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LASERS: A HAZARD TO AVIATION SAFETY AND SECURITY

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BEFORE THE

SUBCOMMITTEE ON AVIATION

OF THE

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LASERS: A HAZARD TO AVIATION SAFETY AND SECURITY?

HOUSE OF REPRESENTATIVES, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, WASHINGTON, D.C.

The subcommittee met, pursuant to notice, at 10:00 a.m. in room 2167, Rayburn House Office Building, Hon. John Mica [chairman of the subcommittee] presiding.

Mr. MICA. Good morning. I would like to call this hearing of the House Aviation Subcommittee to order and welcome everyone this morning. I apologize for being a few minutes late. The only thing more important than my Subcommittee work is my constituents, and they were here in town in force this week.

But welcome, and the subject of today's hearing relates to lasers. The question is what problems do lasers pose as a hazard to our aviation safety and security. The order of business is opening statements by members and one panel of witnesses. We will proceed with opening statements then hear from panelists and welcome other member's comments as we open this.

As I said, today's hearing will focus on the safety and security issues relating to lasers that interfere with the operation of a number of civil aircraft. With the number of incidents of misuse and illegal use of lasers interfering with commercial pilot aircraft operations, it is important that we examine the laws, regulations and safeguards that we have in place to deal with this problem.

A number of important questions need to be answered by those charged with the important responsibility for both protecting our pilots and also for protecting the flying public. Some of those questions, and I hope to get some answers today, are as follows: Do we have adequate laws to deal with those who would disrupt aviation safety by improper use of lasers? Do we need better regulations of laser equipment? Do we need better technology or defensive measures to deal with this problem? And do pilots have adequate training?

We need to ask what safety and security threats do we face by this use of this technology in the future, and also if we do have a future incident in which lasers are used to disrupt or incapacitate a pilot, have we failed in our responsibility to protect passengers aboard the aircraft?

Very powerful lasers are now available over the internet for just a few hundred dollars. What I would like to do at this point is just show a video clip from an Internet vendor which was recently shut down, but demonstrates the power of lasers.

[Video presentation.]

Mr. MICA. That laser, which is 20 times more powerful than the FDA maximum allowable power level for a laser pointer, burned a hole through the cup as you saw on the video in some seven seconds. The misuse of lasers could be dangerous and could also be irresponsible in its application.

One of today's witnesses was injured by a laser while making a final approach to Salt Lake City. The FAA, DHS and the Domestic Events Network have adopted new procedures to catch anyone who points a laser into the cockpit of an aircraft. So far, the Department of Justice has made a handful of arrests under the Patriot Act. I think we should make it very clear today that we expect, those of us in Congress who deal with aviation safety and security, that all of these pranksters or people who misapply the use of lasers will be prosecuted to the fullest extent of the law.

I also have concerns with the proposed Department of Defense visual warning system. At a time when we are trying to prevent lasers from disrupting aviation operations, the Department of Defense has created a warning system that flashes laser beams onto aircraft that violate the air space surrounding the National Capital Region. I would expect the department to take all necessary safety precautions before this system is ever activated.

In a new era of laser technology, it is important that Congress take steps to make certain that the misuse and illegal use of laser technology is properly addressed in both law and regulation. It is my hope that this hearing will provide us with some of the answers to some of the questions that we have raised.

I am now pleased to recognize our Ranking Member for his opening comments.

Mr. COSTELLO. Mr. Chairman, thank you. I do have an opening statement that I will enter into the record. I do have brief comments.

First, let me thank you for calling this hearing today on whether lasers present a threat to aviation safety and security. Since the early 1990s, the FAA has documented more than 400 incidents involving lasers. To date, no aviation accidents have been attributed to lasers, although there have been a few cases where pilots have reportedly sustained eye injuries and we will hear about that today.

The latest incident was this past Thursday, March 10, at Dallas-Fort Worth where a pilot sustained blurred vision and had to have the first officer land the aircraft. As you noted, the FAA has taken steps over the years to address safety issues surrounding lasers directed at aircraft. In 1995, the FAA developed and implemented standards to counter a surge in laser incidents. The standards defined safe laser exposure levels in zones surrounding airports, resulting in laser-free zones, a critical flight zone, and a sensitive flight zone.

The FAA has also undertaken flight simulator studies on the effects of laser light on pilot vision and aircraft operations. I look forward to hearing from the FAA witness today to explain the results of these studies.

While we have known about the safety issues surrounding lasers for a number of years, a recent chain of laser-related events prompts us to start looking at laser activity as a security issues.

While none of the more than 400 incidents have been linked to terrorism, the Department of Homeland Security and the FBI issued a memo last December warning that terrorists have explored using lasers as weapons. Since December of 2004, there have been more than 100 incidents involving lasers, which have resulted in significant media attention.

In response to these events, the FAA issued an advisory circular in January of 2005 which would improve the reporting requirements between flight crews, the FAA and appropriate law enforcement and security agencies via the Domestic Events Network. Pilot groups such as the Air Line Pilots Association, ALPA, who happen to be here today, have provided recommendations to protect and assist flight crews in the event that they encounter laser in flights.

FAA studies reveal that pilots who were subjected to lasers within legal FDA standards have reported temporary vision impairments and brief periods of distraction, but more serious injuries could result from contact with more powerful lasers, as you noted, that are illegal but still available over the Internet. Additionally, extremely powerful military-grade lasers designed for blinding, while not widely available, may be an emerging threat to aviation.

Therefore, it is important that we act to ensure that lasers, especially high-intensity lasers, never become a significant threat to safety or security.

Mr. Chairman, I welcome the witnesses who are here to testify today and I look forward to hearing their testimony. I thank you for holding this hearing.

Mr. MICA. Thank you. I appreciate your opening statement. Let me recognize Mr. Kennedy.

Mr. KENNEDY. Thank you, Chairman, for holding this hearing on this important topic.

Since last September, law enforcement, DHS, the FAA, the airlines and their pilots have been warning of the dangers of passenger aviation from laser devices. A small $50 laser pointer, the kind you can buy from many retail outlets, can become a dangerous weapon to blind a pilot on a landing approach. Until now, all of the incidents reported to Federal law enforcement have been accidents or mischievous acts of children. But during today's hearings, we must begin to understand the nature of the threat.

What kind of a threat do we face when even office equipment can threaten hundreds of lives in an instant? How can we address this threat to protect the tens of thousands of Americans who are 35,000 feet above at this time?

As families prepare to travel this holiday season, what have we done and what can we do to further guarantee their safety? Let us never forget that it was something nothing more sophisticated than a simple box cutter that turned our own airline system in to four weapons of mass destruction on September 11.

I thank the panel for being here and look forward to their comments.

Mr. MICA. I thank the gentleman.

Mr. Salazar?

Mr. SALAZAR. Thank you, Mr. Chairman.

I have a brief opening statement that I would like to make. I am pleased that we are holding this hearing today on aviation safety

and security. As a pilot myself, I have watched with great concern the news reports on the use of lasers that impair pilots' visions. Commercial airline pilots already have enough to worry about when it comes to the safety of their passengers. This new trend of using lasers to blind pilots is alarming.

I am also concerned that this could have greater consequence for national security and the safety of our Nation.

I look forward to today's testimony. We must take appropriate steps to ensure aviation safety and security.

Thank you very much.

Mr. MICA. Are there further opening statements? Mr. DeFazio?

Mr. DEFAZIO. Thank you, Mr. Chairman. Mr. Chairman, thank you for continuing to assert the Committee's role in protecting the safety of the flying public and the integrity of our system.

There has certainly been a disturbing increase in incidents with these lasers. Obviously, the issues to deal with are availability. It is beyond the jurisdiction of this Committee, but hopefully we can make recommendations to some of our peers on Commerce or other committees, or to the Administration on further restrictions on the ownership and use of lasers. Certainly, protocols would be within the realm of the FAA and the airlines to develop training and research for countermeasures or prevention, whether it could be some sort of reflective coating on windshields or other things. Obviously, we should recommend that there be steps taken in that area.

But these all have to also go in tandem with the other threats we have discussed here, shoulder-fired missiles, the fact that we still have gaping holes in our system to detect carry-on explosives and/or checked explosives, probably the most likely method of taking down a plane, and then the newly leaked or revealed or whatever it was report about ostensible al Qaeda exploration of new aviation targets, looking at potential vulnerabilities in the system.

So there is a lot to do. This is one of many things we need to worry about. We will hear from an individual who was injured. I regret, Mr. Chairman, I have another hearing at the same time so I will have to step out, but I will be fully informed by my Ranking Member as to what steps we are taking.

Thank you.

Mr. MICA. I thank the gentleman.

Additional opening statements? Ms. Norton?

Ms. NORTON. I thank you, Mr. Chairman, for focusing on yet another risk to air travel. It is a little disheartening to have to hold this hearing. Lasers have had so many important health and safety-related uses. The notion of this perverted use of lasers is something we have to get a hold of. This is not exactly a weapon of mass destruction, at least as it has been used now, but it is certainly not beyond our imagination to see how the prank use of a laser could cause an air crash with horrible consequences.

I am not sure whether kids are taking movies too seriously; whether or not we ought to recommend that lasers, at least at a certain strength, that in order to buy them you perhaps should be an adult. I am not sure where the problem is coming from, who these people are. I will be very interested to hear that today. I am particularly interested that you are turning this technology on its head in the National Capital Region.

Of course, another set of safety issues may be raised, but I think it is an important step in protecting the Nation's capital because as a plane out of communication with radio contact does not respond. As we know, about the only thing that can be done is to shoot that plane down.

So I welcome the new technology to the extent that it is useful and works here, particularly in the Nation's capital.

I thank you again for your leadership in calling this hearing, Mr. Chairman.

Mr. MICA. I thank the gentlelady.

Any other opening statements? If we do not have any other opening statements, Mr. Costello moves that we leave the record open for a period.

Mr. COSTELLO. For 10 days, Mr. Chairman

Mr. MICA. Without objection, so ordered. Members are welcome to submit their comments for the record.

I would like to now move to our panel of witnesses and introduce them. We have Mr. Parry Winder, First Officer from Delta Airlines. We have Mr. Nick Sabatini, who is the Associate Administrator for Aviation Safety with the Federal Aviation Administration. Mr. Randall Walden is Technical Director of Air Force Rapid Capabilities Office, accompanied by Colonel Peter Demitry, Assistant Air Force Surgeon General, Modernization. And finally, we have Captain Terry McVenes, Executive Safety Chairman of the Air Line Pilots Association.

