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NUCLEAR REGULATORY COMMISSION

Title: Private Fuel Storage, LLC

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

Location: Rockville, Maryland

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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
	)	

ASLBP Hearing Room
Third Floor
Two White Flint North Building
11545 Rockville Pike
Rockville, Maryland

July 1, 2002

The above-entitled matter came on for hearing, pursuant to notice, at 9:00 a.m. before:

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

DR. JERRY R. KLINE
Administrative Judge
U. S. Nuclear Regulatory Commission

DR. PETER S. LAM
Administrative Judge
U. S. Nuclear Regulatory Commission

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C-O-N-T-E-N-T-S

WITNESS	DIRECT	CROSS	REDIRECT	RECROSS
GEN. WAYNE JEFFERSON				
COL. RON FLY				
GEN. JAMES COLE				
By Mr. Barnett	13002		13113	
Voir Dire by Mr. Soper on page 13064				
STEVE VIGEANT				
By Mr. Barnett	13055			
LT. COL. HUGH HORSTMAN				
By Mr. Soper	13131			

E X H I B I T S

NUMBER	DESCRIPTION	MARK	RECD
PFS			
103-218	F-16 Accident reports	13004	13004
100A	PFS Exhibit 100 with changes	13009	13011
245	Surface Weather Observations 2001	13054	13074
State			
220	Video	13144	
221	Video	13181	

P-R-O-C-E-E-D-I-N-G-S

(9:02 a.m.)

CHAIRMAN FARRAR: I want to welcome back Mr. Soper, Mr. Silberg, Mr. Barnett, and Ms. Marco. Although the phrase summer soldiers and fair weather friends does come to mind, I don't know why you think you can just walk in here for the grand finale, having not labored with your colleagues through the last two weeks, we are delighted to have you here.

During your absence we did mention about coming Fourth July, and Independence Day, and the Board does intend to be free on the evening of July 3rd. So Counsel should bear that in mind.

This is the third, well, it is the ninth week in a total of 13 weeks, ninth week of hearing. We've done the aircraft on two different occasions, and we don't need to hear material repeated. If you have something new, that is fine.

But the more that you repeat something that we've heard before, the more we think maybe it is not true, and that is why you are repeating. So please, please, we are not a jury. If it is in the record we don't need to go over it again.

Let's go over the schedule. We found the last couple of weeks of seismic everyone was getting

better about adhering to schedules. Let's make sure we have a game plan for finishing here by noon on Wednesday, which I think was everyone's ambition.

We will start today, Mr. Barnett, with additional rebuttal evidence from your panel. I think at the end of the last session you had said you were about a third finished?

MR. BARNETT: That is right, probably, I think that is right, I think that is right.

CHAIRMAN FARRAR: Which would leave us how many hours?

MR. BARNETT: I think we can get through this, this morning.

CHAIRMAN FARRAR: Your portion?

MR. BARNETT: Yes, I believe so.

CHAIRMAN FARRAR: Okay.

MR. GAUKLER: I would note that at one point, towards the end of the presentation, we would like to get Mr. Vigeant in by phone for a few questions.

CHAIRMAN FARRAR: Well, you had mentioned that last week, Mr. Gaukler. Then Ms. Marco, how much examination do you think you will need of this panel?

MS. MARCO: We have under a half an hour.

CHAIRMAN FARRAR: Okay.

MS. MARCO: Of this panel?

CHAIRMAN FARRAR: Yes.

MS. MARCO: No, we don't anticipate.

CHAIRMAN FARRAR: Mr. Soper?

MR. SOPER: (Inaudible.)

CHAIRMAN FARRAR: I'm sorry, we have a new system in the courtroom where there is no -- you don't have an on/off switch, but you have to speak about six inches from the microphone, and directly into it for the Reporter's taping system to pick it up.

MR. SOPER: Okay, thank you. I'm thinking maybe an hour, or so.

CHAIRMAN FARRAR: Okay.

MR. SOPER: It is a little hard to tell at this point, their being only a third of the way done.

CHAIRMAN FARRAR: Right, that is fine. All right, then the next step would be, after Mr. Vigeant, Mr. Barnett, that would be the end of your rebuttal case?

MR. BARNETT: That is right.

CHAIRMAN FARRAR: Staff has rebuttal?

MS. MARCO: Yes, Your Honor. The Staff has under a half an hour of rebuttal to put on with our witness that we have here. However, I would ask, if it is possible to put that rebuttal on tomorrow, in

light of the fact that I haven't had an opportunity -- Mr. Gosh came in last night, and I haven't had an opportunity to go through it with him.

CHAIRMAN FARRAR: Dr. Campe will or will not be --

MS. MARCO: Dr. Campe will be joining us tomorrow and Wednesday, but he will not -- he may be here today, but I doubt it.

CHAIRMAN FARRAR: All right. Then the State would have what in the way of rebuttal?

MR. SOPER: Lt. Col. Horstman, Your Honor.

CHAIRMAN FARRAR: Okay. And none of the rebuttal, unlike with seismic, none of the proposed rebuttal was committed to writing, is that correct?

MR. BARNETT: That is right. We don't have any written rebuttal.

MS. MARCO: Correct.

MR. BARNETT: We have some exhibits but no written rebuttal testimony.

MR. SOPER: That would be the same for the State, Your Honor, no written testimony. We have several exhibits, too.

CHAIRMAN FARRAR: Then if we finish with the military panel, and Vigeant today, do Staff -- and Col. Horstman tomorrow, what is left? Seismic, I kept

thinking we were at the end, and there was always something additional.

MR. GAUKLER: Just if there is some additional surrebuttal to what Lt. Col. Horstman says, and obviously we can't tell that, until that happens. But it certainly wouldn't be that much. Like seismic we would have to whittling exponentially, I'm sure that would be the case here.

CHAIRMAN FARRAR: All right, then you, at this point no one envisions a problem finishing by noon on Wednesday?

MR. GAUKLER: I didn't hear how much rebuttal the State has. Did they give us an estimate?

CHAIRMAN FARRAR: Well, they have almost all day tomorrow to do that, since the Staff panel is not going to take that long. All right, good.

Col. Horstman when we last saw you, you were taking off, as it were, for a renewal exam, or certificate, that went well?

LT. COL. HORSTMAN: Yes, Your Honor, I'm still licensed.

CHAIRMAN FARRAR: Okay, excellent. A little plug for Southwest Airlines for any of you who may be traVeling over the Holiday.

Gentlemen on the witness panel, it has

been a long time, but you have been previously sworn, so welcome back, and please consider yourself still under oath, and make sure to speak into the microphones.

And while we've had a lot of rapid fire exchanges, given the taping system, make sure we don't talk over each other's words.

Any preliminary matters before we get started?

MR. SOPER: I have just a couple, Your Honor.

Reviewing the record so far it appears that Lt. Col. Horstman's testimony was never actually admitted, or bound into the evidence. And I think that was just an oversight, but I would move that it be bound into the evidence, bound into the record, excuse me.

CHAIRMAN FARRAR: Do you recall, off-hand, which day that was?

MR. GAUKLER: That was Friday, April 12th, that it was first introduced.

CHAIRMAN FARRAR: Okay.

MR. GAUKLER: Also, I don't think that any of the testimony was bound into the record. So I would move that our testimony, the testimony of Gen.

Cole, Gen. Jefferson, and Col. Fly, and Mr. Vigeant, and Mr. Johns --

CHAIRMAN FARRAR: There was some confusion in the early days of the Hearing, so we will make sure we take care -- I thought that had been corrected in revised copies?

MS. MARCO: And, likewise Your Honor, the Staff's testimony was not bound into the record.

CHAIRMAN FARRAR: We will go back and check all that, and make sure we get new copies. In reading over the transcripts of the prior Hearings, there was a point at which we threatened everyone that the Hearing was going to end in May, not in June.

We, obviously, missed that. But we are going to finish by noon on Wednesday, so let's proceed on that basis. Go ahead, Mr. Barnett.

MR. SOPER: Your Honor, excuse me, I really wasn't quite done with my list of preliminaries.

In addition I see that State Exhibits 151, 152, 153, 154, and 157 were either not formally offered, or were offered and never received acknowledgement that they were admitted. And I would move that those exhibits be admitted into the record.

CHAIRMAN FARRAR: Why don't other Counsel,

before the next break, check and make sure they have, or do not have, objections to those. Unless you are ready to speak to them now?a

MR. GAUKLER: We are not ready to speak to them now, and I also have some exhibits of ours that have not been entered, and I will be making a similar motion.

CHAIRMAN FARRAR: Okay. Then, Mr. Gaukler, as soon as you have the ones you need let us know.

MR. GAUKLER: I will.

CHAIRMAN FARRAR: And then other counsel can check their records and see if they have any objections.

All right, then, --

MR. GAUKLER: I would suggest we might do that among the Counsel, and see what we can agree to, and not agree to.

CHAIRMAN FARRAR: Fine, that has worked well in the past, so let's do that.

MR. GAUKLER: We may just want to do that first thing after lunch, and get Counsel to come a back a few minutes early, something like that, to go over the exhibits.

CHAIRMAN FARRAR: All right, fine, thank

you.

Go ahead, Mr. Barnett.

MR. BARNETT: Thank you, Your Honor. Your Honor, I want to refer to the boxes, the three boxes of documents that are sitting there in front of the Court Reporter.

These are the F-16 aircraft accident reports that we distributed to the Board and the Parties. In the interim, since the last Hearing session.

DIRECT EXAMINATION

MR. BARNETT: Gen. Cole, could you describe those documents?

GEN. COLE: Yes. Those documents are Air Force Instruction 51503 accident investigation reports that we used in assessing all the F-16 class A mishaps from FY'89 to FY'98, to determine when the pilot would have control of the aircraft, and sufficient time and ability to steer and avoid objects on the ground.

MR. BARNETT: Your Honor, each one of the reports is labeled with either a PFS exhibit number, or a Joint Exhibit number. We produced all the reports in those boxes. Some of the reports have been admitted previously as Joint Exhibits, and also as PFS exhibits. But they are all labeled.

CHAIRMAN FARRAR: If I remember correctly you supplied all of them in discovery?

MR. BARNETT: That is correct.

CHAIRMAN FARRAR: So there is no problem there. You have some admitted on your motion, there were others that were Joint Exhibits, and now you have all of them, a whole new set of all of them?

MR. BARNETT: Yes, there is a whole new set of all of them. The ones that have been admitted previously are labeled as they were admitted, previously.

So at this point I would move that the new reports, the ones that have not yet been admitted, be admitted.

CHAIRMAN FARRAR: And we have a set of them that you gave us, informally, a few weeks ago?

MR. BARNETT: That is correct.

CHAIRMAN FARRAR: And all the Parties have them. Are there any objections to the admission of those reports?

MR. SOPER: No objection from the State.

MS. MARCO: No objection.

CHAIRMAN FARRAR: All right, then all the ones -- does the Court Reporter have the list you gave us?

MR. BARNETT: Your Honor, the list -- each box has a list.

CHAIRMAN FARRAR: Then the exhibits that were not previously admitted, which look like they go from 103 to 218?

MR. BARNETT: That is --

CHAIRMAN FARRAR: Will be admitted. We previously admitted 12?

MR. BARNETT: I would have to count them, Your Honor. All the ones that are in bold on the list were previously admitted either as PFS exhibits, or Joint Exhibits.

CHAIRMAN FARRAR: Right. Then we will admit 103 to 218.

(The document referred to, having been previously marked for identification as PFS Exhibit Nos. 103 through 218 were received in evidence.)

MR. BARNETT: Gen. Cole, is there anything in these documents that you did not use in your analysis?

GEN. COLE: Yes. There are some reports in which the F-16 was not destroyed. If the F=16 is not destroyed by impact with the ground, we didn't

consider it being a real risk to the site.

So, consequently, these are exhibits 106 and exhibits 209 through 218. So those were class A mishaps, but they did not involve the airplane being destroyed.

In addition there is one other, and this is in exhibit 208, which is included in that group, of an accident dated 23 January of '92, which was provided by the Air Force under a separate Freedom of Information Act request, relating to large aircraft, and it involved a formation of KC-135 tanker aircraft with F-16s and a transoceanic crossing, in which one of the tankers pulled to avoid a converging course with the other tanker, and bumped an F-16.

That report was not submitted in response to the F-16 class A mishap FOIA response. We believe it was simply an oversight on the Air Force. But when we got it, with the large aircraft, we took a look at it.

MR. BARNETT: And, Gen. Cole, how would you asses the accident in that report?

GEN. COLE: Well, it was not a Skull Valley type event, not a severe B MOA type event. It didn't involve an F-16 engine failure, and in this particular mishap the pilot did not have control of

it.

It was almost a subsequent action from a potential mishap with two tankers. So, consequently, that one did not factor in.

MR. BARNETT: And why would you say that this accident was not a Skull Valley type event?

GEN. COLE: Well, you don't have air refueling occurring in Skull Valley. The air refueling tracks are quite far away, nor do you have KC-135s and F-16s doing joint maneuvers within Skull Valley.

MR. BARNETT: Gen. Jefferson, does this collection of reports, including the reports that have already been introduced, include everything that is listed in your analysis in tab H of the PFS aircraft report?

GEN. JEFFERSON: No, it does not. If you compare the list of accidents there with tab H, there is an entry in tab H for a 24 February 1994 accident, but there is no corresponding report for that, that is because the entry in tab H for February 24th was an inadvertent duplication of February 2nd, 1994.

There was no F-16 accident on February 24th, 1994.

MR. BARNETT: And what is the effect of

this on your analysis?

GEN. JEFFERSON: Tab H shows 61 accidents identified as Skull Valley type events, 59 of those left the pilot in control.

In our direct testimony we modified that to -- that is in Q and A 110 of our direct testimony, we modified that to include the September 16th, 1997 accident as a Skull Valley type event, in which the pilot was not in control.

So that we had, then, a total of 62 Skull Valley type events with 59 in control. If you take out the February 24th accident, the effect has reduced the number of Skull Valley type events back to -- from 62 to 61, and to reduce the number of able to avoid accidents from 59 to 58.

