
13 the ground.

14 Q. General Cole or General Jefferson, do
15 you have anything to add with respect to what
16 Colonel Fly just described in terms of the
17 reliance on the accident reports?

18 GEN. COLE: I do, thank you. This is
19 the Air Force's official record of investigating
20 the event; what happened, why did it happen, and
21 how it happened. An Accident Investigation Board
22 is chaired by a full Colonel with experience in
23 that particular aircraft or that particular
24 command. It's a board that is composed of subject
25 matter experts, pilots, maintenance, freighters,

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1 depending on the nature of the accident and the
2 airplane. And they focus intensely on the events
3 and put together a report for the record of what
4 happened with an opinion regarding cause.

5 Q. General Cole, would you please describe
6 how PFS Exhibit QQQ was prepared and what it
7 contains?

8 GEN. COLE: Yes. I would flag again
9 the Air Force instruction 51-503, which is in the
10 Contention K book. That's the Air Force --

11 Q. I don't believe it is in the book. It
12 is referenced in the Contention K book.

13 GEN. COLE: I'm sorry. All right. But
14 at any rate, that is the guide on how to do an
15 Accident Investigation Board. Using that as a
16 guide, and based on our collective experience, we
17 examined 126 Accident Investigation Board reports.

18 Q. General Cole, can you lean closer to
19 the microphone?

20 GEN. COLE: We examined 126 Accident
21 Investigation Board reports. And the contents of
22 those reports basically included an executive
23 summary, a summary of the facts regarding the
24 accident, a statement of opinion of the board as
25 far as cause, and various tab references on

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1 everything from weather to maintenance to life
2 support equipment. We were seeking solid
3 documentation of pilots seeing and steering and
4 avoiding populated areas or structures on the
5 ground.

6 I would reiterate Colonel Fly's comment
7 that, according to the Accident Investigation
8 Board requirements, if something is hit on the
9 ground and there is damage or loss of life, that
10 would be included in the Board report. There's no
11 requirement to cite the existence of structures.
12 But if it meets the requirement for damage or loss
13 of life, that is documented. I would also add,
14 sir, that there is no requirement to document
15 pilot attempts to see and avoid. In many
16 instances in these reports, if a pilot was out on
17 the range and there was nothing there to see and
18 avoid, a pilot simply ejected from the aircraft,
19 there's no comment whatsoever.

20 I would also add that in other
21 investigations, for whatever reasons, the pilot
22 may have automatically steered to avoid something,
23 but may not have been captured in the report
24 because he didn't include it in his debrief. They
25 are simply in the "don't know" category.

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1 But at any rate, going through these we
2 found 15 Accident Investigation Board reports that
3 had clear evidence of pilots consciously seeing,
4 steering, and avoiding. And so the document, sir,
5 is basically an intro on the Accident
6 Investigation Board process, comparing the Safety
7 Investigation Board, which is the privileged
8 document, with the Accident Investigation Board
9 product, which is the one that is releasable,
10 which is the one we are dealing with, and then
11 leading into documented examples of pilot
12 avoidance in F-16 Class A mishaps.

13 Subject to your approval, your Honor,
14 we have a total of 15 of those. We thought each
15 of us could selectively address one, just for the
16 benefit of all assembled, and then respond to
17 questions as required.

18 MR. GAUKLER: I assume that process is
19 okay with the Board? The questions that would be
20 inquired would be questions the Board may have or
21 questions Mr. Soper would have on redirect.

22 JUDGE LAM: While the Chairman is
23 deliberating, General Cole may I ask you, you
24 mentioned 15 events clearly document pilot
25 avoidance?

1 GEN. COLE: Yes, your Honor.

2 JUDGE LAM: Out of how many events?

3 GEN. COLE: Out of a total of 126

4 Accident Investigation Board reports. But again,
5 I would underscore, sir, that the absence of a
6 specific comment does not mean the event did not
7 take place.

8 JUDGE LAM: May I ask you, if you only
9 have 15 events clearly documented out of 126
10 events, how did you come up with the 95 percent
11 probability?