Welcome. What we would like you to do is try to make certain that you be as succinct as possible in delivery of your testimony. If you have additional information, data, something you would like submitted for the record, just request that through the Chair. We will include it in the record of this hearing.

So with that, let me welcome Mr. Parry Winder, First Officer for Delta Airlines. We will hear from you, sir, and your particular experience and knowledge about the use of lasers. Thank you.

STATEMENT OF PARRY WINDER, FIRST OFFICER, DELTA AIRLINES

Mr. WINDER. Thank you very much, Mr. Chairman. It is a pleasure to be with you today and members of the Committee.

As introduced, I am Mr. Winder. I am with Delta Airlines. I am presently assigned as a flight instructor and proficiency check pilot in the simulator for Delta. I am qualified to fly as a First Officer and a Captain on the 737 Model 300.

On the evening of September 22, 2004, making an approach into Salt Lake City, it was a beautiful evening. The weather was clear, visibility greater than 30 miles. There was a ceiling at approximately 25,000 feet. We acquired the airport at least 35 miles out or so and were cleared by Salt Lake City approach for a visual approach, landing to the north, runway 35.

Approximately a glide slope intercept about eight miles from the runway as we came down the instrument landing system, very startlingly and without any warning, the Captain I was flying with mentioned in words such as, "What is this? What is going on?" He pointed up to a console that lies overhead between us, we call it

the overhead panel, and there was an intensely bright green-white light, and it was moving around erratically.

I was hand-flying the airplane, which meant that I had the controls in my hand and the throttles as well. The autopilot was off and we were still speaking to Salt Lake City approach. At that point, I looked up and saw the light and continued to look forward and cross-check my instruments. As we normally do in the aviation profession, when we fly at night we tend to turn our instrument lights, our cockpit lights down low, which helps our visual acuity, especially in the landing phase of flight. Since our lights were down low, this was a very bright light. I initially thought it was a photo flash.

Very shortly after that, I made the mistake of looking to my right slightly, just at the time the laser did in fact catch my right eye. The intensity of the light is nearly indescribable, other than the fact that I would liken it to looking at an arc-welder without a safety mask. It was very intense and very short-lived. I turned away immediately, closed my eye.

At the same time, we received a frequency change from Salt Lake City approach to Salt Lake tower. Prior to leaving that Salt Lake approach frequency, the Captain mentioned to the authorities there, "Hey, someone is trying to track us with a laser. We are getting hit with a laser." The response was, "Okay, we will report it." We immediately had the frequency changed, as I mentioned. Salt Lake City tower cleared us to land. The Captain then was in a discussion with the tower about where the laser was, where it was coming from, if we could identify it, et cetera.

I was still hand-flying the airplane seeing spots in my right eye. The landing was essentially uneventful. It happened approximately two or three minutes later. We had the airplane on the ground, but I did notice that my depth perception was way off. As I was looking out to find the runway to flare the airplane to get it safely on the ground, I ended up flaring way too high and put the airplane a little more than normal on a vertical descent.

We stopped the airplane and taxied clear of the runway. The processes between our cockpit and the air traffic control tower in trying to explain to them what happened seemed difficult and tenuous. That is because we really did not know what to say other than we had been tracked by a laser.

When we got back into the gate, my Captain and I spent a few minutes and talked about what had happened. We determined that we were tracked in the cockpit for approximately six seconds, with the laser moving around, coming through what we call the R-2, my right number two window, at an angle we estimate to be approximately 30 to 40 degrees down, approximately two o'clock position.

My altitude was approximately 2,400 feet above the ground, so we estimate the range of approximately 4,000 to 4,500 feet line of sight from point of origin. We concluded our business that night at the airport, and since it was the end of our rotation, I was driving home. I have about a one hour or so drive to my home north of the airport.

While driving home, I noticed I was starting to get a dull headache in the back of my head. I noticed black spots appearing in my vision in my right eye. By the time I got home, the headache had

intensified. I mentioned it to my wife. She said, "Well, what do you think we ought to do? Do you need to go to the hospital?" I said, "I think I will be okay. Let's just go to sleep." I took a Motrin.

I woke up the next morning in intense pain. It felt like somebody had actually pricked me in the eye with ice pick, as it were. We called our normal family eye doctor. He was out of town. They recommended an adjacent eye surgeon. We immediately were seen by the doctor, first thing in the morning. I was diagnosed at that time with an edema of my right retina, which means a swelling of the right retina. It felt to me, sir, like my eyeball was too big for the socket, like it was going to pop out. In fact, it was red and swollen and very irritated.

The immediate concern was that the swelling would cause a detachment of the retina. So I was under the doctor's care for the next two weeks, every other day or so going in for a full dilation and examination of the retina to make sure that it did not detach or have any further complications.

I am pleased to report that after approximately three or three-and-a-half weeks, I was able to regain my medical flying status through the FAA and our great flight surgeons at Delta, and have since been reinstated to flight status. I do have slight residual effects. I have noticed an over-sensitivity to light, especially in snow area where we live with direct sunlight, as well as some haloing in bright light conditions.

Mr. MICA. I thank you for sharing with us your particular experience and the effects of lasers on your vision and ability to perform your duties.

What we are going to do is go through and hear from all of the other panelists, and then we will get back for some questions.

No stranger to the subcommittee is Nick Sabatini, as the Associate Administrator for Safety, Federal Aviation Administration. Welcome this morning. Welcome back. You are recognized.

STATEMENT OF NICHOLAS A. SABATINI, ASSOCIATE ADMINISTRATOR FOR AVIATION SAFETY, FEDERAL AVIATION ADMINISTRATION

Mr. SABATINI. Chairman Mica, Congressman Costello, and members of the subcommittee, good morning. It is a pleasure to be here today as the Subcommittee on Aviation explores an important issue for aviation safety, the focusing of lasers on cockpits of aircraft and helicopters.

I am Nick Sabatini, Associate Administrator for Aviation Safety at the Federal Aviation Administration, FAA. This morning, I would like to provide an overview of how hand-held lasers are regulated, the potential of catastrophic events from the irradiation of a cockpit, and what the FAA is doing to protect air crew members from these incidents.

With me today, and he is seated behind me, is Dr. Van Nakagawara, a research optometrist and vision research team leader at the FAA's Civil Aerospace Medical Institute, popularly known as CAMI. Dr. Nakagawara is the lead author of a study entitled, The Effects of Laser Illumination on Operational and Visual Performance of Pilots During Final Approach, which was published in June of 2004.

In recent years, laser devices have become less expensive and more commonplace. Lasers are used in supermarket scanners, CD and DVD players, construction and surveying instruments, laser pointers for presentations, and other medical and industrial uses. Also, lasers are often used outdoors as part of orchestrated laser light shows at theme parks, casinos and special events.

The issue of how lasers affect pilots and whether they pose a threat to aviation safety has received media attention recently. The aviation safety issue is very straightforward. Obviously, pilots use their eyes to obtain the vast majority of all the information needed to safely fly an aircraft. Operation of an aircraft at night presents additional visual challenges. Exposure to relatively bright lights such as a laser when the eye is adapted to low light levels can result in temporary visual impairment.

Visual effects can last from several seconds to several minutes. The three most common physiological effects associated with exposure to bright lights are glare, flash-blindness and after-image. The principal concern for pilots is the possibility of being illuminated with a laser during terminal operations, which include approach, landing, and take-offs. Pilots conducting low-altitude operations at night are particularly vulnerable to accidental or malicious laser illumination.

Let me state at the outset that to date no accidents have been attributed to the illumination of air crew members by lasers. While a few of these incidents have resulted in reported eye injury, no civilian pilot has had any permanent visual impairment as the result of laser exposure. However, given the considerable number of reported laser incidents, over 400 since 1990 and approximately 112 since November of 2004, the potential for an aviation accident does exist.

I want to emphasize that the Department of Homeland Security, DHS, assures us that they have no information that would suggest that any of these incidents is in any way related to terrorist activity. FAA's role in the issue surrounding the use of lasers rests with our mandate to ensure aviation safety. There are other entities who are investigating this issue from a security perspective. It is important for everyone to understand the various roles and responsibilities.

The FAA has no authority to either regulate lasers or take enforcement action against individuals who illuminate aircraft cockpits. The Food and Drug Administration, FDA, has authority to regulate lighting products and electronic product radiation.

With respect to the enforcement issue, Federal, State and local law enforcement entities have the authority to prosecute individuals who recklessly illuminate aircraft cockpits. Certainly, FAA has an important role in working with these entities to ensure aviation safety, but our role is not a primary one.

Based in part on historical laser data and military research on vision performance lost from laser exposure, the FAA issued a revised FAA Order 7400.2 on December 31, 2002 which includes new guidelines for flight-safe exposure limits, FSELs, in specific zones of navigable airspace associated with airport terminal operations. The revised FAA Order 7400.2 establishes four specific zones: the

laser-free flight zone; the critical flight zone; the sensitive flight zone; and the normal flight zone.

The laser-free flight zone includes airspace in the immediate proximity of the airport, up to and including 2,000 feet above ground level, extending two nautical miles in all directions, measured from the runway center line. The critical flight zone includes the space outside the laser-free flight zone to a distance of 10 nautical miles from the airport reference point, to 10,000 feet above ground level. Virtually all of the lasing incidents to date have occurred in the critical flight zone.

The necessity of establishing laser-free zones around airports is documented in the results of a study done by CAMI and published in June, 2004. The study consisted of subjecting 34 pilots to four eye-safe levels of visible laser light during four final approach maneuvers in a flight simulator. All test subjects were volunteers who participated after giving informed consent. Subjective responses were solicited after each trial and during an exit interview. The pilots were asked to rate the affect the laser exposure had on their ability to operate the aircraft and on their visual performance.

Approximately 75 percent of the responses solicited from subjects indicated they had experienced adverse visual effects, resulting in some degree of operational difficulty when illuminated by laser radiation during final approach maneuvers at or below 100 feet above ground level. Even at the lowest level of laser exposure, two-thirds of the responses indicated that the subjects experienced glare, flash-blindness or after-images.

However, it is important to note that all subjects were able to maintain operational control and safely land the airplane or successfully execute a missed approach. Significantly, none of the actual lasing incidents against aircraft to date have occurred within these parameters.