This change results in a probability of ability to avoid, of 95.1 percent, that is 58 divided by 61, compared to the former probability of 95.2 percent, or 59 divided by 62.

It has no effect on the other categories, like severe B MOA flight conditions.

MR. BARNETT: And what effect would this change have on your calculations of the hazard?

GEN. JEFFERSON: None, it is still well above the 90 percent that we used.

CHAIRMAN FARRAR: Mr. Barnett, before you leave that, that leaves you, Gen. Jefferson, with how many non Skull Valley accidents in your universe?

You know, after you subtract the duplicates, subtract these that are non-destroyed, that you eliminated, what is our total universe here?

GEN. JEFFERSON: I will double check it. I think it is even, because we added the one with the tanker, and we subtracted the one that was a duplication. So the total remains the same, 121, I believe.

CHAIRMAN FARRAR: Okay.

MR. BARNETT: Your Honor, I would like to distribute a document. This is a copy of PFS exhibit 100 that was previously handed out in May. And it has handwritten changes marked on it.

Gen. Jefferson, do you have a copy of that document in front of you?

GEN. JEFFERSON: Yes, I do.

MR. BARNETT: Who participated in the preparation of that document?

GEN. JEFFERSON: The review of accidents was done by Gen. Cole, Col. Fly, and myself, and I put the table together.

MR. BARNETT: Your Honor, I ask to have

this document marked as PFS exhibit 100A.

CHAIRMAN FARRAR: All right, the Reporter will do that.

(Whereupon, the above-referenced to document was marked as PFS Exhibit No. 100A for identification.)

MR. BARNETT: Gen. Jefferson, were the accident reports that you used to prepare PFS exhibit 100A, the ones that we just introduced? The total of the accident reports that are now in evidence?

GEN. JEFFERSON: Well, we used the ones that were classified as Skull Valley type events, and able to avoid, for this table.

MR. BARNETT: Did you have any changes to make to this table, from what it was, when it was previously produced?

GEN. JEFFERSON: Yes, I do.

MR. BARNETT: Could you explain them?

GEN. JEFFERSON: Your Honors, if we go down to line 4, the last phrase, or sentence says, is modified slightly to delete the word "to", and put a comma in, and so it reads, descended through weather, cleared flight path before ejecting.

CHAIRMAN FARRAR: Mr. Barnett, do we need

to go, since these are all on here, do we need to go through them?

MR. BARNETT: Your Honor, there are some of them that I believe are worth explaining.

CHAIRMAN FARRAR: Then let's just do those rather than all of them, since I take it everybody's copy has these marked on there?

MR. BARNETT: Yes, that is correct.

CHAIRMAN FARRAR: All right.

MR. BARNETT: Gen. Jefferson, going to line 6?

GEN. JEFFERSON: Yes. Line 6 I found, in a subsequent audit of these, that there was a phrase in the summary statement, that a house was destroyed, but no one hurt. That was not in the body of the report around the impact statements, so I missed that.

MR. BARNETT: And line 9?

GEN. JEFFERSON: The actual phrase in the report is residential area. The word apartments actually came from Col. Cosby's sworn testimony.

MR. BARNETT: Line 11?

GEN. JEFFERSON: This is the 24 February duplication, change this line 11 to 2 February and deleted line 31, which is the duplication.

MR. BARNETT: Line 28, which is on page 2?

GEN. JEFFERSON: 18 September the airplane actually impacted in a swampy area, and there was superficial damage to a nearby house.

MR. BARNETT: And line 30?

GEN. JEFFERSON: The airplane turned towards land, rather than to an open area. It turned but --

MR. BARNETT: And then you have no further changes?

GEN. JEFFERSON: No.

MR. BARNETT: Your Honor, at this point we would ask to have exhibit 100A admitted.

CHAIRMAN FARRAR: Does the State have any objection?

MR. SOPER: No objection, Your Honor.

MS. MARCO: No objection.

CHAIRMAN FARRAR: All right, then 100A will be admitted.

(The document referred to, having been previously marked for identification as PFS Exhibit No. 100A was received in evidence.)

MR. BARNETT: Gen. Jefferson, in question and answer 45 of his prefiled testimony, Lt. Col.

Horstman states that ejecting from an aircraft is a dangerous procedure which can cause severe injury or death.

Do the F-16 accident reports discuss ejection injuries?

GEN. JEFFERSON: Yes, they do. They can be found either in the narrative and/or the medical section of the report.

MR. BARNETT: In those accidents that you assessed, the Skull Valley type events, and where the pilot would have ability to avoid, what did the accident report say about the injuries that the pilots had suffered?

GEN. JEFFERSON: Looking at the Skull Valley type events, able to avoid category, and that is the relevant one, because that is where the pilots faced a decision to eject, conscious decision, I did an audit of that.

There were 58 of those, it has been modified now. In the 58 there was one case in which a pilot crash landed on a runway, and had difficulty getting out of the cockpit, but he did not eject. He had difficulty getting out of the cockpit and was burned rather badly. Some of the ground people helped pull him out.

Other than that, then there were also 8 accidents in which there were two occupants of the airplane, they were two-seater airplanes. So if we add those in, then there were a total experienced data base of 65 ejections in this.

And 58 of those 65, or 89 percent, there were no, or only minor injuries like scratches, bruises, sprained ankle, sore muscles, that sort of thing.

In the remaining 7 of the 65, or 11 percent, there were no fatalities. There were -- there was one flight surgeon, actually, in the back seat of one of the airplanes that was burnt by the rocket motor of the front seat going in an improperly sequenced ejection. The front seat went before he, sitting in the back seat, did. So the rocket motor from the front seat burnt him. He survived, but he had some bad burns.

The rest of them were all -- the injuries occurred on landing, not in the ejection. There was one broken leg, one fractured ankle, one compression fracture of the spine, one with lower back pain, which was an anterior compression fracture, one broken ankle.

And there is one that is indeterminate, it

didn't say exactly what had happened on landing, or during the ejection process, but it was a compression fracture of the vertebrae, and a fractured wrist.

In this case the pilot ejected on the runway, and his trajectory carried him over the fireball of the airplane, and his parachute caught fire, and so he fell without a parachute, from some distance, and quite possibly this fractured wrist was because of that, but it doesn't say that, exactly.

So for review of this data base we find no obvious reason for pilots to fear ejecting from the F-16. And especially since the alternative of crash landing with the airplane carries extremely high risk, and the possibility of death.

MR. BARNETT: Thank you.

CHAIRMAN FARRAR: Wait a minute, did you just say that you find no reason -- play that back, please.

(Whereupon, the requested portion was played back.)

CHAIRMAN FARRAR: Okay, I may be wrong, but since I have no life, I spend the entire weekend reading all the old transcripts. It seems that what you just said is absolutely contrary to a whole lot of evidence that is in the record, about the danger of

ejection.

GEN. JEFFERSON: I believe that is correct, sir.

CHAIRMAN FARRAR: Evidence that I think came out of the mouths of the three of you.

MR. BARNETT: Gen. Jefferson, could you explain the nature of accidents, and the different hazards that are associated with different sorts of accidents?

GEN. JEFFERSON: Well, there are differences in ejection depending on the type of flight you are in. If you are in special operations, and mid-air collisions, and things like that, then you may face a higher danger.

And if you are out of the envelope, going too fast, or too low, then you could -- there are problems with that, yes.

CHAIRMAN FARRAR: Didn't we hear about a whole lot of fatalities, and limbs being ripped off, and so forth?

GEN. JEFFERSON: That was not our testimony, sir.

JUDGE LAM: And, Gen. Jefferson, you have not personally ejected from an F-16?

GEN. JEFFERSON: I have not, I have never

flown the F-16.

JUDGE LAM: What about Col. Fly, or Gen. Cole?

COL. FLY: I have never ejected from any aircraft.

GEN. COLE: Day and night parachute jumps, in military special operations, but not ejection.

JUDGE LAM: Thank you, gentlemen.

CHAIRMAN FARRAR: Go ahead, Mr. Barnett.

MR. BARNETT: Now, Gen. Jefferson, you were discussing what was in the -- what you found in the accident reports. You were talking about accidents that you had assessed as being Skull Valley type events, and able to avoid.

Did you distinguish them from other sorts of accidents that you might have, that one might have in an F-16?

GEN. JEFFERSON: Sure. As we were just talking, the type of accident where the pilot is in a dive, for instance, I think there was a case of this where he is in a dive, he perceives that he is going very fast, but he perceives that he is not going to clear the ground, so he ejects, but he is going very fast, he is headed right for the ground.

The individual that did that was lucky to

survive, but he was injured fairly badly. So there are cases, depending on the flight parameters, and so forth, that could cause, and probably will cause death or injury.

But in the Skull Valley type environment, where the predominant case is the pilot has control of the airplane, we don't think that is a high risk, or at least not something that is going to cause him apprehension to the point that he loses focus on what he is doing.

MR. BARNETT: Gen. Cole, in question and answer 31 of his prefiled testimony, Lt. Col. Horstman asserts that PFS should have projected the number of F-16 sorties through Skull Valley, by taking the number of sorties in fiscal year 2000, in Sevier B & D MOAs, and increasing that by 17.4 percent to get a total of 70,040, to account for the additional F-16s assigned to Hill Air Force Base.

Instead of using the average of fiscal year '99, and fiscal year 2000 numbers, for Sevier B MOA, and increasing that by 17.4 percent to get a total of 5,870, as you had done, do you know how many sorties were actually flown through Skull Valley in fiscal year 2001?

GEN. COLE: Well, in 2001 you project

would be 5,435, but when we started this exercise with the Air Force, teleconference in the Fall of '98, my visit to Hill in '98, December of '98, what was provided to us for Skull Valley sorties were the sevier B MOA usage reports.

And those, of course, were in Tab D of Contention K, and they were 3,871 for FY'98. So consequently that was the baseline we used. In April of '99, before I submitted my original draft paper in a telephone conversation with Col. Dan Phillips, to Mr. Jett Trainor, asked the question, what are the Skull Valley sorties, the number played back was 3,871.

Subsequent to that, in a FOIA request, regrading ordinance in Skull Valley sorties, where we cited 3,871 to the Air Force, they came back with ordinance amounts. And so that started the train of using the Sevier B MOA usage reports as the Skull Valley sorties.

MR. BARNETT: And how many sorties were there in fiscal year 2001?

GEN. COLE: 5,435, I show.

MR. BARNETT: And what was the source of that number?

GEN. COLE: That was from the Air Force

affidavit which added B and D.

MR. BARNETT: Are you sure about that?

GEN. COLE: I'm going to have to check. 5,046 for B, and 320 for D in '01.

MR. BARNETT: Could you repeat that, I'm sorry, I couldn't understand.

GEN. COLE: It is 5,046 for B in fiscal year '01, and 320 for sevier D for 5,366.

MR. BARNETT: And what about the number for the sevier D MOA, how do you treat that?

GEN. COLE: Well, the sevier D MOA is a separate accounting, and in the sevier B numbers there is a certain number of sorties that perhaps do not go through Skull Valley, but come in through the southern part of Sevier D.

So that would basically be a wash as far as how many we count for Skull Valley.

MR. BARNETT: Gen. Jefferson, to make a comparison between your prediction as to the number of flights down Skull Valley, and the actual fiscal year 2001 numbers, can you account for the fact that the new F-16s were only assigned to Hill Air Force Base in the middle of fiscal year 2001?

GEN. JEFFERSON: Yes, that is relatively straightforward. The correction factor that we put in

for the 12 aircraft was 17.4 percent for a full year. These 12 aircraft were officially transferred on the first of April.

Anyway, the last two quarters, the last half of the fiscal year, so you simply use a factor of 8.7 percent, instead of 17.4 percent.

MR. BARNETT: And if you did that, what would your projected number be?

GEN. JEFFERSON: The projected number there would be 5,435 for sevier B.

MR. BARNETT: And how does that compare to the reported number?

GEN. JEFFERSON: That is about 8 percent higher, 5,435, compared to the actual 5,046 for sevier B.

MR. BARNETT: Now, assuming you had only used fiscal year 2000 data, as Lt. Col. Horstman contends you should, what number would you have projected for Skull Valley flights in fiscal year 2001, taking into account that the additional F-16s were only there for half of fiscal year 2001?

GEN. JEFFERSON: The sevier B data for fiscal year '00 was 5,757 flights. We had projected from that with 8.7 percent increase, 6,258. If we had done that, if we had used that methodology we would

have over-predicted the number of sorties by 1,212, or about 24 percent.

MR. BARNETT: Now, Lt. Col. Horstman also asserts that PFS should have used the combined number for both sevier B and sevier D MOAs for fiscal year 2000 in estimating flights.

Using that methodology how many flights would you predict for sevier B and sevier D in fiscal year 2001, and how does that compare to the actual flights in sevier B and sevier D for 2001?

GEN. JEFFERSON: The total flights for sevier B and D, for fiscal year '00 was 5,997. And, again, if we multiply that by the factor of 1.087, to account for the additional F-16s for half the year, we get an answer of 6,519.

That is the number of flights that if we used Lt. Col. Horstman's methodology we would have estimated for sevier B and D in fiscal year '01. The actual number of B & D flights was 5,366, so that would have been an over-projection of 1,153 sorties, or about 21 percent higher than the actual.

MR. BARNETT: Based on the fiscal year 2001 information, is there any reason for you to change your assessment?

GEN. JEFFERSON: No, I believe ours is

much more accurate, yet still conservative, high by about 7 or 8 percent.

MR. BARNETT: Col. Fly, in question and answer 39 of his pre-filed testimony, Lt. Col. Horstman described what he says are F-16 emergency procedures, and he states that: "In some situations, such as an engine fire, the pilot may be forced to immediately eject even if control of the aircraft is retained.

Would you have to eject automatically in the event of an engine fire?

MR. SOPER: Excuse me, the question mischaracterizes the testimony, if that is the intent of it.

MR. BARNETT: It is a quote.

