EFFORTS TO PREVENT PANDEMICS BY AIR TRAVEL

(109–9)

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AVIATION

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TRANSPORTATION AND
INFRASTRUCTURE
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Wednesday, April 6, 2005

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

The subcommittee met, pursuant to call, at 2:00 p.m., in Room 2167, Rayburn House Office Building, Hon. John L. Mica [chairman of the subcommittee] presiding.

Mr. MICA. Good afternoon. I would like to call this hearing of the House Aviation Subcommittee to order.

Thank you for your patience while I was late today. I had some constituents and a school group and they take precedent even over the Subcommittee business.

The order of business today will be opening statements by members, then we have two panels of witnesses and we will introduce them. I will begin with my opening statement and then will yield to other members and then we will hear from our first panel.

The title of today's hearing is our efforts to prevent pandemics by air travel. I believe that one of the most important responsibilities of the Aviation Subcommittee is to both anticipate and also preempt significant problems that may drastically affect our commercial aviation industry. Today's hearing will focus on the spread of contagious diseases by commercial aviation.

I think we all remember that the terrorist attacks of 2001 killed some 3,000 people and its after-effects seriously damaged our economy. What we may have forgotten is that while our aviation industry was struggling to recover, it was also hurt by the Asian SARS epidemic. SARS sent another devastating shock to passenger air service and nearly destroyed or bankrupted a number of airlines. Billions of dollars were lost, regional air traffic disrupted, and economies were very seriously affected.

SARS fortunately was limited and contained. But as we may know from some news accounts and some folks who are looking at the bird flu epidemic, we may face an even more serious pandemic and we must be prepared. A pandemic contagious disease spread rapidly by air travel could do untold damage to both our aviation industry and also to our economy.

Well before commercial air travel arrived on the scene pandemics circled the globe in a variety of ways. In fact, the 1918 influenza pandemic caused over 50 million deaths worldwide and over 1.5 million here in the United States. Ironically, I learned not too long ago that my grandmother, whom I never met, died in that epidemic of 1918.

Today, with over 1.6 billion passengers traveling worldwide each year on commercial air carriers, there is a real threat that these sometimes deadly diseases can be transmitted around the globe in just a matter of hours. There is also concern that epidemics, or pandemics for that matter, could be intentionally caused by terrorists or instigated by terrorists on board an aircraft or at airports and rapidly transported around the world.

In four short years since the 9/11 attacks in 2001, the U.S. airline industry has incurred losses of well over $32 billion. These enormous losses are attributed to a variety of factors, including the 9/11 three-day shutdown of our national airspace system, the war in Iraq and Afghanistan, high fuel prices, and also the SARS epidemic that we saw as the virus spread through Asia.

While there is no exact price tag associated with the outbreak of SARS in early 2003, which in fact resulted in a sharp decline in passenger traffic to and from Asia and Canada and the United States, the pandemic adversely affected economies and the airline industry worldwide lost billions of dollars, again from this one incident. With the potential of dramatic economic losses, caused either by viruses or terrorists who use viruses, a proactive posture rather than a reactive posture is an absolute necessity.

In June 2003, our Subcommittee took a look at the SARS situation as well as the issue of air cabin quality. According to the World Health Organization, there were more than 8,000 probable SARS cases worldwide between 2002 and July of 2003. Of these cases, 774 resulted in death.

Today's hearing will focus on questions that need to be answered if we are confronted with a serious world pandemic or a terrorist biological threat using commercial aviation.

With respect to aviation, the Department of Homeland Security's Science and Technology Biological Countermeasure activities are focusing now on two major areas—first, protection of airports against biological attacks, and also the development of advanced detection technologies that have application for protection of individual aircraft.

Because of the serious health risks and potential economic consequences associated with pandemics, it is imperative that processes are in place to deal with potential problems of spreading contagious disease by air before, and I stress before this threat has a chance to occur.

I am pleased now to recognize the acting Ranking Member, a former Ranking Member of our Subcommittee, Mr. DeFazio.

Mr. DEFAZIO. Thank you, Mr. Chairman. Thanks for convening a hearing on this important issue. I am looking forward to hearing from the panel, so I will defer in the interest of time my opening statement time to Ms. Holmes-Norton, who I believe has a statement she wishes to make.

Mr. MICA. You are recognized.

Ms. NORTON. I thank the Ranking Member and I thank you, Mr. Chairman, for this hearing. You have focused and this Subcommittee has appropriately focused on the attacks on air travel since 9/11. That was a mammoth challenge that I think this Subcommittee and Committee met very well. We have not concentrated as much on attacks within planes, as it were, by natural diseases, if I may call them that, as we have on the kinds of attacks that have so devastated us here and around the world.

We are still concerned about those attacks, if you bear in mind chemical attacks and biological attacks, but we are far more likely as citizens to encounter a disease from travel or from contact with someone who has traveled than we are to be the victim of an attack on an airplane. The avian flu, SARS, you have mentioned, Mr. Chairman, are but perfect examples of this.

We are not, of course, just talking about those who travel. We are certainly talking about those who go from one destination to another, but we are also talking about the destinations to which they come and bring with them whatever they have encountered where they were. Those are the citizens we represent.

The only question I have, Mr. Chairman, is why have we been so free of the transmission of such diseases thus far given the whirlwind rate of air travel and of citizens of every variety, not just business people, not just Members of Congress, but citizens of every variety going all over the world all the time. Perhaps it is that we have very good health regulations. I am not sure why.

But I am very grateful. In any case, I want to compliment you, Mr. Chairman, for getting hold of this before it does become a matter of serious concern in our country.

Thank you very much.

Mr. MICA. I thank the gentlelady. Are there additional opening statements? Ms. Johnson?

Ms. JOHNSON. Thank you, Mr. Chairman. With over 1.6 billion passengers traveling worldwide each year, the risk of spreading disease by air travel is real and warrants utmost diligence. We hear all the time about recycling the same air. And as evidenced by the SARS outbreak just a few years ago, for both public health and economic reasons, it is imperative that we pay close attention to the relationship of international air travel to public health.

We have been a very open country before many of these types of viruses and diseases spread very rapidly. But now, with global warming and looking at the path of disease traveling various places, it is becoming more and more important that we give much more attention to it. In late June of 2004, the World Health Organization reported that new lethal outbreaks of avian influenza and infections were reported by several countries in Asia, Cambodia, China, Indonesia, Malaysia, Thailand, and Vietnam. Fortunately, no sustained human-to-human transmission of the virus has been identified. Nevertheless, the outbreak in Asia poses an important public health threat.

So as a result of this, the World Health Organization has urged all of us to develop and update influenza pandemic preparedness plans for responding to a swiftly moving contagious disease and to address the widespread socioeconomic disruptions that will result from having large numbers of people sick and dying. And while we do not hear about this very much, very frequently in air travel the airline attendants will bring to your attention how concerned they are about breathing this same air over and over.

Fortunately, we have not had the kind of problem that we hope to be ahead of. But I think it does warrant that we get busy and try to look into it.

I will file the rest of my statement, Mr. Chairman, and thank you and the witnesses for coming today.

Mr. MICA. I thank the gentlelady. Ms. Berkley?

Ms. BERKLEY. Thank you very much, Mr. Chairman, for holding this hearing. Preventing the spread of disease is important in dealing with all air travel, but it is particularly important to international travel. After 9/11 and during the SARS outbreak, international travel to and from McCarran Airport in Las Vegas declined and declined dramatically. However, the airport passenger count has now exceeded pre-9/11 numbers. Last year, more than one million international travelers flew into McCarren Airport.

Given the large number of international travelers arriving in Las Vegas each year, it is vital that airport and public health officials have readily available information and any resources necessary to protect the Las Vegas community and the millions of tourists who come to visit. I know that sounds somewhat parochial, and I am interested in the general aviation information, but given the fact that McCarran Airport is in the center of my district, I am particularly interested in it due to the large volume of international travelers that we have coming to visit Las Vegas and enjoy our wholesome family entertainment.

So I want to thank you again, Mr. Chairman. I look forward to the witnesses and to hearing your testimony. Thank you.

Mr. MICA. I thank the gentlelady. Are there other opening statements? Mr. Pascrell?

Mr. PASCRELL. Thank you, Mr. Chairman. Chairman Mica and Ranking Member Costello and DeFazio, I want to thank you for holding the hearing. This Committee has a significant role to play. The Federal Government must pay proper attention to public health threats such as the spread of infectious disease via aviation before we find ourselves in a public health emergency.

In 1918, 25 million people worldwide died in six months from an influenza pandemic dubbed the "Spanish Flu.' While we have better medications today, we also have a level of mobility unprecedented. And that is what makes the threat of pandemics so alarming.

In a recent article in the New Yorker magazine, entitled "Nature's Vile Terrorist," it spoke directly to the threat that we now face—public health officials in Thailand, commenting on how a pandemic would spread, observed, "People around here fly to Hanoi, to Phnom Penh, Paris, they visit China, they travel all over. Well, you have to realize this and accept it. If you take a plane ride to Paris, you may be taking an epidemic with you."

If there is an outbreak of pandemic influenza, our front lines in the battle against the disease will be on our airplanes and in our airports. Flight attendants, pilots, and aviation workers, along with hundreds of thousands of passengers would be at immediate risk. It is ironic that yesterday in the State of New Jersey we had a top-off dealing with a very, very serious spread of a disease in a bioattack on the counties of Union and Middlesex county. All of the agencies responded in a most, most appropriate manner. And those of us on Homeland Security were very pleased at the response. This is real though. This is real.

So we have options available to prepare for such an occurrence. Yesterday I joined my colleague from New Jersey, Congressman Frelinghuysen, in sending a letter to the Secretary of Health and Human Services, Michael Leavitt, in support of the President's budget request for the Strategic National Stockpile. However, we also questioned where we stand with respect to the draft "Pandemic Influenza Preparedness and Response Plan," which was released last August, as you well know.

The draft plan is supposed to be a blueprint for how the United States would act before a pandemic hurts us and hits us and how we would cope with the pandemic outbreak when it occurs. It has been more than six months since the release of the draft plan and we have not heard much regarding it. With all of the reports about the spread of avian flu in Southeast Asia, I am extremely concerned that our planning efforts may be overtaken by events.

I would hope that the CDC would shed some light on that issue during our hearing today, as all relevant agencies should be privy to Federal reports and plans. We do not want anything redacted. As we find so often, coordination and communication is key to both effective preparedness and response. I thank you, Mr. Chairman, for allowing me the opening statement.

Mr. MICA. I thank the gentleman. Are there additional opening statements? Mr. Ehlers, you are recognized.

Mr. EHLERS. Thank you, Mr. Chairman. I will attempt to be brief but I certainly want to thank you for calling this hearing. I had read the New Yorker article that the previous speaker mentioned and I have taken a look at some other issues surrounding pandemics.

It is interesting that many of the pandemics were caused by aviation long before we had airplanes, they were spread by migratory birds. So what we are talking about is not something new, it is just a different magnitude and a different speed at which things will happen. But it is clearly a matter of huge concern.

We spend so much time worrying about homeland security and other security issues. I can assure you that natural causes may well be far more serious over the next decade than the number of deaths caused by terrorist activity. I think it is very important for this Committee and others to be educated on the role that aviation plays in the spread of disease.

It is particularly interesting looking at the history of bubonic plague and how that spread. It was really one of the first cases of a major pandemic caused by new modes of transportation, particularly by shipping. It was able to spread much more rapidly than it had before. Of course, aviation presents a much grater problem than ordinary shipping of several hundred years ago.

I look forward with great interest to seeing the information, but particularly facing the issue and trying to determine what, if anything, we can do to prevent the spread of disease through aviation. I just returned from a trip yesterday, a fairly lengthy trip, and I was struck by the number of people starting to wear masks as they fly and when they are walking through the terminals. They are taking matters into their own hands. That is one answer, but not everything is communicated through inhalants, it can also be through touch and so forth.

So thank you for calling the hearing and I look forward to hearing from the witnesses.

Mr. MICA. I thank the gentleman. Are there any other that have opening statements? If not, we will proceed to our first panel.

I would like to welcome our panelists. We have Dr. Jon L. Jordan, Federal Air Surgeon, Office of Aerospace Medicine, the Federal Aviation Administration; and then we have Captain Anne Schuchat, Acting Director, National Center for Infectious Diseases, Centers for Disease Control and Prevention, the Department of Health and Human Services, and I believe Captain Schuchat is accompanied by Dr. Ram Koppaka, division of Global Migration and Quarantine, of the Centers for Disease Control and Prevention.

I am pleased to welcome the three of you. I do not think I have seen you before. If you have any lengthy statements or any information you would like to be made part of the record, feel free to ask for submission of that through the Chair and we will make certain that it is included in the record of today's hearing.

With that, I would like to welcome our three panelists. We also have visiting in the audience today Trinity Christian Academy, which happens to be from the Chairman's district. So those young people in the back are probably attending their first congressional hearing. We would like to welcome them and the chaperons that are with them today.

Mr. DEFAZIO. Mr. Chairman, if I could join in the welcome to the students from your district and let them know that you are an all-knowing and powerful Member of Congress as Chairman of this Committee, and they should be duly impressed to be in your presence.

[Laughter.]

Mr. MICA. Well, we do not want to take that to a vote right now.

[Laughter.]

Mr. MICA. But I do miss Mr. DeFazio's sense of humor as the former Ranking Member of the Aviation Subcommittee.

So with that introduction of the young people who are attending the hearing, and I have just introduced the three witnesses that we have, one from the Federal Aviation Administration and two from the Centers from Disease Control, who are going to tell us what they are doing to deal with the possibility of spreading disease or pandemic by air.

I would like to recognize first Dr. Jon L. Jordan of the FAA. You are recognized, and welcome.

TESTIMONY OF JON L. JORDAN, FEDERAL AIR SURGEON, OFFICE OF AEROSPACE MEDICINE, FEDERAL AVIATION ADMINISTRATION; CAPTAIN ANNE SCHUCHAT, ACTING DIRECTOR, NATIONAL CENTER FOR INFECTIOUS DISEASES, CENTER FOR DISEASE CONTROL AND PREVENTION, DEPARTMENT OF HEALTH AND HUMAN SERVICES, ACCOMPANIED BY RAM KOPPAKA, DIVISION OF GLOBAL MIGRATION AND QUARANTINE, CENTERS FOR DISEASE CONTROL AND PREVENTION

Dr. JORDAN. Thank you very much. Chairman Mica, Congressman DeFazio, and members of the Subcommittee, good afternoon. It is a pleasure to appear before you today to discuss the efforts to prevent pandemics by air travel. I recognize that this is a priority of this Subcommittee and FAA shares your concerns. It has also been a matter of significant concern to aviation passengers and the crews that earn their living by working on commercial transport aircraft. Secretary Mineta and Administrator Blakey both take these concerns seriously. They are supportive of efforts to help protect the health, safety, and comfort of the travelling public and cabin crews.

I wish to offer my full statement for the record and highlight just a few points here.

Mr. MICA. Without objection, your entire statement will be made part of the record. Please proceed.

Dr. JORDAN. This will be a short statement, Chairman Mica.

An important new initiative is underway in the Office of the Secretary of Transportation. The Office of the Secretary, in coordination with the Department of Health and Human Services, is compiling a best practices manual to provide airport operators and local health authorities with assistance in responding to the threats of contagious diseases in international gateway airports.

Guidelines and other important information are being assembled from experiences at airports throughout the world and will be used for training sessions that the Center for Disease Control and Prevention plans to begin this spring. In publishing this best practices manual, the Department will make this information widely available to airport owners and operators and public health officials.