In response to the recent increase in reports of pilots being illuminated with lasers, and as a result of the findings of the CAMI report, Secretary Mineta announced on January 12, 2005 a new FAA policy designed to protect air crews and passengers and to discourage future laser incidents. Secretary Mineta directed the FAA to distribute an advisory circular, AC 70-02, which contains new guidelines to give pilots, air traffic controllers, and law enforcement timely information about laser incidents. The new guidelines will help pilots identify areas where lasers have been sighted, will assist controllers in reporting laser incidents, and will give law enforcement officers the information as quickly as possible in order to investigate and prosecute those persons who put aircraft at risk.

At the present time, there is no system or device that can be installed on an aircraft or given to pilots and crew to protect them from these incidents, without possibly affecting operational performance. The U.S. military has dedicated a great deal of time and research to finding ways of protecting their pilots from an enemy's use of lasers to impair pilot performance during military flight operations. Their efforts have established that there is no easy answer to this problem.

For example, efforts to develop pilot goggles that will screen out all the wavelengths of visible lasers and thereby prevent any adverse effects from exposure to them, have proven to have limited

practical application and may even be potentially hazardous to flight safety. Screening out the wavelengths that produce red and green lights, the most common color of lasers, will also impair the pilot's ability to read the instruments in current cockpits, which are often displayed in either green or magenta. The goggles can also impair the pilot's vision by reducing the amount of visible light. Both of these results are unacceptable.

Consequently, other initiatives that call for installing filters or screens on cockpit wind screens to intercept or deflect lasers could similarly result in an unacceptable reduction of critical visibility for safe flight. Protecting pilots from the real but remote risk of being illuminated by a commercially available laser powerful enough to cause an accident cannot be accomplished by a solution that could create an even more dangerous operating condition.

We at the FAA are working with the Department of Defense to explore technologies and protocols that may provide protection for pilots and air crews, while not impairing their ability to operate their aircraft. An alternative solution may be an operational one. We are hopeful by obtaining and evaluating more information on the effects and risks of laser illumination, FAA might at some point be in a position to develop protocols for pilots to follow to best mitigate the effects of a laser, much as we have for other operational challenges.

In the interim, the FAA will continue to partner with the Department of Homeland Security to better define the threat laser devices pose and identify countermeasures to minimize the risk to aviation safety. We will also work collaboratively with Department of Defense scientists to determine whether any of their research can have practical applications to the civil aviation arena. It is our hope that the Advisory Circular the Secretary announced earlier this year will result in an improvement in the ability of State and local government to prosecute individuals who intentionally attempt to focus lasers on aircraft.

The FAA will continue working with the FDA and the Consumer Product Safety Commission to improve product labeling and better educate the general public concerning the potential harm from the inappropriate use of lasers.

Mr. Chairman, this concludes my testimony and I would be happy to answer any questions you may have.

Mr. MICA. Thank you. I appreciate your testimony. As I said, we will defer until we have heard from all of the panelists.

Before I go to the next panelist, I have had a request by Mr. Boswell to make an opening statement. He has another obligation. I would like to recognize him, if I may.

Mr. BOSWELL. Thank you, Mr. Chairman. Again, I appreciate your having this important hearing. I will read the record on this very carefully.

Mr. Hayes and I talk about these things from the fact that we are still flying airplanes and proud that we are. Yesterday, I was test flying a Grumman 430 in my little Comanche and, wow, what a gadget. But I was thinking about today a little bit, and this was broad daylight and so on, but last night, or this morning, rather, about, I don't know, it must have been around one o'clock. I was landing at Dulles, beautiful lights, approach, looking over the pi-

lot's shoulder. I wondered what would happen if you got struck by a laser right then. I assume your night vision is gone. How long? I would like for you to address if you can, or somewhere.

Make an missed approach, how long is the recovery? Is it normal time? Of course you are subject to maybe it would happen to you again on the second approach, but nevertheless. I do not know what the answers are to this. A thought came to my mind very much during your testimony that goggles, when you think about depth perception and all these things, it might be more of a hindrance than a help and so on.

So I think it is very timely we are doing this. You know, certainly, and I cannot emphasize how much all of us feel that the importance of the airline industry, commercial aviation is to our country in many, many respects. I do not need to go there. We know that. But general aviation is too. It is a big deal. We have just got to do our best to keep them flying and be safe, and there are no guarantees for anything. We know that, but we have to do the best we can.

So I salute you for your efforts. I want you to keep it up. If there is something that we need to do, and I know that is why our Chairman and Ranking Member have called these type of hearings, is so we can be knowledgeable. It is a moving thing. It is not static at all. I just want to encourage you to really give it your all. I think you are. I have confidence. I like the representation I see here at this hearing this morning.

I think that if we put smart people, and I mean that, smart people like you together in the same room, you will work out some solutions. That is what we need to do. Whether it is to help that military pilot that is taking off in his F-16 out of Des Moines and heading for Iraq, or whether it is the general aviation airplane that would allow me and one of my colleagues to get in here late last night, or this morning rather, or whatever. We depend so much in this country on our ability to be able to fly and fly safely.

We have to keep flying. We have to keep flying. So we have to do our best. I thank you for your input. You might address that before I have to leave. I can read about it, if the Chairman does not want to go there, the in recovery time, once you get that with the laser.

Thank you very much and thanks for your hard work.

Mr. MICA. Thank you. We may have witnesses address that.

We will return now to our panel, and recognize Mr. Randall Walden, Technical Director of Air Force Rapid Capabilities Office. He is accompanied by Colonel Peter Demitry. Welcome sir, and you are recognized.

STATEMENT OF RANDALL WALDEN, TECHNICAL DIRECTOR, AIR FORCE RAPID CAPABILITIES OFFICE, ACCOMPANIED BY COLONEL PETER DEMITRY, ASSISTANT AIR FORCE SURGEON GENERAL MODERNIZATION

Mr. WALDEN. Thank you, Mr. Chairman.

Mr. Chairman, members of the subcommittee and staff, I sincerely appreciate the opportunity to appear before you today and answer questions regarding the visual warning system, a system that was developed by the United States Air Force Rapid Capabili-

ties Office in support of North American Aerospace Defense Command, or NORAD's mission.

Accompanying me today is Colonel Peter Demitry. Colonel Demitry is a medical doctor, a flight surgeon and command pilot, and was instrumental in setting the eye-safe design parameters for the visual warning system.

The visual warning system is a ground-based light signal similar to those defined in Federal Aviation Regulation 91-125. The visual warning system that was developed by the Air Force is controlled by NORAD and safely emits a sequenced red and green light in a narrow beam directed only at the intended aircraft. These visually conspicuous lights, distinct from all other lights in the National Capital Region, and from those currently used by FAA air traffic control, are intended to warn pilots who are operating in an unauthorized manner with respect to FAA regulations and who may appear to be a threat to the National Capital Region.

To enable this signal to both selectively and effectively warn two attributes were required: one, a highly visible light of multiple colors; and two, a very narrow beam. To meet both of these requirements, a low-power laser system that displays alternating green and red lights was developed and tested for safety. Prior to using the alternating green and red lights, a technical chain of events must occur. These events include tracking the intruder aircraft by precision radar, tracking the intruder by visual or infrared camera, a decision to use the visual warning system, and finally illumination of the visual warning system.

For a decision to be made to use the visual warning system, an aircraft must enter the National Capital Region airspace without authorization and fail to respond to air traffic control. Both of these occurrences are violations of FAA procedures for flight within the restricted flight zones and represent a threat to general and commercial aviation. Details of the decision process for use of the visual warning system are under the operational control of NORAD.

In cooperation with the Surgeon General of the Air Force, the Air Force Research Laboratory Optical Radiation Safety Team, the FAA Flight Standards Office, the FAA Airspace and Rules Division and the Massachusetts Institute of Technology Lincoln Laboratory, we know the visual warning system to be eye-safe.

The visual warning system consists of two one-and-a-half watt lasers that produce red and green light, two telescopes, and two cameras for precision tracking, all mounted on a fully controllable pedestal. Each laser's level of light is passed through a telescope to disperse the power over an area sufficiently large enough so an aircraft will be illuminated at long ranges. These pairings of laser sources with telescopes render the level of illumination eye-safe not only at the aircraft, but also at the output of each telescope. The American National Standards Institute, or ANSI, defines the term "eye-safe" associated with lasers. At all ranges, the level of light radiating from the telescope is less than the ANSI maximum permissible exposure level for eye safety.

Based on the ANSI standards and additional guidance from the Air Force biophysicists and physicians who specialize in lasers in the anatomy of the eye, these light levels were defined and laboratory-tested. Prior to moving this system to the National Capital Re-

gion, we received a letter of non-objection from the FAA for test operation and conducted field tests in New England.

Once the system was moved to the National Capital Region, further testing was performed in which we illuminated cooperative government aircraft and observers. In the 12 flights flown in the National Capital Region over the past three months, the visual warning system illuminated observers for a total of 120 minutes. The observers included flight surgeons, FAA personnel, government pilots and others who participated in the development of the system. All of this development was done with full FAA knowledge and participation.

The Air Force has developed an enhanced warning capability that adds great value to the defense of the National Capital Region. The visual warning system aids the safety of general and commercial aviation by providing a non-lethal, non-threatening method to warn pilots before there is an opportunity for an innocent errant pilot to be confused with a hostile air threat. Perceived air threats to national security in the National Capital Region not only impact general and commercial aviation. They affect the lives of professionals and tourists in our Nation's capital. In the near future, this system may even prevent an unnecessary evacuation of personnel from government buildings like the U.S. Capitol as seen on June 9, 2004.

Mr. Chairman, thank you again for the opportunity to appear before the subcommittee. I look forward to answering your questions.

Mr. MICA. Thank you. I take it Colonel Demitry did not have an opening statement.

Mr. WALDEN. That is correct.

Mr. MICA. Okay.

So we will turn to Captain Terry McVenes, Executive Air Safety Chairman of the Air Line Pilots Association. Welcome, sir, and you are recognized.

STATEMENT OF TERRY MCVENES, EXECUTIVE AIR SAFETY CHAIRMAN, AIR LINE PILOTS ASSOCIATION

Mr. MCVENES. Good morning, Congressman Mica, Congressman Costello and the rest of the Committee.

My name is Captain Terry McVenes. I am the Executive Air Safety Chairman for the Air Line Pilots Association International. I have been an airline pilot for 27 years. It is a pleasure to be here this morning to represent ALPA's 64,000 pilots that fly for 41 different airlines here in the United States and Canada.