MR. SOPER: He said may, and you said would have to.

MR. BARNETT: And I would like an answer to the question.

CHAIRMAN FARRAR: What was the -- you said question and answer 39?

MR. BARNETT: That is correct.

CHAIRMAN FARRAR: Which, well, however you phrased it, which I didn't catch, since I didn't know there was an objection coming. The pilot may be

forced to immediately eject, even if control of the aircraft is retained.

And given that that is what he said, what is your question?

MR. BARNETT: My question to Col. Fly is would you have to eject automatically in the event of an engine fire?

CHAIRMAN FARRAR: You may answer.

COL. FLY: And the answer is, no, you would not have to necessarily automatically eject with an engine fire. There are cases, the F-16 does not have a history of catching on fire, and blowing up immediately.

And there are cases, in fact in the Dash One there is discussion of a fire in the tailpipe section of the airplane, back in the nozzle region is what it is referred to.

And this is, typically, associated with an after burner operations, and the Dash One will tell you, in that case, you would want to come out of after burner, and it may take 30 to 45 seconds for the fire in the nozzle area to extinguish itself.

And then the engine, you may expect some damage to the art as a result of that, but the aircraft would, may very well be flyable, and you can

bring it back and land it.

In fact, there are reported cases where that has happened. And, again, the F-16 does not have a history of catching on fire and blowing up immediately, even if it is a sever fire, and you do wind up ejecting from it.

MR. BARNETT: Col. Fly, in question and answer 31 of his testimony, Lt. Col. Horstman asserts on the basis of a statement in an Air Force magazine, which was State exhibit 56, by F-16 manufacturer Lockheed Martin, that the leading cause of F-16 crashes is pilot failure, which allegedly accounts for 52 percent of all class A mishaps, while engine related mishaps only account for 36 percent of all class A mishaps.

Is that right?

CHAIRMAN FARRAR: Just so the record is clear, you said pilot failure, you meant pilot error?

MR. BARNETT: The word used in the article is pilot failure, or the phrase is pilot failure, Your Honor.

CHAIRMAN FARRAR: In the article?

MR. BARNETT: Yes.

CHAIRMAN FARRAR: In his testimony he says error. But just so the record is clear, that is fine.

COL. FLY: I think that brings up one of the problems with that statement. We don't know the basis for the term pilot failure, or what that means. It is not a term that is commonly used in the Air Force.

The term that we use, Your Honors, as you correctly referred to, is pilot error. We don't have any insight into the underlying data that Lockheed used in how they defined the term pilot failure. So we are not really sure what goes into that category.

But I think perhaps more importantly is that what we need to look at are the accidents that could reasonably be expected to happen within Skull Valley. It is those that are germane to our analysis as it pertains to the proposed PFSF.

For instance, if the pilot were to do something wrong, and as a result crashed the airplane on landing, an otherwise good airplane, that might be reflected in the Lockheed statistic of pilot failure, but would have no bearing on relative risk of that aircraft crash being to the proposed PFSF.

So our feeling was that as you go through the reports, you see that the high percentage of those likely to cause an accident would be engine failures, and that is not necessarily, in fact, a mechanical

failure of the engine is, by definition, not a pilot-induced problem that would account for the aircraft crashing.

JUDGE LAM: Can you explain to me, I understand the Air Force magazine is published by the Air Force Association. Can you gentlemen explain to me what type of organization is that?

COL. FLY: It is a private organization, I believe it is non-profit, I don't know that for sure. But it is a private organization founded by people who generally have an interest in the Air Force, and in supporting the Air Force. But it is not affiliated with the Air Force in any official capacity.

JUDGE LAM: So it is not a United States Air Force official publication?

COL. FLY: No, it is published by a private organization, as a private article, or private publication.

MR. BARNETT: Col. Fly, in question and answer 84 of his pre-filed testimony, Lt. Col. Horstman states as follows: Pilots making the g-awareness turns in Skull Valley, which apply 3 to 4 g on a pilot, if a pilot has not flown for a period of time, due to leave, injury, or another assignment, a

pilot may not be physically capable of sustaining a g-awareness turn, and could lose consciousness.

I have personally experienced this lack of ability to sustain G forces after a period of not flying, and it is a common experience among pilots.

Do you have experience instructing pilots on the effects of G-forces in flight?

COL. FLY: Yes, I do. I'm sorry, I was trying to write a note to myself. I hope I can read it. Yes, back in the early 1980s, as the F-16 was coming into the Air Force inventory as a new weapon system, and they were just really starting to get into the production of large numbers, so we were using it to replace, primarily, the F-4, but also the E-7, but it was still in its infancy in terms of the total Air Force buy.

I was assigned as an instructor pilot down at MacDill Air Force Base, which at the time was transitioning from an F-4 base to an F-16 base. And with the intent being that would become the primary F-16 training base for the Air Force, for a while, and then they activated Luke Air Force Base.

But, anyway, in this time frame, '81 to '83, when I was stationed at MacDill, MacDill was the primary training base for the F-16s, about the last

year that I was there I was an academic instructor.

And, again, to reiterate, this is the training base, where you take somebody who has not flown the F-16 and teach him how to fly it. So it is different from the flying that is done at Hill Air Force Base.

Our job is to train people to fly the airplane, and how to employ it in combat. About the last year that I was there I was the head of the air-to-air section for the academic squadron. So I flew and instructed as a pilot in the airplane, but I was also responsible for the air-to-air presentations that were given to each class as they came through, and there were a variety of different types of classes.

But there was a block of instruction on the physiological effects of high-G flight. And this became, really, a topic of great concern to the Air Force, with the introduction and the growth of the F-16, because it was capable of sustaining such high G-loads, and pulling such high G-loads, that we had started to experience this phenomena called G-LOC, G-induced loss of consciousness, which probably happened in other fighters before, but nowhere near with the propensity, or the potential devastation, because of the fact that the airplane was so maneuverable, and

because of lots of other reasons, it was able to sustain G-loadings that other airplanes were not.

So, anyway, I taught that as an academic instructor to all the different classes that came through during that time frame.

MR. BARNETT: Could you describe, briefly, what the effects on a pilot are of sustaining high G-forces?

COL. FLY: Well, the effects of high G-forces are -- well, first it is physically tiring. Second, it tends to pool your blood down toward your feet, basically. Just like the centrifugal force that keeps the water in a bucket, as you spin it on a rope.

The same thing happens to your body, the blood wants to go down to your feet, so that is why they have things like the anti-g suit, that is why they came up with this thing called the combat edge, which is, again, primarily as a result of the F-16, but is now used on other fighters, such as the F-15 and A-10, because of the high G-loading.

It is a pressure -- it is a vest you wear in flights, and it keeps pressure on the chest. It also has positive pressure into the -- through the mask, into your lungs, to try to keep the partial pressure of oxygen, and things, up high in the blood,

or in the lungs, to keep the oxygen content high enough in the body.

So the short answer, it is not a very short answer, but the body -- the blood wants to pool in the lower extremities. There are other phenomena associated with it, plus just the physical stress, and the tiring effects of sustained high G flight, and that can lead to periods of unconsciousness.

MR. BARNETT: What is the purpose of a G-awareness maneuver?

COL. FLY: The G-awareness maneuver was instituted back in the early '80s, as a warmup exercise. And it really kind of serves two purposes. One is, when you pull Gs, it kind of warms you up to pull more Gs.

So they designed the G-awareness maneuver at relatively low G-loads, to warm you up, so you can get ready for the rest of the mission. So that was kind of one purpose.

And then the other purpose was to see if you were having problems pulling Gs today that would adversely impact your plan scenario, or mission for the day. So it is really kind of a two-fold purpose for the G-awareness maneuver.

MR. BARNETT: Do you know of anyone who

has lost consciousness during a G-awareness maneuver at 3 to 4 Gs?

COL. FLY: No, I do not.

MR. BARNETT: Gen. Cole, do you have any information to add on the question of potential loss of consciousness during G-awareness maneuvers?

GEN. COLE: I do. As we looked at this issue we thought it appropriate to go to the experts, subject matter experts on this, the people that are charged with risk assessment, and accident prevention.

We sent a Freedom of Information Act request to the United States Air Force, specifically, to Air Combat Command, that was responded to by Col. Greg Alston, who was the chief of safety of Air Combat Command at that time.

In his 15 October '99 FOIA response, he stated that, basically, G-awareness maneuvers are not high risk. He discussed this with his staff, and he responded to us in writing, and that was the memo at Tab F of our aircraft crash report.

MR. BARNETT: Do you know whether he is aware of anyone who has lost consciousness in a G-awareness maneuver?

GEN. COLE: He was not. I also had telephone conversations with him, and I said, in your

experience, and he has extensive F-16 experience, and F-117 experience, and he was not aware of anyone that had lost consciousness in a G-awareness turn.

The purpose of a G-awareness turn is basically, in his words, a warmup, so that you are prepared, when you go into high-G air combat maneuvers.

MR. BARNETT: Col. Fly, in his testimony on the stand in May, Lt. Col. Horstman stated that independent of whether you had a ceiling due to weather in Skull Valley, if there were a scattered deck of clouds covering 25 percent of the sky beneath the pilot, then the pilot would not be able to see a site on the ground most of the time.

Do you agree with that?

COL. FLY: No, no, I don't.

MR. BARNETT: Now, do you recall his demonstration that he did with the Scrabble pieces, and the note pad?

COL. FLY: Yes, I do.

MR. BARNETT: Do you believe that displays the situation as you would see it if you were flying over Skull Valley?

COL. FLY: No, I think one of the -- one of the things you have to consider is layering of

clouds, and the vertical component of it. You can oftentimes fly underneath clouds, you can fly over them, you can fly around them.

So you need to kind of put it into a 3-D perspective, if you will, to get some appreciation for the impact, as well as the layering effect of clouds.

MR. BARNETT: Can you demonstrate that?

COL. FLY: Yes, I've prepared a demonstration.

MR. BARNETT: Your Honor, could we take a five minute break?

CHAIRMAN FARRAR: What is the demonstration going to look like, what do we need to do?

MR. BARNETT: It, Your Honor, it is going to be a -- I was thinking we could use that table over there, and we would just have, basically, a white piece of cardboard --

CHAIRMAN FARRAR: If it is not video, or anything --

MR. BARNETT: No, it is an actual physical demonstration.

CHAIRMAN FARRAR: All right. It is four minutes of, let's be back at 5 after.

(Whereupon, the above-entitled matter

went off the record at 9:56 a.m. and went back on the record at 10:06 a.m.)

CHAIRMAN FARRAR: All right, we are ready to resume. Go ahead, Mr. Barnett.

MR. BARNETT: Col. Fly, could you describe that, and what it shows?

COL. FLY: Yes. This is a white board that is two feet by four feet.

CHAIRMAN FARRAR: Off the record.

(Whereupon, the above-entitled matter went off the record at 10:07 a.m. and went back on the record at 10:11 a.m.)

CHAIRMAN FARRAR: All right. We are back on the record having fixed the microphone problems so go ahead, Colonel Fly.

COLONEL FLY: Yes, Your Honor. Describing the board, it's a two foot by four foot whiteboard. It has two pieces of ribbon laying across it. There's a small cloth triangle and small cloth rectangle laid on there. There are two different pieces of gray cardboard that are folded up that we can move around and do different things with.

Each one of these cardboard pieces that are on the plastic column is a six-by-eight. There are nine six-by-eights of this cloud covered and we

have two other sets of gray and a purple that are nine six-by-eights. Hopefully I did the math correctly and nine of any one color represents 25 percent of the surface area of the big whiteboard. That was the intent just to make it with the scale perspective to show the accurate representation of the proportion of whiteboard covered by the different clouds that are simulated clouds if you will.

CHAIRMAN FARRAR: Each of the clouds is on a clear plastic column of which you have a large number on there. That's just to be able to put --

COLONEL FLY: -- the other colors on, yes sir.

CHAIRMAN FARRAR: -- at a particular height different from its neighbors.

COLONEL FLY: Yes, Your Honor. I hope there is a total 27 different columns so we will be able to get to 75 percent cloud cover. There were last night. We also have our -- of sixteen. The intent here is just to show you the different perspectives in how you can maintain some orientation as well which we will talk a little bit more about without necessarily having to see everything.

For instance, depending on what altitude you wanted to call this lowest series of clouds the

pilots may be able to operate free and clear up to about these clouds (Witness indicating.) without any problem. You can see with this sort of a distribution you can quite easily operate co-level, co-altitude with the clouds and just see around if that's what you wanted. Or if necessary you could get up above the clouds if that's what your plan was and you would still see the different things.

For instance, Your Honor, I don't know if you want to look at the board as we go through this but as you fly through an area different things will be available, seen and not seen. For instance, right here where I have the airplane (Witness indicating.) and I'm showing probably a foot and a half above in one quarter of it, the rectangular piece of cloth is not visible. As the airplane moves just a little bit I just moved it a quarter moved forward and I would guess six or eight inches now you can see it again. It all has to do with perspective and relative lines of sight and those types of things. This is what it would look like with 25 percent from the straight top of the surface area covered.

MR. TURK: May I ask for one clarification? The index cards are six inches by eight inches or five by eight? Because when I

multiply six inches by eight inches I get 432 square inches which is 3/8ths of the area, 2.375 of the two-by-four.

(Witness measuring.)

COLONEL FLY: Six-by-eight. I'll do the math for you real quick if you would like.

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

CHAIRMAN FARRAR: Yes. Off the record.

(Whereupon, the foregoing matter went off the record at 10:16 p.m. and went back on the record at 10:18 p.m.)

CHAIRMAN FARRAR: We're back on the record. Mr. Turk, could you made that suggestion on the record? Was your question on the record, do you recall?

MR. TURK: I believe I did. But I would note that my personal observation of that board looks like it's about three feet on the port side.

CHAIRMAN FARRAR: We've measured the cards that represent the clouds and they are in fact six-by-eight. There are nine of them. If the board is now appears to be three feet by four feet everyone agrees that it comes out to the 25 percent coverage that was represented at the beginning. Go ahead, Colonel Fly.