Considering the potential of pandemics and contagious disease transmission on airliners in general, issues inevitably arise concerning the quality of air in airliner cabins. It is important, however, to understand that studies have indicated that many aspects of cabin air are as good or better than that air found in offices and home environments. For those aircraft that recirculate some part of the cabin air, that air is typically passed through high quality filters before it returns to the cabin. Manufacturers of new airplanes used by air carriers incorporate either high efficiency particulate air filters, similar to those used in hospital isolation areas and surgical suites, or particulate filters that are somewhat less effective. HEPA filters are defined by EPA as those with the filtering efficiency of 99.97 percent. The filters remove dust, vapors, bacteria, and fungi. HEPA filters also effectively capture viruses. Several airlines, in coordination with aircraft manufacturers, have even installed HEPA filters on airplanes that did not originally incorporate them into their design.

Even though progress has been made with these efforts, we still need to know more about what affects cabin air quality and what further improvements can be made. In September of 2004, the Federal Aviation Administration announced the establishment of an Air Transportation Center of Excellence for Airliner Cabin Environment Research, which I will refer to ACER. This is headed by Auburn University. ACER will research cabin air quality and conduct an assessment of chemical and biological threats. The FAA will provide funding for the center and matching funds will be provided by the private sector.

ACER will conduct a comprehensive and integrated program of research and development in cabin environment. The team brings the diverse expertise necessary to conduct research on the healthfulness of cabin environment for passengers and crew, enhancement of aircraft environmental control systems, and detection and mitigation of chemical and biological threats aboard aircraft. ACER aims to be a unique resource for airlines, equipment manufacturers, cabin crews, and the travelling public, and places a major emphasis on partnerships with industry.

Finally, I would like to briefly comment on one area that is concern to travelers—chemical disinsection, a term used to describe the process for ridding an aircraft of insects—has been a long time concern. The Office of the Secretary of Transportation chairs an interagency working group that is taking a lead in researching and developing means of non-chemical disinsection of aircraft. OST's efforts are currently focused on air curtain technology, which would prevent insects from both entering and leaving aircraft, thus eliminating the need for treatment with pesticides. DOT is about to embark on a pilot program with Jamaica to demonstrate this technology.

In closing, Mr. Chairman, on behalf of Administrator Blakey, I would like to reiterate that FAA is committed to ensuring the safest flight possible—from the safety of the operation of the aircraft to the quality of the air that passengers and crews breathe inside the cabin. I look forward to working with the Subcommittee regarding any concerns you might have on the quality of airliner cabin air and, specifically, efforts to prevent pandemics in air travel. This concludes my testimony and I would be happy to answer any questions you might have.

Mr. MICA. Thank you. We will hear from Dr. Anne Schuchat, Acting Director of the Center for Infectious Diseases, first and then we will go to questions.

Welcome, Captain Schuchat, also a medical doctor, and you are recognized.

Captain SCHUCHAT. Thank you, Mr. Chairman and members of the Subcommittee. Good afternoon. I am pleased to be here today to discuss this important public health topic. In this age of expanding air travel and international trade, infectious microbes are transported across borders everyday. Because one route of introduction is air travel, and because of multiple outbreaks currently going on in other parts of the world, today's hearing is particularly timely.

A pandemic is broadly defined as an epidemic occurring over a wide area, crossing international boundaries and usually affecting a large number of people. Certain diseases such as SARS or certain types of influenza are capable of causing a pandemic because of the ease of their transmissibility among people, the severity of the illness they cause, the low level of immunity among the population, and the ease and speed with which people travel. There are other diseases, such as tuberculosis and meningococcal meningitis, that may pose less of a threat of causing pandemics but are still of significant public health concern because of their ease of spread from one location to another.

Because of the variety of infectious disease threats that exist in the world and the volume of people traveling, the threat of infectious disease introduction and rapid spread is real. The best prevention strategy is through disease surveillance, early detection, and rapid response. Preventing the importation of an infectious disease into the U.S. must involve collaborations with many partners and must address these critical points: pre-departure, in-transit or upon arrival, and post-arrival.

Pre-departure prevention includes health education at home before people travel. On its web site, CDC posts travel notices and other important travel information to inform travelers of health events taking place globally and steps they can take to avoid infection.

Pre-departure prevention can be improved through surveillance for infectious diseases among traveling population. One surveillance network is called GeoSentinel. It is a global network of 30 travel and tropical medicine providers established by the International Society of Travel Medicine and the CDC. These sites participate in surveillance of all travel related illnesses seen in their clinics and share this information.

The second critical control point is in-transit or on arrival in the U.S. The commander of an aircraft destined for a U.S. airport is required to report the presence on board of any death or any ill person among passengers or crew to the CDC quarantine station at or nearest the port of arrival.

CDC currently has 11 quarantine stations and they have established protocols with State and local public health authorities for handling ill passengers, coordinating care with local hospitals, and handling contacts. We plan to have up to 18 stations by the end of this year, and our goal is to have 25 stations at ports of entry that represent over 80 percent of international arrivals.

For post-arrival prevention, mechanisms are in place to prevent transmission of disease in the event a person was infectious while traveling but the infection was not identified until after they arrived in the U.S. In these cases, CDC relies on a manual system of gathering, compiling, and processing data from flight manifests, customs declarations, and any other available sources.

Quarantine stations routinely work with State and local health departments to contact passengers who may have been exposed during a flight and provide guidance on what to do. In most instances, these are limited events and involve only a single aircraft. However, during SARS the process was determined to be ineffective for an outbreak that required notification of passengers on more than a few flights, primarily because this manual paper-based process is slow, labor-intensive, costly, and depends upon possibly obsolete or inaccurate data. Since then, we have been working with our Federal and private sector partners to improve our ability to notify passengers of a possible exposure.

The experience with SARS taught us many practical lessons about issues of infectious diseases in today's world of frequent air travel. As you are probably aware, there is an outbreak of Marburg hemorrhagic fever ongoing currently in Angola. We at CDC are following this closely and we are participating in the response with our partners at the World Health Organization and the Angolan Ministry of Health. This situation has not progressed to the point of having quarantine officers meet incoming flights to the U.S., but we are prepared to do so if we need to.

In conclusion, both the ongoing outbreak in Angola and the current avian influenza situation in Southeast Asia reinforce the importance of global surveillance, prompt reporting, and adequate containment measures to prevent a localized outbreak spreading to other countries and becoming a pandemic. CDC will continue to collaborate with State and local health departments, industry, other Federal agencies, and other partners. A strong and flexible public health infrastructure is the best defense against any disease outbreak.

Thank you for your attention. Dr. Koppaka and I will be happy to answer questions that you may have.

Mr. MICA. Thank you. So Dr. Koppaka will be available only for questions, no statement. All right. We will go ahead and proceed to questions. I have a few.

You mentioned, Captain Schuchat, the plans to increase the number of quarantine stations. Could you explain further the role of the current quarantine stations and how and why they should be expanded.

Captain SCHUCHAT. Thank you, Mr. Chairman. I think it is helpful to realize the historical context of our current quarantine situation. By the late 1960s there were over 200 ports of entry overseas, consular offices, and maritime vessels that had quarantine capacity or expertise. But after the eradication of small pox and the perception that we had won the war against infectious diseases, this infrastructure was really downsized and we reached a point where there were only six ports of entry with quarantine stations.

The SARS epidemic taught us that we really need this border control and ability to evaluate patients on arrival and integrate public health response into potential importation of infectious diseases. So we are in the process of rebuilding that capacity. As I mentioned, we are at 11 stations now, with an aim to be at 18 by the end of this year, and a goal of 25.

In addition to the number of stations increasing, we are trying to increase the capacity at the stations with medical officers available, more senior public health experts, so that we can move from just visual inspection into more public health evaluation of the disease risks.

Mr. MICA. On Friday, President Bush added pandemic influenza to the list of quarantinable diseases. Why was that necessary?

Captain SCHUCHAT. The list of quarantinable diseases was developed many years ago. In 2003, SARS was added to the list, and then Friday novel or emerging influenza strains capable of causing a pandemic or actually causing a pandemic was added. The spirit of what quarantine is for has always included something like pandemic influenza but it was not actually on the list.

This is not an order that we expect to need to use. The State and local health authorities have the first line of response for quarantine issues. But in terms of preparing for a pandemic, having this legal authority available to us sets us in better preparedness state.

Mr. MICA. What kind of additional tools does it give?

Captain SCHUCHAT. We are able to detain a person, evaluate them for their public health risk, arrange for care, and evaluate contacts. So it gives us that kind of authority.

Mr. MICA. Now you work pretty closely with FAA on transmission of influenza or communicable diseases. Have you been working with them on this best practices manual that they talked about?

Captain SCHUCHAT. Yes. Most of what the CDC does is through extremely strong partnerships, and in this area we have a close collaboration with the FAA and the Department of Transportation. We have been carrying out a series of training exercises with our quarantine stations, and the Department of Transportation is going to participate in those. So for the best practices manual, we are involved as a collaborator I would say.

Mr. MICA. At what stage would you take preventative action? So far, what you have described is if you see some signs of influenza or sickness, the person is quarantined once they enter the United States. At what stage of, say, the bird influenza in Asia or what has been described in Angola, at what stage do you take preventative measures or screening measures of passengers coming into the United States before they get on a plane?

Captain SCHUCHAT. There are a series of steps that are carried out in these situations. It is important to individualize the circumstance and assess what is going on in the distant site. Is there spread beyond close contacts, is it into the community, is there a true risk for importation. I would just like to clarify that the quarantine executive order for pandemic influenza and all of the use of quarantine is when voluntary efforts to restrict movement of a potentially contagious person have been exhausted. So you do not use it every time you think there is a problem. It is really when you are not able to get voluntary cooperation.

Mr. MICA. But you have all the authority you need now to proceed?

Captain SCHUCHAT. The executive order did add pandemic influenza and the wording is such that it gave us appropriate authority.

Mr. MICA. And at what point would you take measures? You would have to have some evidence that someone could get on a plane who was contagious and that there were not measures in place to screen those people. Once they get to the United States and in quarantine, it is a different situation. They have already been on a plane potentially infecting others on the plane and the chain sort of starts with that.

Captain SCHUCHAT. Right. This is why we emphasize the importance of controlling the outbreak at its source and why we are working so intensively with the World Health Organization and with countries in Southeast Asia around the avian influenza problem, or why we have people in Angola helping with the Marburg situation. So that keeping a sick person from getting on a plane is a better way to deal with the potential contagious threat than dealing with it after their arriving.

Mr. MICA. Finally, do we keep records now of folks coming in from Angola or from points in Asia? Are they easily accessible, so that if we got some report that someone had the potential or comes down with a contagious disease after the plane has already arrived, Are we prepared for that?

Captain SCHUCHAT. I think you raise a really central issue—how quickly could we notify passengers who were on a flight with a potentially infectious traveler. We have a couple methods of doing that right now in terms of using the passenger manifest and additional information that you can get from customs records because the passenger manifests do not include addresses. So we still, for the most part, are dealing with a manual paper-based type of system. We have a pilot project with one of the airlines to explore electronic access to passenger manifests and whether that will speed things up.

Do you want to add anything, Dr. Koppaka?

Dr. KOPPAKA. Thank you. I think the only thing I would add to what the Captain stated is, since SARS we have also developed what we call a passenger locator form that enables us to collect locator information on passengers who may have been exposed. Again, that assumes that we know there was an ill passenger on board the flight. But the intent behind that is to facilitate the process of identifying and locating individuals that may have been at risk.

Mr. MICA. Thank you. I have additional questions but let me yield to Mr. DeFazio.

Mr. DEFAZIO. Thank you, Mr. Chairman. Dr. Jordan, in your testimony talking about the aircraft cabin air being superior to that of buildings, that assumes a certain operational aspect, does it not, that is, that the system is being operated at its maximum capacity?

Dr. JORDAN. Yes, that is correct.

Mr. DEFAZIO. And is there an FAA standard which requires the airlines to operate at maximum capacity or at any capacity?

Dr. JORDAN. There is no requirement for that except for acceptable air quality. We have design standards for the manufacturer of the aircraft, however, that are generally followed by the industry.

Mr. DEFAZIO. Right. But with high fuel costs, we can expect that the aircraft crew are getting orders to crank the system down as much as they can.

Dr. JORDAN. Not necessarily. I think it is dependent upon the crew's understanding of what the air quality is for the passengers and the—

Mr. DEFAZIO. Right. But why do we not have a standard? For instance, if we are looking at the threat of pandemic, we know that in the circulatory system that if you crank it down it is more likely that more people in a larger area are going to get ill on a plane with a transmissible disease. Why do we not have a required standard, particularly in light of this threat?

Dr. JORDAN. We have not found it necessary at this point in time. A number of strategies—

Mr. DEFAZIO. So there has not been a pandemic yet, so it is not necessary? It is kind of like the old tombstone mentality—the planes have not gone down yet so we do not need to fix the problems we know about.

If I could, as I understand it, we have the vaunted group, and I will ask both Captain Schuchat and Dr. Koppaka their opinion here, would you think the American Society of Heating, Refrigeration, and Air Conditioning Engineers are a well-known, medically qualified group to pass on the issues of transmission of disease in enclosed spaces? Are they someone you consult with regularly?

Captain SCHUCHAT. Actually, speaking for the CDC, we do work with ASHRAE on issues such as infectious disease issues.

Mr. DEFAZIO. Right. But do they tell you, or do you sort of consult with them when you want to achieve something and you then talk to them about how to achieve it? Do they tell you what you should achieve?

Captain SCHUCHAT. No.

Mr. DEFAZIO. All right. Well, the FAA has chosen them as the body to come up with standards for aircraft. We have been waiting for several years for ASHRA to come up with their vaunted standard. I would think that we might want to interject some of the concerns we are hearing about here into that debate and go beyond the grand expertise of ASHRA for aviation. I would hope, Mr. Chairman, we could facilitate some communication in perhaps the FAA, including some expertise from CDC, in consultation with ASHRA, since they are familiar with them on these issues.

The other issue would be, as you said, the HEPA filters and others that are not as effective. Why do we continue to allow planes that carry over one hundred people to operate without HEPA filters?

Dr. JORDAN. Well, we have not seen at this point in time a reason to make a requirement.

Mr. DEFAZIO. Then why do we have HEPA filters at all if we do not need them? The other 85 percent—

Dr. JORDAN. The industry is moving toward HEPA filtration toward 100 percent of the fleet.

Mr. DEFAZIO. Right. But you see no need, even though 85 percent of the planes have it and we know it is effective, that the other 15 percent is not necessary?

Dr. JORDAN. I think eventually at some point in time we will have 100 percent of the aircraft.

Mr. DEFAZIO. Right. After a bunch of planes are retired in 10 or 20 years. So, basically, no operating standard because there has not been a pandemic, no requirement for HEPA filters because there has not been a pandemic generated by aircraft, we are going to wait until after the fact and then we will say, gee, maybe we should have required full circulation, maybe we should have required HEPA filters, maybe we should have taken other measures, and ASHRA has not come back with their suggestions yet on how we might better protect the health of the traveling public.

I really am not sanguine about the FAA's position on this. I think just hearing the concerns expressed by the Chairman and others here that the FAA should revisit this issue. I know there is always pressure from the industry. But I really think that if they just look back to what happened with SARS, they are not going to want to be in a position to see their passenger loads cut because they saved a little bit of money on fuel and operated the plane at less than maximum efficiency.

I do appreciate the incremental progress on chemical disinsection. I think it has been now 15 years since the United States stopped doing it, since we found out it was totally ineffective and unnecessary. And we did, with some pressure in the last Administration, negotiate away the requirement. But it is still being done without passengers' knowledge. I would again suggest that the FAA wants to promulgate rules to inform passengers, because then those passengers are going to say, gee, maybe I really do not want to go to New Zealand, or they are going to say to the New Zealand government or the Australian government, or one of the others that is practicing this bizarre sort of totem-like protection of their country, which has no effect but making flight attendants and others very ill with chemical sensitivities, that we should at least minimally inform the public.

I have been hearing about the air curtain for two years now. I am glad we are going to try it in Jamaica. But, really, we are making people sick. I have met with flight attendants who are disabled because of chemical disinfection. And passengers have no knowledge, even those with multiple chemical sensitivities, that they are getting on a plane that has been disinfected because of the bizarre requirements of these countries that are not protecting themselves against anything by doing it. But I appreciate that you are making progress. Thank you, Mr. Chairman.