First of all, I would like to applaud the Committee for holding this hearing and for your continuing attention to aviation safety and security. As First Officer Winder's earlier statement made very clear, pilots, our members, are on the front lines of aviation safety every day. Regardless of whether a prankster or someone with more sinister intentions caused these recent incidents, they underscore the real dangers that lasers impose. Federal agencies and legal authorities must respond and they must involve pilots every step of the way.

Lasers are not a new threat to aviation or to ALPA. We have been involved in dealing with the laser hazard since the early 1990s when the potential dangers of powerful outdoor displays

such as those used by Las Vegas casinos first became known. More recently, private individuals have used lower-powered lasers available on the Internet to create visible beams in our airspace. We are aware of at least 20 laser events in a very short two-week period just between December 23, 2004 and January 2, 2005. Hundreds of these events have taken place over the last several years.

Lasers affect pilots in one of four ways, each with increasing seriousness: distraction, disruption, disorientation, and finally incapacitation. While we are extremely concerned about the risks to the health of our pilots, the public needs to understand that every commercial aircraft carries a professional two-pilot crew, and it is highly unlikely that an individual could incapacitate both pilots simultaneously, so flying remains extremely safe as a result of this dynamic.

As this Committee well knows, no practical and reliable technology exists today to shield airline pilots from the effects of lasers. However, research is ongoing to develop filters that could be used for airline operations and ALPA supports that research.

As Mr. Costello and Mr. Sabatini have already mentioned this morning, on January 11 of this year the Federal Aviation Administration issued an advisory circular that requires all pilots to immediately report any laser sightings to air traffic controllers. It also requires controllers to share that information through the Federal Domestic Events Network. This DEN is designed to provide real-time security-related information about events affecting air traffic operations to the FAA, to the TSA and to other government stakeholders, including law enforcement agencies. Both the DEN and the new guidance to pilots are critical steps forward and ALPA commends Transportation Secretary Norman Mineta for his leadership on this action.

I do want to note that while lasers are clearly an aviation safety issue, the extent to which they are an aviation security threat is still unclear. On January 12 of this year, Secretary Mineta reported that there is, "no specific or credible intelligence that would indicate that these laser incidents are connected to terrorism." Law enforcement and intelligence community sources confirm that the recent spate of laser incidents cannot be linked to terrorism.

That said, there is little doubt that lasers will continue to be an aviation safety concern in the future. As our Nation responds to 64,000 pilots of ALPA, we make the following recommendations. First of all, because pilots are on the front lines of aviation safety, it is critical that we have the information that we need to do our jobs. ALPA calls on the Federal Government to improve that information flow both for reporting incidents and for informing pilots about major security concerns while they are in the cockpit.

Number two, government and industry must support work underway that will help pilots respond in the event of an unauthorized laser illumination. That has to include creating operational procedures, conducting simulator training and adapting ground school materials.

Number three, we recommend that the government and industry must accelerate research and development of technology that can protect airline crews from the potential of this risk of lasers.

Number four, while the Federal Government has publicly said that it knows of no credible evidence that terrorists may be involved with these laser incidents, we must not assume that this will always be true. ALPA urges the DHS and other agencies to continue monitoring for any indications of terrorist activities.

And finally, ALPA recommends that law enforcement agencies fully investigate and prosecute those who intentionally illuminate cockpits with lasers to the maximum extent of the law.

Flying remains extremely safe. However, our country must remain vigilant and use responsible fact-based approaches to evaluate all aviation safety and security threats, including those represented by lasers. By virtue of our passion and our professionalism, pilots have an unrivaled stake in aviation safety and security.

We look forward to working together with the Federal agencies and with Congress to address lasers and any other threats to passengers, crew or cargo. The panel sitting before you today is made up of pilots and Federal agency leaders, a true testament to the fact that aviation security is more than just protecting pilots or planes. It is about protecting our Nation.

Thank you.

Mr. MICA. Thank you for your testimony.

I thank each of our witnesses for their participation and comments.

We will turn now to some questions. I will lead off with a few questions. First of all, First Officer Winder, the individual or individuals that were involved in your particular incident, were they identified or arrested?

Mr. WINDER. No, sir. We have not to date been able to find out who the perpetrators were. We did find a generalized location where they probably operated from. It was a light industrial complex in South Central Salt Lake near a graveyard.

Mr. MICA. In your incident, I guess it was September.

Mr. WINDER. September 22.

Mr. MICA. Yes. It was prior to FAA's issuing their ruling in January and their guidelines.

Mr. WINDER. Yes, sir.

Mr. MICA. Are you familiar with what they have issued as far as guidelines for reporting, et cetera? And do you think that is adequate?

Mr. WINDER. Yes, sir. I am now familiar with it. I will probably put myself on report by saying knowing what I know now, and doing what I or we did as a crew, is very different, because we did not respond. Having no previous experience or knowledge or understanding, we were kind of treading new water. We did not really know what we were doing.

Mr. MICA. So when did you end up reporting? And to whom did you report the incident?

Mr. WINDER. We reported to the FAA during the incident. We failed to follow-up on that that night. We did not understand the complexity of the issue. The very next morning very early, we reported it to our company officials, our Delta corporate security. That kind of got the ball rolling, sir.

Mr. MICA. Okay.

Mr. WINDER. The FBI got involved immediately, the TSA, Anti-Terrorist Task Force.

Mr. MICA. When did the FBI get involved, again?

Mr. WINDER. Why did they?

Mr. MICA. When?

Mr. WINDER. When? The very next morning.

Mr. MICA. The next morning, okay.

Mr. WINDER. So the morning of the 23rd they got involved.

Mr. MICA. So there was some follow-through by FAA.

Mr. WINDER. Yes, sir. Tremendous.

Mr. MICA. Okay.

Mr. Sabatini, according to what I think you testified, there have been about 112 reports of incidents in 2004, which is a dramatic increase over the previous time, since I think you said 1990. In many of those incidents have the perpetrators of using lasers in an improper fashion been identified?

Mr. SABATINI. Well, I do not have the information that the law enforcement organizations would have in terms of that information. But we do know that, as Mr. Winder has explained, there is now in place a very rigorous procedure to be followed.

Mr. MICA. I am told there are only three or four incidents in which they have actually been able to, or where they have gone after folks and have been able to identify them or prosecute them, out of the 112. Does anyone know if that is the case? ALPA?

Mr. MCVENES. No, we are not aware of a whole lot of prosecutions on it, that is true.

Mr. MICA. Since January, we have some new guidelines in place. I understand most recently, and with the provisions of the Patriot Act, that an individual can be prosecuted at the Federal level. Is that an adequate enforcement tool, Mr. Sabatini?

Mr. SABATINI. It is my understanding that the law enforcement organizations have the tools necessary to prosecute individuals who may participate in such activities.

Mr. MICA. Again, I think you testified that the FDA has no authority to prosecute or go after these folks, no enforcement authority. You talked about FDA regulating the equipment itself, the laser equipment, and then you said Federal, State and local. In instances like this, though, I am not sure that State or local really have much jurisdiction and it would also be questionable where maybe the individual perpetrates it, he commits an offense to an aircraft in the sky which might be over two or three jurisdictions. So it seems like it is going to end up in the Federal bailiwick for enforcement.

Do you feel that we need to adopt any additional laws, FAA regulations, anything to deal with it? What we are seeing is a pretty dramatic increase in the incidents.

Mr. SABATINI. Mr. Chairman, I think there is a popular case, the one up in New Jersey where a police helicopter was irradiated and they immediately landed and apprehended the individual. It is my understanding that the Federal level, the Patriot Act, was used as a tool to prosecute this individual.

If there is additional need for stronger authority, I am not familiar with that.

Mr. MICA. Again, do you think that FAA could do something by rule, or do we need to do it by law?

Mr. SABATINI. Sir, I would think that it would be done by law.

Mr. MICA. Okay. I was kind of surprised. I flew into Dallas-Fort Worth on Thursday and was kind of shocked by reading that there was an incident. I flew on a Friday and I understand there was an incident on Thursday, which I am not certain whether they found anyone who perpetrated that laser incident.

ALPA has some recommendations, improving the reporting of incidents. Can you elaborate on that? Are the guidelines that were put in place in January insufficient and how would you improve reporting?

Mr. MCVENES. I would not say that they are insufficient. Certainly, it was a very first step for putting some procedures in place that both the air traffic controllers could use, and then provide a means for getting that information to the appropriate government agencies. We also have to make sure that the pilots are getting the information as well.

Part of the requirement is for the air traffic controllers to, if they get a report of a laser incident, that they are to report that to other crews in the area. We just have to make sure that those procedures are being followed because information is everything for us in our business. We have to have it so we can do our jobs and keep our passengers and cargo safe.

Mr. MICA. Final question and I may have some additional questions, but I want to give other members an opportunity. Mr. Walden, the Air Force is putting into place this sort of warning system. It is not operational.

Mr. WALDEN. That is correct.

Mr. MICA. So your primary means of the warning system is a laser technology. How would pilots be able to differentiate between a random misuse of lasers like we have heard most of the incidents out today, versus your system?

Mr. WALDEN. I think the main way they would tell the difference is it has a sequence of red-red-green lights that you would see based over about a one second interval, and that would be repetitive. It would also be directed at intruder aircraft to specifically identify that aircraft, as opposed to just randomly doing that.

Mr. MICA. Is this a backup? Is this a last resort? Are there communications and other notifications, when they fail, is that what this is designed for or what?

Mr. WALDEN. Yes, sir. It is a form of communication.

Mr. MICA. But it is a backup. You will use other methods of notifying someone that they have intruded into airspace before you get to this laser.

Mr. WALDEN. Yes, sir.

Mr. MICA. How long before you plan to implement this?

Mr. WALDEN. That is really up to NORAD. My understanding is they are working closely with the FAA to come up with a schedule to actually take it operational. But for specifics on that schedule, you need to really talk to NORAD.

Mr. MICA. Okay. Let me yield to Mr. Costello at this point.

Mr. COSTELLO. Mr. Sabatini, you have suggested in your written testimony that there may be operational mitigation techniques that

crews could employ and use. You have heard the testimony of Captain McVenes about the ALPA recommendations. I wonder if you might tell us where the FAA is and how they feel about the recommendations of ALPA.