12 GEN. COLE: Because, sir, if a pilot
13 did not steer to avoid, if a pilot did not steer
14 to avoid and the aircraft, indeed, impacted a
15 structure on the ground or impacted the ground and
16 injured or killed people, that would be captured
17 in the report. And we went through the numbers
18 again as far as engine failures, roughly half of
19 the aircraft, and if the pilot maintains control
20 he would, indeed, steer to avoid.

21 JUDGE LAM: I see.

22 JUDGE FARRAR: But if I can follow up
23 on Judge Lam's question, of the 111 where there's
24 no indication, we don't know that in some of those
25 the pilot didn't steer to avoid and he got lucky

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1 and the plane didn't hit anything.

2 GEN. COLE: That is correct, your
3 Honor. We don't know specifically.

4 MR. GAUKLER: Could I just ask a
5 clarifying question, your Honor?

6 JUDGE FARRAR: Yes.

7 Q. (By Mr. Gaukler) Where do most of
8 these accidents occur, General Cole, within these
9 accident reports?

10 GEN. COLE: Well, a large number of
11 them appear on the ranges, your Honor, where, in
12 most cases, there is nothing to see, steer, or
13 avoid. So your assessment is accurate. But as
14 far as the pilot getting lucky, very often you
15 keep a constant crosscheck of where you are and
16 where the plane is pointed. And if you don't see
17 anything out there you are worried about when you
18 eject, you can do that.

19 JUDGE FARRAR: I was not thinking about
20 that case where, given the situational awareness,
21 he says, "No big deal here. I'm out. The plane
22 will land. No one will be hurt." In other words,
23 where he makes a conscious decision, "I don't have
24 to do anything because the area is clear ahead of
25 me," as opposed to those where he fails to make a

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1 conscious decision and there are things out there
2 and he just or the plane happens not to hit them.
3 I think those are the other cases that Judge Lam
4 is concerned that we not omit, because it wouldn't
5 take many of those cases out of 15 to eliminate
6 your 95 percent figure.

7 GEN. COLE: Yes, sir. And we can talk
8 to a value judgment on our part as far as why we
9 are confident that number is good.

10 GEN. JEFFERSON: Judge, may I add,
11 please, we also found no case where there was a
12 pilot who had the time to avoid something on the
13 ground that didn't take action if there was
14 something there.

15 JUDGE FARRAR: But I thought on some of
16 them you indicated the record just --

17 GEN. JEFFERSON: On some there's no
18 record and it's an assumption, if they didn't hit
19 something, that it wasn't a factor.

20 JUDGE FARRAR: And I think that's the
21 assumption Judge Lam is concerned about
22 statistically.

23 GEN. JEFFERSON: We have data that
24 would support 100 percent, and we are using 95
25 percent.

1 GEN. COLE: May I make one other
2 observation, your Honor?

3 JUDGE FARRAR: Yes. Sorry. You all
4 sound like Mr. Soper and every time you talk --

5 GEN. COLE: I should have addressed
6 this in the opening comment but the Historical
7 Examples of Pilot Avoidance, I owe you an
8 explanation of where that came from. We were very
9 concerned at even the prospect of Air Force pilots
10 thinking only first of saving their lives and
11 everything else is secondary. And where these
12 came from, the source documents are frankly a
13 stack of e-mails, and there's a lot more than the
14 ones here. I didn't want to bury you with
15 details. But I called an esteemed colleague and
16 dear friend, Walter Boyne, a former director of
17 National Air and Space Museum, and just laid out
18 to him, "Sir, I was presented with this
19 proposition, that pilots don't think about it or
20 do it." And his reaction was, "Well, I certainly
21 don't agree with that." And I said, "Walter, you
22 have written 30 books on aviation. You are one of
23 the greatest guys. Can you give me examples?"
24 And I got more than I asked for. He said, "I'm
25 going to call some friends of mine that have been

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1 in this situation." And some of these go back a
2 long way. And I got a pretty good shower of
3 e-mails, sir. And I just picked a few. That's
4 where that came from.

5 JUDGE FARRAR: If Mr. Soper had called
6 him and asked for a number of examples of pilots
7 that didn't care, he might have gotten some
8 e-mails, also?