Mr. MICA. I thank the gentleman. Mr. Ehlers?

Mr. EHLERS. Thank you, Mr. Chairman. I would like to pursue this but along a different line. What do we know about the transmission of disease on aircraft? How much of it comes from airborne transmission, how much through contact transmission, and how much through ingestion, as an example? For years, we believed that colds were transmitted by people sneezing and others inhaling those germs. Now the general wisdom seems to be that it is primarily through contact with the hands and then you touch your nose, your eyes, whatever, and you transmit the virus that way. I am just curious what you have learned on this, particularly in view of the issues of air quality. Is air really the transmission medium, or would we be better off handing everyone some alcohol wipes or something like that to wipe their hands with every once in a while? Anyone wish to respond?

Dr. JORDAN. I think transmission is identified really as person-to-person contact, and then the epidemiologic studies that have been done in respect to aircraft and the carriage of passengers who might have communicable disease indicates that, for the most part, it is from the individual who is sitting in close proximity to you that you are likely to get the disease from. It is not the air system within the aircraft, the recirculation of cabin air, it seems to be close contact with individuals that have illnesses.

Mr. EHLERS. By close contact, you mean actually touching them?

Dr. JORDAN. Well, it could be touching them, but sitting close to them if they are coughing, sneezing, then you are more likely to come—

Mr. EHLERS. But that does not answer my question. I said, for example with colds, we always thought it was the coughing, sneezing, now I am being told that it is not, it is the actual physical touching.

Dr. JORDAN. Well, it could come from a hard surface that has bacteria or viruses on it and hand contact with that, or contact with the individual's mouth or respiratory system as a result of the contact from a hard surface, also from airborne fomites that carry bacteria and viruses. But again, it is typically being with individuals who have been in close contact with someone who is ill.

Mr. EHLERS. That gets to my second question of maintaining the lists. What problems do you encounter in trying to contact people once you find out there has been a serious communicable disease on the plane? You mentioned you are working on trying to make it electronic. But do you have the authority to solve that problem now? And if so, what is impeding it?

Captain SCHUCHAT. The challenges that we face, as I mentioned with SARS, when there are multiple flights of interest, the volume of passengers is great and the manual system is not efficient. So there are a couple of problems. The passenger manifest itself would not have all of the relevant information. So you need to go to other sources.

By the time we recognize that there is a problem, time might have elapsed from the flight. It may be that we are meeting flights and we know there is a problem right away, but more typically we learn of an event some time after the flight occurred. I think you may remember last August and September there was a U.S. citizen who traveled from West Africa into New Jersey, who after arrival took a train, and from the train basically went to a hospital and some days later died and post-mortem was diagnosed as having Lassa fever, an infection that we do not have in the U.S. that is common in West Africa. Trying to go back and find passengers at some remove is challenging. So, electronic access to all of the relevant information, even remote, even not just the day of arrival or a couple days after, would help considerably.

Mr. EHLERS. But do we have the practice in country when someone comes in that they have to list where they are going to be staying initially?

Captain SCHUCHAT. The customs declaration does include your address while you are there. So one of the airlines may not keep that information in a database themselves, or they may have some in their frequent traveler programs. So there are a lot of different places where information may be. It is not all in the same place and we usually have to go to that next step of the customs declarations records to get that. It also may not be quite as accurate as if someone was filling information out knowing that they might need to be contacted. So that passenger locator form that we have developed, that Dr. Koppaka described, is an attempt to get better quality information that then can be scanned by the quarantine station and we would have electronic assess to. But we are not using that routinely for every flight. That is when we have a suspicion of an ill person in transit.

Mr. EHLERS. I yield back.

Mr. MICA. I thank the gentleman. Ms. Norton?

Ms. NORTON. Thank you, Mr. Chairman. Mr. Jordan, I was interested in part of your testimony on Page 5, where you indicate that ACER will conduct—you talk in the future—will do research about cabin air quality and conduct an assessment of chemical and biological threats, and then you name a set of rather distinguished looking researchers or universities, and then you say FAA will provide funding and there will be funding by the private sector. Unlike some of the rest of your testimony which describes dates attached to work being done, this all looks like it is in the future. Would you say more about whether this work is being done? It sounds almost as if we are beginning from scratch.

Dr. JORDAN. We are beginning from scratch with this particular effort. This is not the only effort that the agency has engaged in in terms of looking at cabin air quality and issues related to contamination of aircraft. But it was only last August that we established a Center of Excellence for Research in Cabin Environment, which includes possible contamination of aircraft with biologicals and chemicals. And in this activity, we are working with Homeland Security, who are very interested in this particular issue, as you might guess. The actual research has not started but we have established the Center of Excellence, we have a research plan, we have funding dedicated to this effort, and we anticipate research on this specific issue, decontamination of aircraft and contamination of aircraft with biologicals and chemicals, will be begin in the very near future.

Ms. NORTON. But you do not have a date for when it will begin? You say the money is always available.

Dr. JORDAN. I do not have the specific date. It is part of the research plan which covers a tremendous number of issues in respect to cabin environment.

Ms. NORTON. May I ask you, have we already done a fair amount of research? Do you already know enough to prevent a chemical or biological attack being transmitted through cabin air, the way in which air is circulated in a cabin?

Dr. JORDAN. Well, we certainly know a great deal about air circulation and the cabin environment. But in terms of intentional contamination of an aircraft with a biological or chemical, there is not a lot that we know about that. We know about the transmission of such diseases as Small Pox and others like anthrax I suppose that might be used as a contaminant of an aircraft. But when it gets to the question of chemical contamination, there are a lot of unknowns in respect to that. And so a lot of work needs to be done in the development of sensor technology, sensors that can actually identify that the aircraft has been contaminated, and what must be done in respect to the decontamination with the aircraft for that specific contaminant.

Ms. NORTON. Dr. Jordan, all I can say is this one of the chief worries, also in Homeland Security Committee, that we have focused on. Direct attacks of biological and chemical attacks are a matter of some great concern. I do not know what can be done about them, and that is part of the problem. I would like to suggest that you get a date for when this will start to the Chairman of this Committee within the next 30 days. This really sounds like real futuristic stuff, we will do this. I was very pleased to hear you say we have the money to do it. Well, if you have the money to do it, I do not know what we are waiting for. You have got the money, you have got the universities, what else is needed?

Dr. JORDAN. Well, it is that we are talking about some very difficult technical issues.

Ms. NORTON. You have already got the universities, and you spelled them out in great detail. Who is going to do the research?

Dr. JORDAN. The research will be done by researchers at the various academic institutions that are part of the Center for Excellence.

Ms. NORTON. Yes, and you have got their names in your testimony. Yet you say you cannot tell me when, in fact, this research is going to even begin. And we do not know anything about this matter now. I am very concerned if you cannot do better than that. I am very pleased that you have gotten as far as you have gotten, particularly when you say there is money available already. You also say matching funds will be provided by the private sector. Have those funds been provided as yet?

Dr. JORDAN. They are being provided by the academic institutions as well as industry.

Ms. NORTON. Well, all I can say is I cannot tell from your testimony whether this is start-up activity, if you are close to where we can expect this very urgent and difficult research to begin. I just really cannot tell from your testimony and it is very bothersome. So may I ask you to get to the Chairman a date within 30 days when you believe this research can begin. I do not say you have to say it will begin tomorrow, and you can only say when you think it will, but I would very much appreciate that.

Dr. JORDAN. All right.

[The information received follows:]

QUESTION FOR THE RECORD
FROM THE SUBCOMMITTEE ON AVIATION
OF THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
HEARING ON EFFORTS TO PREVENT PANDEMICS BY AIR TRAVEL
ON APRIL 6, 2005

Question: Please provide for this Subcommittee a specific date when your Center of Excellence on Airliner Cabin Environment Research will begin research about cabin air quality and conduct an assessment of chemical and biological threats to air travel.

Answer: The Center of Excellence for Airliner Cabin Environment Research (ACER) began conducting research with funding authorization pursuant to the Federal Aviation Administration approved protocols at three of the six university partners on March 11, 2005.

On May 26, 2005 $3.98M was awarded to Auburn University to launch the chemical/ biological sensing and decontamination work.

By June 15, 2005 awards to Harvard University, University of California Berkeley, University of Oregon, and Lawrence Berkeley National Laboratory will complete the funding of proposals under the $14M appropriated in Fiscal Years 04 and 05. An amount of $1.1M remains for administrative support and in-house FAA expenditures in support of ACER.

Ms. NORTON. Could I ask a question of Dr. Schuchat. At Page 6 of your testimony, you discuss the kind of travel from people abroad that, of course, we and every country have direct jurisdiction over with respect to the health indicators they are required to show when they enter the country; that is to say, refugees and immigrants. I have to ask you, in light of the amount of air travel that takes place to our country, how likely it is that a visitor, a business person, somebody who does not seek immigration, is not a refugee, is not subject to the normal kinds of health screens that these groups are subject to, would in fact be the carrier of a communicable disease, and how we handle that huge number of people who transit everyday across the world and into our country?

Captain SCHUCHAT. I think the most important issue for the business traveler is to be informed about the health issues in the country you are going to. CDC runs a travel health web site with a lot of information about—

Ms. NORTON. I am not interested in whether we are carrying disease there. We tend to be healthy people. And I am not even talking just about business people. My question is about people from abroad who are visiting the United States.

Captain SCHUCHAT. Right. I meant a person from here going elsewhere and bringing something back. But you are right, there are infectious disease issues in other countries that we do not have currently, like the Lassa fever story I told earlier. So I think our best approach for these infectious disease problems overseas is to have good surveillance of what is going on elsewhere and good partnerships through the World Health Organization or travel health networks to get information about what the risks are.

Ms. NORTON. Suppose we know that in fact there was a contagious disease in a country with which we have frequent commerce an travel, we know it is there, and here comes a visitor to stay three or four days. Is there anything we can do when we know that there is a contagious disease going around there that could be brought into the country and yet this person does not seek to immigrate to this country?

Captain SCHUCHAT. Yes. This is where we have a tiered approach to health risk. So those quarantine stations that I was mentioning may do visual inspection of people coming in, they may give out information. What we did in SARS is give out health alert notices where everybody deplaning from the affected countries was given a yellow card with information about signs and symptoms to look for over the next 10 days—give this card to your doctor, this is the number to call if you have one of these things, here is what is going on. And we translated that information into numerous languages as additional countries came on line.

So there is quite a bit we can do with education both for the arriving traveler, businessperson or otherwise, and then there are additional steps we can take if we are concerned. If we know a person is sick enroute or if they are ill on arrival, we can evaluate them medically with these quarantine officers, handle their care, refer them to local hospitals that we have arrangements with, and we can also evaluate their contacts. So we have that kind of authority and capacity right now.

Ms. NORTON. I must say, you apparently, judged only by what one picks up in the media, have been reasonably successful, and for that I congratulate you and the steps that have been taken apparently with some considerable success. I appreciate that that is being done and hope that level of success continues. I yield back the balance of my time.

Mr. KUHL. [Presiding] The Chair recognizes the gentleman from Arkansas.

Mr. BOOZMAN. I just have some general questions. What do you feel the greatest risk is as far as the spread of stuff?

Captain SCHUCHAT. I think that—

Mr. BOOZMAN. I mean, it is one thing to get on a plane and get a cold. It is another thing to get on and get something that can have a severely damaging effect to the Nation.

Captain SCHUCHAT. Right. I would say that our area of greatest concern right now is the threat of pandemic influenza. Currently, we have quite a bit of attention around the avian influenza outbreak in poultry in Southeast Asia.

Mr. BOOZMAN. So what countries then would we be more concerned about than others?

Captain SCHUCHAT. Let me clarify about that in terms of what countries. Influenza is a complex virus and the issue with pandemic influenza is that you need a strain of the virus that we do not have immunity to, that is easily transmitted from person to person, and that is very severe when you get it. Right now in Southeast Asia there is a strain of influenza that we do not have immunity to. It is spreading easily between poultry but it is not spreading easily to humans or from human to human. So this particular strain has not developed the capacity to easily spread between humans.

While we have a lot of concern in the Southeast Asia region and are increasing our surveillance efforts and laboratory support there, I think it is important to realize that a pandemic influenza could emerge anywhere. And so it is important that we strengthen laboratory capacity around the world and the recognition of new influenza viruses. They could emerge here. We have, of course, had a lot of interest in Asia because of the huge poultry problem. But it is not the only area that we need to be attending to.

Mr. BOOZMAN. In the areas, though, where it has occurred, okay, so you know it is there, do we do anything different there than in an area where it has never occurred and does not have the potential to occur? I mean, if you are flying from Iceland where there is no whatever, is that any different than flying from Thailand?

Captain SCHUCHAT. Okay. In terms of the passenger issue, there are certain points where we would change approaches to arriving passengers. During SARS we designated certain countries from which we met every plane, we gave information out to people deplaning from those aircraft, and when people were ill they were evaluated by the quarantine staff. There are a number of issues that get considered to reach that threshold.

At this point, because there is not widespread human-to-human transmission, we are not at the stage where we are meeting every plane that is coming from Southeast Asia. We certainly learned during SARS that there is a lot of travel back from some of the affected areas there and we were meeting hundreds and hundreds of planes at that point. But we are not at that point with the avian influenza concern. But much of our effort is preparing to improve the quality of information we have about what is going on in parts of Asia, and to improve the global and the national public health infrastructure to respond and control problems quickly.

Mr. BOOZMAN. Okay. Thank you.

Mr. KUHL. The gentleman from New Jersey?

Mr. PASCRELL. Thank you. I want to frame my questions, if I may, the first question I am going to ask is to Dr. Jordan, and I want to frame the questions in this respect, that we are at war right now. And I am reminded of Lincoln reminding the generals during the Civil War, his own generals, hey, we have got a war going on here, are we taking this seriously. So I want to ask you this question and with that framework. Who is responsible in every airplane for checking the quality of air before the plane takes off? Who has that responsibility?

Dr. JORDAN. No one takes that responsibility at the present time.

Mr. PASCRELL. I am sorry?

Dr. JORDAN. I say no one takes that responsibility at the present time, other than perhaps the operator of the aircraft.

Mr. PASCRELL. I am not surprised at the answer, and I thank you for your candor. Because I think if you look back over the last 30 years in terms of responsibilities in a lot of these areas, from security all the way up, do we have the cart being pulled, or is the cart pulling the horse? This is serious business and I think you understand that. So what is the role of the airlines to begin with, very basic, is pretty dubious, pretty dubious, indeed.

This report, Captain, that I referred to earlier, the Pandemic Influenza Preparedness and Response Plan, was finished last August. I would like to know where are we in implementation? Reassure me in some manner, shape, or form now that I know that the next plane I get on we have no idea who is responsible for checking the air. And we are concerned about the spread of disease? You have got to be kidding me. In our own minds, we are not at war.

Captain SCHUCHAT. Thank you. I appreciate the analogy to war, and I think that the Department of Health and Human Services is taking the risk of pandemic influenza incredibly seriously. As you mentioned, there was a draft pandemic influenza planning document released last August and we have received numerous comments on that draft.

There are several efforts going on now around pandemic planing. We have intensified surveillance as an approach to improving the information we have, strengthening surveillance internationally, particularly in a couple of those Asian countries, working in close partnership with the World Health Organization's influenza collaborating centers. So we are really tracking the viruses that are occurring in different places.

We have also improved surveillance in the United States and a tremendous amount of energy has gone into improving the capacity of our states to recognize the avian influenza, should it emerge here.

CDC has trained 31 states, laboratory professionals in those states, with new molecular techniques to recognize the H5N1 avian strain of influenza, should one of the people here with an influenza-like illness actually have that bug. We intend to complete training of the rest of the states this year.