Mr. SABATINI. I would support the recommendations made by ALPA. I would add that we have a work group working with a number of different agencies and professionals to help us develop what those protocols might be. They might be examples such as engage the autopilot or look away, obviously, and lower your head below the instrument panel so that you avoid the direct viewing of the light. But it is premature for me to say what those might be. Those are just some examples, Mr. Costello.

Mr. COSTELLO. This work group that you referred to, how long have they existed and how long have they been working on this issue?

Mr. SABATINI. They have been in existence probably less than a year, but I expect to have their recommendations by August of this year.

Mr. COSTELLO. It has been suggested by some that pilots could wear some type of goggles to mitigate the effects of laser attacks. I just wonder what your thoughts are on that idea.

Mr. SABATINI. I think the technology has some promise, but as we know it today, it has some significant limitations, primarily with civilian airliners where the cockpits today utilize many different colors to indicate the importance of the information that is being presented, such as red, green, magenta, et cetera. When you consider that a goggle will filter out that wavelength, that particular color, the red or the green, you would actually be inducing a limitation and the ability of a crew member to see some important information. So at this point in time, we do not think it advisable to install on or have crew members wear.

Mr. COSTELLO. Mr. Winder, I wonder if you might respond to the issue of the suggestion that goggles may help prevent blurred vision and so on.

Mr. WINDER. With respect to laser energy, and because of the multitude of displays we are required to closely monitor, especially on final approach and landing, unless we can come to a technological conclusion on how to avoid filtering out important color signals that we receive, we just do not have that technology right now.

Goggles, as it were, I think would be an immediate fix, but having both pilots wear goggles probably would not be the best way, especially today as the technology is presently constituted.

Mr. COSTELLO. Mr. Walden, it seems a little ironic that we are talking about the potential danger of lasers being directed at pilots and crews, while at the same time that NORAD is planning to implement a laser-based visual warning system. I wonder if you might comment as to how you believe that this system can be developed where it is safe for pilots.

Mr. WALDEN. There were three main things that we came up with when we designed the system. The first one was that it had to be eye-safe at all ranges, to include right up to the aperture. The second thing is that it needed to be a very narrow beam so it specifically focuses on an intruder aircraft. And then finally, operator

controls that allow it to be turned off when the decision needs to be made.

I do not want to comment on the operational impacts associated with what NORAD is going to do procedurally, but we can take that and get that information back to your staff.

Mr. COSTELLO. Very good.

A final question for Mr. Sabatini. I am wondering what type of lasers did the FAA employ in their study to determine the effects on pilots?

Mr. SABATINI. We used that which is considered not to exceed the maximum exposure limits. If you need some specifics, I do have Dr. Van Nakagawara who conducted the testing right here behind me if you need more specific information.

Mr. COSTELLO. I would ask that you submit the information to us for the record.

Mr. SABATINI. I would be happy to do that, sir.

Mr. COSTELLO. Thank you.

Thank you, Mr. Chairman.

[The information received follows:]

A collimated beam of green light with a peak spectral irradiance of 532 nm wavelength was generated by a continuous-wave doubled Nd:YAG laser.

Mr. MICA. Thank you.

Mr. Duncan?

Mr. DUNCAN. Thank you, Mr. Chairman. I appreciate your calling this hearing because with the great increase in the number of these incidents, this is certainly something that is appropriate to look into.

I notice that in our briefing paper it says in the March 2005 issue of the Airline Pilot magazine, the Air Line Pilots Association recommends several tactics to reduce the impact of a laser, including turning up cockpit lighting to maximum brightness, turning on the autopilot, and shielding the eyes from the light source.

Now, I am not sure exactly what they are referring to on shielding the eyes, unless that is the goggles that we are talking about. Have you seen that article, Mr. Winder, with those recommendations? And what affect do you think that would have had in your case?

Mr. WINDER. Yes, sir, I have seen the article. Though not directly instrumental in some of these procedures, I did make recommendations as a result of my incident. With respect to specifically shielding the eyes, it is more of a direct shield, for instance your hand or lowering your head or actually turning your head away from the light source.

With respect to our exact incident, it was very, very pinpoint light. As a matter of fact, it looked like a light saber. It was so intensely bright. There was no problem in tracking this light beam all the way down to the source. There was no breakup of the light. It was absolutely intense. I would think, though not professionally qualified to make a judgment, that it was of the extreme energy level laser.

Mr. DUNCAN. But since you had not had that happen before, you were so caught by surprise you did not think to do any of those simple things.

Mr. WINDER. I did not. I think probably my human nature is that I see a bright light and I immediately look to see what it was. But now having some information and training now, saying that if you do see a bright light, do not look at it. Turn away.

Mr. DUNCAN. Well, it is good that other pilots are being warned about this by articles such as that and also hearings like this. Is it correct to assume, I know that a lot of people maybe do not want to put on goggles. Is it correct to assume that something as simple as an expensive pair of sunglasses would be sufficient to assist with this problem, Mr. Walden?

Mr. WALDEN. I believe that we can assist in making that better. Right now, I would kind of like to refer to my medical doctor here to help me out on that one question.

Mr. DUNCAN. Sure.

Mr. DEMITRY. Sir, that question comes up very, very frequently among all air crews worldwide. Succinctly, the answer is no. Sunglasses do not suffice in any way, shape or form for adequate protection against laser radiation.

Mr. DUNCAN. Well, I know that it has been stated here that the Federal Government has authority under the Patriot Act to prosecute people who do this. I know that it would be very, very difficult to apprehend people who do this, just as in Mr. Winder's case, but I think that what we should check into is, even though there is authority, are the penalties sufficient, and we need to make sure that the penalties are pretty stiff and strong for an incident like this, and we should prosecute somebody to the hilt to set an example if and when we have a rare case where we are able to catch somebody doing this. I think it is a very serious thing and I am concerned about the great increase in the number of these incidents. We need to watch that to see if it continues to go up.

Thank you very much, Mr. Chairman.

Mr. MICA. Thank you.

Ms. Norton?

Ms. NORTON. Thank you, Mr. Chairman.

First I would like to ask you, Mr. Walden, whether or not the DOD or the Air Force have analyzed the threat that would be posed by military-grade lasers where we have an even greater threat. As I understand it now, we are talking about lasers that almost anyone can buy over the counter.

Mr. WALDEN. I have not looked into that specific area. I know that Colonel Demitry has looked in that area, but for an open forum today, it probably would not be appropriate to touch on some of those issues.

As far as my office, again our hope was to make sure that we bring a safe and very effective visual warning system about to aid not only the FAA, but NORAD's mission.

Ms. NORTON. Mr. Chairman, these military-grade lasers are something I think would be of interest to the Committee. We may need a secure briefing to know where we are on them, but I doubt that al Qaeda will buy lasers across the counter and try to disable one of our airplanes. So I am very interested in military-grade lasers.

Mr. Walden, you indicated in your testimony that, oh, first let me ask whether or not it is possible with the use of the over-the-

counter lasers that both a pilot and a co-pilot could be disabled in the way Mr. Winder was? Or is it likely that only one of the pilots would be temporarily disabled?

Mr. WALDEN. The best way to answer it is, it really kind of depends. It depends on the weather conditions. It depends on how accurate you can point the laser. I believe certainly you can build lasers out there that can reach out a great distance.

Ms. NORTON. Including the kinds of lasers that anybody can buy?

Mr. WALDEN. Again, I am not familiar so much with the specific market out there on the lasers. They are sufficiently powerful enough to at close distances injure an eye. Again, I would turn to the laser expert certainly from the air crew point of view and a medical doctor. Colonel Demitry, do you have any comments on that?

Mr. DEMITRY. Ma'am, if you and I were to look on the internet, it would take us less than three minutes to find a laser that was sufficiently hazardous to permanently disable the human eye for many miles.

Ms. NORTON. So given the distance from which these lasers have been fired, I take it that you believe that both pilots could be disabled?

Mr. DEMITRY. I did not go that far, ma'am, and in open forum I would prefer to address that question and that scenario in a closed forum as well. We have thought about those issues for the military applications. We have been studying this for many, many years and have multiple active programs. But clearly in an open forum, any of us could go on the Internet and there are many, many. You would have to shop it to find the hazardous laser du jour that you would want to just buy online. After that, you would be able to put out some damage.

Ms. NORTON. Let me move to the NORAD system that has been tested here in this region. Is the plan to ultimately spread this kind of laser protection system to other major airports? This airport has not been one of the airports, I believe, and I am thankful to say, that has had one of these incidents.

Mr. WALDEN. Not to my knowledge, but again that would be a great question for NORAD and the mission that they need to undertake for their overall Operation Noble Eagle.

Ms. NORTON. Final question. I would like to hear what Captain Winder and Captain McVenes think about the system for the NORAD system. In my comments, I indicated at least in this region, if we cannot make radio contact, then there is nothing else to do virtually. I mean, some Captain may try to shoot the person. That, of course, is full of risk to the plane and to the passengers. So basically what we have is either that, if a pilot happens to be armed, and not all of them are armed, or shoot down the plane.

So I would like to know what you think, particularly considering that in your statement, Mr. McVenes, you indicated that you had some concerns about startling, distracting or disrupting pilots, causing some kind of safety concern.

Mr. MCVENES. Yes, that is pretty much our concerns right now with the system, but the real issue here is that we are only familiar with the system like everybody else is in terms of what we have read in the newspapers. We have not been involved with any of

this, and as the comments I made in my statement, is we have to have the pilots involved with these things so that we can adequately learn about them, address them and provide input as to their applicability out there in the real world.

Ms. NORTON. Mr. Winder, do you have anything to say on that?

Mr. WINDER. No, ma'am. I agree. I think that it will be a timely manner that those good folks through NORAD will probably embrace us at ALPA and the Airline Association and we will take a serious look at it.

Ms. NORTON. Very important.

Yes, sir, Mr. Sabatini?

Mr. SABATINI. I would like to volunteer some information regarding some of the questions you have asked. The testing we have done clearly indicate that while there is visual impairment to the flight crew members, it has not in any way caused loss of control of the aircraft, so operational control of the aircraft is maintained at all times. Also, when you consider the sophistication you would need with a laser to pinpoint and sight an aircraft while it is moving at high speed, and constantly keep it focused on a pilot's eye, and when you consider your question of two pilots, to focus on two pilots at the same time, it leaves a great deal to be desired, given what is available.

Well, I will stop there.

Ms. NORTON. Thank you. I think the earliest involvement of the pilots would be well advised.

Thank you very much, Mr. Chairman.