Thank you for that observation, Mr. Turk. We will reconnect your microphone. (Laughter.)

MR. TURK: I apologize for that interruption.

CHAIRMAN FARRAR: No, it's fine. I'm glad you thought it earlier. I would rather do it now than later.

COLONEL FLY: So anyway, Your Honor, that starts to give a perspective of what it looks like with a 25 percent cloud cover from different angles as well whether you are straight on top or down looking at from the side or completely underneath. I would now like to go to a 50 percent Hopefully it will just take a moment.

MR. SOPER: Before we change the set-up could I just note for the record that none of the clouds have any vertical development. They are approximately a sixteenth of an inch thick or the thickness of a thick piece of paper.

COLONEL FLY: (Off microphone.) It's a heavy piece of construction paper. You're right.

(Pause.)

JUDGE LAM: Colonel Fly, the two pieces of black paper standing on this edge on the end, are these the mountains or what are they?

COLONEL FLY: Your Honor, those are just intended to represent vertical development. You could consider them mountains. They could be small hills. You could scale your clouds according to say this is for instance the cedars and you could say that this would be about this high in terms of cloud cover. If you took that away then that gives you a different scale in terms of how high are the clouds if you associate different scales with the vertical development.

JUDGE LAM: Okay.

CHAIRMAN FARRAR: Colonel Fly, just so the record is clear, your vertical plastic columns on which you're stacking the representations of the clouds look like they are anywhere from two to four little plastic gizmos stacked on top of one another.

COLONEL FLY: That is correct, Your Honor.

CHAIRMAN FARRAR: So again that's just by saying that the sum of the so-called clouds are twice as high as others and so forth.

COLONEL FLY: That's correct, yes. There is a small washer on the bottom of some of them just to give them some weight. You have two of them with weight about four and a half inches high. (Witness measuring.)

CHAIRMAN FARRAR: So you have two, three or four stacked together.

COLONEL FLY: So they are evenly distributed, nine of each. So to give you 50 percent cover again as you walk around from different areas you can take a look at it. You can see that you still have some general idea of where things are even though looking at it straight from the top 50 percent of the ground is covered. You start to get some sense of slant looking through it from where I am off to one side. I can see both pieces of the cloth that were on there. If I move to a different position I can see one and part of another. Much of it has to do with where are you relative to the clouds and the things on the ground.

CHAIRMAN FARRAR: Does Counsel want to stand around there and do the little tour that Colonel Fly just suggested? We will join you.

JUDGE LAM: Colonel Fly, do you intend to demonstrate even at 50 percent cloud cover there is still visibility left? Is that what you intend?

COLONEL FLY: Your Honor, yes. We're attempting to show that. The straight answer is yes. To expand a little on that and we'll get into it, you'll see on the 75 percent the ground cover with

some vision contact with different peoples of the ground. You'll start to gain an appreciation if I see this and this. For instance just this gray intersection based on that you can now say I know that half a mile north and two miles to the west is such and such from this road intersection.

JUDGE LAM: So you will go to 75 percent.

COLONEL FLY: Yes, Your Honor.

MR. TURK: What happens as the plane is moving?

COLONEL FLY: As the plane is moving assuming he is operating at an altitude where at least some of the clouds are below him if not all, then he will start to seek pieces, different parts of the roads, different parts of the cultural features such as buildings or other terrain features such as hills and mountains. They will start to come in and out of view to update him as to where he is physically at this moment.

MR. BARNETT: Colonel Fly, could you compare that demonstration to what you have with what those scrabble tiles look like on the note pad?

COLONEL FLY: I'm not sure if I understand your question correctly. The previous demonstration showed the scrabble tiles all on the scrabble board or

whatever the notepad whatever the surface was. So there was no sense of layering or perspective and opportunities to actually see through clouds at different perspectives because most of them were generally clumped together and sitting on the surface if you will so there is no opportunity to see anything ever below it regardless of your perspective.

By raising the clouds some assuming it's not a ground fog, then you wind up with the opportunity to see things at different perspectives based on your altitude, the altitude of clouds, the extent of the layering and relative position with various things that you would want to see or could possibly see on the ground.

MR. BARNETT: In terms of seeing things on the ground or not seeing things on the ground, is there a difference between being far away from that and being close up to it? From a perspective of somebody say flying in among or over that if you were to see something far from it say you were far above it, would there be a difference between being there and being closer to the tops of the highest clouds that you have there?

COLONEL FLY: It's all relational. I'm not sure I'm fully grasping the question. But it's a

relationship of sight ranges and look angles and also how big of a thing does it obscure. Overhead, right in front of your eye, you can't see a thing but move your hand back right here and I can see Mr. Turk just fine because of the difference in the perspective. (Witness indicating.) I don't know if that answers your question or not.

MR. BARNETT: I was just asking about how you would see things differently whether for example you were flying and you had your model airplane up near the ceiling of the room relative to what you would see if you were a few inches over the tops of the paper.

COLONEL FLY: Okay. That would give more of the total outlook. If you are very high above the clouds what you are seeing is going to be much more near vertical as opposed to where I'm standing which is probably three or four feet from the board. I'm looking at even though it's two or three feet below my eyesight, I can see lots of ground because of the look through angle versus the look down. I'm not sure if I'm answering the question you're trying to get to or not. Okay then. That's what it looks like with 50 percent and now I'll get the 75 percent up.

MR. SOPER: Could I have the record note

that when the clouds were added for the 50 percent coverage don't have any vertical development? It's again flat pieces of paper.

CHAIRMAN FARRAR: Yes, Mr. Soper. Apparently the set being added to make up 75 percent is the same. The standard thin paper board.

(Pause.)

COLONEL FLY: Your Honor, I've added the last nine of the pieces of paper so 75 percent of the surface area if you are looking at it from the top would be covered. Again if you come and look at it again from different perspectives you can still see the road structure which would give you indications of relative positions to where things are. You can see depending on where you stand the square piece, the triangular piece even though it's basically directly underneath the clouds. You still have an opportunity these things as you progress through the valley at different altitudes combinations.

MR. BARNETT: Colonel Fly, based on your experience of flying in Utah, what were your recollections of how thick the clouds tended to be? The cloud layers?

COLONEL FLY: The cloud cover out in Utah and other Western states that I've flown are

relatively and I don't want to use the word thin because that has meteorological implications that say you can live through it but not that thick I guess is a way of saying it as opposed to the Southeast where I live. You get these towering things this time of year that are really deep. They tend to be not that thick. Although on occasion you will start to get some of the thicker clouds that get real built up.

My experience was that the really extensive thick clouds tend to be associated primarily not exclusively with the bad weather in terms of the December-January timeframe when it's not uncommon to start to reduce the flying schedule because of the weather out over the range.

That's what it looks like with 75 percent and you can still see. But you have the road structure. It's those types of things that allow you to maintain an awareness as to where you are, what you can see and not see in relation to positions of things. That's in fact the way that pilots fly and think at least fighter pilots do. Some people argue they don't think at all but that's a totally separate conversation.

If you needed now to try to bring a sense of what would the road structure look like in Skull

Valley, I would take this --

CHAIRMAN FARRAR: "This" meaning the ribbon that formed one of the crossroads.

COLONEL FLY: Yes, Your Honor.

(Pause.)

MR. SOPER: Can I ask that the record reflect that the width of the piece of ribbon that's been laid down here I think to reflect an interstate highway or something?

COLONEL FLY: It's a little over half an inch.

CHAIRMAN FARRAR: The ribbons I take it would now represent Skull Valley Road and the access road.

COLONEL FLY: Yes, Your Honor. The Skull Valley access road from this way. You would have the rails from the other side which would again if you think to your days in your flying to Salt Lake City you probably looked down and you saw roads and you saw railroads and you saw all those kinds of features. Roads are not that difficult to see from 20,000 feet. So at 10,000 feet it should be easier and from 5,000 feet quite simple. But the intent here --

CHAIRMAN FARRAR: Do you know what the access road from Skull Valley Road will be made of?

COLONEL FLY: Your Honor, I do not. I can get that for you.

CHAIRMAN FARRAR: Well, we'll get it. Mr. Donnell, consider yourself still on earth. What is it?

MR. DONNELL: It's a paved road.

CHAIRMAN FARRAR: Okay. In case the reporter didn't pick that up, Mr. Donnell indicated that it's a paved road.

MR. SOPER: Is that concrete or blacktop paving or what sort of material?

MR. DONNELL: I believe it's an asphalt paved road.

MR. SOPER: Asphalt. Thank you.

MR. TURK: Is the central ribbon the railroad?

COLONEL FLY: No, the central ribbon in this case would be the Skull Valley Road. The railroad would be off on the side and it comes up and approaches the facility from the left side. Then on the other side of the facility you have the access road that runs from the facility to the Skull Valley Road so it forms a U if you will at that point.

MR. TURK: The ribbon that ends into an L is the railroad then.

COLONEL FLY: Yes, the bent portion is railroad over here. Then from this little portion from the cloth over that couple of inches would be the access road.

MR. BARNETT: Colonel Fly, is that a literal representation to scale of what Skull Valley looks like?

COLONEL FLY: No, this was notional. The real idea of the intent of this demonstration was to show how cloud cover even at 75 percent does not preclude you from understanding where you are and relative positions of different things whether or not you can specifically see this thing right now.

As we've shown from the various amounts of cloud cover even 25 percent there are times when your relevant looking will preclude you from seeing a specific sight but that doesn't preclude you from knowing that right underneath although I can't see it I know right there underneath that gray cloud or whatever you call it is where that rectangular piece of cloth is. I know that. I can use the road structure and what little I can see of it with 75 percent cloud cover to know that.

MR. BARNETT: Colonel Fly, what if you had a case where you had total cloud cover and you were

flying over it, how would you know where you were?

COLONEL FLY: You discussed this actually. It's in the testimony. But you have an onboard navigation system. Primarily the one that you would be relying on would be the Initial Navigation System coupled with the Global Positioning System or the GPS.

To back up and set the stage, you're not just going to magically appear over Skull Valley in an F-16 at 10,000 feet. You have to take off first. Before you ever take off you have to do some mission planning: where am I going today, what is my route of flight going to be, what will my activities be, etc., that whole drill that Lieutenant Colonel Horstman discussed.

One of the things he would do is on his route of flight he would pick different turnpoints. As an example only and I'm now pointing to a large blow up of a Skull Valley map that's on a foam cord board that was used in Salt Lake City at both the other hearings is an example.

I'm doing this for ease of viewing as well as anything else. If you took this road intersection which is a T intersection up at the northern section of the Sevier B and D where Skull Valley Road is running north-south and then there's this road that

comes off running west but if you took that T intersection as one of your turnpoints and you took down basically a B Dugway Village about in the center of that narrow mark there's a road bend.

If that were your second turnpoint what you would do as part of your mission preparation you would circle the point of your turns. You would draw a line that connects the two of them. Then you would figure out what's a heading from point one and point two and what's the distance. You would mark that on your map.

Again I haven't measured any of this but sake of discussing it, it looks like about a 170 degree heading. You would be able to set up your cockpit instruments so that you would know your bearing to this turnpoint down at the south that we discussed. You would know your distance in terms of miles from it as well.

You would have another instrument that's described as the RAI that talks about the horizontal situation indicator that would have a line on it. If you would point it directly on that turnpoint that's a 170 bearing from you, you are going to have a straight line on this instrument.

If it's not, if you are displaced one way

or another, then that line will displace accordingly. You can look at it on your internal instruments and say I'm to the left or to the right of that course line that connects those two turnpoints. So that gives you a relative left-right if you will of my course actual versus what I thought it was.

So if you start to now think about the picture here with the notional cloud representations and our ability with different amounts of cloud cover that we just demonstrated to still see things on the ground, that sort of mentally blocking out 25 percent of that area, you still have in your cockpit this map looking like this with the circles and the lines connecting them and the distance hatch marks on the line you can start coming out 25 percent and say what will I be able to see and what would I not be able to see. Where would Michael Army Air Field be? Where would this be and where are these different things? It's part of the mission prep to start to figure this whole thing out in terms of what can I expect to see.

If I had flown through Skull Valley or some other training area before, then it's going to be even easier for me to know that because I know where these different things are and what they look like. Obviously if I have flown down Skull Valley once or

twice a week for the last two years, I will be fairly familiar with what little things are out there and I think as we've all discussed it's not a whole lot.

But now as you start getting to that 25, 50 and 75 percent cloud coverage you still have these onboard system. You still have this knowledge in your head of where am I. What am I doing? What's next?

Finally if you were to flip this board over, you have complete cloud cover. I can't see a thing on the ground. I would still have my map with the circle up here, the circle down here. I would know based on my instruments how far away I was from that. I would know if I were left or right of the course. I would know in that case we talked about even though nothing is depicted on this white piece of paper. That's the position of that dot at the north. There is a circle to the south. PFSF would be about here. Michael Army Air Field would be about here. The Great Salt Lake would be about there.

So I know these things even though I can't see anything. Now if you would flip it over, you would see that my estimation is certainly at least ballpark in terms of where those different things were or are. So that's the other thing that I think is important that when we have this conversation about

what you can see or what can you not see on the ground is that we put it in the context of what do you normally see, what mission preparation does the pilot go through to prepare for today's mission.

He's not going to magically appear here with 50 or 75 or complete overcast and no idea how he got there or where he is right now. It's a process that goes on and he updates himself continuously just like when you drive your car. You know where you are. You know you want to go to the grocery store. You know you go down to Maple and you turn right. As you approach the stop light, you know you're going to turn right whether you can see the grocery store or not. You know how to get there or about where it is.

MR. BARNETT: Your Honor, at this point we'd like to call Mr. Vigeant on the phone.

CHAIRMAN FARRAR: We'll go off the record.

(Whereupon, the proceedings went off the record at 10:45 a.m. and resumed at 10:46 a.m.)

CHAIRMAN FARRAR: Back on the record.

MR. BARNETT: One more question. If you were to suffer an engine failure, those instruments that you were talking about, would they still work?