In addition to surveillance, HHS has invested a lot of priority and resources into vaccine development and supply issues, which is a critical area to be ready for a pandemic, both in research and development of new approaches to vaccines for influenza that will potentially improve the reliability of the vaccine supply, encouraging expansion of manufacturing capacity in the United States.

So HHS has funded efforts for both cell-based production of influenza vaccines, and egg-based production. There is also a major effort of stockpiling anti-viral drugs to prepare for response.

In terms of the draft, it has gone through much since it was issued in August. I would say it is at the final stages in terms of intensifying the interactions with the state and local partners who are going to have to use this, since one of the goals is to guide updating or developing state and local capacity. So it has been given huge priority, and it is moving quite quickly.

Mr. PASCRELL. And you will share that as soon as it is completed?

Captain SCHUCHAT. Absolutely.

Mr. PASCRELL. You cannot give us a time when it will be finalized? You cannot give us a date?

Captain SCHUCHAT. I am not aware of a date, but we could get you one. We could get that to the Committee.

Mr. PASCRELL. In the report from my friend from Michigan, the magazine article, the New Yorker Magazine, I would like you to respond very quickly and I will read this quickly. It is a very small paragraph in this report, which I found a little bit disturbing.

"When the Bush Administration's Health and Human Services Secretary Tommy Thompson announced his resignation in December, he cited a potential epidemic of avian influenza as one of the greatest dangers facing the United States." That is what he said.

The World Health Organization has put a conservative estimate of debts from such an event at between 2,000,000 and 7,000,000 people, and expect that as many as one billion people would fall.

Is this hyperbole? Should we not even be talking about this? Do we scare people out of their wits, and we do not know what the heck we are talking about, or is this real? This is not reality TV, is it?

Captain SCHUCHAT. The influenza virus is an extraordinary virus with the capacity to do huge damage to populations. We are in better shape now than in 1918, because we have antibiotics.

Mr. PASCRELL. That is reassuring.

Captain SCHUCHAT. Right, but our current estimates of the toll that a pandemic would take in the United States are not of the magnitude of what we saw in the last century. But as you know, there were three pandemics in the last century, and people who were very expert on influenza do not think it is a question of if, but it is a question of when.

This is why we are giving the highest priority to the planning around pandemic flu. It is going to improve our ability to deal with other infectious diseases, natural or intentional, and we take it incredibly seriously.

Mr. PASCRELL. Thank you, and thank each of you for your service for this country.

Mr. KUHL. Yes, the Chair would recognize the gentleman from Illinois, Mr. Costello.

Mr. COSTELLO. Mr. Chairman, thank you. Mr. Chairman, I have no questions at this time. I simply want to thank the witnesses on the first panel for being here.

I apologize that I came in late. We had a delegation meeting with the Secretary of Energy concerning some major projects. I thank my colleague, Mr. Defazio, for sitting in, and I thank the witnesses for being here today. I look forward to hearing the testimony of panel number two.

Mr. KUHL. Thank you, Mr. Costello. I likewise would like to apologize for coming in late. I do have just one question, if you can share an answer, or at least give us a brief overview. I note that the CDC and the FAA are working together on this issue.

My question comes to, have you had any kind of a relationship or an investigation or a development or a program with the Department of Homeland Security as it might relate to bio-terrorism in this area, in the aviation industry?

Dr. JORDAN. Yes, we have. Our Center of Excellence, which was created at Auburn University as the administrative lead, has been in close contact with Homeland Security, in terms of potential contamination of an aircraft from biologicals or chemicals, and the decontamination of those aircraft. We anticipate that this will be a major initiative at the Center of Excellence.

There are other universities that are a part of this effort, including Purdue and Harvard University and Boise State. There is a whole list of them, as well as other universities outside the immediate circle of the universities, that are an official part of the center of excellence. So there is coordination going on currently, and it will go on into the future.

Mr. KUHL. Great, thank you, let me at this time thank all of you for appearing. On behalf of Chairman Mica and the members here, we appreciate your participation here, Dr. Jordan, Captain Schuchat and Dr. Koppaka. Thank you very much. It has been very, very helpful.

I would like to call the second panel now for testimony, that panel consisting of Mr. John Meenan, Executive Vice President and COO of the Air Transport Association; Dr. Mark Gendreau, MD, Senior Attending Physician at the Lahey Clinic Medical Center; Dr. Michael McCawley, Executive Vice President and Chief Scientific Officer of Respiratory Management Technology, Incorporated; and Dr. Ronald Brown, MD, Managing Partner and CEO of AeroClave, LLC.

Gentlemen, welcome. Would you like to go in the order that we have you listed with Mr. Meenan first, or have you predetermined that you would like to go with some other batting order? All right, Mr. Meenan?

TESTIMONY OF JOHN MEENAN, EXECUTIVE VICE PRESIDENT AND COO, AIR TRANSPORT ASSOCIATION; DR. MARK A. GENDREAU, MD, SENIOR ATTENDING PHYSICIAN, LAHEY CLINIC MEDICAL CENTER; DR. MICHAEL MCCAWLEY, PH.D., EXECUTIVE VICE PRESIDENT AND CHIEF SCIENTIFIC OFFICER, RESPIRATORY MANAGEMENT TECHNOLOGY, INC.; DR. RONALD D. BROWN, MD., MANAGING PARTNER AND CEO, AEROCLAVE, LLC

Mr. MEENAN. Mr. Chairman, thank you very much for inviting us to appear today. I have submitted a written statement. I would like it made available for the record.

Efficient and affordable air transportation has helped to create a highly international society today. That society facilitates the exchange of ideas and goods and, unfortunately, viruses. The rapid spread of Severe Acute Respiratory Syndrome underscored that fact. But lessons learned from that experience can help to limit the impact of possible future disease outbreaks.

Airlines must, of course, be part of any comprehensive strategy for controlling potential pandemics, and we continue to work to be better prepared to respond promptly and in a coordinated way.

However, the airlines cannot do it alone. We must rely on information and guidance from the experts. ATA is proud of its record of cooperation with both the Centers for Disease Control and the FAA, in responding to the threats of communicable diseases.

This relationship did not start with SARS. Although through the years, we have worked closely with Government health experts, but SARS brought a new focus.

During the three month period that SARS played havoc with international travel, ATA and its members were in often daily contact with CDC to receive updates and provide input on what needed to be done to respond. ATA member airlines assisted CDC in distributing more than 2.7 million health alert notices to travelers.

Since that time, we have continued discussions with CDC, the FAA, and others, to develop more effective mechanisms for responding to the next international health crisis.

Specifically, we have been working to expedite passenger contact tracing, an important tool in bringing an end to an epidemic, because it allows public health authorities to take steps to isolate and treat the affected individuals.

While airlines have cooperated with public health officials to conduct passenger contact tracking for decades, SARS taught us all that the old methods, which relied on hand search records to reconstruct passenger lists, that simply would not work in a situation where you had hundreds of flights and thousands of passengers.

The good news is that we have learned from the experience. Should a SARS outbreak or a similar disease occur today, we are better prepared to respond swiftly. Working with CDC, airlines fully understand reporting requirements for passengers with suspected communicable diseases.

The expansion of CDC's quarantine stations to additional airports has made reporting and response far more efficient. With input from the airlines, CDC has developed the passenger locator card to collect contact information from passengers in a machine-readable form. Those forms have been made available to the carriers for distribution when directed.

CDC would identify the countries where exposure to disease was of concern, and the specific flights on which locator cards and health alert notices would be distributed. Using this targeted approach, CDC would be able to gather the information necessary to contact the passengers on those flights very efficiently.

This is a valuable interim solution, that represents a reasonable approach to the real world challenge we are facing in collecting and transmitting passenger information to Government agencies.

The ultimate goal remains a seamless electronic transfer of data, but the impediments, including concerns about data privacy, incompatible and sometimes outdated computer systems, as well as questions of reciprocity with other nations, are very significant.

These issues are not limited to the information required by CDC to conduct contract tracing. The same issues and much of the same information are at the heart of debates of how to best provide advanced passenger information to the Bureau of Customs and Border Protection, data needed by TSA to screen passengers, and other Federal requirements for passenger information.

In the interest of public health, safety, and national security, ATA's member airlines stand ready and willing to assist in each of these endeavors. But we cannot do it in an ad hoc, redundant, and uncoordinated fashion.

We have long called for the unification of these functions within the Federal Government, and believe that containing the spread of infectious diseases is yet another justification. We urge the various agencies that have a need for passenger information, not only to continue working with us, but to focus, too, on working with each other.

Thank you for inviting us today. We would be happy to respond to questions.

Mr. KUHL. Thank you, Mr. Meenan. You may have heard the buzzers and the bells going off. That indicates that the members are being called to the Chamber for a vote. We are into a 15 minute vote and there are 10 minutes left. So Dr. Gendreau, if you would like to give your statement in three minutes, if you can do it, or else we can just adjourn now until 4:00 and come back and do it then.

Dr. GENDREAU. I will defer until you come back.

Mr. KUHL. We can do that. We appreciate your understanding. So let us adjourn the Subcommittee hearing now until 4:00. There are two votes that are going to be recorded. We are in the one now, a 15, and then a five, and then we will be right back to continue. Thank you very much for your patience and understanding.

[Recess]

Mr. KUHL. We will reconvene.

Dr. GENDREAU. Thank you, Mr. Chairman and members of the Subcommittee. My name is Dr. Mark Gendreau, and I am a physician who has been involved with research regarding air travel health issues.

Recently, a colleague and I published a comprehensive analysis of transmission of infectious diseases aboard commercial aircraft.

My testimony summarizes that analysis and review, and I will submit my written testimony. I will summarize that here.

With over one billion passengers traveling by air annually, the risk of disease transmission during commercial air travel and the potential of commercial aircraft serving as vehicles of the pandemics is clearly present. However, the perceived risk is actually lower than the actual risk.

Since 1946, there have been only a handful of serious infectious disease outbreaks. Fresh in everyone's minds, however, is the SARS outbreak of 2002/2003. As the first severe contagious of the 21st century, SARS exemplifies the ever-present threat of newly emerging infectious diseases and the real potential for rapid dissemination made possible by the current volume and speed of air travel.

A total of 40 commercial air flights have been investigated for carrying SARS-infected passengers. Five of these flights have been associated with probable on-board transmission of SARS, infecting a total of 37 passengers.

One particular flight, Air China Flight 12, involved 22 of the 37 infected passengers, and represents a super-spreading event.

What is the risk of contracting an infectious illness during commercial air travel? Insufficient data prohibits a proper analysis to gain an idea of the probability of disease transmission.

However, despite these limitations, available data suggests that the risk of transmission to symptom-free passengers within an aircraft cabin is associated to sitting within two rows of an affected passenger, with a flight time greater than eight hours. However, variation in this association has been reported, specifically involving an in-flight SARS transmission.

Risk of infection within the aircraft cabin also seems to be affected by ventilation within the aircraft. Ventilation dilutes the concentration of infectious particles within any confined space, thereby reducing the probability of infection.

Experience shows us that transmission becomes widespread within the passenger cabin, involving all sections when the ventilation system is non-operational, as evidenced by an influenza outbreak on Air Alaska in 1979, while passengers were being kept aboard their grounded aircraft, with an inoperative ventilation system.

HEPA filtering of re-circulated of cabin air as a means of minimizing the exposure of infectious particles is established within the scientific literature and is strongly endorsed.

With that said, regulations requiring HEPA filtering of any aircraft that utilizes re-circulated air should seriously be considered if we want to minimize the risk of disease spread within the aircraft cabin.

Prevention of disease outbreak is perhaps the most important means of control and requires a proactive approach. The Government, aviation industry, and medical community should better educate the general public on health issues related to air travel and infection control.

The only real way to eliminate any risk of cross-infection in the aircraft cabin and the rapid world-wide spread of an infectious agent is to prevent intending passengers who are either substantially exposed to or are carrying a transmittable infection from flying.

This needs to come from education and promoting individual responsibility, since the systematic screening of passengers for contagious diseases is impractical.

Although thermal scanners used in airports may be useful in detecting symptomatic travelers, they are not an effective means of control, since persons exposed to an infectious disease could travel without any signs or symptoms, yet still be infectious. Good hand hygiene and cough etiquette have been proven to reduce the risk of disease transmission, and should be promoted.

In March, 2003, the World Health Organization issued specific infection control guidelines for air travel and SARS. These guidelines include pre-flight exit screening and travel restrictions at regions with recent local transmission of SARS. These protocols should be reviewed by appropriate agencies, and expanded to pertain to other infectious agents.

Passenger notification is an issue that is being addressed by both the Centers of Disease Control and Prevention, and the Aerospace Medical Association, and measures to improve the archiving of passenger manifests to facilitate the timely notification of exposed passengers should be encouraged.

In summary, commercial aircraft are a suitable environment for the spread of pathogens carried by its occupants. The environmental control systems utilized in commercial aircraft seem to restrict the spread of infection when the system is properly functioning.

The international health regulations adopted worldwide to limit the international spread of disease are being revised to provide a means of immediate notification of all disease outbreaks of international importance, and it is scheduled for a final voting in the World Health Organization General Assembly later this year in May.

Outbreaks will be characterized by clinical syndrome, rather than specific diagnosis, to expedite reporting. These new regulations and continued vigilance by countries, health authorities, airlines, and passengers will keep to a minimum, but will not eliminate the risk of the disease spread by the aircraft.

I would be happy to answer any questions. Thank you.

Mr. KUHL. Thank you, Dr. Gendreau. Dr. McCawley?

Dr. MCCAWLEY. Thank you, Mr. Chairman, Congressman Costello, members of the Subcommittee, RMT would like to thank the Committee for inviting us here today for this important topic.

I was reminded by something I had read a number of years ago called "Rat, Lice, and History," that infections and the spread of infections have altered the course of history in many cases, many times not for the better.

So it is important, I think, that we understand that there are both unintentional infections that a number of the members of the panel have spoken about, and then there are, today, those intentional infections that could be brought about by groups intent upon doing damage to the United States.

So I have submitted a written testimony, which I would like read into the record, and let me summarize what we are talking about.

I could, today, go onto an airplane with a device capable of generating between five and ten billion particles per hour. The device is readily available off the shelf, is inexpensive and, in fact, allowable on virtually all airplanes. I am not going to go into what it is, in public, obviously. That means a terrorist with the means of acquiring the agents could, in fact, spread them on a airplane.

The number is relatively important. I heard about the ASHRA committee that is looking into the guidelines for air cabins. You have to know what the contaminant source and what the contaminant levels could possibly be, before you can know what kind of dilution rate you need in that cabin.

I want to present that, at least, so you know, and so the ASHRA can look at those kinds of numbers, because they are horrendous. If you even take out 99.9 percent, and that is one part in 1,000, you would still have about 10,000 particles left. So being able to produce nine or ten billion particles per hour is pretty horrendous.

My company makes a device that is able, in fact, to pick out those particles from the background. The reason for that is pretty simple. The background of particles that you would find in an aircraft cabin or even in this room are very, very tiny. They are on the order of 50 to 100 nanameters in size. That is five hundredths of a micrometer. A human hair is 100 micrometers in size. So they are very small particles on the number basis, if you were to count them all.

But if you look at what comes from a generator for the kinds of biological weapons that you would have to generate to be infectious, you would see particles that are on the order of one to ten microns, two orders of magnitude larger.

So picking them out is like being able to pick out basketballs from baseballs on a table. It is relatively simple and straight-forward. The means for doing that is relatively inexpensive, and we are rolling it out of production this year. So we could, in fact, have it on airplanes within the year, in terms of the questions that were asked before.

We also produce, in fact, a device that is called a stage alert, because there are three stages to it. If you want the simplest measure of that contamination, you would look at both the particle number and the size of the particles. The first stage of the stage alert does that.

The second stage then can take a sample, connect it on to a filter from the air that may be contaminated, and determine whether or not the agents that it collects are living microbial agents. That is done with a simple dye, and it takes just a couple of seconds to do it.