Mr. MICA. Thank you.

We have two votes coming up. Mr. Hayes, we have about six-and-a-half minutes to divide. Did you or any other members have questions? If you would like to go ahead, Mr. Hayes, and then we could give Ms. Johnson the balance of the time, so we will split it up.

Mr. HAYES. Thank you, Mr. Chairman, for the meeting, and thank you, gentlemen, for being here.

I am coming at this from a pilot's perspective. A couple of quick questions, let me ask the questions, and then you can respond in the time available.

What is the penalty for being caught with a laser now and lasering an aircraft? And also, how often is this occurring? What is the legitimate use, Colonel, of the laser that you can buy over the Internet? And then last but not least, general aviation obviously is involved in this. We have totally different kinds of wind screens from very thick glass on a pressurized aircraft, to thin plastic on a 172. I would ask that as you proceed with the testing, you make sure that someone like AOPA provides their 172 Bonanza or whatever to make sure that you have a good look at what is going on there. And then also factor in all the other different aspects of this.

I want to start with the legitimate use of the laser. That is really puzzling to me.

Mr. DEMITRY. Sir, I will not take much time. Legitimate uses would include medical uses, research, even industry is using lasers more and more in telecommunications. The type of that are nuisance lasers, just for having one, sir.

Mr. HAYES. They are just like a flashlight. You can point them, and a medical laser would not be something you would carry around in your hand.

Mr. Sabatini, what is the penalty now if caught?

Mr. SABATINI. If we use the New Jersey example, they could be subject to the Patriot Act.

Mr. HAYES. Okay, and is their active jail time? What is the sentence?

Mr. SABATINI. I do not know what that information is.

Mr. HAYES. Well, it is a very serious matter, so if the FAA would consult with us and let us know if there are additional legal things that need to happen.

Mr. Walden?

Mr WALDEN. Sir, you brought up the question of putting a laser through a windscreen. We did do some of that testing that you brought up, and that is particularly looking at different thicknesses of windscreen off of actual aircraft to characterize the effect of the visual warning system.

Mr. HAYES. Okay. Well, again, make sure that general aviation provides any of the assets that again, my windscreen in front is very thick. The one on the side is not so thick.

First Officer Winder?

Mr. WINDER. Sir, from the internet just before I left home, I want to read you the first line. You asked the question why. Quote, "Imagine being able to wield a laser light saber that extends for 20 miles; Imagine being a standout as you point your green beam into the heavens or around your neighborhood; Imagine being known as a wicked laser master."

Mr. HAYES. Weird stuff. Gotcha.

Thank you, Mr. Chairman.

Mr. MICA. Thank you.

Ms. Johnson?

Ms. JOHNSON. Thank you, Mr. Chairman.

Mr. Winder, did you have permanent eye damage?

Mr. WINDER. No, ma'am, not permanent, but I have some lasting effect, just some mild shadowing and my right eye is more light-sensitive in extreme light conditions, direct sunlight or in the snow.

Ms. JOHNSON. Thank you.

I guess it is to Mr. Sabatini I need to ask this. What kind of coordination is going on between the Department of Defense, the Department of Homeland Security, to address this threat? What kind of public outreach for education is going on?

Mr. SABATINI. We are working very closely with FBI, DHS and DOD, and it is the Laser Eye Protection Task Force. It is ongoing as we speak. They are addressing the issues that we are describing here today. The public education primarily takes place as a result of an event like what took place in New Jersey which was widely publicized and will hopefully educate the public as to the danger of innocently or maliciously radiating an aircraft.

Ms. JOHNSON. Thank you, Mr. Chairman. I have more questions, but I will withhold them for a vote.

Mr. MICA. We have about two minutes remaining. Any other members have questions?

I would like to thank our panelists for their participation today. We may have some additional questions and some of them may be of a sensitive security nature that we may want to submit to the panel, so if you could respond to the subcommittee, we would appreciate it.

I thank each and every one of you for your participation, for the opportunity to look at what has not been a major problem, but could pose some serious threats and challenges to both pilots and passenger safety.

There being no further business then to come before the Aviation Subcommittee, this hearing is adjourned.

Thank you.

[Whereupon, at 11:28 a.m., the subcommittee was adjourned to reconvene at the call of the Chair.]

OPENING STATEMENT OF
THE HONORABLE JERRY F. COSTELLO
AVIATION SUBCOMMITTEE
HEARING ON LASERS: A HAZARD TO AVIATION SAFETY AND SECURITY?
MARCH 15, 2005

- I want to thank Chairman Mica for calling today's hearing on whether lasers present a threat to aviation.

- Since the early 1990s, FAA has documented more than 400 incidents involving lasers.

- To date, no aviation accidents have been attributed to lasers, although there are a few cases where pilots have reportedly sustained eye injuries.

- The Federal Aviation Administration (FAA) has taken steps over the years to address safety issues surrounding lasers directed at aircraft.

- In 1995, FAA developed and implemented standards to counter a surge in laser incidents. These standards defined "safe" laser exposure levels in zones surrounding airports, resulting in a laser free zone (LFZ), a critical flight zone (CFZ), and a sensitive flight zone (SFZ).

- The FAA has also undertaken flight simulator studies on the affects of laser light on pilot vision and aircraft operations, and I look forward to hearing FAA witnesses explain the results of these studies.

- While we have known about the safety issues surrounding lasers for years, a recent chain of laser-related events prompts us to start looking at laser activity as a security issue.

- While none of the more than 400 laser incidents has been linked to terrorism, the Department of Homeland Security (DHS) and the Federal Bureau of Investigation (FBI) issued a memo last December warning that terrorists have explored using lasers as weapons.
- Since November 2004, there have been more than 100 reported incidents involving lasers, which have resulted in significant media attention.

- In response to these events, the FAA issued an Advisory Circular in January 2005, which would improve the reporting requirements between flight crews, FAA, and appropriate law enforcement and security agencies via the Domestic Events Network (DEN).

- Moreover, pilot groups, such as the Airline Pilots Association (ALPA), have provided recommendations to protect and assist flight crews in the event that they encounter lasers in flight.

- The Food and Drug Administration (FDA) regulates the manufacturing of lasers and classifies them based on strength and power.

- FAA studies reveal that pilots who were subjected to lasers within legal FDA standards have reported temporary visual impairments and brief periods of distraction.

- But, more serious potential injuries could result from contact with more powerful lasers that are illegal, but still available over the Internet.

- Additionally, extremely powerful military-grade lasers designed for blinding, while not widely available, may be an emerging threat to aviation.

- Therefore, it is important that we act to ensure that lasers, especially high-intensity lasers, never become a significant threat, to safety or security.

- While FAA and DHS have been working to prevent lasers from disrupting aircraft operations, the U.S. Air Force has developed a laser warning system that it intends to fire at aircraft that violate restricted airspace around Washington DC.

- I look forward to hearing FAA and Air Force witnesses on whether or not this new warning laser prevents safety issues, and if not, why not.

- Thank you once again, Mr. Chairman, for holding this hearing. I look forward to hearing from our witnesses.

Opening Statement for the Honorable Eddie Bernice Johnson
House Subcommittee on Aviation
Lasers: A Hazard to Aviation Safety & Security?
Tuesday, March 15, 2005 – 2167 RHOB

Thank you Mr. Chairman.

I want to thank you and Ranking Member Costello for holding this important and timely hearing this morning.

According to the Department of Transportation, there have been [redacted] 100 reported laser incidents involving aircraft since December of last year.

Further, airports within my congressional district and throughout North Texas have expressed concern about the sudden uptick in ground-based laser illumination of aircraft on approaches.

Make no mistake about it, laser pointers can pose a threat to commercial aviation safety. Illumination at night can distract pilots; and if the laser is powerful enough or sustained on the eye long enough, eye damage can occur.

<u>Just last Thursday</u>, the Department of Public Safety for D/FW Airport informed me of an incident involving a laser illumination that resulted in a pilot going to the hospital due to blurred vision.

It is unclear whether this person has sustained a permanent injury.

On January 12th of this year Secretary Mineta asserted, "There is no specific or credible intelligence that would indicate that these laser incidents are connected to terrorists."

While I am heartened by this fact, I feel strongly that any misuse of a product that places at risk the safety of a flight crew and its passengers during <u>any</u> phase of flight is <u>unacceptable and can not be tolerated</u>.

As I close, I want to thank our witnesses that have come before us to testify this morning.

I look forward to their testimony, as I am particularly interested in learning more about public outreach and enforcement efforts currently underway to curtail this irresponsible activity.

I am also interested in dialoguing on ways we may partner to send a clear message that misuse of laser pointers will not be tolerated and offenders will be dealt with justly.

Thank you.

STATEMENT OF

CAPTAIN TERRY MCVENES,
EXECUTIVE AIR SAFETY CHAIRMAN

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

BEFORE

THE SUBCOMMITTEE ON AVIATION

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

U.S. HOUSE OF REPRESENTATIVES

WASHINGTON, DC

MARCH 15, 2005

Air Line Pilots Association, Int'l
1625 Massachusetts Avenue, NW
Washington, DC 20036
(202) 797-4033

STATEMENT OF

CAPTAIN TERRY MCVENES,
EXECUTIVE AIR SAFETY CHAIRMAN

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

BEFORE THE

SUBCOMMITTEE ON AVIATION

THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

UNITED STATES HOUSE OF REPRESENTATIVES

ON

LASERS: A HAZARD TO AVIATION SAFETY AND SECURITY

MARCH 15, 2005

Good morning. I am Terry McVenes, Executive Air Safety Chairman of the Air Line Pilots Association, International. ALPA is the world's largest pilot union, representing more than 64,000 pilots who fly for 41 airlines in the U.S. and Canada.

We applaud the Committee for holding this hearing and we appreciate the opportunity to provide our views on the hazard posed by the intentional misuse of lasers aimed at our members. The timing of this hearing is virtually coincident with yet another serious laser event – this past Thursday, March 10th, the captain from a major ALPA airline was struck by a green laser as his jet turned to align with the runway for landing at Dallas/Ft. Worth International Airport. He suffered blurred vision in one eye and the First Officer was required to take over the aircraft and land for him. Regardless of whether a prankster or someone with more nefarious intentions was responsible, this event, and others like it, pose a definite danger to airline safety and must be aggressively pursued.