9 GEN. COLE: I would say possible, sir,
10 but not probable. We can talk at great length
11 about how pilots think and how pilots do and what
12 they believe. I wouldn't say that is impossible,
13 but I would say it is very improbable.

14 JUDGE FARRAR: And again, we are in the
15 hearsay realm.

16 GEN. COLE: Yes, sir, we certainly are.

17 JUDGE FARRAR: You are talking to an
18 expert who is getting people to write to you. And
19 without impugning the credibility of any of the
20 people in that chain, looking at Judge Lam's
21 concern, that's not necessarily the universe of
22 all the cases. We'd like to know -- I mean,
23 ideally we would have them lined up at the door
24 and every pilot who ever ejected would come in
25 here and we would say, "What is going through your

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1 mind?" And then we might have the best evidence
2 and might come out exactly where you say we should
3 come out, or we might hear something different.

4 GEN. COLE: Yes, sir.

5 JUDGE LAM: Now, let me explore further
6 what you had done, General Cole and General
7 Jefferson. You had 126 events and 15 of which
8 clearly documented pilots had tried to avoid a
9 land target. That would give me somewhere about
10 12 percent success. And additionally, I guess you
11 had done analysis to determine the time available
12 to take action. Couple that with joint assessment
13 of pilot training, motivation, and attitude, to
14 come up with the remaining contribution to the 95
15 percent. As a matter of fact, in your direct
16 testimony you assume 100 percent success, but let
17 us say 95 percent.

18 GEN. COLE: Yes, sir.

19 JUDGE LAM: Am I correct to say that is
20 the process you have gone through?

21 GEN. COLE: I would totally agree with
22 that. I would ask, with your permission, to ask
23 General Jefferson and Colonel Fly to comment on
24 that, too, because we did it collectively. But
25 you described accurately the way I did it.

1 JUDGE LAM: Please.

2 GEN. JEFFERSON: We took the 121
3 destroyed aircraft reports and divided them by
4 phase of flight, according to definition from
5 ACRAM, the DOA standard for aircraft crashes. Of
6 the ones that were normal flight, there was a
7 smaller subset and those are some that we used.
8 You know, we broke them down into classifications
9 the further we went. So when you get down to 15
10 that were where the pilot has avoided something,
11 they are out of a subset of those. And those are
12 the ones that we categorized as "able to avoid" in
13 our report.

14 There are a lot of accidents where the
15 pilot has no opportunity, a mid-air or something
16 like that. And so those would have been put
17 aside. And these are simply the ones that, out of
18 those which were relevant to Skull Valley, that
19 have that or that indicated in some way in the
20 report that the pilot was conscious of the fact of
21 where he was and made some effort to make sure
22 that he didn't hit something on the ground. I
23 hope that's --

24 JUDGE LAM: And what I am getting at is
25 in operational data analysis, 15 events over 126

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1 would not be disputed. That's a success rate
2 nobody can dispute. What I'm saying is beyond the
3 15 events of success which is clearly documented
4 as you testified, now I see success also being
5 claimed where there is no clear documentation,
6 quote/unquote, where substantial expert judgment
7 is applied in the area of pilot motivation,
8 training, and attitude. That's where I was --

9 GEN. JEFFERSON: I understand. And as
10 General Cole mentioned, we are going in part by
11 the lack, in many cases, of any description of
12 damage. And that has to be in a report if there
13 is damage on the ground. And if it is not
14 reported, then there's an assumption, a
15 presumption, I guess, that the pilot -- it wasn't
16 a factor for the pilot because he was on a range
17 or it wasn't a big factor and he avoided it
18 somehow.

19 JUDGE LAM: So you are going outside
20 and beyond what you describe as clear
21 documentation; am I correct?

22 GEN. JEFFERSON: Yes, sir.

23 JUDGE LAM: Thank you.

24 Q. (By Mr. Gaukler) General Cole and
25 Colonel Fly and General Jefferson, the 15 examples

1 that are listed from the historical or listed from
2 the accident reports, are they just limited to the
3 accidents for the ten-year period, 1989 through
4 1998, or do they include other accidents from
5 subsequent times?