So you have a real time monitor in a couple of seconds to do an analysis to see whether what you are getting are a lot of microbes.

We have a third stage that is a good bit more expensive in terms of being tens of thousands of dollars, that would, in fact, readily identify within an hour exactly what the agent is. So we have this three stage approach that gives you a very, very low false positive rate, in fact. As far as we can tell, it is going to be pretty much zero and a very low false negative to go along with that.

So we think this would be of some value to the people who are beginning to look at this. We have heard about the Auburn University Center of Excellence, and we would propose to send them information, if they want it, and it is commercially available. So I thank you for letting me make these comments.

Mr. KUHL. Dr. Brown?

Dr. BROWN. Good afternoon, Mr. Chairman and members of the Committee. I would like to thank you for the opportunity to speak with you today, and would ask that my written testimony be entered into the record. Thank you.

AeroClave is a Florida limited liability corporation, which was founded in early 2003, and is headquartered in Orlando, Florida. Our primary objective in starting this company was to design and build a system to decontaminate commercial aircraft, that is, rid them of disease-causing organisms.

We had three primary objectives in designing the unit. Number one, it had to be efficient and cost effective. Time is money in the airline industry, and any process that required planes to be out of service for any length of time would be unacceptable.

In addition, even though airlines could face huge potential losses should an outbreak occur, they could hardly afford to be faced with additional and substantial operating expenses. More simply put, we needed to make sure that the cure was not worse than the disease.

We had to find a way to accomplish the de-contamination without using chemicals that might harm expensive avionics or other critical aircraft components.

Lastly, and most important, at least from my personal perspective, was the need to accomplish the process without endangering the health of the passengers and crews.

Currently recommendations for a SARS-contaminated plane call for cleaning personnel to enter the aircraft in protective gear and wipe down the hard surfaces. Those recommendations also advise the employer to monitor the health of those workers in the future.

This may subject the employer to potential long-term liability, should those workers become ill. Ideally, the process we were trying to design should be completed without putting anyone inside the aircraft.

After two years of research and development, we believe we have accomplished all these goals with the AeroClave unit. Number one, the AeroClave unit is a self-contained, mobile apparatus, that manipulates the air temperature and relative humidity inside the aircraft, to create an environment that is lethal for a number of disease-causing agents, while not exceeding the aircraft manufacturer's operational parameters.

It has its own power supply, and carries enough fuel to run for approximately 48 hours. It meets all DOT and EPA specifications, and can be transported over the open road, without the need for any special equipment or permits.

It has an environmentally-controlled operator's cab to protect the operator for all-weather environments. It has on-board satellite communications that allow for real time data transmission to aircraft maintenance managers, and provides a lasting record of the details of each de-contamination cycle.

It allows us to download any new treatment parameters, without the need for on-site reprogramming. It allows for remote diagnostics of the equipment, and provides telephone communications for technical support from any location on the planet.

The entire process takes approximately two and-a-half hours, and costs approximately $100 in consumables, such as fuel and filters. Connections to the aircraft are made via quick connectors, enabling a crew of two to hook up the aircraft in approximately 15 minutes, without the need for any special tooling.

There are no modifications required of the aircraft, and regular ground handling crew personnel can be trained to operate the equipment in approximately two to three days.

It uses a closed loop system of hoses to prevent any leak of potential pathogens into the local environment, and multiple units can be daisy chained together, should the need be required for larger aircraft or buildings.

After the recent hurricanes that devastated many parts of Florida last season, we realized that there might be additional uses for our equipment. After consultation with state and Federal disaster management officials, we have added some additional features to increase its versatility.

After the hurricanes, a number of shelters were left without power and communications. With the addition of our power and communications distributions center to the unit, we are now able to pull up to a facility and restore power, conditioned air and heat, and communications within 30 minutes of arrival.

On a recent visit by Pentagon officials, one officer commented how this system could be used to provide power and conditioned air or heat to field hospitals during the day, and then decontaminate those same facilities during the night.

They also felt that this unit had additional applications. In addition to aircraft decontamination, they felt it would be useful to help control the spread of disease on board ships, submarines, and tactical ground vehicles.

Currently, we have two prototype units, and have carried out extensive testing on a recently de-commissioned DC-9, which we have purchased. We have completed the design of our production unit, and the first units will begin rolling off the assembly line in August of 2005.

We have hosted a number of demonstrations for a variety of state, local, and Federal officials. A number of representatives from the United States Department of Defense, up to and including two star generals, have witnessed demonstrations of our unit.

We have recently been invited to participate in the FAA's Center of Excellence for Airliner Cabin Environmental Research, or ACER, as you have heard spoken of today, in Auburn, Alabama, where our product will undergo efficacy and reliability testing.

We have recently begun negotiations with another company, who is an industry leader in de-contamination and sterilization technology, about incorporating their technology into our system. By integrating these two technologies, we believe we will have a comprehensive solution, with a biological kill spectrum that ranges from simple viruses to the most resistant spoors, including anthrax.

Should the Federal Government decide to invest in technology such as the AeroClave unit, we would suggest that they be viewed and staged as regional disaster preparedness assets, possibly under the control of FEMA or some similar agency. From a readiness standpoint, we believe that the first units should be stationed at major international airports.

Whether a natural occurring pandemic, or the act of a bio-terrorist, we believe that AeroClave can help protect the country's transportation system, and help mitigate the disastrous financial consequences of such an event.

Whether it be de-contaminating aircraft or other transportation vehicles, or establishing and supporting field medical units and shelters, we feel the AeroClave unit could be a valuable asset in our Nation's defense.

That concludes my oral presentation. Again, I would like to thank Mr. Chairman and the other members of the Committee for the opportunity to speak with you today. Thank you.

Mr. KUHL. Thank you, Dr. Brown.

The Chair would recognize the gentleman from Illinois, Mr. Costello.

Mr. COSTELLO. Mr. Chairman, thank you.

Dr. McCawley, let me ask just a couple of questions. One is, you mentioned the cost of the bio-sensor, the stage alert. How much would it cost per aircraft?

Dr. MCCAWLEY. Well, if you handle all three stages on there, it would cost between $25,000 and $27,000. If you had the first two stages on, you would probably be able to do it for under $2,000. The third stage could be located at a terminal, to then check whatever filter was sampled on the aircraft.

Mr. COSTELLO. What is involved in the maintenance of the system and the cost of maintaining stages one, two, and three?

Dr. MCCAWLEY. The primary cost is in stage three, where you could have re-agents that would have to be replaced at the end of the life span, which would be $100 or $200, probably every three to six months.

Mr. COSTELLO. Explain for me again, if you will, just quickly, how the system works.

Dr. MCCAWLEY. Okay, the first stage looks at the size and number of particles that are coming through it.

Mr. COSTELLO. How does it do that?

Dr. MCCAWLEY. It uses a light scattering photometer. Just like in sunlight, where you can see dust particles in the air, when you shine a laser light through and you have an aerosol coming through, the laser light is scattered by the particles. The amount of scattering that is there is proportional to the size of the particle.

So each time a particle passes through, you get a pulse from the scatter, and the height of the pulse is the sign of the particle. So you know the number that have passed through and the size.

The second stage is a dye. It is a dye that has been tested out. It is now for sale for evaluating powders. Any living microorganism will take up this particular dye. Once the dye is taken up, it undergoes a change that makes it florescent. So you shine a UV light on it, and the stuff fluoresces, just like a black light.

The third stage, we actually use bacteria phages to identify specific micro-organisms. The bacteria phage, particularly for bacteria, is very, very specific, when you know exactly what you want to look for.

Mr. COSTELLO. Where are you in the production of the system?

Dr. MCCAWLEY. We have all the components in pre-production form. We are, right now, going through our casing of those, so that we can have the tooling for making the cases that all of the materials will fit in. Pretty much, then we will roll them off the assembly line.

Mr. COSTELLO. Is it, in your opinion, possible that the system could be used in large buildings in an airport terminal, an airport environment?

Dr. MCCAWLEY. Yes, absolutely. We actually had originally envisioned the system to be used in urban environments, outdoor environments, and in buildings. So both of those would be locations.

Mr. COSTELLO. Would you have a cost estimate on that?

Dr. MCCAWLEY. Again, the cost would be pretty much the same, whether it is on an airline or whether it is in a building. In a building, depending upon the number of HVAC heating ventilation and air conditioning systems that you have, you might want to have one in each of those systems. So it would depend upon the number of different HVACs.

Mr. COSTELLO. How large of an area would one cover?

Dr. MCCAWLEY. Probably a cubic foot, at most. Most of that would be in that third stage. The first two stages are hand-held portable kinds of devices.

Mr. COSTELLO. Very good.

Dr. Brown, if you would, could you kind of walk me through how the AeroClave's decontamination unit operates.

Dr. BROWN. Sure, it is hooked up. We pull the unit up to the aircraft. It is a self-contained unit, the size of a 53 foot tractor trailer. It backs up to the aircraft. The crew will then pop the emergency exit windows over the mid-cabin, where we enter the supply air.

We also go in through the pre-conditioned air inlet at the rear of the plane, which is what the ground air conditioning units are hooked up to when you are sitting on the ramp. That forces the heated air, as well, through the internal duct system of the plane. The returns are brought out of the baggage compartment.

Then what we do is, we place wireless sensors inside the aircraft that transmit telemetry data back to the unit to control the process. The aircraft is then brought up to temperature.

Once all these sensors in the plane reach a predetermined temperature, then the cycle begins a countdown. Say, for example, for SARS, it is a certain temperature for 15 minutes. What we do is, we double that time for 100 percent redundancy.

The clock will then count backwards from 30 minutes. At the end of that hold time, the heaters drop off, the air conditioning comes back on, and we cool down the plane.

So within approximately an hour and-a-half to two hours after starting the cycle, the plane would be inhabitable again. There is no retained heat in any of the upholstery or anything, so you could easily board passengers at that time. It takes a crew of two about 15 minutes to hook the aircraft up and to pull it back apart again.

Mr. COSTELLO. Does the aircraft have to be modified or changed at all?

Dr. BROWN. No, there are absolutely no modifications required of the aircraft.

Mr. COSTELLO. You mentioned the cost of operating the system. I think you said it was $100 an hour. Could you go ahead and elaborate on that?

Dr. BROWN. Sure. That is the direct operating expenses of the unit. Given the fact that each process takes about two and a half hours to complete a cycle, that cycle would cost approximately $100, and that is primarily in diesel fuel and filters that would be required to be changed every 30 days. So there is very little maintenance on the unit. The direct operating costs are less than $100, each time you would perform a cycle on an aircraft.

Mr. COSTELLO. What is the cost of one of these machines?

Dr. BROWN. Our basic unit is around $500,000.

Mr. COSTELLO. About $500,000?

Dr. BROWN. Correct.

Mr. COSTELLO. I have the same question for you that I asked Dr. McCawley. Can this system be used in an airport terminal?

Dr. BROWN. Absolutely, absolutely. It can be used for really any space that can be compartmentalized, either internally or externally. We have had discussions with cruise ship operators and, again, with the military, as far as ships, submarines, things like that, rescue vehicles, ambulances, taxis, buses, subways, trains, anything that can be compartmentalized, either externally or internally can be treated with this system.

Mr. COSTELLO. I understand that you have tested the prototype on a de-commissioned DC-9.

Dr. BROWN. Correct.

Mr. COSTELLO. Can you tell us about the results of that test?

Dr. BROWN. Well, those tests were primarily designed to modulate the air flow and make sure that we could keep the temperature range even throughout the aircraft, and to get the cycle time down as low as possible.

Again, time is money in the airline industry. Our initial goal was to complete this process within four hours, and now we are down around two hours.

The next stage in the testing process is efficacy testing, which through the FAA Center of Excellence. We will actually be putting biological indicators into the system.

What we have been going off of, to date, is empirical data that has been supplied to us by virologists and microbiologists as to, at what temperature can you kill certain diseases. We have proved that we can get the cabin to temperature and maintain it without damaging the aircraft. So the next part of the testing cycle is actually using biological indicators to quantify that.

Mr. COSTELLO. When do you expect this de-contamination system to be in production?

Dr. BROWN. Well, the first production unit will come out in early August of 2005.

Mr. COSTELLO. Do you have customers waiting to use the product?

Dr. BROWN. Yes, sir. We are currently negotiating a contract with an Australian firm for the purpose of 100 units. This is a large company that has global air operations that were substantially injured financially by the SARS crisis. So even though our contract is pending certification and efficacy testing, they are eager to move to the front of the production line.

Mr. COSTELLO. Dr. Gendreau, I wonder if you might want to comment on either one of the systems, either the alert system or the de-contamination system?

Dr. GENDREAU. I do not know much about the systems and how they would interact with the current ventilation system on the aircraft.

Mr. COSTELLO. Is there anything else that you would like to add before my time is up?

Dr. GENDREAU. I would say that at this point, the aircraft cabin is safe, if there is a system that has a functional environmental control system that includes a HEPA filter. I guess that is about it.

Mr. COSTELLO. I have one last question, if I may. You talk about both the Government, aviation industry and the medical community, and the need to better educate the public. I wonder if you might want to elaborate on your suggestions as to how all three should go about educating the public.

Dr. GENDREAU. Well, we could do it in the same fashion that the CDC did in regards to the hand hygiene initiative that they put out several years ago to promote proper hand hygiene in the health care workers and the general public. That would be a good means of doing it. Public service announcements, particularly when there is an outbreak, would be useful, I believe.

Mr. COSTELLO. Mr. Chairman, thank you. I see my time is up, and I thank our witnesses for being here today.

Mr. KUHL. Thank you, Mr. Ranking Member.

Mr. Meenan, I have got just a couple of questions. I am curious as to if you have an estimate, and I know it is very difficult to place estimates. But do you have some sort of an estimate on what the SARS outbreak cost the airline industry?

Mr. MEENAN. We never attempted to break out the SARS impact from the other issues that were going on at the time, particularly the Iraq war. I know I have seen a number used publicly that said the industry sustained a $10 billion loss. I do not know where that number fame from.

We do have some data on traffic to and from Toronto during that period, that indicates that it was a very substantial impact. But we have not tried to back that up into any specific number.

Mr. KUHL. Since that time, has there been an improved communication within the industry to try to deal with this issue?

Mr. MEENAN. As my testimony alluded to, we have been working, on a very regular basis, with CDC, the World Health Organization, and other bodies around the world to deal with the whole array of issues involving the possible spread of disease by aircraft. I think dealing with things like contact tracing, dealing with the installation of filters on aircraft, the entire spectrum of activity has moved us in a very positive direction.

Mr. KUHL. Do people in the airline industry, particularly employees, ever refuse to put sick people on airplanes?

Mr. MEENAN. The existing regulations limit very substantially the ability of an airline to do that. The anti-discrimination regulations of the Department of Transportation are somewhat ambiguously worded, but they are worded in such a way that it greatly inhibits the ability of the carrier to refuse transport to anyone who is not easily recognizable as posing an immediate threat. Obviously, most ill passengers do not fall into that category.

So we have been seeking some additional guidance in really working again with CDC. We defer to CDC as to the best way to address these problems.

But the airlines do obviously engage in sort of common sense approaches to dealing with passengers who appear ill. They try to encourage them to see their physicians to deal with their health issues and so forth.

Mr. KUHL. Do you have any suggestions, or do you care to elaborate on what other types of oversight might be potentially helpful to the industry?

Mr. MEENAN. As I said, we have specifically asked for additional guidance as to what exactly the Department of Transportation is referring to in this existing regulation. I think that because the diseases we are dealing with here, the symptoms may not be clear. The communicable phase may not be understood at the time the disease comes out.

It has to be somewhat of an ad hoc approach to the situation. But it has to involve health care professionals at that stage. I think expecting airline employees to fill the role of a trained medical professional is not particularly practical.

Mr. KUHL. Dr. McCawley, do you have any thoughts on that particular issue, as to ways that we could help the industry out in avoiding contamination within the cabins?