BACKGROUND

Lasers are not a new hazard to aviation and ALPA has been involved with addressing it for more than a decade, when the potential dangers of powerful outdoor displays, such as those used by Las Vegas casinos, first became known. The temporary incapacitation of a B-737 first officer whose aircraft was departing McCarran International Airport in

October of 1995 gave the problem national recognition. In November 1996, the captain of a Skywest Airlines flight sustained an eye injury and was incapacitated when he was irradiated by what was believed to have been a laser beam during approach to the Los Angeles International Airport.

ALPA safety representatives were at the forefront of efforts to address the issue, and did so through promoting amendments of FAA and FDA standards applicable to those types of displays. That specific type of laser hazard, in essence, powerful outdoor laser displays used by legitimate operators, has been satisfactorily addressed and we have not seen evidence of any significant problems in that area since the new standards were adopted.

More recently, however, there has been a proliferation of visible laser beams in airspace created by private users of lasers, which normally are a lower-powered type that are available via the Internet. Twenty laser events occurred between December 23, 2004 and January 2, 2005 alone, and there have been hundreds of these kinds of events over the past several years. Federal authorities filed charges earlier this year against a Parsippany, New Jersey, man for shining a laser at a private plane and temporarily blinding two pilots during their approach to Teterboro Airport. While such lasers are incapable of causing permanent eye damage at long distances, they are certainly able to create a safety hazard, as has been demonstrated repeatedly.

Last September, a laser directed into the flight deck of a B-737 as it made an approach into Salt Lake City International Airport burned the retina of the First Officer. No public law enforcement report has been made on the source of the laser or its power output, but it is surmised to have been a high-powered laser.

PHYSIOLOGICAL EFFECTS OF LASERS

The word "laser" is actually an acronym that stands for "light amplification by stimulated emission of radiation." Laser light differs from common sources of electrically generated light in three ways: it is monochromatic, directional, and coherent (i.e., has a continuous wave form). Laser lights are low-powered compared to ordinary light, but they can be dangerous to the human eye because they focus their energy in a very small area.

A laser illumination event can result in temporary vision loss associated with (1) flash-blindness (a visual interference that persists after the source of illumination has been removed), (2) after-image (a transient image left in the visual field after exposure to a bright light), and (3) glare (obscuration of an object in a person's field of vision due to a bright light source located near the same line of sight). Laser effects on pilots occur in four stages of increasing seriousness – distraction, disruption, disorientation, and incapacitation. Given the hundreds of incidents of cockpit illuminations by lasers, the potential for an accident definitely exists, but a professional two-pilot crew certainly helps safeguard against that possibility.

Clearly, flight operations nearest the ground and especially during approach and landing, are of the greatest concern. A June 2004 report by the FAA's Office of Aerospace Medicine was published on "The Effects of Laser Illumination on Operational and Visual Performance of Pilots During Final Approach." Thirty-four pilots served as test subjects to determine the effects of laser light on their ability to fly safely during final approach maneuvers in what the FAA has defined as the "Laser-Free Zone" or LFZ. Pilot performance was measured using subjects in a 727-200 simulator who were exposed to four eye-safe levels of green laser light. A few excerpts from that study are noteworthy:

> "To ensure optimal visual performance at night when viewing objects inside and outside the cockpit, a pilot's eyes should be adapted for mesopic vision [i.e., night vision]... if the eyes are briefly exposed to a source of intensely bright light, such as from a laser, while in a mesopic state of adaptation, temporary visual impairment will almost certainly occur. Visual effects can last for several seconds to several minutes.
>
> At the lowest exposure level ($0.5\mu W/cm^2$)[1], 67% of the responses indicated that test subjects experienced adverse visual effects from laser exposure. Higher exposure levels resulted in significantly greater performance difficulties and a total of nine aborted landings."

Currently, there are no practical and reliable technologies available to guard airline pilots from the effects of lasers. Protective eyewear (aka "notch filters") can provide excellent protection from specific wavelengths, but they limit the pilot's ability to read instruments, they must be carefully adjusted, and they have other shortcomings. Unfortunately, there are as yet no practical and effective windscreen filters that would serve the same purpose. Research is ongoing to develop filters that could be used for airline operations and ALPA is supportive of continuing this research.

FAA RESPONSE AND POLICY

On January 11, 2005, the Federal Aviation Administration (FAA) issued Advisory Circular (AC) No. 70-2, "Reporting of Laser Illumination of Aircraft." The purpose of the AC is to provide "information to the aviation community operating within the National Airspace System (NAS) regarding steps taken by the FAA to address the unauthorized illumination of aircraft by lasers." The AC became effective on January 19, 2005, and requires all pilots to immediately report any laser sightings to air traffic controllers. It also requires controllers to share that information through the federal Domestic Events Network (DEN). As reflected in the AC, the DEN supports the sharing of real-time, security-related information affecting National Air Space air traffic

[1]The output of green lasers currently sold for use as outdoor pointers is approximately 10 times more powerful (i.e., $5\mu W/cm^2$) than that of the lowest illumination used with the test subjects.

operations among the FAA, TSA, and other governmental stakeholders, including law enforcement agencies.

As related in the AC, the ATC report includes event date and time, operator, flight number, type of aircraft, nearest major city, altitude, location of the event, a brief description of the event, and any other information needed to support the action.

On January 12, 2005, Transportation Secretary Norman Mineta reported that there is "no specific or credible intelligence that would indicate that these laser incidents [which occurred around the holidays] are connected to terrorists." Additional law enforcement and intelligence community sources have confirmed to ALPA that the recent spate of laser incidents cannot be linked to terrorism. Based on these facts, it seems likely that the incidents are being conducted by individual lawbreakers, rather than by terrorists, or in the words of Secretary Mineta, "careless people making stupid choices to put pilots and their passengers at risk."

NORAD LASER WARNING SYSTEM

Reports were made last month of a laser warning system being researched by the North American Aerospace Defense Command (NORAD). The system would use alternating red and green eye-safe lasers to warn pilots of their entrance into restricted airspace, specifically, that which protects the Capitol and White House, when they cannot be reached by radio. ALPA is familiar with the system and we have concerns with it, not the least of which is the concept of using a device that could startle, distract or disrupt pilots and lessen safety as a result.

It is our understanding that the Defense Department and FAA are still reviewing this proposal. We recommend that those organizations include all affected airspace users in their deliberations to help preclude the development of a system that would create a safety hazard.

RECOMMENDATIONS

- ALPA recommends that law enforcement agencies continue to take the laser hazard very seriously and fully investigate and bring to justice those who intentionally illuminate cockpits with lasers. We urge prosecutors and the courts to impose maximum penalties in these cases to deter others who might think that use of lasers against aircraft constitutes a harmless prank.

- ALPA calls on the federal government to improve information flow, both for reporting incidents or suspicious activity of any kind, to a central office for analysis, and for dissemination of security information to pilots. The procedures for reporting laser incidents and broadcasting this information to pilots in the cockpit are an important first step toward that goal.

- Although the federal government has publicly said that it knows of no specific, credible evidence that terrorists may be involved in these laser incidents, we must not assume that will always be true. We would urge DHS and other appropriate agencies to continue monitoring for any indications of terrorist connections to such activity. ALPA continues to evaluate this growing threat to aviation, and continues to collect as much information about it as possible.

- Work is underway to develop human factors-based safety enhancements to help pilots cope in the event of unauthorized laser illumination events in navigable airspace. Included in this effort are the creation of operational procedures, simulator training, ground school educational materials for commercial aviation, general aviation and information for the general population. The government and industry should support these efforts.

- Government and industry should also support and accelerate research and development of notch filter technology that can protect airline crews from the potential risk of lasers.

Mr. Chairman, thank you once again for permitting us to testify today. I would be pleased to respond to any questions that you may have.

# # #

OPENING STATEMENT OF
THE HONORABLE JAMES L. OBERSTAR
AVIATION SUBCOMMITTEE
LASERS: A HAZARD TO AVIATION SAFETY AND SECURITY?
MARCH 15, 2005

I want to thank Chairman Mica and Ranking Member Costello for calling today's hearing on the issue of lasers. Additionally, I applaud Secretary Mineta for his recent actions to address this matter by improving reporting requirements. Shining lasers into a cockpit of an aircraft is a serious safety issue. And, I believe that we must look not only at holding those who endanger aircraft accountable for their actions, but also at prevention and protection for flight crews in the air.

Over the last few years, the Federal Aviation Administration (FAA) has taken steps to address safety issues surrounding lasers directed at aircraft. Since the early 1990s, FAA has documented more than 400 incidents involving lasers. In 1995, FAA developed and implemented standards to counter a surge in laser incidents. These standards defined "safe" laser exposure levels in zones surrounding airports, resulting in a laser free zone, a critical flight zone, and a sensitive flight zone.

However, a recent chain of laser-related events prompts us to view laser activity as both a safety *and a security issue*. Since November 2004, there have

been more than 100 reported incidents involving lasers, many of which, have resulted in significant media attention. In mid December, the Department of Homeland Security (DHS) and the Federal Bureau of Investigation (FBI) issued a memo warning that terrorists have explored using lasers as weapons. In response, the Department of Transportation (DOT) issued an Advisory Circular in January 2005, which would improve the reporting requirements between flight crews, FAA, and appropriate law enforcement and security agencies via the Domestic Events Network (DEN). Moreover, pilot groups, such as the Airline Pilots Association (ALPA), have provided recommendations to protect and assist flight crews in the event that they encounter lasers in flight.

The Food and Drug Administration (FDA) regulates the manufacturing of lasers and classifies them based on strength and power. The FAA recently completed a study, which found that pilots who were subjected to lasers within legal FDA standards have reported temporary visual impairments and brief periods of distraction. However, it is my understanding that more serious potential injuries could result from contact with more powerful lasers that are illegal, but available over the Internet. For example, a Delta Air Lines pilot sustained eye injuries when he was struck by a laser while in the cockpit.

Therefore, it is important that we act to ensure that lasers, especially high-intensity lasers, never become a significant threat to safety or security.

While we can take measures to address an incident once it has occurred, we also must consider measures to protect the safety of flight crews while in the air. It is my understanding that FAA has considered the use of goggles, similar to those that the military utilizes, to absorb the effects of the laser on the eye. However, these mitigating efforts create other challenges for everyday flight operations. I look forward to hearing more from the FAA on this and other methods of protecting flight crews while in the air.

Thank you once again, Mr. Chairman, for holding this hearing. I look forward to hearing from our witnesses.