6 GEN. COLE: We do have some from
7 subsequent times because later in the process we
8 received accident reports for '99 and 2000. As
9 long as we had them, we looked at them just for
10 the sake of accuracy.

11 Q. And why do you consider those to be
12 relevant to your analysis?

13 GEN. COLE: Well, simply because the
14 issue at hand is do pilots, indeed, consciously
15 address and maintain situational and positional
16 awareness and seek to see, steer, and avoid; or
17 even if they don't see, if they know something,
18 where it is if they had seen it, steer to avoid
19 populated areas or structures.

20 Q. Now, you have gone through various
21 bases of your opinions, as you said this morning,
22 why you believe pilots would do that. Beyond
23 that, did you see anything in these accident
24 reports that would suggest to you that pilots do
25 not seek to steer and avoid if they know there is

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1 a site on the ground in front of them, when they
2 are in control of the plane?

3 GEN. COLE: I did not. And the only
4 observation I would make, which I will second what
5 General Jefferson did, is there are some instances
6 where two aircraft have a mid-air and the airplane
7 is simply not controllable. Then see, steer, and
8 avoid is not a factor. We could not find a single
9 instance where the pilot, sitting in control, he
10 could fly the airplane, that he didn't steer and
11 avoid.

12 JUDGE FARRAR: Isn't that an
13 overstatement? You -- wouldn't it be better to
14 characterize it as you didn't see a single
15 instance where it was clear there was something to
16 avoid that he didn't avoid? Because some of them,
17 as I understand it from what you said a few
18 minutes ago, there may have been nothing out there
19 so the report -- or there may be no indication
20 there was anything out there, so there would be no
21 reason to say that he steered to avoid or didn't
22 steer to avoid because, for all that that record
23 shows, there was nothing to avoid.

24 GEN. COLE: Better words, your Honor.
25 Yes, sir.

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1 JUDGE FARRAR: Thank you.

2 Mr. Soper, you have been very quiet the
3 last few minutes and I keep waiting for you to
4 help us with where we are going.

5 MR. SOPER: Have I missed an objection,
6 your Honor that I should have made?

7 JUDGE FARRAR: Not an objection. But
8 we are obviously in a difficult area here where we
9 are, as you characterized it, we are looking for
10 the best truth we can find even though it is an
11 adversarial proceeding. But in our search for the
12 truth, we don't want to be doing anything that
13 tramples on your rights. We may step on your toes
14 once in a while, but we try to preserve your
15 essential rights.

16 MR. SOPER: Well, the witnesses are
17 addressing the contents of Exhibit QQQ,
18 essentially, I take it. And I will have an
19 opportunity to cross with respect to that. So I
20 just assumed that's the direction we were going.

21 MR. GAUKLER: That's what I assume,
22 too.

23 JUDGE FARRAR: Okay. Fine.

24 MR. GAUKLER: Let me proceed, then.

25 JUDGE FARRAR: Certainly, Mr. Gaukler.

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1 Q. (By Mr. Gaukler) General Cole, as you
2 suggested, each of you would take one example and
3 kind of walk through it. Would you please begin.

4 GEN. COLE: Certainly. The one I
5 picked is --

6 JUDGE FARRAR: Wait a minute.

7 (The Board conferred off the record.)

8 JUDGE FARRAR: Mr. Gaukler, as we see
9 it there are two issues here, one of which we have
10 discussed which is are these representative of the
11 universe, given what we have said about the
12 others. So that is one issue. And having the
13 panel go through the 15 would not add to our
14 understanding of that issue. These 15, you all
15 wrote these?

16 GEN. COLE: Yes, sir.

17 JUDGE FARRAR: Then why -- is this an
18 instance where we don't need them to tell us about
19 each of the 15 because they have written about the
20 15? Wouldn't it be better, in the interest of
21 time, that Mr. Soper cross examine them and then
22 if you needed to, you having done no direct, you
23 could do a limited redirect. In other words, I
24 don't need them to say, "Here is what is here."
25 If they take four minutes each, that's an hour to

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1 say this --

2 MR. GAUKLER: I was going to suggest
3 one apiece, not all the 15. I understand.

4 JUDGE FARRAR: But in other words,
5 right now, I believe that they believe that this
6 is or that they wrote this in good faith. Mr.
7 Soper may or may not believe that. He can
8 challenge where they got this from, why they wrote
9 it a certain way and so forth. And then would be,
10 in the interest of time, would be the time you
11 could come back and, since you know more about it,
12 you could come back and say, "Wait a minute.
13 Wasn't there some other factor that went into
14 that?" I hate to do things in reverse order but
15 we have -- I sense we have what we need.