Dr. MCCAWLEY. Well, actually, as I said, the kinds of things you would be looking for are what we are measuring with our devices, particularly for the terrorist attacks, which have been bothering me for quite awhile now.

For the terrorist attacks, if you can catch somebody doing it and there is an alarm that goes off, you can prevent a lot of contamination that you then do not have to clean up and you do not have to worry about it. So the less that happens, the better off you are. Prevention is the key. that is why CDC added “and Prevention” to its title, I suppose.

Mr. KUHL. Lastly, Dr. Brown, I know I am not looking for you to disclose all of your potential clients. But I am curious as to what other countries, other industries, might potentially avail themselves of your product, that are seeking you out to try to engage your services.

In other words, you mentioned an industry in Australia. Are there other countries who are trying to be as preventative as we are, who are looking to resolve these issues before they become issues?

Dr. BROWN. Oh, very much so. We are now in discussions with qualified customers. We have had a lot of “tire kickers” I guess, for lack of a better term. But we quickly sort those out, and we are dealing now with qualified customers from several countries in Europe, from the Middle East, and from Southeast Asia.

Besides the airline industry, we are also speaking with representatives from the shipping container industry, from the cruise line industry, from the rental car industry, and mass transit authority, particularly in Europe.

Europe seems to be driven by mass transit. What seems to be happening over there is that on an almost daily basis, the tabloids are bringing these horrendous scare tactics stories to the press, and it is driving people away from mass transit, which is putting them into private vehicles, which is now clogging their system.

So they are desperately seeking a way to give the public a sense of security that it is indeed safe to ride on the subway or the buses. So those are the industries that we are dealing with now, and the military has several other potential uses in mind.

Mr. KUHL. Well, thank you. Do any of you gentlemen have anything further that you would like to offer at this time, any additional comments that we did not elicit from you? Dr. Gendreau?

Dr. GENDREAU. I would like to just say something in terms of how do you screen somebody, in terms of getting on an aircraft.

Right now, the resources that are available vary between airport to airport. One resource that is used by some airlines right now is private medical companies, in which someone can call a physician and express concerns about the fitness to fly of a particular passenger.

Then that physician can get on the phone and interview that particular passenger, and make a determination of whether or not that person should fly or not.

Mr. KUHL. Dr. Brown, you had something you wanted to say?

Dr. BROWN. Yes. It seems like the reoccurring theme that I have heard from a number of members of the Committee is being preemptive or being proactive, instead of reactive.

It has always been my experience that it is less expensive to prevent than to mitigate. So I would encourage members of the Committee to be supportive of the efforts, such as the FAA Center of Excellence, that does bring together Government and private industry, with a mandate not to reinvent the wheel, but to incorporate existing technologies and bring them to market.

Because I do believe that we do face a potential threat, whether it is imminent or in the very near future. Who knows? But I think it will be beneficial to all if we are adequately prepared before the event begins, rather than trying to mop up the effects after it starts. I thank you for your leadership in bringing this issue before us.

Mr. KUHL. Well, if there is nothing further, gentlemen, Mr. Meenan, Dr. Gendreau, Dr. McCawley, and Dr. Brown, thank you very much for coming. Thank you for your patience and understanding that we were called away for a short period of time, and we thank you for your testimony. We appreciate your being here today. With that, we will conclude the hearing.

[Whereupon, at 4:35 p.m., the subcommittee was adjourned.]

"Efforts to Prevent Pandemics by Air Travel"

Testimony before the House Aviation Subcommittee
April 6, 2005 2:00 PM
2167 Rayburn House Office Building

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Testimony before the House Aviation Subcommittee
"Efforts to Prevent Pandemics by Air Travel"
April 6, 2005 2:00 PM
2167 Rayburn House Office Building

INTRODUCTION

My name is Dr. Ronald Brown, founder and Managing Partner of AeroClave, a Florida Limited Liability Corporation headquartered in Orlando, Florida. AeroClave was founded in 2003 in an effort to design and build an effective way to decontaminate the interiors of commercial aircraft from disease-causing organisms and prevent the global spread of disease or pandemics. We are privately funded and have, to date, received no funding from any branch of government.

BACKGROUND

My decision to start the company grew out of a discussion I had with local airport planners during my tenure as the EMS Medical Director of a Central Florida county. Their desire was to develop a quarantine center for ill and possibly infectious air travelers. I felt confident we could handle the patient side of it, but when I asked who was going to disinfect the aircraft there was no clear response. It was, and still is, my firm belief that unless you decontaminate the aircraft, you risk putting healthy people on sick aircraft, thereby perpetuating the spread of disease.

Today's aircraft have a highly advanced air circulation and filtration system. In-line HEPA filters trap even small viral particles preventing their recirculation in the cabin. Airflow from the aircraft's cabin air system flows out of the overhead vents and exits the cabin through return air grills located in the sidewalls near the floor. According to the Boeing website "the cabin air ventilation system is designed and balanced so that air supplied at one seat row leaves at approximately the same seat row, minimizing airflow in the fore and aft directions[1]" The airflow is, generally speaking, from top to bottom, not front to back as many people believe. It is my belief that many aircraft acquired illnesses are not the result of recirculating air, but rather the direct hand-to-mouth transmission from touching contaminated hard surfaces, such as tray tables, seat belts or latches on overhead baggage compartments.

During flu season health experts advise constant hand washing because many illnesses are transmitted by touching contaminated surfaces and then putting your hands near your mouth and nose[2]. So, theoretically, it is more likely that you become ill on an aircraft, not from the coughing and sneezing passenger three rows back, but from the passenger who sat in your seat on the previous flight that was ill with a contagious disease who then touched the tray table and seat belts. World Health Organization studies proved the SARS virus can live on hard plastic surfaces for up to 72 hours[3]. How many different passengers have sat in that seat over the past three days?

At the time, the SARS crisis was still evolving and was significantly impacting the airline and travel related industries. Though the SARS crisis was, by definition, a regional health emergency primarily affecting Southeast Asia and Canada, its effects were beginning to permeate the entire global economy. Though airlines and travel related industries were the hardest hit, SARS impacted banking and manufacturers whose operations were tied to Southeast Asian countries. Economists are still trying to calculate the impact of the SARS crisis on airlines and other industries but estimates range into the tens of billions of dollars. [4,5,6,7,8,9,10,11] It is staggering to imagine what the impact might have been had this evolved into a truly global pandemic, such as the evolving avian influenza epidemic of which public health officials now warn us.

The one indisputable fact that the SARS crisis did prove was, because of international air travel, new diseases can quickly spread around the world.[12] Before the advent of modern air travel, new diseases would emerge from time to time and be carried by travelers to new locations. However, because it took weeks and even months to travel from one part of the world to another, many times the disease became identified and isolation and quarantine measures were put into place helping to curb the spread. Though we have sophisticated medical monitoring and tracking programs that help identify new disease outbreaks, there is still the fear among public health officials that a new and highly virulent disease will emerge and spread to all parts of the globe before adequate measures can be put in place. It then becomes a problem of mitigation, which has historically been a more expensive process then prevention.

Should a pandemic develop as predicted, not only will the physical manifestations of the disaster need rectifying, but also the psychological aspects as well. In response to the SARS crisis devastating effects to the airline industry in 2003, the International Air Transport Association (IATA) released to its members a presentation entitled "Manage the Fear. Feed the Beast. Crisis Communications Response: Lessons for SARS." In it, John Hughes-Hallet, Chairman of Cathay Pacific Airways, was quoted as saying "In particular what we have experienced in the last two months is more or less complete collapse in public confidence regarding the safety of air travel."[13] In short, until the public feels the aircraft are safe for them to fly in, that is, free of disease, the economic recovery of the airline industry will be more prolonged, if it happens at all.

DEVELOPMENT GOALS AND OBJECTIVES

AeroClave had three main objectives in the development of its product.

1. The process had to be effective and efficient. Time is money to the airline industry and any process that took too long would not be economically viable. Similarly, any process that was too expensive would place an undue burden on an industry already facing severe economic challenges.
2. The process had to be done without the addition of any harmful or corrosive chemicals nor could it leave any unpleasant odor. Cleaning agents and processes used in other industries might not be allowed due to the adverse effects on electronics, seals or other critical components.
3. The process should be done without endangering the health of the cleaning crew. In instances where there might be a high degree of suspicion of infectious agents, the process should ideally be accomplished without putting any personnel inside the aircraft.

After two years of research and development, we believe we have accomplished all of these goals with our AeroClave unit.

THE AEROCLAVE UNIT

The AeroClave unit is a self-contained mobile apparatus that manipulates the cabin air temperature and relative humidity inside the aircraft to create an environment that is lethal for a number of disease causing agents. The entire process takes approximately

2 ½ hours and costs approximately $100 in consumables such as fuel and filters. There are no modifications required on the aircraft and regular ground handling crews can be trained to operate the equipment in approximately two to three days.

I'd like to go over a few of the features of the AeroClave unit:

1. It is self-contained with its own power supply and carries enough fuel to run for approximately 48 hours. It meets all DOT and EPA specifications and can be transported over the road without the need for any special equipment or permits.
2. It has an environmentally controlled operator's cab to protect the operator during all-weather operations.
3. It has onboard satellite communications that allow for real time data transmission to aircraft maintenance managers and provides a lasting record of the details of each decontamination cycle. It also allows us to download any new treatment parameters as determined by public health officials without the need of onsite reprogramming. It allows for remote diagnostics of the equipment and provides telephone communications for technical support from any location on earth.
4. It uses a closed loop system of hoses to prevent any leak of the potential pathogens into the local environment. Connections to the aircraft and the unit are made via quick connectors enabling a crew of two to hook it up in approximately 15 minutes without the need of any special tools. Again, no modifications of the aircraft are required.
5. Multiple units can be "daisy chained" if needed for larger aircraft or buildings.

OTHER APPLICATIONS

After the recent hurricanes that devastated many parts of Florida last season, we realized there might be additional uses for our equipment. After consultation with State and Federal disaster management officials we have added some additional features that increase its versatility.

During last year's hurricanes in Florida, a number of shelters were left without power and communications. With the addition of the Power and Communications Distribution Center to the unit we are able to pull up to a facility and restore power, conditioned air and/or heat and communications within 30 minutes.

On a recent visit by Pentagon officials, one officer commented how this system could be used to provide power and conditioned air or heat to field hospitals during the day and decontaminate them at night. They also felt this unit had broader applications. In addition to aircraft decontamination, they felt it would be useful to help control the spread of disease on ships, submarines and tactical ground vehicles.

CURRENT STATUS

Currently we have two prototype units and have carried out extensive testing on a recently decommissioned DC-9 that we purchased. We have completed the design of the production unit and the first units will begin rolling off the assembly line in early August 2005.

We have hosted numerous demonstrations for a variety of local, state, and federal officials. A number of representatives from the US Department of Defense up to and including two-star generals have witnessed demonstrations of the unit. We have recently been invited to participate in the FAA's Center of Excellence for Cabin Aircraft

Environment in Auburn, Alabama where our product will undergo efficacy and reliability testing.

We have recently begun negotiations with another company who is an industry leader in decontamination and sterilization about incorporating their technology into our system. By integrating these two technologies we believe we will have a comprehensive solution with a biological kill spectrum ranging from simple viruses to the most resistant spores, including anthrax.

From the outset, we have constantly sought the input from industry experts and potential end users in an effort to develop a product that, while effective in its primary mission, might be modified to allow it to be used as a regional asset by a number of different agencies at the local, state, and federal level. Whether it be decontaminating aircraft or other transportation vehicles or establishing and supporting field medical units and shelters, we feel the AeroClave unit could be a valuable asset in our nation's defense. Whether a naturally occurring pandemic or the act of a bioterrorist, AeroClave can help protect the country's transportation system and help mitigate the disastrous financial consequences of such an event.

Should the Federal government decide to invest in technology such as the AeroClave unit, we would suggest that they be viewed and staged as regional disaster preparedness assets, possibly under the control of FEMA or some similar agency. From a readiness standpoint, the first units should be stationed at the major international airports. Daily maintenance checks could be integrated into the responsibilities of those airports' emergency response agencies, e.g., the airport's fire department.

SUPPLY AND DEMAND

Although it is our primary goal to protect the transportation assets of the United States using AeroClave units to be produced at various US facilities, it appears our first customers will be from overseas. We are currently negotiating a contract for 100 units to an Australian company with global aviation operations. In addition, we have serious inquiries from qualified customers in Europe, Southeast Asia and the Middle East.

We believe that the threat of a rapidly spreading biologic emergency is real and that its effects on the US economy could be devastating. While no one system should claim to be the "silver bullet" we do believe the United States government should invest in equipment that can help stem the transmission of such diseases. We believe the AeroClave system can be a vital part of an overall strategy designed to protect the transportation assets of an economy that depends on the constant movement of people and goods. While this protection is not without costs, the economic effects of an uncontrolled epidemic could be disastrous. In addition, building this equipment takes time and demand from foreign customers could produce limited supplies of critical components for use in the United States.

CONCLUSION

With increasing frequency we read warnings from world health officials about the eventual, and some say imminent, outbreak of a deadly pandemic event. [14,15] The CDC has estimated that a pandemic could have "severe" effects on the United States causing between 89,000 and 207,000 deaths and having an economic impact of between $71.3 and $166.5 billion [16].

While many have become hardened and skeptical with the repeated warnings, our discussions with potential industry and government customers proves to me that these warnings are not going unheeded. It is reassuring that our government is also heeding the warnings as evidenced by this hearing today. I thank you for your leadership in addressing this problem and, as the Managing Partner of AeroClave; I thank you for the opportunity to speak with you today.

I believe the essence of what we are and why we started AeroClave can be summed up in a response from a potential customer when asked why he was interested in ordering now and in such large quantities. He replied:

"It was not yet raining when God ordered Noah to start building the ark".

Respectfully submitted on April 6, 2005 by:

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OPENING STATEMENT OF
THE HONORABLE JERRY F. COSTELLO
AVIATION SUBCOMMITTEE
EFFORTS TO PREVENT PANDEMICS BY AIR TRAVEL
APRIL 6, 2005

- Thank you, Chairman Mica for calling today's hearing on efforts to prevent pandemics by air travel. In the post-September 11th environment, there has been increased concern about the potential for spreading bio-terrorism agents or other infectious diseases via aircraft.

- As we learned with the Severe Acute Respiratory Syndrome (SARS) virus in 2002, the aircraft environment is one avenue for the transmission of contagious diseases. According to some experts, the aviation industry experienced billions in losses from the impact of the SARS virus.

- Recently, several countries in Asia have experienced outbreaks of avian influenza (H5N1 strain). While there has been only limited human-to-human transmission of the avian flu, now is a good time to examine the processes that we have in place to prevent or diminish the transmission of these diseases via aircraft.

- Over 1 billion passengers worldwide travel by air annually, and approximately 50 million of these passengers travel to and from developing countries. Some experts estimate that diseases with confirmed human-to-human transmission could spread more rapidly throughout the world via air, perhaps in just hours. For example, the SARS virus was transmitted during a flight of only 3 hours from China. Further, there have been other probable transmissions of disease via air travel, including: tuberculosis, influenza, measles and meningococcal disease.

- The Department of Health and Human Services (DHHS), through its Center for Disease Control and Prevention (CDC), is the lead on preventing the introduction, transmission and spread of communicable disease in the United States, and the dissemination of information between the government and the airlines in the event of a communicable disease outbreak. I look forward to hearing more about the CDC's responsibilities as well as its coordination with international organizations, such as the World Health Organization, from Captain

Anne Schuchat (SHUCK-et), Acting Director of the National Center for Infectious Diseases at the CDC.

- I also look forward to hearing from Dr. John Jordan, Federal Air Surgeon, Federal Aviation Administration (FAA), who is involved in monitoring developments in this field, and would be instrumental in ensuring that any changes to procedures or aircraft systems to combat airborne diseases would not have a negative impact on operations.