STATEMENT OF NICHOLAS A. SABATINI, ASSOCIATE ADMINISTRATOR FOR AVIATION SAFETY, FEDERAL AVIATION ADMINISTRATION, BEFORE THE SUBCOMMITTEE ON AVIATION, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, U.S. HOUSE OF REPRESENTATIVES, ON RECENT LASER INCIDENTS AND THE POTENTIAL IMPACT ON AVIATION SAFETY

MARCH 15, 2005

Chairman Mica, Congressman Costello, and Members of the Subcommittee,

Good morning, it is a pleasure to be here today as the Subcommittee on Aviation explores an important issue for aviation safety—the focusing of lasers on cockpits of aircraft and helicopters. I am Nick Sabatini, Associate Administrator for Aviation Safety at the Federal Aviation Administration (FAA), and this morning, I would like to provide an overview of how hand-held lasers are regulated, the potential of catastrophic events from the irradiation of a cockpit, and what the FAA is doing to protect air crew members from these incidents.

With me today is Dr. Van Nakagawara, a Research Optometrist and Vision Research Team Leader at the FAA's Civil Aerospace Medical Institute, popularly known as CAMI. Dr. Nakagawara is the lead author of a study entitled, "The Effects of Laser Illumination on Operational and Visual Performance of Pilots During Final Approach," which was published in June 2004.

In recent years, LASER (Light Amplification by Stimulated Emission of Radiation) devices have become less expensive and more commonplace. Lasers are used in supermarket scanners, CD and DVD players, construction and surveying instruments, laser pointers for presentations, and for other medical and industrial purposes. Also, lasers are often used outdoors as part of orchestrated laser light shows at theme parks, casinos, and special events.

The issue of how lasers affect pilots and whether they pose a threat to aviation safety has received media attention recently. The aviation safety issue is very straightforward. Obviously, pilots use their eyes to obtain the vast majority (approximately 80%) of all the information needed to safely fly an aircraft. Operation of an aircraft at night presents additional visual challenges. Exposure to relatively bright light such as a laser, when the eye is adapted to low-light levels, can result in temporary visual impairment. Visual effects can last from several seconds to several minutes. The three most common physiological effects associated with exposure to bright lights are: 1) glare, 2) flash-blindness, and 3) afterimage.

The principal concern for pilots is the possibility of being illuminated with a laser during terminal operations, which include approach, landing and take-off. Pilots conducting

low-altitude operations at night are particularly vulnerable to accidental or malicious laser illumination.

Let me state at the outset that, to date, no accidents have been attributed to the illumination of air crew members by lasers. While a few of these incidents have resulted in reported eye injury, no civilian pilot has had any permanent visual impairment as a result of laser exposure. However, given the considerable number of reported laser incidents—over 400 since 1990—and approximately 112 incidents since November 2004, the potential for an aviation accident does exist.

I want to emphasize that the Department of Homeland Security (DHS) assures us that they have no information that would suggest that any of these incidents is in any way related to terrorist activity. Some incidents have made national news. One such incident occurred in December when a father and daughter allegedly were experimenting with a new laser pointer to test its capabilities. The man allegedly pointed it at an aircraft on its final approach, and then, two days later, at a helicopter. The helicopter was operated by the Port Authority of New York and New Jersey Police Department, who were searching for the suspect in the earlier laser incident, when it was illuminated. The helicopter was able to identify the location based on the earlier complaint, and the man was arrested.

FAA's role in the issues surrounding the use of lasers rests with our mandate to ensure aviation safety. There are other entities who are investigating this issue from a security perspective, and it is important for everyone to understand the various roles and responsibilities. The FAA has no authority to either regulate lasers or take enforcement action against individuals who illuminate aircraft cockpits. The Food and Drug Administration (FDA) has authority to regulate light-emitting products and electronic product radiation. With respect to the enforcement issue, federal, state and local law enforcement entities have the authority to prosecute individuals who recklessly illuminate aircraft cockpits. Certainly, FAA has an important role in working with these entities to ensure aviation safety, but our role is not a primary one.

The FDA regulates lasers under their "Performance Standards for Light-Emitting Products." This FDA standard utilizes the American National Standard Institute (ANSI Z136.1) recommended Maximum Permissible Exposure (MPE) of 2.5 milliwatts per centimeter squared for continuous wave lasers, which is applied to the previously established Normal Flight Zone to prevent ocular tissue damage in all navigable airspace. The MPE is used to calculate the Nominal Ocular Hazard Distance (NOHD), which is the distance of a laser beam beyond which an individual may be exposed without risk of ocular tissue damage.

Based in part on historical laser safety data and military research on vision performance loss from laser exposure, the FAA issued a revised FAA Order 7400.2 on December 31, 2002, which includes new guidelines for Flight Safe Exposure Limits (FSELs) in specific zones of navigable airspace associated with airport terminal operations. The revised FAA Order 7400.2 establishes four specific zones: 1) the Laser Free Flight Zone; 2) the Critical Flight Zone; 3) the Sensitive Flight Zone; and 4) the Normal Flight Zone. The

Laser Free Flight Zone includes airspace in the immediate proximity of the airport, up to and including 2,000 feet above ground level, extending two nautical miles in all directions measured from the runway centerline. The Critical Flight Zone includes the space outside the Laser Free Flight Zone to a distance of 10 nautical miles from the Airport Reference Point to 10,000 feet above ground level. Virtually all of the lasing incidents to date have occurred in the Critical Flight Zone. The parameters of the Sensitive Flight Zone include airspace outside the critical flight zones that authorities (e.g., FAA, local departments of aviation, military) have identified that must be protected from the potential effects of laser emissions. The Normal Flight Zone includes all navigable airspace not defined by the Laser Free, Critical, or Sensitive Flight Zones.

The necessity of establishing Laser Free Zones around airports is documented in the results of a study done by CAMI and published in June 2004. The study consisted of subjecting 34 pilots to four eye-safe levels of visible laser light during four final approach maneuvers in a flight simulator. All test subjects were volunteers who participated after giving informed consent. Subjective responses were solicited after each trial and during an exit interview, and the pilots were asked to rate the affect the laser exposure had on their ability to operate the aircraft and on their visual performance.

Approximately 75 percent of the responses solicited from subjects indicated they had experienced adverse visual effects resulting in some degree of operational difficulty when illuminated by laser radiation during final approach maneuvers at or below 100 feet above ground level. Even at the lowest level of laser exposure, two-thirds of the responses indicated that the subjects experienced glare, flash-blindness, or afterimages. However, it is important to note that all subjects were able to maintain operational control, and safely land the plane or successfully execute a missed approach. Significantly, none of the actual lasing incidents against aircraft to date have occurred within these parameters.

In response to the recent increase in reports of pilots being illuminated with lasers, and as a result of the findings in the CAMI report, Secretary Mineta announced on January 12, 2005, a new FAA policy designed to protect air crews and passengers, and to discourage future laser incidents. Secretary Mineta directed the FAA to distribute an Advisory Circular, AC 70-02, which contains new guidelines to give pilots, air traffic controllers, and law enforcement timely information about laser incidents. The new guidelines will help pilots identify areas where lasers have been sighted; will assist controllers in reporting laser incidents; and will give law enforcement officers the information as quickly as possible in order to investigate and prosecute those persons who put aircraft at risk.

As of January 19, 2005, all pilots are now requested to immediately report any laser sightings to air traffic controllers, who will then be required to share these reports through the Federal Domestic Events Network. Once these laser incidents are posted on the network, air traffic controllers will work with law enforcement entities to identify the source of the lasers, with the goal of assisting police in locating the scene of the lasing incident swiftly, and hopefully, apprehending the person responsible. As Secretary

Mineta said when announcing this new policy, "We must act now, before someone's reckless actions lead to a terrible and tragic incident."

At the present time, there is no system or device that can be installed on aircraft or given to pilots and crew to protect them from these incidents without possibly affecting operational performance. The U.S. Military has dedicated a great deal of time and research to finding ways of protecting their pilots from an enemy's use of lasers to impair pilot performance during military flight operations. Their efforts have established that there is no easy answer to this problem. For example, efforts to develop pilot goggles that will screen out all the wavelengths of visible lasers, and thereby prevent any adverse affects from exposure to them, have proven to have limited practical application and may even be potentially hazardous to flight safety. Screening out the wavelengths that produce red and green light (the most common colors of lasers) would also impair the pilot's ability to read the instruments in current cockpits, which are often displayed in either green or magenta. The goggles can also impair the pilot's vision by reducing the amount of visible light. Both of these results are unacceptable. Consequently, other initiatives that call for installing filters or screens on cockpit windscreens to intercept or deflect lasers could similarly result in an unacceptable reduction of critical visibility for safe flight. Protecting pilots from the real, but remote, risk of being illuminated by a commercially available laser powerful enough to cause an accident cannot be accomplished by a solution that could create an even more dangerous operating condition. We at the FAA are working with the Department of Defense to explore technologies and protocols that may provide protection for pilots and air crews, while not impairing their ability to safely operate their aircraft.

An alternative solution may be an operational one. We are hopeful that by obtaining and evaluating more information on the affects and risks of laser illumination, FAA might, at some point, be in a position to develop protocols for pilots to follow to best mitigate the affects of a laser, much as we have for other operational challenges. Examples of these protocols for flight crews include: shielding their eyes to the maximum extent possible, yet consistent with aircraft control and safety; avoiding flight within areas of reported on-going unauthorized laser activity; and avoiding areas, if practicable, where an incident has just been reported and a warning broadcasted. Other measures could include obtaining authorization to deviate from the last assigned clearance in the event laser activity is encountered, and expediting the reporting of incidents to the appropriate air traffic control facility.

In the interim, the FAA will continue to partner with the Department of Homeland Security to better define the threat posed by laser devices and identify countermeasures to minimize the risk to aviation safety. We will also work collaboratively with Department of Defense scientists to determine whether any of their research could have practical applications to the civil aviation arena. It is our hope that the Advisory Circular the Secretary announced earlier this year will result in an improvement in the ability of state and local government to prosecute individuals who intentionally attempt to focus lasers on aircraft. Aggressive enforcement will hopefully discourage reckless laser use. The FAA will also continue working with the FDA and the Consumer Product Safety

Commission to improve product labeling and better educate the general public concerning the potential harm from the inappropriate use of lasers. Improved labels and better education represent the best means of raising awareness among the public in the short term.

Mr. Chairman, this concludes my testimony, and I would be happy to answer any questions you may have.

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