16 Now, Mr. Soper, I assume that in saving
17 time that way, that doesn't harm your ability to
18 cross examine but you might have the opposite
19 argument which is you'd like to hear them go
20 through all 15 because, as they go through it,
21 that gives you a better chance to be thinking
22 about your cross.

23 MR. SOPER: What I think would be the
24 most accurate, your Honor, I think I can cross
25 examine them based on the fact that they would

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1 characterize each accident report as this exhibit
2 shows. I think it would be a gross omission to
3 admit a characterization of an accident report
4 which is a couple pages long that had the exact
5 details. And I would suggest that I offer these
6 15 accidents, the actual accident report, as
7 evidence.

8 JUDGE FARRAR: You have those?

9 MR. SOPER: Yes.

10 MR. GAUKLER: I have no objection, I
11 guess. In terms -- I guess I would say the same
12 thing needs to be done with some of the stuff Mr.
13 Soper did; they would be part of the record.
14 Wouldn't necessarily admit them at evidence, but
15 they would be part of the record. We could review
16 it in that context.

17 MR. SOPER: We admit the
18 characterizations of it as evidence and not the
19 accident reports as evidence? Is that what you
20 are suggesting?

21 MR. GAUKLER: I guess what I was
22 suggesting yesterday, what we did yesterday in
23 this context, was there were topics that may not
24 be discussed specifically in the accident report,
25 and we are concerned about people looking at the

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1 record down the road, pointing something out that
2 was not discussed, not focused on, and reaching
3 some conclusion based upon that. That's all I'm
4 suggesting. And so, therefore, yesterday we
5 reached the conclusion on several instances that
6 the best way to proceed was to have the discussion
7 of what everybody thought was relevant, put the
8 document into the record, it would be there to
9 evaluate the testimony given on the document,
10 whether that testimony was correct or incorrect or
11 however the document may come into play in terms
12 of gathering that testimony as opposed to then
13 having a document in evidence that is something
14 that was unrelated to the discussion or focus of
15 the issue at the hearing that can't be relied
16 upon.

17 MR. SOPER: Can I briefly respond?

18 That may be true for a magazine article but if I
19 have made objections before without being or
20 trying to emphasize it, this is my best attempt of
21 emphasizing an objection. This whole area focuses
22 on how important accident reports are, tells about
23 them, then cites from accident reports that deal
24 with nothing other than the accident. I think
25 that it is a gross omission to talk about it

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1 without the details of the accident report.

2 JUDGE FARRAR: I think we are ready to
3 rule. Mr. Turk, you may have something to
4 contribute.

5 MR. TURK: I would ask for an estimate
6 of how many pages each accident report is and then
7 ask if the -- and my concern is that if you admit
8 the accident reports, perhaps it's a pretty big
9 amount of documentation. But if --

10 JUDGE FARRAR: Go ahead.

11 MR. TURK: But if you do admit, what is
12 the purpose of the offer? Is it limited to the
13 issue of the avoidance issue or are they in for
14 all purposes? Because I think if you admit for
15 all purposes, then you have a lot of data that we
16 have to sift through and try to understand how to
17 use, and proposed findings.

18 GEN. COLE: Would you like examples of
19 the length, your Honor?

20 JUDGE FARRAR: Yes.

21 MR. SOPER: They are about ten pages,
22 your Honor.

23 COL. FLY: His is 13, mine is 21.

24 GEN. COLE: Eleven.

25 JUDGE FARRAR: I think Mr. Soper is

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1 correct that these are different from the types of
2 materials, Mr. Gaukler, we were talking about
3 yesterday, which were, if I could misuse the word,
4 kind of random things. These aren't random.
5 These go to the heart of the case, or at least
6 what appears thus far in the last couple of days
7 to be a heart of the case. Maybe it will prove to
8 be that. Maybe not.