COLONEL FLY: Your inertial navigation system would still show you the relative bearing and

the distance to that selected turn point that was out in front of you, yes.

MR. BARNETT: Your Honor, we're handing out a document to be marked as the latest PFS exhibit in this series, which I believe is 245.

CHAIRMAN FARRAR: All right, that will be marked for identification.

[Whereupon, the above-referred-to document was marked as PFS Exhibit 245 for identification.]

MR. BARNETT: Is Mr. Vigeant on the phone?

CHAIRMAN FARRAR: Mr. Vigeant?

MR. VIGEANT: Yes, I'm here.

CHAIRMAN FARRAR: Yes, this is Mike Farrar, the Chairman of the Licensing Board. If I recall correctly, after a long delay, you finally got to testify in Salt Lake City at some point.

MR. VIGEANT: That's correct.

CHAIRMAN FARRAR: And you were under oath then, if you will recall. Consider yourself still under oath at this point.

MR. VIGEANT: Okay.

CHAIRMAN FARRAR: We're on a speaker phone here at our headquarters hearing room with three

gentlemen from a military panel who have been testifying, and counsel for the three parties are in the room, as are a number of spectators.

MR. VIGEANT: Okay.

WHEREUPON,

STEVE VIGEANT

having been previously duly sworn, resumed the witness stand (by telephone), was examined and testified as follows:

DIRECT EXAMINATION BY MR. BARNETT

MR. BARNETT: Steve, this is Sean Barnett. Can you hear me?

MR. VIGEANT: Yes, I can, Sean.

MR. BARNETT: Okay. Do you have any cloud-layering data for a location near Skull Valley?

MR. VIGEANT: Yes, we have collected surface weather observations from Salt Lake City International Airport for the calendar year 2001.

MR. BARNETT: Do you have a copy of that with you?

MR. VIGEANT: Yes, I do.

MR. BARNETT: Could you describe it? And, Your Honor, this is the document that I just handed out.

CHAIRMAN FARRAR: Right.

MR. VIGEANT: Sure. This document contains data summarized from hourly observations obtained for Salt Lake City from a publicly-available database from the National Climatic Data Center. The observations that were taken from this database are basically the sky condition for each observation hour.

The table presents hourly sky condition observations for three days per month, the 5th, the 15th, and the 25th, and for three times of day, at 9:00 a.m., 3:00 p.m., and 9:00 p.m. The information presented gives the amount of cloud cover at various layers, and it also includes the altitude of each cloud layer.

MR. BARNETT: Could you explain the abbreviations that are next the numbers in each of the entries?

MR. VIGEANT: Yes. The abbreviations have to do with the amount of cloud cover. The abbreviation of SKC means it's a clear sky. There are no clouds present. The designation FEW means that the cloud coverage is less than or equal to two-eighths of the sky. The SCT acronym refers to scattered clouds, which corresponds to a coverage of three-eighths to four-eighths cloud cover. The BKN refers to broken clouds, and that corresponds to coverage of five-

eighths to seven-eighths. The OVC refers to an overcast, which is total coverage or eight-eighths. The designation of VV refers to vertical visibility in cases where there is an obscuration such as fog. That just means the vertical visibility into the obscuration.

MR. BARNETT: Now I see an abbreviation CLR on this table in some places. What does that mean?

MR. VIGEANT: In some cases the CLR is another way of expressing a clear sky.

MR. BARNETT: And if you have a case where there are multiple abbreviations and numbers in one entry, for example, on the 15 January '01, and in each hourly entry there are multiple abbreviations and numbers, what do those mean?

MR. VIGEANT: As I said before, the letters refer to the amount of cloud cover, such as SCT, scattered. The numbers, those three-digit numbers refer to the altitude of the cloud layer in hundreds of feet. So you would basically add two zeroes to the number.

So, for example, at the first hour, 9:00 a.m., on January 15th, you would have scattered clouds of 2,500 feet, scattered at 8,500 feet, and broken

clouds at 20,000 feet. Each cloud cover designation is cumulative in that the cloud cover at a given layer includes any cloud cover at a lower layer.

MR. BARNETT: How does the weather at Salt Lake City generally compare with the weather at Michael Army Airfield?

MR. VIGEANT: Based on the climatological data, the cloud cover at Michael Army Airfield tends to be slightly better than that at Salt Lake City in that the frequency of occurrence of ceiling is less and the frequency of various higher ceilings is greater. So, therefore, overall, the sky condition is slightly better at Michael Army Airfield.

MR. BARNETT: Would the weather at Michael Army Airfield be representative of what you would see at Skull Valley?

MR. VIGEANT: Yes, it wold.

MR. BARNETT: When you collected your data, why did you collect it from a Salt Lake City source?

MR. VIGEANT: Salt Lake City was the closest available station that had the archived data available for the year 2000 in terms of providing the layered cloud cover information.

MR. BARNETT: You said, "2000." Was that

2001?

MR. VIGEANT: 2001, I'm sorry.

MR. BARNETT: Colonel Fly, do you have a copy of this in front of you?

COLONEL FLY: Yes, I do.

MR. BARNETT: If you look at this data, what does it show with respect to the occurrence of cloud layers?

COLONEL FLY: What it shows basically is that for the altitudes that the F-16s at Hill Air Force Base typically fly through Skull Valley the weather is pretty good, and clouds are not really a factor. If you flip to the last page, there's a sheet called, "Salt Lake City Cloud Cover Analysis 2001." If you look at the cloud cover, the observations with clouds reported at or below 5,000 feet AGL, and go through and count them, you will see that cloud cover was recorded as few, 4 percent -- I'm sorry, four observations of few, six observations of scattered, three observations of broken, and the ten for the overcast condition. So out of the 108 observations, only 23 had any clouds reported below 5,000 feet, which would correspond, if you will, to the severe Bee-MOA in terms of altitude, given the condition that Mr. Vigeant put on that historically the weather at

Michael is better than at Salt Lake City.

Then if you look at cloud-layering for cloud observations with the clouds greater than 5,000 feet and less than or equal to 14,000 feet, you can see the columns there tell you there are 21 were there are few, 18 where they are scattered, 14 where they're broken, and 11 where there were overcast conditions.

It is possible to at this point start to double-count, if you're not careful because you can line with a condition, if we look at, say, the 15 January nine o'clock local standard time listing on the front page, you'll see that there's a scattered condition reported at 2,500 feet and a scattered condition reported at 8,500 feet. So that one observation would be reflected in the tabulation sheet, on the last sheet, as a scattered condition both for the 5,000 feet and a scattered condition for the greater than 5,000, less than 14,000. So you would wind up with that one observation being reflected in both those different altitude bands.

Conversely, just to try to make sure there's no confusion, if you look at the very first one, there is a broken condition at 600 feet, an overcast condition at 1,100 feet. That's only reflected one time. You show the presence of cloud,

and you take the worst observation, which would be the overcast condition. So we reflected that as one overcast condition observation in the less than or equal to 5,000 feet.

So what this gives, first, it gives you a sense of the typical cloud coverage and the layering effect that we started to talk about here with the board demonstration, and we try to take not just the ceiling into consideration, but also some idea of what is the cloud layering because that has an awful lot to do with it as well.

MR. BARNETT: So when you looked at all these observations, how often did you see no clouds below 5,000 feet?

COLONEL FLY: That was 85 out of the 108 observations. So that would be roughly 79 percent of the observations there were no clouds shown or reported.

MR. BARNETT: How often did you see no clouds below 14,000 feet?

COLONEL FLY: That was a total of 31 observations or roughly 29 percent.

MR. BARNETT: And when you set up this table with the dates and the times, how did you pick the dates of the month and the times of the day?

COLONEL FLY: Well, what we wanted to do was pick three days -- we were just trying to build enough datapoints that it would give us a sense or flavor for what to reasonably expect. So we thought that three days a month would start to do that. We wanted to pick them relatively evenly-spaced throughout the month, so that we didn't wind up with some unusual bias that we wouldn't know about, maybe -- I can't think of what it would be, but we were trying to evenly space it is what it boiled down to. Thirty days in most months, so we thought that 10 days between observations was reasonable.

Then we picked the times, 9:00, 15:00, and 21:00 local, because those are times when we could reasonably expect to have F-16s airborne from Hill Air Force Base using the range. The 21:00 kind of depended on whether you are talking about the winter or the summer. It has to do with, because it is as far north as it is, the sun goes down fairly late during the summer months in Utah. But we tried to pick times when we thought you could reasonably expect airplanes would be airborne, just, again, to get a sense of what is the cloud-layering like out there.

MR. BARNETT: Now if you had a case, one of these cases in the table where you had multiple

layers of clouds, would that be something -- would it be possible to fly between layers of clouds?

COLONEL FLY: The answer is it might be possible. There are conditions when it would not be possible. There are conditions when it would be possible.

For instance, if you look at the 15 January nine o'clock listing, there's a scattered condition listed at 2,500 feet; there's a scattered condition listed at 8,500 feet. So there's roughly 6,000 feet between those two cloud -- the reported basis of those clouds. That would generally be enough airspace that you could maneuver VFR, visual flight rules, maintaining all the requisite cloud clearances and operate legally without any problem. But if you took that up one more step, you see that you've got the broken condition at 20,000 feet. So that gives you 11,000 feet vertically there that you could operate.

As we saw during the demonstration, with some of the lower concentrations of clouds, like 25 percent, it's conceivable you can operate co-altitude with the clouds and still be perfectly legal as long as you maintain your required cloud clearances. But in terms of operating between those different types of

clouds, here's a case where that would work.

Now if you look over at the 1,500 local on the 15th of January, you've got few at 4,500 and a scattered condition at 6,500 feet. So that's only 2,000 feet. You may not be able to operate between those, although you need to look at and realize that few is up to and no greater than 2H cloud coverage.

But there's a case where the clouds conceivably could be close enough together that you can't operate between them. So, as you look through, you'll see different conditions where you might have two broken conditions reported at a thousand or 2,000 feet separation. That would not be a place you would reasonably expect to go fly the plane. But in many of these where you've got thousands of feet or tens of thousands of feet, you could quite easily do that.

MR. BARNETT: Your Honor, at this point I would move for the admission of this exhibit.

CHAIRMAN FARRAR: Mr. Soper?

MR. SOPER: I'd like to ask a few questions about it, if I may, Your Honor.

CHAIRMAN FARRAR: Go ahead.

VOIR DIRE EXAMINATION BY MR. SOPER

MR. SOPER: Colonel Fly, there's no visibility information that I see on here. Was that

information available?

COLONEL FLY: I don't know. I did not gather the data. We were looking at cloud-layering. We have information on visibility available in a report. I will be happy to pull those numbers out for you.

MR. SOPER: You did not gather this data?

COLONEL FLY: Mr. Vigeant supplied the data. He's the --

MR. SOPER: Is he still on the phone now?

MR. VIGEANT: Yes, I am.

MR. SOPER: Where did you physically get this data?

MR. VIGEANT: The data were obtained from the National Climatic Data Center website.

MR. SOPER: Did you obtain it from the website personally?

MR. VIGEANT: Yes, I did.

MR. SOPER: And there's visibility information available there?

MR. VIGEANT: That is one of the parameters that is available from this database of surface observations.

MR. SOPER: Why doesn't that appear on this chart?

MR. VIGEANT: We selected the data to address examples of cloud-layering. We did not choose to include visibility.

MR. SOPER: That's an important factor, is it not?

MR. VIGEANT: The objective was primarily to show examples of how cloud cover and ceiling are made up oftentimes of multiple layers, and that was the thrust of this exercise.

MR. SOPER: Did someone instruct you not to include visibility information on there?

MR. VIGEANT: No, nobody did.

MR. SOPER: That was your choice?

MR. VIGEANT: That was my choice in consultation with Colonel Fly in terms of interest in showing examples of cloud-layering.

MR. SOPER: So you personally, then, prepared this chart that we have here that's marked Exhibit 245, is that correct?

MR. VIGEANT: Yes, I extracted the cloud information from the climatological database and inserted it into a spreadsheet, that's correct.

MR. SOPER: And is this your work that we're seeing here then, this 245, or did someone else prepare this table?

MR. VIGEANT: Which table is that?

MR. SOPER: Two forty-five.

MR. BARNETT: Steve, it's the one that you have in front of you.

CHAIRMAN FARRAR: It's marked 245, has an Exhibit No. of 245, but it's your Salt Lake City weather observations, 2001.

MR. VIGEANT: Yes, I prepared the spreadsheet.

MR. SOPER: Okay, and what about the notes following the spreadsheet? Are those your notes on page 2?

MR. VIGEANT: The notes are, yes, yes, those are my notes in consultation with Colonel Fly.

MR. SOPER: Did you type these notes out yourself?

MR. VIGEANT: I did not type them out myself. I believe Colonel Fly did, and I reviewed them.

MR. SOPER: And what about page 3, the calculations, is this a page that you prepared?

MR. VIGEANT: Colonel Fly and I basically prepared this together.

MR. SOPER: Well, which of you actually did it?

MR. VIGEANT: Colonel Fly set up the table, and then I reviewed the information.

MR. SOPER: Now I take it that information was available for every single day of 2001, was it not?

MR. VIGEANT: That's correct.

MR. SOPER: And why was it that you selected only three days a month?

MR. VIGEANT: We were just trying to show examples of cloud-layering without getting overly consumed by detail in terms of the numbers of observations. It would be an intractable amount of data to summarize in this fashion.

MR. SOPER: Did you run any other percentages of observations for the back sheet other than these three observations that are shown here?

MR. VIGEANT: No, I did not.

MR. SOPER: Colonel Fly, did you?

COLONEL FLY: Could you repeat the question, please?

MR. SOPER: Did you run any calculations based on data other than the three days a month that are shown on --

COLONEL FLY: No, we just used the three days a month, the three observations per day.

MR. SOPER: Okay, and who selected the three observations, three times?

COLONEL FLY: The number three or the times?

MR. SOPER: The 09:00, the 15:00, and 21:00.

COLONEL FLY: That was my recommendation.