- We will also hear from Dr. Mark Gendreau (Jen-dro), who will discuss his findings in his recently published study "*Transmission of infectious diseases during air travel*," including how better to manage infectious disease exposures aboard aircraft.

- I look forward to hearing from our witnesses on prevention efforts to halt the spread of diseases via aircraft.

Transmission of Infectious Diseases During Commercial Air Travel

Testimony of
Mark A. Gendreau, M.S., M.D., F.A.C.E.P.
Attending Physician, Lahey Clinic, Burlington, MA
Before the
Subcommittee on Aviation
Committee on Transportation and Infrastructure
United States House of Representatives
April 6, 2005

Chairman Mica and Members of the Subcommittee, I am Mark Gendreau, and I am an attending physician at Lahey Clinic Medical Center, a tertiary care teaching hospital located in the greater Boston region. One of my clinical and research interests over the past 5 years has been health issues related to commercial air travel. Recently, a colleague and I published a comprehensive analysis on the current knowledge and status of Infectious Disease Transmission during Commercial Air Travel. This publication represented a year and a half effort of reviewing and analyzing all available scientific and governmental literature concerning infectious disease spread aboard aircraft. My testimony will summarize the findings of our analysis.

Joshua Lederberg, a Nobel laureate once wrote "The microbe that felled one child in a distant continent yesterday can reach yours today, and seed a global pandemic tomorrow. With over one billion passengers traveling by air annually the risk of disease transmission during commercial air travel and the potential of commercial aircraft serving as vehicles of pandemics is clearly present and has recently gained increased interest. Over the past decade the world community has been introduced to many new and reemerging infectious diseases. Diseases such as Severe Acute Respiratory Syndrome, Avian influenza (H5N1), West Nile fever, Monkey pox have emerged or resurged. The anthrax outbreak of 2001 demonstrated the ever present threat of bioterrorism. Fortunately, the widespread general perception that transmission of infection between aircraft cabin occupants and facilitated by the nature of the aircraft cabin environment is unfounded. In fact, the current environmental control systems utilized on modern commercial aircraft, when properly functioning, limit the spread of disease within the cabin.

Since 1946, there have been a number of reported outbreaks of serious infectious diseases aboard commercial airlines. These include: influenza, measles, SARS, Tuberculosis, food poisoning, and small pox. While less serious outbreaks like the common cold or simple viral syndromes have not been reported, common sense suggests that they likely occur and lack of reporting is likely attributable to the difficulties of investigating such outbreaks in view of the ubiquitous nature of these minor infections.

Fresh in everyone's minds is the Severe Acute Respiratory Syndrome (SARS) outbreak of 2002-2003. As the first severe contagious disease of the twenty-first century, SARS exemplifies the ever-present threat of new emerging infectious diseases and the real potential for rapid dissemination made possible by the current volume and speed of air travel. A total of 40 commercial air flights have been investigated for carrying SARS-infected passengers. Five of these flights have been associated with probable on-board transmission of SARS inflicting a total of 37 passengers.

One three-hour flight (Air China flight 112), a 737-300 aircraft, carrying 120 passengers and traveling from Hong Kong to Beijing on March 15, 2003 constituted a superpreading event accounting for 22 of the 37 air travel-SARS cases. The number of secondary cases from Flight 112 remains under investigation but may have involved over 300 persons.

The spread of microorganisms to humans occurs by one of four mechanisms: contact/large droplet, airborne, common vehicle and vectorborne. With the purpose of not being overwhelming, suffice it to say that although all modes are relevant to commercial air travel, large droplet and airborne mechanisms likely represent the greatest risk for passengers within the aircraft given the high density and close proximity of passengers. Large droplet transmission is considered a form of contact transmission and involves the generation of large droplets (> 5 microns) contaminated with microorganisms by an infected person via sneezing, coughing or talking. These droplets are propelled short distances (< 3 feet) and either deposited on a susceptible host's conjunctiva or mucosa or onto an inanimate object such as a table, chair or door knob. This mode of transmission is seen in, upper respiratory tract viral infections, the common cold, influenza, meningococcus and anthrax. Airborne transmission on the other hand involves aerolization of an infectious agent through droplet nuclei (residua of large droplets containing microorganisms that have evaporated to size less than 5 microns). These tiny nuclei are not propelled through the air like large droplets but rather become aerosolized and disperse widely depending upon environmental conditions where they remain suspended in air for indefinite periods. Influenza, SARS, measles, tuberculosis, legionnaires and small pox are examples of airborne infectious diseases.

What is the risk of contracting an infectious illness during commercial air travel? The risk within the confined space of a commercial aircraft cabin is difficult to determine. In general in addition to proximity, successful dissemination of an infectious disease within an enclosed space to other hosts is dependent upon multiple factors including: chance, mode of transmission, infectiousness of the source, pathogenicity of the microorganism, proximity to source, duration of exposure, environmental conditions (ventilation, humidity, and temperature) and host-specific factors such as general health and immune status. How these factors influence risk of disease transmission within the aircraft cabin remains unclear.

Insufficient data prohibits a proper analysis to gain an idea of the probability of disease transmission. Many of the epidemiological studies that are available are compromised by reporting bias due to incomplete or inaccurate passenger manifests during the time of the study further complicating the issue of risk assessment. Despite these limitations available data suggests that the risk of transmission to other symptom-free passengers within the aircraft cabin is associated to sitting within two rows of the affected passenger (proximity) with a flight time greater than 8 hours (duration). This risk was derived from epidemiological investigations in the 1990s by the Centers of Disease Control and Prevention (CDC) regarding in-flight tuberculosis transmission, and has been assumed to be relevant to other infectious diseases. However, some variation in this association has been reported. For example, the largest in-flight SARS outbreak (Air China Flight 112) in which passengers seated as far as seven rows were affected and the flight time was only three hours. This dissemination pattern may be important in that it did not follow the typical example of in-flight transmission of airborne pathogens-namely flight time greater than 8 hours and sitting within 2 rows of the source passenger. The duration of flight 112 was 3 hours and affected passengers were seated 7 rows in front and 5 rows behind the index passenger. This different time and distribution pattern of transmission signifies the urgent need to study airborne transmission patterns aboard commercial aircraft.

Risk of infection within the aircraft cabin also seems to be affected by ventilation within the aircraft. Ventilation dilutes the concentration of infectious particles within any confined space thereby reducing the probability of infection. Experience shows us that transmission becomes widespread within the passenger cabin involving all sections when the ventilation system is non operational as evidenced by an influenza outbreak involving passengers being kept aboard grounded aircraft with inoperative ventilation system.

Air circulation patterns aboard standard commercial aircraft are side-to-side (laminar) with air entering the cabin from the overhead, circulating across the aircraft and exiting the cabin near the floor. Little to none front-to -back (longitudinal) airflow takes place. This air circulation pattern "compartmentalizes" the air flow into sections within the cabin; thereby limiting the spread of airborne particles throughout the passenger cabin. Ventilation capacity varies substantially, dependent upon the aircraft type, but typically averages 10 cubic feet per minute with normal cabin air exchanges ranging from 15 to 20 air changes per hour compared with 12 per hour for a typical office building. Ventilation can involve either 100 % fresh air in which outside air enters and leaves the cabin in a single pass or a system in which various fractions of air are recirculated from the aircraft cabin and mixed with fresh air. Most commercial aircraft in service recirculate 50 % of the air delivered to the passenger cabin for improved control of cabin circulation, humidity and fuel efficiency. This recirculated air usually passes through high efficiency particulate filters (HEPA) before delivery into the cabin.

In general, proper ventilation within any confined space decreases the concentration of airborne organisms in a logarithmic fashion with one air exchange removing 63 % of airborne organisms suspended in that particular space. In the case of recirculated systems, this relationship holds only if the recirculated air undergoes filtration through high efficiency particulate filters (HEPA). Most HEPA filters utilized on commercial airlines have a particle removing efficiency of 99·97 % at 0·3 microns this cutoff removes dust, vapors, bacterium and fungi. HEPA filters are also effective in capturing viral particles since they tend to disseminate by droplet nuclei.

HEPA filtering of recirculated cabin air as a means of minimizing the exposure of infectious particles is established within the scientific literature and is strongly endorsed by the medical community and cabin health experts. Currently the FAA and its British (Civil Aviation Authority) and European (Joint Aviation Authority) counterparts do not require the use of these filters on commercial airlines. Although it has been stated that HEPA filtration of recirculated cabin air is an industrial standard, a recent GAO survey of major U.S. air carriers found that 15 percent of large commercial aircraft that recirculate cabin air and carrying more than 100 passengers did not use HEPA filters. This number was larger in smaller regional commercial fleet and approached fifty percent.

Risk assessment incorporating epidemiological data into mathematical models may provide some insight into how proximity and ventilation influences disease transmission aboard commercial airlines. For instance, deterministic modeling utilizing data from an in-flight tuberculosis investigation revealed that doubling ventilation rate within the cabin reduced infection risk by half. Clearly ventilation provides a critical determinant of risk and efforts to increase ventilation may provide opportunities to reduce risk of infection.

Efforts leading to improved international regulations regarding the certification, inspection and maintenance of aircraft environmental control systems are needed. To minimize the risk of disease spread by aircraft, regulations requiring HEPA filters for any aircraft that utilizes recirculated air should be seriously considered.

Prevention of a disease outbreak is the most important means of control and requires a proactive approach. The government, aviation industry and medical community should better educate the general public on health issues related to air travel and infection control. The only way to eliminate any risk of cross-infection in the aircraft cabin and the rapid world-wide spread of an infectious agent, is to prevent intending passengers who are either substantially exposed to or carrying transmissible infections from flying. This needs to come from education and promoting individual responsibility since the systematic screening of passengers for contagious diseases is impractical. Although thermal scanners used in airports may be useful in detecting symptomatic travelers, they are not an effective means of control since persons exposed to an infectious disease could travel without any signs or symptoms yet still be infectious. Good hand hygiene and cough etiquette have been proven to reduce the risk of disease transmission and should be promoted. In March 2003, the WHO issued specific infection control guidelines for air travel and SARS (http://www.who.int/csr/sars/travel/airtravel/en/index.html). These guidelines are essentially an adaptation of universally accepted standard and droplet precautions; and include preflight exit screening and travel restrictions at regions with recent local transmission of SARS. These protocols should be reviewed by appropriate agencies and expanded to pertain to other infectious agents.

Passenger notification is also an issue that requires review. Although the CDC and WHO have published guidelines regarding flight crew and passenger notification after an in-flight exposure, notification is typically limited to flights longer than 8 hr and in some cases, dependent upon the design of the aircraft, to passengers seated only in the same cabin area. Public health officials have access to passenger manifests but historically these lists have been frequently incomplete, inaccurate or unavailable making it difficult to locate potentially exposed passengers in a timely fashion. This issue is being addressed by the CDC and Aerospace Medical Association and measures to improve the archiving of passenger manifests should be encouraged.

In summary, commercial aircraft are a suitable environment for the spread of pathogens carried by its occupants. The environmental control systems utilized in commercial aircraft seem to restrict the spread of airborne pathogens. Transmission of infectious diseases probably happens more frequently than reported for various reasons, including reporting bias and the fact that most diseases have a longer incubation period than air travel. Many important questions regarding the behavior of infectious agents within the aircraft cabin environment remain unstudied. For example, what factors affect the transmission of infectious diseases within the aircraft cabin? How effective are the ventilation systems used within the commercial aircraft with regard to emerging infections? Further assessment of risk through mathematical modeling is needed and will provide insight into disease transmission within the aircraft as well as control of outbreaks of different diseases. Use of HEPA filtration in aircraft utilizing recirculating systems needs to be addressed now if we are to be serious about minimizing disease spread within the aircraft cabin and improving the health of air travelers and flight crew. Finally, the International Health Regulations adopted worldwide in 1969 to limit the international spread of disease are being revised to provide a means for immediate notification of all disease outbreaks of international importance and are scheduled for final voting by the WHO general assembly in May 2005.

Outbreaks will be characterized by clinical syndrome rather than specific diagnosis to expedite reporting. These new regulations and continued vigilance by countries, health authorities, airlines and passengers will keep to a minimum but not eliminate the risk of disease spread by aircraft. The aviation industry, government and medical community should educate the general public on health issues related to air travel and infection control. Chairman Mica this concludes my testimony thank you for allowing me to participate in this hearing.

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STATEMENT OF JON L. JORDAN, M.D., J.D. FEDERAL AIR SURGEON, FEDERAL AVIATION ADMINISTRATION BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, ON EFFORTS TO PREVENT PANDEMICS BY AIR TRAVEL

APRIL 6, 2005

Chairman Mica, Congressman Costello and Members of the Subcommittee, I am Jon L. Jordan, the Federal Aviation Administration's (FAA) Federal Air Surgeon. It is a pleasure to appear before you today to discuss the efforts to prevent pandemics by air travel. I recognize that this is a priority of this Subcommittee and FAA shares your concerns. It has also been a matter of significant concern to aviation passengers and the crews that earn their living by working on commercial transport aircraft. Secretary Mineta and Administrator Blakey both take these concerns seriously. They are supportive of efforts to help protect the health, safety and comfort of the traveling public and cabin crews.

The FAA and the Centers for Disease Control and Prevention (CDC) have strengthened their relationship with the airline industry on the issues of infectious diseases and travelers' health through the Air Transport Association's Medical Committee. The FAA and the CDC have become regular attendees at the meetings of the Medical Committee of the Air Transport Association. The effectiveness of this growing partnership was demonstrated during the SARS outbreak, when the CDC and the ATA Medical Committee conducted weekly teleconferences to discuss developments, and the CDC and FAA took special care to make sure that the airline industry received notice of all updates and alerts issued by the CDC on SARS. Presently, the CDC is exploring with the airline industry methods to improve communications in a number of areas.

An important new initiative is underway in the Office of the Secretary of Transportation, (OST). OST in coordination with the Department of Health and Human Services is compiling a Best Practices Manual to provide airport operators and local health authorities with assistance in responding to the threats of contagious diseases at international gateway airports. Guidelines and other important information are being assembled from experiences at airports throughout the world, and will be used for training sessions that the CDC plans to begin this spring. This project will result in the publication by the Department of a Best Practices Manual, which will be available to airport owners and operators and public health officials.

Considering the potential of pandemics and contagious disease transmission on airliners in general, issues inevitably arise concerning the quality of air in airliner cabins. It is important, however, to understand that studies have indicated that many aspects of cabin air are as good as or better than the air found in office and home environments. Air carriers have the benefit of flying at altitudes above the air pollution that is circulated into spaces on the ground that we occupy on a daily basis.

For those aircraft that recirculate some part of the cabin air, that air is typically passed through high quality filters before it returns to the cabin. Manufacturers of new airplanes used by air carriers incorporate either High Efficiency Particulate Air (HEPA) filters, similar to those used in hospital isolation areas and surgical suites, or particulate filters that are somewhat less efficient. HEPA filters are defined by the EPA as those with a filtering efficiency of 99.97 percent. These filters remove dust, vapors, bacteria and fungi. HEPA filters also effectively capture some viruses. Several airlines, in coordination with aircraft manufacturers, have even installed HEPA filters on board airplanes that did not originally incorporate them into their design.

Today, I will describe new developments related to airliner cabin air as well as FAA's ongoing efforts in this area.

NATIONAL RESEARCH COUNCIL REPORT

In December 2001, the National Research Council (NRC) completed a congressionally-directed study of cabin air quality. The NRC developed ten recommendations related to cabin air quality. FAA concurred with the intent of all of the recommendations and, for many of these recommendations, we have either completed actions that address the underlying concerns or we are in the process of addressing specific items.

The first four NRC recommendations involve assessing the validity of current regulations related to airplane ventilation systems and potential contaminants of cabin air. We anticipate that by the close of 2006 or early 2007, when a comprehensive study on cabin air quality being conducted by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) is completed, that substantial data will be available for our consideration that will enable us to do these assessments.