9 But again, if it was important enough
10 for the witnesses to go to this database of
11 reports to reach conclusions from them, then it
12 seems important enough to bring in the, you
13 know -- not doubting their characterization or
14 paraphrase of them, but here again we have the
15 best evidence is the reports themselves. I'm less
16 worried about extraneous material than I was with
17 yesterday. But Mr. Turk may have some or a point
18 here that there may be extraneous materials.
19 Rather than rule on that now, let's get the
20 reports, see them, and then we will deal with Mr.
21 Turk's objection or suggestion. But basically, we
22 would be looking at the avoidance issue rather
23 than anything else.

24 Having made that ruling without
25 consulting with my colleagues, let me make sure

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1 that I will have the necessary votes to enforce
2 it.

3 (The Board confers off the record.)

4 JUDGE FARRAR: Okay. I do have the
5 votes. Then we will do it that way. Then
6 let's --

7 MR. GAUKLER: Your Honor, then I will
8 make copies of the accident reports and introduce
9 them as exhibits.

10 JUDGE FARRAR: Okay.

11 MR. GAUKLER: I have them and I will go
12 ahead and do that.

13 JUDGE FARRAR: I thought Mr. Soper was
14 going to introduce them.

15 MR. SOPER: At your pleasure we have
16 them being copied right now.

17 JUDGE FARRAR: Why don't you make them
18 a joint exhibit.

19 MR. GAUKLER: Fine.

20 JUDGE FARRAR: Is that alright, Mr.
21 Soper? They are official government documents;
22 doesn't matter who sponsors them.

23 MR. SOPER: Just to make sure we are
24 talking about the same thing, it is the ones that
25 are identified in bold beginning, on August 26,

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1 December '89, through 31 August '00. A total of
2 15 reports.

3 JUDGE FARRAR: You said August 26?

4 MR. SOPER: Excuse me. 26 December,
5 '89 through 31 August, '00. A total of 15
6 accident reports. We are having those prepared
7 right now.

8 JUDGE FARRAR: All right.

9 JUDGE LAM: I would like to ask General
10 Cole if these 15 reports are identical to the 15
11 events that you mentioned earlier.

12 GEN. COLE: Yes, sir.

13 JUDGE LAM: Thank you.

14 JUDGE FARRAR: Do you want to start
15 your cross-examination?

16 MR. SOPER: I'll be happy to. I assume
17 the witnesses have copies of these reports?

18 MR. GAUKLER: Not all of them. Why
19 don't we continue, go through my direct, redirect,
20 and then have his cross.

21 JUDGE FARRAR: Well, if we get the
22 reports - and don't take this disrespectfully -
23 but do we care what they say or do we want to read
24 the reports? In other words, do we need their --
25 would we be benefitted by their talking us through

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1 the reports, or do we just read the reports
2 ourselves? Let me ask the witnesses to answer
3 that.

4 GEN. JEFFERSON: I might suggest, we
5 spent an awful lot of time on these things. To
6 start on them and start reading them would take an
7 extraordinary amount of time, I suspect. We
8 certainly wouldn't object, you know, or have any
9 reservation about people reading them and seeing
10 whether we excerpted properly or not.

11 JUDGE FARRAR: But your explaining them
12 to the Board would be more beneficial to us, you
13 think, than us just trying to read them and figure
14 out what they say?

15 GEN. JEFFERSON: The stack of all the
16 accident reports is about that high (indicating).

17 MR. GAUKLER: I think it would be more
18 beneficial if they were explained.

19 MR. SOPER: General, you are
20 representing a couple feet? That's not the 15
21 accident reports?

22 GEN. JEFFERSON: No. That's the total
23 database.

24 MR. SOPER: Well, your Honor, if it
25 would assist the Board, as a courtesy we can get

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1 them for you. I am thinking you would like to
2 have them; is that right?

3 JUDGE FARRAR: Yes. As they are
4 explaining them to us, I'd like to say, "Where it
5 says on Page 3, what that really means is or what
6 we found out about it was," and if we don't have
7 it in front of us, then we are at a disadvantage.