MR. SOPER: What observations during the day, what times were available, Mr. Vigeant?

MR. VIGEANT: Twenty-four hours are available.

MR. SOPER: So you selected three of the twenty-four data observations and 36 days out of the 365 days available for 2001? Does that summarize what you did?

MR. VIGEANT: That's correct.

CHAIRMAN FARRAR: Mr. Vigeant, this is Mike Farrar.

When he said what's available, you said 24 hours. You mean 24 separate hour observations?

MR. VIGEANT: That's correct.

CHAIRMAN FARRAR: Okay.

MR. SOPER: Mr. Vigeant, are you aware that the cloud conditions are generally lowest around sunrise?

MR. VIGEANT: I don't know that for sure.

MR. SOPER: And are you aware that night training occurs after dark, which would be after nine o'clock in the summer?

MR. VIGEANT: I'm not precisely, have precise knowledge of the timing of the operations.

MR. SOPER: Well, Your Honor, based on what I know about this, this seems to be prejudicial in that it's selected data, and the State would object to it.

MR. BARNETT: Your Honor, I think the witnesses --

CHAIRMAN FARRAR: Let me ask Mr. Vigeant a question or two before you respond, Mr. Barnett.

Mr. Vigeant, I'm going to make sure the Board understands this. When you decided to pick three days a month, the 5th, 15th, and 25th, had you reviewed the data before you did that or did you just say, well, we've got to take a certain number of days every month; we don't want to do 365 days, so let's just pick these three; they sound good, before you looked at any data?

MR. VIGEANT: Yes, that's correct. The decision was made just to select samples for presentation purposes. So that decision was made

before collecting the data.

CHAIRMAN FARRAR: And the same thing with the times of day, before you looked at any data?

MR. VIGEANT: That's correct.

CHAIRMAN FARRAR: Quite apart from whether the times of day -- in other words, can I safely assume that weather on days of the month is random? I mean, if I pick the 6th of every month, there's no factor that's going to make that different from the 5th of every month as a meteorological matter, right?

MR. VIGEANT: Yes, generally speaking, it's fairly random in that you cannot expect a pattern per se from the same day per month. It's a variable.

CHAIRMAN FARRAR: Right, but in terms of Mr. Soper's question on time of day, that would not be random? In other words, any particular city we're looking at, people who live there would know that the cloud cover or the weather at a certain time of that day, a certain time of day, will not be random? Correct?

MR. VIGEANT: It's probably not random, but neither is it very predictable in terms of cloud cover is very much a function of a synoptic condition at the time, meaning what the weather patterns are like, and that's a variable. Clouds can come and go

throughout the day depending on the synoptic condition.

CHAIRMAN FARRAR: Synoptic meaning?

MR. VIGEANT: Synoptic meaning basically looking at a weather map, looking at the highs and lows and fronts, and so forth.

CHAIRMAN FARRAR: Okay, with that further background, Mr. Barnett, go ahead with your response to the objection.

MR. BARNETT: Your Honor, I don't think -- or, first of all, the witnesses have explained the basis for their selection of the data, and I don't think there's anything to show that they biased it in favor of good weather or bad weather or otherwise. As Mr. Vigeant explained, they were just trying to get a representative sample of times during the year, and as Colonel Fly explained, they picked the hours of the day to get a spread, a representative set of what you would see when the F-16s would be flying in Skull Valley.

CHAIRMAN FARRAR: Ms. Marco?

MS. MARCO: The staff has no objection to the admission of it, and it does seem to be a representative sampling of the various datasets.

JUDGE LAM: Colonel Fly, do you know how

sensitive these datas are relative to the different times of the day and different dates of the year?

COLONEL FLY: The short answer is, no, Your Honor, I have never done an analysis like that. We picked three evenly-spaced days throughout the month at three times when you could reasonably expect, spaced throughout the day, you could expect to have F-16s airborne. We're just trying to get a flavor for what's typical, what's reasonable, what can you expect. I've never done an analysis based on time. I mean, this is the analysis, and we went into it just trying to pick reasonable times reasonably spaced throughout the year.

CHAIRMAN FARRAR: Colonel Fly, you have significant experience in the Salt Lake City area, correct?

COLONEL FLY: I was there for about a year, sir.

CHAIRMAN FARRAR: Okay, Mr. Vigeant, I can't remember your background offhand. You're not from Salt Lake City, are you?

MR. VIGEANT: That's correct.

CHAIRMAN FARRAR: You are from where?

MR. VIGEANT: I'm from Massachusetts.

CHAIRMAN FARRAR: Mr. Soper, do you want

to respond to the response to your objection?

MR. SOPER: I don't have anything further to add, Your Honor. Thank you.

CHAIRMAN FARRAR: Okay.

MR. BARNETT: Your Honor, I might also add that if there's any question of the variability of the data within the day, that that would go to the weight that the evidence should be given, rather than whether or not it's admissible.

CHAIRMAN FARRAR: All right, give us a minute here.

(Judges confer.)

CHAIRMAN FARRAR: We think there's sufficient avoidance of preselection, any methodical preselection, so this would not disqualify this document. So we will admit it over the State's objection.

[Whereupon, the above-referred-to document marked as PFS Exhibit 245 for identification was received in evidence.]

CHAIRMAN FARRAR: Mr. Barnett, do you still need Mr. Vigeant?

MR. BARNETT: Your Honor, I have, yes, I have one more question for Mr. Vigeant, and I might as

well go to it now. It would be more convenient.

CONTINUED DIRECT EXAMINATION BY MR. BARNETT

MR. BARNETT: In Question 60 of his testimony, Lieutenant Colonel Horstman asserts that, in addition to cloud cover, when conditions are otherwise clear, ground fog could conceal the PFS facility. Mr. Vigeant, how often does ground fog occur in the Skull Valley area?

MR. VIGEANT: Well, according to the same database that was used to provide the information on the frequency of occurrence of cloud ceiling and ceiling height, the frequency of occurrence is 2.5 percent of the hourly observations on an annual basis.

MR. BARNETT: And is ground fog something that persists throughout the day or does its presence depend in any way on the hour of the day?

MR. VIGEANT: Well, it typically more frequently occurs in the morning hours, and then with the heating of the sun would tend to burn off for the afternoon hours. So, in general, on average, it tends to be more of a morning occurrence, which would then subsequently burn off for the afternoon.

MR. BARNETT: Your Honor, that's all I have for Mr. Vigeant.

MS. MARCO: Staff has a few questions.

MR. BARNETT: Should we finish now and then go back to Mr. Vigeant later? He will be available to do that. We told him to stand by his phone, so we can call him back as necessary.

CHAIRMAN FARRAR: You have more of the military panel?

MR. BARNETT: Yes, I do.

CHAIRMAN FARRAR: So you don't mind, Mr. Vigeant, signing off now?

MR. VIGEANT: That's fine.

CHAIRMAN FARRAR: No, no, no, no.

(Laughter.)

I'm asking -- it sounds like you must have been talking to Dr. Luk, who left the hotel after I called on him too many times.

(Laughter.)

Mr. Barnett, you wouldn't mind him leaving now? How about you, Mr. Soper?

MR. SOPER: Your Honor, I could probably ask Mr. Vigeant two or three questions and we would be finished with him, unless --

CHAIRMAN FARRAR: How about you, Ms. Marco?

MS. MARCO: I have a few questions.

CHAIRMAN FARRAR: Then let's let him go,

and we'll bring him back after we -- that's all right with you, Mr. Barnett?

MR. BARNETT: That's fine, Your Honor. That's fine.

CHAIRMAN FARRAR: All right, Mr. Vigeant, you're available all day, I understand?

MR. VIGEANT: That's right.

CHAIRMAN FARRAR: All right, then we will call you back, and we'll try during the lunch break, someone will call you and give you an idea of when that might be.

MR. VIGEANT: Okay.

CHAIRMAN FARRAR: You're excused temporarily. Thank you.

MR. VIGEANT: Okay, thank you.

(Mr. Vigeant excused temporarily.)

MR. BARNETT: I would like to address this question to the panel generally. In his testimony on the stand in May, Lieutenant Colonel Horstman asserted that what a weatherman would call a transparent cloud was something that he, as a pilot, Lieutenant Colonel Horstman as a pilot, would not be able to see through. Can you as pilots see through transparent clouds?

COLONEL FLY: In general, yes. I mean, that's why they're called "transparent."

MR. BARNETT: General Jefferson?

GENERAL JEFFERSON: Yes, you can. There may be some restriction on that if you're looking at slant range, but generally a transparent cloud is just that; it's very thin and you can see down, you can certainly see down in some radius that gives you situational awareness.

MR. BARNETT: General Cole?

GENERAL COLE: I would agree. Slant range visibility is an issue. Looking straight down through it is probably a little easier than at an angle, and it also depends on the position of the sun and the lighting.

MR. BARNETT: Colonel Fly, in Question 53 of his prefiled testimony Lieutenant Colonel Horstman stated that, "a pilot cannot penetrate cloud cover without an instrument flight rules clearance provided for a Clover control." Is that correct?

COLONEL FLY: I will give a conditional answer. I will say, conditionally, that's correct. However, I would go back to our layering demonstration. If it's a solid cloud layer, the pilot cannot penetrate that without an IFR clearance. There's no question about that.

But it is quite possible to penetrate or

go between clouds-layering, maintaining all the required separation from clouds as a pilot. So in our example where we had the three different levels of clouds, where you could pick and choose your way through maintaining all the clearances, so you could do it required distances from the clouds, that you could do that without clearance from Clover or some other air traffic control agency.

MR. BARNETT: Now, Colonel Fly, you hear the question that I asked of Mr. Vigeant regarding ground fog in Skull Valley obscuring the PFSF. What effect would ground fog have, if you did have ground fog, on the pilot's ability to avoid the PFSF in the event of an accident?

COLONEL FLY: If the phenomena you were dealing with was ground fog, that tends not to be too thick. I mean you don't have ground fog typically that goes up to 5,000 or 10,000 feet. It tends to be fairly thin in terms of hundreds of feet. Occasionally, you can see through ground fog, but let's discount those.

So let's assume that we can't see the PFSF through the ground fog. You would still have the mountains around; you would still have your onboard navigation. You would have these other things

available to help assist you in terms of general positional awareness.

MR. BARNETT: Colonel Fly, in Question and Answer 61 of his testimony Lieutenant Colonel Horstman states that the nose of the F-16 could block the pilot's view and prevent a pilot from locating a PFSF in the event of an accident. Is that correct? Is that likely to impact his ability to avoid --

COLONEL FLY: I think you need to kind of put it back in perspective. If you're flying along straight and level, you can see about 10 or 11 degrees directly in front of you below the horizon, and then the radome or the nose of the airplane starts to obscure your view. So straight ahead you've got about a 10- or 11-degree look angle.

Now if you start moving down the side, either side of the airplane, your look angle starts to get much better in terms of what you can see. So if you go to the case we had discussed previously with the low altitude engine failure, if the engine quits, one of the first things a pilot wants to do is establish that 30-degree zoom climb that Colonel Horstman and I had both discussed previously. Clearly, the pilot will not be able to see directly in front of him at point. However, as he apexes over, or

actually prior to that point, before the engine failed, he's going to know what is out in front of him, hopefully, if he's looking through the canopy.

But when he starts his nose up, he will lose sight of what's directly in front of him while he is in this zoom maneuver. Then he will start to push the nose over and establish motionally about a 6-degree glide path or so, to maintain his air speed as he attempts to reestablish -- get the engine going again.

During this time if you said, okay, if I can normally see 10 or 11 and I now have got my nose 6 or 7 below the horizon, the pilot will be able to see 16 degrees, plus or minus a little bit, below the horizon directly in front of him. So at this point he will have the opportunity to see whatever he can see out in front of him. So it would not be an issue there.

So the whole time he is coming down, attempting to restart the engine, the pilot should be able to see whatever is out there to be seen. As he approaches the ejection, he will, hopefully, have made -- once he thinks, I may have to eject, as some of the other pilots have testified, he may start -- he will have taken those avoidance maneuvers, those small

turns that we described earlier, hopefully, prior to that. So now that when he gets ready to eject, it's no longer an issue.

MR. BARNETT: Colonel Fly, in Question and Answer 76 of this testimony Lieutenant Colonel Horstman states that the usage of ordnance in training by the 388th Fighter Wing depends on the current tactics of the Air Force and budget, and that the actual number of ordnance used each year could vary dramatically. Is that correct?

COLONEL FLY: The Air Force minimum munitions training requirements are established in regulations, and they are primarily a function of what's called the unit designated operational capability. Each fighter squadron has a primary DOC, designated operational capability. For instance, the F-15 Eagle that they fly is our primary air superiority airplane. So their DOC is written to say we want you guys to control the skies. Their training program is built to support that designated operational capability. So they go out and fly a lot of intercepts and a log of dogfighting. That's what they do.

Their tactics -- your DOC, if you will, is your mission. Your tactics are, how do I do it? My

mission is to maintain air superiority. My tactics will be, what's the best way for me to accomplish air superiority in today's mission?

Now to bring that a little closer to the issue at hand, which is --

CHAIRMAN FARRAR: Hold on a minute. That last thing you said, what's the best way, is that embodied in regulations or does Secretary Rumsfeld --

COLONEL FLY: No --

CHAIRMAN FARRAR: Let me finish.

COLONEL FLY: Okay.

CHAIRMAN FARRAR: Does Secretary Rumsfeld tell you what to do or does each base commander figure out what to do?

COLONEL FLY: Each wing commander has some flexibility. He's got some latitude in terms of how he wants to conduct his training program. Having said that, I will also tell you the Air Force has things such as MCM, Multicommand Manual, 3-1, and in there they talk about tactical considerations, ways to employ different airplanes, tactics that you could use in different situations. So there is help available from higher headquarters, if you will, and the local units have some flexibility in terms of how to implement it and what's best for them.