8 MR. TURK: Your Honor, I would suggest
9 allowing both reports and the summary. The
10 summary provides you the witnesses' judgment. It
11 is their evaluation on what was important on this
12 point that they wanted to bring to your attention.
13 The report itself is the best evidence of what the
14 Air Force concluded was the statement. So you
15 would have both, for both points, you would have a
16 proper exhibit.

17 JUDGE FARRAR: Okay. But with both of
18 those in front of us, would we have Mr. Gaukler do
19 any direct or are we more efficient but still fair
20 by having Mr. Soper -- and Mr. Gaukler, that
21 question is not addressed, even though it had your
22 name in it, it is not addressed to you. It is
23 addressed to Mr. Turk. If we adopt that idea, do
24 we go back to my suggestion that Mr. Soper just
25 launch into cross?

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1 MR. TURK: I think if you admit QQQ,
2 there's no reason to have direct. I think that's
3 the heart of what, if I understand the Applicant's
4 purpose, that's the heart of what they want to get
5 into the record. I thought the direct was only a
6 way of getting around the problem of not admitting
7 the exhibit itself, if I interpreted that
8 correctly.

9 MR. GAUKLER: I guess my thinking would
10 be would it be helpful to have them go briefly
11 through the report and explain how they arrived at
12 that conclusion and show where it is, et cetera.
13 And if that's what path we are going down, that's
14 what I would recommend.

15 JUDGE FARRAR: Mr. Gaukler, you have
16 got the burden of proof in this proceeding, so I
17 think on that we will defer to you.

18 MR. GAUKLER: I would suggest that we
19 continue to the other parts of the direct,
20 redirect, and then come back to this.

21 JUDGE FARRAR: Good.

22 MR. GAUKLER: Okay. Given that we are
23 going to come back to this when we have the
24 reports, I would suggest that I go to a different
25 topic of my plan, okay? And Mr. Barnett has some

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1 questions on several topics and I have a few
2 remaining isolated topics. I would suggest that
3 Mr. Barnett go, ask the questions he has, and then
4 we can pick up with my topics and go back to the
5 reports when they are copied.

6 JUDGE FARRAR: That would be fine.

7 MR. GAUKLER: Just for clarification,
8 you are getting copies for the 15 documents and we
9 don't need to worry about that?

10 MR. SOPER: We are.

11 MR. GAUKLER: Okay. Thank you.

12 MR. SOPER: We will send you a bill for
13 them, however.

14 MR. GAUKLER: You have high copying
15 charges. Higher than we do.

16 JUDGE FARRAR: Go ahead, Mr. Barnett,
17 when you are ready.

18 MR. TURK: It's a joint exhibit. Maybe
19 they should share the costs.

20

21 REDIRECT EXAMINATION

22 BY MR. BARNETT:

23 Q. I'd like to mark as a PFS exhibit,
24 wherever we are on the list. I believe the
25 reporter has the list of Applicant exhibits. This

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1 is RRR. And this is an excerpt from the U.S. NRC
2 Standard Review Plan for Nuclear Power Plants,
3 section 3.5.1.6, Aircraft Hazards.

4 (EXHIBIT-RRR WAS MARKED.)

5 Q. General Jefferson, do you have that in
6 front of you?

7 GEN. JEFFERSON: Yes, I do.

8 Q. Do you recall yesterday or the day
9 before when the State asked you questions about
10 the use of NUREG 0800 to evaluate the probability
11 of an aircraft crash at the PFSF?

12 GEN. JEFFERSON: Yes, I do.

13 Q. Do you recall the State asking you
14 questions about the formula for calculating the
15 probability where the formula is $N \times C \times A/W$?

16 GEN. JEFFERSON: Yes, I do.

17 Q. If you use that formula, simply as the
18 way its printed in the section, to predict the
19 crash impact probability for a facility under an
20 aviation corridor or an airway, what does that
21 formula say about the crash impact probability at
22 different locations under the airway?

23 GEN. JEFFERSON: That they would be
24 evenly distributed.

25 Q. That is, so if you were looking at the

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1 probability at one location compared to the
2 probability at another location, what would they
3 be?