To talk to the F-16s at Hill Air Force Base, their primary designated operational capability is air-to-ground, dropping bombs. The 388th is a precision -- they have the capability to drop the precision-guided munitions, the laser-guided bombs. So that's a subspecialty, if you will, that the 388th has that other F-16s don't.

So the DOC is written toward air-to-ground training. Because of that, each pilot has annual requirements. He has to fly so many sorties. A given percentage of them must be air-to-ground. So many of them, because there's a secondary DOC of air superiority, have to be dedicated toward air-to-air, but primarily it's dropping bombs because that's what the 388th primary does.

So the training requirements are set in an Air Force regulation in terms of how many sorties you have to fly, how often you have to fly, how many of them have to be air-to-ground or surface attack types of missions, and how many of them you have to drop munitions. You actually have to go out and drop so many, "X" number of those bombs, actually have to come off your airplane in different events each year.

Far and away, most of the bombs that they drop out at Hill are the small, 25-pound bombs. To

kind of take it to the other side, the laser-guided bombs that we drop at the Hill Air Force Base, hardly anybody actually ever drops one of those in training because the guidance and control unit is so expensive. It's in the tens of thousands of dollars just for the guidance unit. So you can't afford to drop those.

On the good news side, you don't need to because, from the cockpit perspective, you can do and see everything you would have to do to drop that bomb without actually having one on the airplane. Then you can record that on your videotape recorder and then come back and look at it in your debrief, and you can figure out whether or not you did everything correctly and whether or not that bomb would have hit where you were aiming. There are ways that you can do that without actually even having a bomb or dropping it on the airplane.

Now the one thing that doesn't take into consideration is whether there was a -- if you had really dropped a bomb, if the bomb had had a mechanical failure of some sort, but that's not a pilot problem anyway. The pilot has requirements to aim certain things at the target and do that, and that can all be evaluated.

CHAIRMAN FARRAR: In terms of number of

training sessions, does that vary with the nation's foreign policy as the Secretary of the Air Force may pass it on and say, you know, "Here's what we may be getting ready for next year. Let's up our training."? Or is it training for one thing, training you for everything?

COLONEL FLY: I have seen little change in the actual training requirements over the years. If you were an air-to-ground unit, you generally had to fly this number of sorties; you had to drop so many bombs in different types of events to maintain, to meet your requirement. That has not changed very much.

CHAIRMAN FARRAR: No matter what the President may be thinking?

COLONEL FLY: As a general statement, I would say that's correct, Your Honor, because you need to be -- we, the United States, the United States military, and when I was on active duty, tried to be prepared to fight the full spectrum of war, and that doesn't necessarily change whether you're thinking about going into Kosovo or not. So the training was intended to be that you would have a fully deployable anywhere in the world combat capability. So that drove our training.

What does change it year to year, obviously, is the budget, and there have been times when the budgets were good and budgets were bad.

MR. BARNETT: General Cole, could you say, explain the likely effect of the budget on training usage of ordnance?

GENERAL COLE: Certainly. Again, as Colonel Fly mentioned, there are specific proficiency requirements. But to give you an example, as far as budget and force structure size, depending on which year slice you use, you will get slightly different variations, but from 1986 to 1995 the total budget or obligational authority of the United States Air Force decreased by roughly a third. During that same time period, the population of the active duty Air Force decreased roughly by a quarter. During that same time period, 1986 to 1995, the total aircraft, active duty, guard, and reserve, decreased by about a fifth. So, consequently, there's less aircraft, less people fulfilling those proficiency requirements.

I wanted to make sure, as the numbers went down in ordnance expenditures, to corroborate what Colonel Fly said and also to look at that decrease in force structure and less people flying, less ordnance delivered, I went to the United States Air Force and

asked the question. Basically, it was confirmed with Colonel Fred Clark, Air Force Safety Agency, who monitors the expenditures, said that over time there's definitely been a decrease in ordnance expenditures, and it is a reflection of that downsizing in budget and force structure, and also the fact that there are more high-technology, precision-guided munitions that you don't need as many sortie requirements for proficiency.

He indicated that the expenditure rates now are basically flat-lined, does not expect them to decrease further, but certainly doesn't expect any increases at all. If you look at the projections for the first quarter of the 21st century, the general predictions by experts in the field are that it will be still an even smaller, but highly technical, highly proficient force with a greater number of precision-guided munitions. So that is kind of the short story of why there are other things besides the foreign policy guidance, the budget issues, the force structure issues, that resulted in a greater decrease in expenditures.

JUDGE LAM: General Cole, are these budget reductions inflation-adjusted?

GENERAL COLE: They are. They are on

real-year dollars. In other words, they adjust them year to year.

CHAIRMAN FARRAR: Mr. Barnett, before you continue, some people in the room may need a break, but how much more do you have?

MR. BARNETT: I don't have very much more, Your Honor. Probably 10 minutes.

CHAIRMAN FARRAR: It's twenty-six of, let's go off the record for a few minutes.

(Whereupon, the proceedings went off the record at 11:35 a.m. and resumed at 11:48 a.m.)

CHAIRMAN FARRAR: Mr. Barnett, if you'd be good enough to continue.

MR. BARNETT: Certainly. Colonel Fly, in question and answer 77 of his pre-filed testimony, Lieutenant Colonel Horstman claims that the fiscal year 2000 Ordinance Usage Data for the 388th Fighter Wing was "an anomaly and not indicative of usual training." And he asserts that, "The local fiscal year 2000 usage was due to the change in training of the 388th Fighter Wing to prepare for drug interdiction operations in the Caribbean, and he claims that now the 388th Fighter Wing requires more ordinance usage and training because of current Air Force needs in Kosovo and Afghanistan. It is correct

that fiscal year 2000 was an anomaly and that you should have used the fiscal year '98 data as the basis for projecting ordinance usage for the 388th FighTer Wing in the future?

COLONEL FLY: We actually used not the 00 but the average of the '99 and 2000 numbers, and they were relatively consistent. I'm sorry. There was another part to that question.

MR. BARNETT: What impact -- did the change in training, the asserted change in training at the 388th affect lower ordinance usage?

COLONEL FLY: The -- as I understand it, I was talking to one of the former Deputy Operations Groups Commanders, and he said that the deployment was -- down at the Caribbean was much smaller than the Kosovo -- than the traditional deployments that we sent to Southwest Asia to support operations in Iraq, so those were -- you know, the 99 and the 00 numbers were what they were. And again, the training -- the tactics -- the training requirements don't change much from year to year, to get back to the point that we made earlier.

Your minimum requirements are maintain proficiency and mission-ready status, just don't change that often. The Air Force does change them

occasionally, but not very often, because the worldwide threat, although our current mode of operation is significantly different than it was during the -- than the Cold War. We're not looking at the same types of changes that happened then.

Again, we used a two year number, the average because that was the sortie averages that we used, as well. And so we were trying to not let any one year drive anomalous numbers and computations, so I don't agree that -- first, the assertion that we only used the 00 is incorrect. We used the last -- the two most recent years, which was the flying hours that we used, as well.

MR. BARNETT: General Jefferson in question and answer 82 of his testimony, Lieutenant Colonel Horstman states that, "PFS incorrectly excluded accidents that occurred at altitudes higher than 5,000 feet AGL, and accidents under instrument flight rules, both of which commonly occur in Skull Valley." Is that correct? Is that what you did in your analysis?

GENERAL JEFFERSON: No. We only excluded accidents that happened above 5,000 AGL when we did the very narrow look at Sevier B conditions. They were not excluded from the broader general category of

Skull Valley-type events. In addition, we didn't exclude any accidents simply because they happened in instrument flight rules conditions.

MR. BARNETT: And General Jefferson, in question and answer 86 of his testimony, Lieutenant Colonel Horstman states that "PFS incorrectly excluded accidents caused by lightning." Is that correct, did you exclude accidents because they were caused by lightning?

GENERAL JEFFERSON: No, we did not. In fact, there was an accident on the 15th of January, 1991 at Homestead Air Force Base in Southern Florida where the aircraft was struck by lightning and eventually crashed. We did include that as a Skull Valley-type event.

MR. BARNETT: Colonel Fly, the accident of 16 March, 1990 was discussed during Lieutenant Colonel Horstman's testimony on the stand in response to a question from the Licensing Board. Lieutenant Colonel Horstman questioned why this accident which involved an engine failure during the normal phase of flight was not included as a Skull Valley-type event. Could you explain this accident, and why you did not include it as a Skull Valley-type event?

MR. SOPER: I'm sorry. What accident

again?

MR. BARNETT: 16 March, 1990.

COLONEL FLY: Yes. One of the criteria for being included in a Skull Valley-type event was that we could reasonably expect that this accident would happen, or could happen in Skull Valley. And for a couple of reasons, we didn't feel like that was applicable here.

One is, you have to understand that this airplane was flying with what's called a Pratt & Whitney F100-200 engine, which was the original engine in the F16. Currently, our -- that engine, at the combination of high altitude and slow airspeed, had known operational anomalies. In words, there were words in the Dash-1, which the tech order, 1F-F16-A-1. The F16's operation manual that the pilot uses, it said -- it defined two operating regions. One was called "Region Two", which is if you were above 20,000 feet and less than 250 knots. The third one was "Regional Three", which was above 30,000 feet, below 180 knots.

The aircraft in this particular instance was almost 26,978 feet, so almost 27,000 feet. And he was at 90 knots, that's nine zero, so this -- that's an extremely unusual and out-of-the-ordinary

combination of airspeed and altitude. The typical landing airspeed for the F16 is 140 knots, plus or minus a few, and this guy is up at 27,000 feet at 90 knots, so he's well into Region Two and the engine quit, so he goes through a series of air starts. He's able to maneuver the airplane. Attempts to go to Wendover, realizes he's not going to make it and eventually ejects, but he's flying an engine that's no longer flown by the active duty Air Force. One of the engines that we fly in the Air Force that are closest to this are called the Pratt & Whitney F100-220, or the Pratt & Whitney F100-220E, as in echo.

If you go into the Dash-1 is talks about those two engines. It says words to the effect, "There are no operational restrictions or throttle restrictions on this engine." So it was our belief that because of this abnormal -- I mean, you're not going to be 27,000 feet, 90 knots of airspeed over Skull Valley. And it's an engine that we don't fly. The Hill airplanes, both the 388th and the Reserve Wing fly the General Electric engine which is a totally different engine, and not susceptible to this Region Two/Region Three from the old original F16 engines, so we though it would be inappropriate to include it in the analysis because it's not likely to

happen over Skull Valley.

MR. BARNETT: General Jefferson, if you had included this accident in your assessment, how would it have affected your calculations?

GENERAL JEFFERSON: Well, the pilot was in control so it would have been an "able to avoid" accident. He headed for Wendover. If we had actually included it in the Skull Valley-type event, it would have increased our percentage of "able to avoids" in that category.

MR. BARNETT: Your Honor, that's all I have.

CHAIRMAN FARRAR: Ms. Marco, how much time do you think you'll need?

MS. MARCO: I do not have any recross.

CHAIRMAN FARRAR: Board likes to hear that. Thank you. Judge Lam has a question.

JUDGE LAM: Gentlemen, if I may ask you to go back to look at the weather report, PFS Exhibit 245. If you were to go look at the last page, I see a 9 percent of the time there will be 100 percent cloud cover. I'd like to ask your opinion, does that mean the pilot would not be able to see anything on the land 9 percent of the time?

COLONEL FLY: Your Honor, I would say that

the answer is maybe. And I would go back to the layering example. Overcast can be a single cloud coverette in altitude that covers the entire sky. Depending on the altitude of that cloud cover, that single solid layer, you may or may not be able to operate underneath it. You may be able to operate over it and still maintain sight of the Stansbury and the Cedars.

The other thing to look at is that cloud coverage is cumulative. You could have a deck at, and I will make the numbers up, 5,000 feet that covers two-eights. You could have another deck at 10,000 feet that covers four-eights. You could have a third deck at 15,000 that covers the remaining two-eights, so the cumulative effect would be the sky is completely covered, and in that case, you would have that overcast conditions of eight-eighths, but it was in three separate layers spaced by 5,000 feet. So where am I with relationship to this layer of the clouds, above, below, in-between? If it's a solid layer of cloud, am I below it or above it? If I'm above it, then what can be seen? Are there any terrain features that would protrude over the top?

JUDGE LAM: Thank you, Colonel Fly.

General Jefferson, with what Colonel Fly

just testified, assuming there is a fraction of the time that the weather would not permit any visibility, whatever that number may be, how -- let's call that number X. How would you modify your data of the ability to avoid probability with the weather data, because in your data analysis, you indicate ability to avoid, a number that you have selected is 90 percent.

My question is, assuming there is a fraction of the time, whatever fraction that may be, the weather would not permit any visibility, how would that cut into your probability of successful avoidance?

GENERAL JEFFERSON: Your Honor, I would -- there are two factors involved, as you know, the 90 percent factor and then the 95 percent factor that are involved in this are. The 90 percent is the one that tells us whether the pilot has the physical capability to control the airplane and the time to do something about it. I don't think that would affect that particular part of the calculation. It would come in the other part, which is the -- given the pilot has the physical control of the airplane will he, in fact, avoid the site? That's the 95 percent part.

We found a much higher number, as you know. Ninety-five percent I think would take care of

the few cases where you might see that kind of cloud cover. You know, there are some other things associated with it. If you had that heavy a cloud, you know, floor-to-ceiling cloud cover, you probably wouldn't be flying anyway because you couldn't do the training, so I don't think it would make a big impact on it.

JUDGE LAM: But just for the sake of discussion, General Jefferson, assuming 10 percent of the time --

GENERAL JEFFERSON: Oh, okay.

JUDGE LAM: Assuming 10 percent of the time the weather, it's bad. By bad, I mean there's no visibility.

GENERAL JEFFERSON: Yes.

JUDGE LAM: Then how would you justify the 95 percent success probability? If 10 percent of the time he cannot see, how would he be able to do it 95 percent of the time?

GENERAL JEFFERSON: And the assumption is -- I'm just restating, I think, what you said. The assumption is clouds go all the way up to cover the Stansbury Mountains so there's nothing can be seen anywhere except clouds, and he's not able to go below that. If that were to happen 10 percent of the time?