4 GEN. JEFFERSON: They would be the same
5 within the airway.

6 Q. Does NUREG 0800 require you to use that
7 formula to calculate the crash impact probability?

8 GEN. JEFFERSON: No, it doesn't. It is
9 put forward as one way to do that.

10 Q. And how much flexibility does it give
11 you in analyzing a crash impact probability?

12 GEN. JEFFERSON: It gives quite a bit.
13 May I read sections?

14 Q. Please do.

15 GEN. JEFFERSON: If that's -- okay. On
16 page 6-3 under Review Procedures, and Paragraph 2,
17 Airways, that's where that formula is presented.
18 And it says the probability PFA should be
19 estimated -- let me just read it.

20 "For situations where federal airways
21 or aviation corridors pass through the vicinity of
22 the site, the probability per year of an aircraft
23 crashing into the plant (PFA) should be estimated.
24 This probability will depend on a number of
25 factors such as the altitude and frequency of the

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1 flights, the width of the corridor, and the
2 corresponding distribution of past accidents."

3 "One way of calculating PFA is by using
4 the following expression: $PFA = C \times N \times A/W$," and
5 those terms are explained below.

6 I think it is of note that the formula
7 does not take in some of the factors that are
8 presented in the paragraph above such as altitude
9 and the corresponding distribution of past
10 accidents. So it is not a limiting formula, in my
11 opinion.

12 Q. Is there any other respect that you see
13 there that it gives you flexibility in the method
14 you might choose to analyze a crash impact
15 probability?

16 GEN. JEFFERSON: On the next page, at
17 the top it says, "This gives a conservative upper
18 bound on aircraft impact probability if care is
19 taken in using values for the individual factors
20 that are meaningful and conservative." And the
21 next paragraph, 3, or Section 3 presents the
22 formula in an expanded form for considering
23 several different types of aircraft and flight
24 trajectories affecting the site. But it does
25 conclude after, explaining symbols, "The manner of

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1 interpreting the individual factors in the above
2 equation may vary on a case-by-case basis because
3 of the specific conditions of each case or because
4 of changes in aircraft accident statistics."

5 And then I move to the last section, 5,
6 Implementation. It says -- that's on Page 6-6.
7 "The following is intended to provide guidance to
8 applicants and licensees regarding the NRC staff's
9 plans for using this SRP section. Except in those
10 cases in which the applicant proposes an
11 acceptable alternative method for complying with
12 specific portions of the Commission's regulations,
13 and method described herein," it's not exactly
14 correct grammatically, but that's the way it is
15 printed, "and method described herein will be used
16 by the staff in its evaluation of conformance with
17 Commission regulations."

18 And that, to me, means that if you
19 decide to use something other than this factor, it
20 can be acceptable if the staff approves it.

21 Q. Given what you have just read, in your
22 opinion would that allow you to take into account
23 a pilot's ability to avoid a site on the ground in
24 the event of an accident?

25 GEN. JEFFERSON: Yes, it would.

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1 Q. Did you do that?

2 GEN. JEFFERSON: Yes, I did.

3 MR. BARNETT: Your Honor, we move to
4 have Exhibit RRR admitted.

5 JUDGE FARRAR: Mr. Soper?

6 MR. SOPER: No objection.

7 MS. MARCO: No objection from the
8 Staff.

9 JUDGE FARRAR: Then let it be admitted.

10 (EXHIBIT-RRR WAS ADMITTED.)

11 MR. BARNETT: The next document we are
12 passing out here is an excerpt from the DOE
13 Standard, "Accident Analysis For Aircraft Crash
14 Into Hazardous Facilities," DOE Standard 3014-96,
15 October, 1996.

16 (EXHIBIT-SSS WAS MARKED.)

17 MR. BARNETT: I'd like to have this
18 marked as Applicant's Exhibit SSS.

19 JUDGE FARRAR: That's been done. Go
20 ahead, sir.

21 Q. (By Mr. Barnett) General Jefferson, do
22 you recall the State asking you questions about
23 the use of the DOE Standard to calculate the
24 probability of a crash impact at the PFSF?

25 GEN. JEFFERSON: Yes, I do.