JUDGE LAM: Right.

GENERAL JEFFERSON: Oh, okay. There are a couple of factors that would make it less than the 10 percent number, which is the fact that he would be navigating on instruments. It would -- you know, he'd have to because he couldn't see the ground. He'd have to know I'm over this point. I'm going to that point, so he'd know where he was in a pretty precise situation since. If he lost his engine or had a problem like that and had to descend, if he knew there were no clouds -- I mean, no openings anywhere down, he would -- I defer to the F16 pilot here, but I wouldn't descend into that because it's too likely to hit a mountain, and so he would eject.

JUDGE LAM: Thank you, General Jefferson.

GENERAL JEFFERSON: Okay.

CHAIRMAN FARRAR: Let me ask you a question about what's been marked as PFS Exhibit 100A. If I understand the label on that, this is intended only to support your 90 percent factor, conservatively 90 percent of the Skull Valley-type accidents left the pilot able to avoid, and it's not intended to reflect anything on the other factor, will, in fact, the avoid, notwithstanding that there's language in your two columns that would seem to deal with whether, in

fact, they exercise their discretion to avoid. That's a kind of a compound question, but what it deals with, is this offered for just the limited purpose of the 90 percent factor, or are we also supposed to take something from it on the 95 percent?

GENERAL JEFFERSON: Your Honor, this was offered actually to address the 95 percent factor. Given -- these are the accidents in which -- these 58 now accidents are the ones in which the pilot was in a Skull Valley-type relevant accident, and also had the --

CHAIRMAN FARRAR: And had the -- okay.

GENERAL JEFFERSON: So that's the 90 percent factor already taken care of.

CHAIRMAN FARRAR: Is already taken care of.

GENERAL JEFFERSON: So this -- we'd been asked to justify the 95 percent number, so we took a look at what was actually in there, and came up with these specific references in an attempt to address that.

CHAIRMAN FARRAR: All right. Then do you want us to conclude from the language in here, that turning towards something is the same as turning away from something?

GENERAL JEFFERSON: In the top part of this, except for one as we mentioned last time, our reference to the pilot actually turning toward or away from populated areas, or structures, or something like that.

CHAIRMAN FARRAR: Well, let me rephrase my question. Can we conclude -- are you asking us to conclude from the fact that a pilot turned toward something, namely the airfield, that we should conclude that that proves that if he was coming upon something he didn't want to have the plane crash into, he would have exercised his discretion to turn away from that something?

GENERAL JEFFERSON: That would be an extension of that. Really what we were trying to say is the pilot had situational awareness because he made a turn back to his base, or over to a clear area, or something like that.

CHAIRMAN FARRAR: So that's generally, he did some maneuver.

GENERAL JEFFERSON: Yes.

CHAIRMAN FARRAR: But I thought I understood the question in front of us to be specifically at the last second, or sometime before then, would he make a specific maneuver that had

nothing to do with saving his life or his airplane, to avoid something on the ground. I'm asking how much extrapolation do you want us to do from these comments in those two columns?

GENERAL JEFFERSON: What we're trying to do is find support for why we thought 95 percent was a good number. We find evidence of where a pilot took, you know, recorded in the accident report where he took action to avoid something, a populated area, a structure, or something like that. We found evidence where he was not to that specificity, but it did say he turned toward or away from something. And then finally, there's a category where there wasn't -- you know, you couldn't tell, so the proposition is that the pilots know where they are. If there's something there, they can turn -- they will turn away from it if they, you know.

COLONEL FLY: Your Honor, if I could offer, again, the intent was to show that pilots know where they are, and will act accordingly in the event of an emergency. Whether it's turning toward an emergency airfield, if that's the reasonable thing to do, or whether it's turning away from a populated area, if that's the reasonable thing to. Or in some cases, both.

If you remember the accident that Colonel Cosby talked about, not his but the one in his unit, where they were out over the water. He had the problems. He turned back toward the home plate or toward his airbase, figured out that he was not going to have -- the weather was not good enough as he approached the airfield, so he turned back out over the water, away from populated areas, saw the bay or whatever it was, a little hole, figured out where he was. Sent one of his flight mates below to clear the area, and then he jettisoned the airplane.

CHAIRMAN FARRAR: But that was one of the original 12, if I remember. One of the original 12 reports, or was it?

MR. BARNETT: I don't think that was in the reports. I think that was a different accident.

GENERAL JEFFERSON: Your Honor, one other comment. The damage column is there because that is a supporting consideration. It didn't say they really turned away from a structure, or towards a structure or anything, but it didn't hit anything, so that's not quite as strong on evidence, but it's there. And we found no case where they tried to avoid something, and they didn't avoid it, other than those couple where they went for the lesser of the two evils.

CHAIRMAN FARRAR: Maybe I'm not making myself clear. Colonel Cosby's accident is number nine on this exhibit, I understand.

GENERAL JEFFERSON: That's correct.

CHAIRMAN FARRAR: But that was not -- now you're telling me it was not one of the original 12.

COLONEL FLY: Sir, I was referring to, not Colonel Cosby's, but he referenced in his telephone call another one from a lieutenant or a captain in his unit.

CHAIRMAN FARRAR: Okay. I'm sorry. I'm talking about Colonel Cosby himself, which is number nine on this list, if I'm not mistaken.

COLONEL FLY: And you're asking if that was one of the original 12 that we turned in, Your Honor?

CHAIRMAN FARRAR: Right.

MR. BARNETT: Your Honor, I don't believe Colonel Cosby's accident report was one of the original 12. It's PFS Exhibit 79, and I believe the 12 are the joint exhibits, so it was in a different group.

CHAIRMAN FARRAR: And I guess I would ask how come you only had 11 or 12 to begin with, and now there's 17, or 46?

COLONEL FLY: Your Honor, I think the answer to that would be that those original 12 were just to use as an example, not to try to represent that they were of the types of things that pilots would do in emergency situations, and not -- the intent was not to represent them as the entire population of accident reports that we looked at where the pilots did something.

JUDGE LAM: And furthermore, gentlemen, in PFS Exhibit 100A, there has been no changes in the event categorization relative to Exhibit 100. Is that true? By which I meant, in May, when PFS Exhibit 100 was offered and admitted, I asked General Jefferson to categorize the events into different classes, and your response was it would be a Class A, Class B, and Class C accidents. And furthermore, you provide a definition as to what Class A, B and C meant.

GENERAL JEFFERSON: Yes, Your Honor. I'm looking for my reference to that. I thought I had that written down. The numbers for the A Category are unchanged. We did eliminate the line 31 when we got to Exhibit 100A.

CHAIRMAN FARRAR: But the A Category is not indicated on the --

GENERAL JEFFERSON: No. It was a

discussion item, and we just posited A, B and C. I had not done that before.

JUDGE LAM: Right. So the Category B has now --

GENERAL JEFFERSON: Dropped one.

JUDGE LAM: From 29 to 28?

GENERAL JEFFERSON: Yes, I believe that's the right count.

JUDGE LAM: Okay. And there's no changes in the others.

GENERAL JEFFERSON: No changes to the others. That's correct.

JUDGE LAM: And the definition of these categories have not changed either.

GENERAL JEFFERSON: No.

JUDGE LAM: Okay. Thank you.

CHAIRMAN FARRAR: Let me ask again, if there's a plane in trouble and he knows he's somewhere within range of an airfield, he turns for the airfield. I read into that he's trying to save his plane. He's trying to save his life. If Colonel Horstman is correct, that ejection is not necessarily a safe activity, but I take it from your previous answer to my question, you also conclude from the fact that he took that action to save his plane and his

life, that you can conclude from that that's the equivalent -- or you can conclude from that that yes, he would have avoid -- if there was a populated area you can figure he would have tried to avoid it.

GENERAL JEFFERSON: It certainly increases the likelihood, because it indicates that he has situational awareness. He knows where he is, and where he needs to be. It's not as strong as the Group A, which did say that -- you know, it had some reference to population or structure.

One of the things that we dealt with in the damage column was the fact that a lot of these things happen over ranges where there's nothing but desert, and so the fact that the report doesn't say turned to avoid a structure, doesn't mean that if there had been something there they wouldn't have done it. It just means it was not mentioned.

CHAIRMAN FARRAR: One of the reasons you assert that pilots will avoid things that we wouldn't want planes crashing into, is that they're trained to do this. But you can read a lot of these accident reports and say that notwithstanding how good your training is, a lot of these pilots do the wrong thing on other matters. So if they do the wrong thing on other matters, like staying with the plane below where

they should, doing one thing or another wrong, whether or not you agree with the Lockheed Martin calculation, if they make those errors, why should we assume they would never make an error about where they steer the plane at the last second when they have a lot of other things on their mind?

GENERAL JEFFERSON: Several of the cases that come to mind where the pilot stayed with the airplane below the 2,000 feet, in fact, some of them at -- I think one of them was at 130 feet was because he was trying to avoid hitting something, and he stayed with it until it was -- he just lost any effective input to the controls, and then he ejected, so that factor is at least in there.

CHAIRMAN FARRAR: Well, that's all I have for now.

JUDGE LAM: General Jefferson, if I may follow-up. Now with the new PFS Exhibit 100A, there are now 17 Class A events, 28 Class B events, and 13 Class C events. For the record, let me read my notes about what you had defined what is Class A, and B, and C event.

Class A events are those that they are specific references for the pilot to turn away and to avoid a land target. Class B events refer to pilot

action to turn towards an airfield or open land. And then Class C events refer to those that there are no specific references to either Class A or Class B events. Do I describe your definition correctly?

GENERAL JEFFERSON: That's correct, although I think the numbers are a little different. We were doing those on the run at the last hearing. The A Category has 17. That's the first 16 accidents plus number 49, which I had put in the wrong position. I haven't changed it because we weren't doing those kind of changes to this table. And then the next group was from the original number 17 down through 45, the original 45, which would have given 28. But then we eliminated one, so that's 27 in the B Category. And then the C Category is 14.

JUDGE LAM: I see. Then my question to you, General Jefferson, is based on these numbers how do you propose these data would reflect a 95 percent success probability for a pilot to avoid a land target?

GENERAL JEFFERSON: That's the question that we've been struggling with. We cannot support it statistically with these. We have what we feel is strong evidence to that, in our professional opinion, based on the training and the other things that we

talked about, the time available, those kinds of things. We believe that the 95 percent number is correct, and probably conservative, but we can't find the statistical support for it. This was to give the best look that we could find as to what supporting evidence there might be.

JUDGE LAM: Now would you -- if you were asked to rely on these data, what type of number would you come up with? Should you use 17 plus 28 as the numerator, and then 59 events as the denominator?

GENERAL JEFFERSON: That would be -- I guess in grades of certainty or support, that would be one that you could. I think our total -- our opinion is that it's higher than that, because some of these where it's not mentioned, you know, if you look at landed in the Gulf Of Mexico, well, it's not going to say anything about him avoiding a structure or a populated area. So you could -- you know, it works up from there, I guess, is what I'd have to say.

JUDGE LAM: Oh yes, indeed, General Jefferson. I understand the rationale.

GENERAL JEFFERSON: Yeah.

JUDGE LAM: I'm just asking you to focus on this particular exhibit. If one is totally ignorant about how events would progress, just looking

at the numbers, I guess the maximum number one could derive would be using a numerator of Class A, Class B events, and a denominator of Class A, plus B, plus C, assuming somebody's ignorant of what you just said. Strictly focusing on the data, one would come up with what you just said. It would be like 45 over 58, or 59.

GENERAL JEFFERSON: Over 58, yes. I guess if one were totally ignorant, they might do that. I wouldn't, and I don't think a reasonably informed person would do that.

COLONEL FLY: Your Honor, if I could, I believe there have been six pilots that have offered testimony to this Board, we three, Lieutenant Colonel Horstman, Colonel Cosby, and Colonel Barnett, I believe his name was.

MR. BARNETT: Bernard.

COLONEL FLY: Bernard. All six of those pilots, I believe, you could characterize, at the risk of characterizing somebody else's testimony, have said that given a chance and a structure in front of them, every one of them said of course, the pilot is going to do that, so it's not just we three. I mean, this is the best we've been able to come up with because some of these are silent. They're just silent on the

subject, but there's, in many cases, no damage report, so we're -- intuitively, I think -- I believe this, and this supports it. It's not a 95 percent number, depending how you wanted to slice and dice, but it's the best that we can come up with in terms of empirical data. But every pilot that's testified has said, of course, pilots will do that.

JUDGE LAM: And Colonel Fly, and General Jefferson, and General Cole, I, for one, am very appreciative of what you have done here on Exhibit 100 and 100A, because these efforts were performed in response to one of the questions that I asked you gentlemen.

CHAIRMAN FARRAR: Whether or not you would add the 17 and the 29, and get 46 or 58, whether or not that's a legitimate approach, you can't add in the 29 unless you come to the conclusion that turning towards something is the same as turning away from something. And that's not just a play on words, that's, as I understand from what I've read of these reports, those are different thought processes and different reasons why you're turning towards something, and why you're turning away from something, so you can't -- so you want us to make the jump even to get to the 46 out of 58, which you say is not the

way to do things, but even to get to the 46, we have to conclude that turning towards something is the same as turning away, and all that those words imply in terms of values.

GENERAL JEFFERSON: Excuse me. I'm sorry.

CHAIRMAN FARRAR: With all that those words imply or embrace in terms of values, and procedures, and training, and so forth.

GENERAL JEFFERSON: Plus, the supporting evidence of what actually happened with the airplane.

CHAIRMAN FARRAR: It's now 12:25. Mr. Soper, would it make sense to take a lunch break before we start your cross?

CHAIRMAN FARRAR: It's now 12:25.

Mr. Soper, would it make sense to take a lunch break before we start your cross?

MR. SOPER: Yes.

CHAIRMAN FARRAR: All right, I think we're on target, so let's be back here at 1:30.

(Lunch recess from 12:27 to 1:33 p.m.)