NRC Recommendation 5 addresses allergen exposure. Allergens in the airplane cabin are a serious, potentially life-threatening issue for a small segment of the airline passenger population. Although some air carriers do not allow pets in the cabins, FAA and DOT regulations do not prohibit animals in air carriers for two primary reasons. We believe that most animal allergens are brought onto the airplane on the clothes of passengers rather than by animals. Therefore, prohibiting small animals altogether would have only a modest reduction in allergen levels. In addition, carriage of service animals in the cabin may be necessary to assist disabled travelers. FAA issued an Advisory Circular (AC) providing information to passengers, crew, and operators on how to prepare for air travel when allergens could present a medical concern and how to respond in the case of an allergen induced medical emergency.

The agency also issued an AC implementing NRC Recommendation 7, concerning ventilation failure or shutdowns on the ground. We have advised air carriers to remove passengers from an airplane within 30 minutes of a ventilation failure or shutdown, as long as operational safety is not compromised.

In Recommendation 6, the NRC suggested that FAA increase efforts to provide information on health issues related to air travel to crew, passengers and health professionals. FAA has taken significant steps to make available information and recommendations regarding air travel health and medical issues through the FAA website, and have linked our site with the CDC website, and other websites that provide health information to passengers and crews.

In Recommendations 8 and 9, NRC recommends that FAA establish a surveillance and research program for air quality and health that would provide the data to analyze the relationship between cabin air quality and health effects or complaints. These recommendations are being addressed through research efforts by the FAA's newly established Center of Excellence for Airliner Cabin Environment (ACER), which I discuss in detail below, and ASHRAE. The data collected from these studies on air quality and the potential air quality correlation with health concerns will provide us with information essential to developing an implementation plan for the first four NRC recommendations. As I mentioned earlier, FAA expects data to be available by the end of 2006 or early 2007, and thereafter, as a result of the work done both by ASHRAE and FAA'S ACER.

FAA AIR TRANSPORTATION CENTER OF EXCELLENCE

FOR AIRLINER CABIN ENVIRONMENT RESEARCH

In September of 2004, the FAA announced the establishment of the Air Transportation Center of Excellence for Airliner Cabin Environment Research (ACER), headed by Auburn University. ACER will research cabin air quality and conduct an assessment of chemical and biological threats. Other universities taking part in the effort include Purdue University, Harvard University, Boise State University, Kansas State University, the University of California at Berkeley, and the University of Medicine and Dentistry of New Jersey. The FAA will provide funding for the center and matching funds will be provided by the private sector.

ACER will conduct a comprehensive and integrated program of research and development on the cabin environment. The team brings the diverse expertise necessary to conduct research on the healthfulness of the cabin environment for passengers and crew, enhancement of aircraft environmental control systems, and detection and mitigation of chemical and biological threats aboard aircraft. ACER aims to be a unique resource for airlines, equipment manufacturers, cabin crews and the traveling public, and places a major emphasis on partnerships with industry. Among others, the University of Oregon and Oklahoma State University will contribute to this research effort.

DISINSECTION

Chemical disinsection—a term used to describe the process of ridding an airplane of insects-- has been a long-time concern, although a 1995 World Health Organization report concluded that aircraft disinsection, if performed appropriately, would not present a risk to human health. Chemical disinsection has been significantly reduced and approximately half of the 15 countries that still require disinsection of all in-bound flights allow disinsection prior to boarding the aircraft. The Office of the Secretary of Transportation chairs an interagency working group that is taking a lead in researching and developing means of non-chemical disinsection of aircraft. OST's efforts are currently focused on air curtain technology, which would prevent insects from both entering and leaving aircraft, thus eliminating the need for treatment with pesticides. DOT is about to embark on a pilot program with Jamaica to demonstrate this technology.

TUFTS-NEW ENGLAND MEDICAL CENTER STUDY

The Lancet published, in its March 12, 2005 issue, a study by doctors at Tufts-New England Medical Center and the Lahey Clinic Medical Center entitled, "Transmission of Infectious Diseases During Commercial Air Travel." The report notes that cabin air quality has been the focus of many media investigations and criticism from special interest groups and that most of this concern is associated with the perception that airborne particles are distributed throughout the entire cabin by the ventilation system. The report states, however, that no peer-reviewed scientific work links cabin air quality and aircraft ventilation rates to heightened health risks compared with other modes of transport or with office buildings. The report concludes that the environmental control system used in commercial aircraft seems to restrict the spread of airborne pathogens, and the perceived risk is greater than the actual risk.

CONCLUSION

In closing, on behalf of Administrator Blakey, I would like to reiterate that FAA is committed to ensuring the safest flight possible – from the safety of the operation of the aircraft to the quality of the air that passengers and crew breathe inside the cabin. I look forward to working with the Subcommittee regarding any concerns you may have on the quality of airliner cabin air and specifically, efforts to prevent pandemics by air travel. This concludes my testimony, and I would be happy to answer any questions you may have.

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STATEMENT OF MICHAEL MCCAWLEY, CHIEF SCIENTIFIC OFFICER OF RESPIRATORY MANAGEMENT TECHNOLGY, BEFORE THE SUBCOMMITTEE ON AVIATION, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, U.S. HOUSE OF REPRESENTATIVES, ON EFFORTS TO PREVENT PANDEMICS BY AIR TRAVEL.

APRIL 6, 2005

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

Good afternoon. It is a pleasure to be here before the committee today and testify on this important health issue of preventing pandemics by air travel. I am Dr. Michael McCawley, Chief Scientific Officer and co-founder of Respiratory Management Technology. I hold a doctorate in environmental health from New York University, a master's degree in engineering from West Virginia University and a bachelor's degree in zoology from George Washington University. For twenty seven years I worked as a Public Health Service Officer and scientist with the Centers for Disease Control and Prevention at the National Institute for Occupational Safety and Health, NIOSH, and retired from there three years ago. For twenty five years I have also been a Professor of Civil and Environmental Engineering at West Virginia University, where I have taught courses in air pollution and aerosol science. I have published over forty papers in the scientific literature, mainly on topics concerning aerosols, that is, particles in the air. I have been recognized with awards both from the government and from scientific organizations for my work on aerosols. As a team leader at NIOSH I supervised a group of researchers responsible for developing the methods for assessing airborne microorganism concentrations. The method developed, the N-6 sampler, is recognized as the gold standard for airborne microorganism detection. Members of this same team participated in the evaluation of the anthrax contamination episodes of several years ago.

I am here today to speak on the possibility of intentional biological contamination of aircraft cabin atmospheres and how that contamination might be detected before it can be spread. My company, Respiratory Management Technology, Inc. ("RMT") was incorporated in 2002 to focus on identifying solutions for the diagnosis of respiratory illness. Since 2002, RMT has expanded its initial focus to include new scientific and technological advancements in the fields of pulmonary disease management, environmental medicine and biosensor technology. In response to these new advances, RMT has created three business divisions to manage its inter-related products.

Currently, RMT is headquartered in Wilmington, Delaware and is performing initial research and development efforts in Morgantown, West Virginia. RMT's three divisions created are the Pulmonary Disease Management Division, Environmental Medicine Division and the Homeland Security Division. RMT's Pulmonary Disease Management division utilizes it's aerosol generation and sensing technology known as "RAPID" (Respiratory Aerosol Pulsed Injection

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Delivery) to cost effectively test, diagnose, analyze and even treat lung disease problems that currently effects over 20 million Americans.

RMT's Environmental Medicine Division has developed an aerosol detection system known as the "CODA" (COntinuous Dust Assessment) Monitoring System. The CODA is a spin-off of RAPID technology that helps companies to detect and control the risk of aerosol-related disease in their work force. The CODA consists of a light scattering photometer capable of detecting and classifying concentrations of dangerous airborne particles. The CODA has already proven to be equally sensitive to competitive products at a substantially lower cost.

RMT's third division, Homeland Security, will also utilize CODA's proprietary technology as part of the "Stage Alert" bio-sensor. RMT's forte, the development of aerosol generation and measurement equipment, has been combined with the expertise of several other corporations to formulate this new cost effective method of bio-terrorist attack detection. The Stage Alert is specifically designed to provide the detection capabilities required for today's bio-terrorist attack threat. The technology consists of sensors that allow the rapid, automated and simultaneous identification of a biological agent. The fundamentals of the system have already been tested and work is planned for a fully functional prototype in the coming months. Portions of the system have been incorporated into a project jointly undertaken with Los Alamos National Laboratory and funded by DARPA to provide protection against airborne microorganism attack for frontline troops. This monitoring system breaks the paradigm for threat detection used by many other devices which do not adequately account for the nature of aerosol generation. Any technique specifically designed for the purpose of microbial droplet generation will yield a different, usually narrower, particle size spectrum which, on a number basis, is substantially larger by orders of magnitude than the "normal" background size spectrum. Analysis of the size spectrum thereby reveals the presence of different sources of aerosol and alerts to the introduction and presence of foreign, extraneous, sources to the average background. Flowing particles can be analyzed using light scattering techniques, instantaneously, in order to measure each particle's size. This aerosol spectrometry gives data on both the number and size of particles suspended in an air stream. Research has shown that the mean particle size based on the number distribution is substantially less than one micrometer (figure 1). Thus, generation of particles larger than one micrometer, common for most biological aerosol generation systems, is easily detected against very low background number concentrations in that size range.

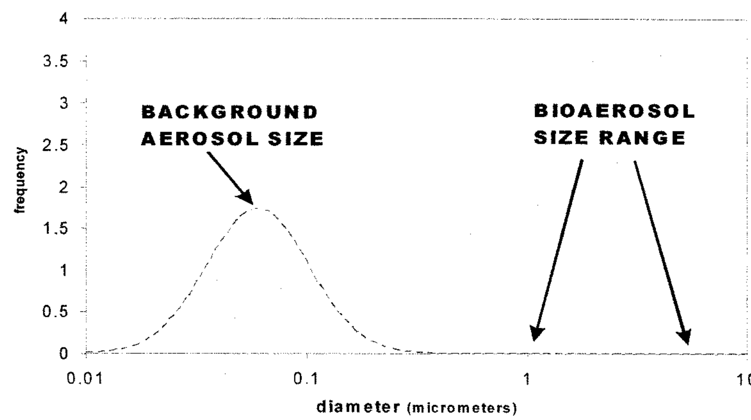

Figure 1. Typical normalized background atmospheric count size distribution, showing the difference between the size of particles expected to be found in the air compared with the much larger size for a generated particle such as would be necessary to disperse microorganisms.

The monitor system consists of three primary autonomous modules, computer controlled, with wireless communication capabilities. The first module (less than 0.1 cubic feet in size) and requiring no maintenance is a light scattering photometer capable of classifying particles between 0.3 and 20 micrometers in size in up to 20 separate size classes, each, one micrometer in width. This is done in real time with constant analysis and storage of the size distribution parameters (geometric mean and geometric standard deviation). This module is able to determine the introduction of a specific narrow size spectrum aerosol at a higher than average particle number concentration. These devices (costing less than $1000 each) could be widely disseminated to alert to the occurrence of a potential attack. In the event of an occurrence a second module, (less than 0.25 cubic feet in volume) consisting of a collection substrate, with only weekly maintenance required for determining the viable component of a sample, employing a fluorescence detector could be used to detect viable material. This module determines whether the amount of overall biologic activity in a particulate sample has increased significantly over previous background samples. It is specific for determining the presence of microbial agents. This second module could be collocated with a third module , either in a fixed location or in a mobile station(less than 0.25 cubic feet in size and costing less than $25,000 for both modules combined) and used for determination of the identity of 20 specific biowarfare agents (BWA), both toxins and microbial pathogens. The third module, in association with the other two modules, allows evaluation of the threat matrix by means of logic that determines: a significant increase in the overall particle concentration within a short span of time along with a spike in a particular size range within that same short span of time; the presence of increased biologic activity in the collected material during that same time span; and finally, the recognition of certain known biological weapons agents in the air stream. These threat events, taken in the order stated, comprise a "high threat alert" when all modules signal an occurrence simultaneously; a "threat potential" when the first two modules together signal an event or if the third module alone signals an event by itself; and a "threat threshold occurrence" if either one of the first two modules singly signals an event happening.

This same system could be deployed in ventilation systems of buildings or in the ventilation system of commercial air carriers. In airplanes, the introduction of a biological aerosol generator could be accomplished in a pocket-sized, simple and inexpensive form. This generator could silently contaminate hundreds of individuals as well as spread further contamination from their clothes and their subsequent infection. This threat could be immediately detected with either the first stage or the first and second stages of a device like the Stage-Alert. These devices could monitor the re-circulated air within the cabin, sense a potential threat and allow the threat to be assessed immediately and possibly countered by various means. Further evaluation, such as could occur with the third stage of the system positioned at the terminal, might take place once the plane has landed. Passengers could be detained shortly while a sample of the cabin air was analyzed. If results for microorganism contamination were positive and quickly confirmed, suspects could be more easily identified and searched. The cost would be under two thousand dollars per plane for deployment with the more costly means of identification of the specific agent involved located only at the terminals.

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

Statement of
John M. Meenan
Executive Vice President and Chief Operating Officer
Air Transport Association of America, Inc.
Before the
Subcommittee on Aviation
Committee on Transportation and Infrastructure
United States House of Representatives
April 6, 2005

Mr. Chairman and members of the Subcommittee, thank you for inviting me to appear before you today to discuss the role of the airlines in stemming the spread of pandemic disease. Efficient and affordable air transportation has helped to create a highly mobile international society which facilitates the exchange of ideas, goods, and unfortunately, viruses. The rapid spread of Severe Acute Respiratory Syndrome (SARS) underscored that fact. But we believe that the lessons learned from that experience can help us and the federal agencies we work with to limit the impact of similar outbreaks.

We recognize that air travel makes it possible for infected individuals to cover great distances in a short time and therefore that airlines must be part of any comprehensive strategy for controlling potential pandemics. We continue to work to be better prepared to respond promptly and in a coordinated way to any such episodes. However, any examination of this issue must recognize the different capabilities and, therefore, the different roles of those who must respond to these outbreaks. The airlines cannot do it alone – we must rely on information and guidance from the experts. The Air Transport Association (ATA) is proud of its record of cooperation and coordination with the Centers for Disease Control (CDC) and the Federal Aviation Administration (FAA) in responding to the threat of communicable diseases. As a matter of fact, our Medical

Committee will be meeting next week at the CDC in Atlanta, and Dr. Jordan will be among the meeting participants.

This relationship didn't start with SARS – through the years we have worked closely with these two agencies on more familiar public health issues such as tuberculosis, measles and chicken pox – but SARS brought home the importance of a close relationship in responding to an emerging disease. During the three-month period that SARS played havoc with international travel, April through June of 2003, ATA and its members were in frequent – often daily – contact with the CDC's Traveler's Health Program to receive updates and provide input on what was needed to respond effectively. ATA member airlines also assisted the CDC in distributing more than 2.7 million health alert notices to travelers arriving in the U.S. from SARS-affected countries.

Since that time, we have continued discussions with the CDC, the FAA, the Department of Transportation's Research and Innovative Technologies Institute and international groups including the World Health Organization (WHO), the International Air Transport Association (IATA), and the International Civil Aviation Organization (ICAO) to develop more effective mechanisms for responding to the next international health crisis.

Specifically, we have been working with the CDC and the others to expedite the process of providing information about passengers and crew members who may have been exposed to a suspected communicable disease. "Passenger contact tracing," as it is sometimes called, can be an important tool in bringing an end to an epidemic because it allows public health authorities to take steps to isolate and treat infected individuals before they can spread the disease further.

While airlines have cooperated with public health officials to conduct passenger contact tracing for decades, SARS taught us all that the old methods – which relied on hand-searching records to construct a contact list – simply would not work in a situation with literally hundreds of flights per day involving thousands of passengers. Thankfully, SARS did not gain a hold in the United States, but we acknowledge that despite the airlines' and the CDC's best efforts, there were difficulties and delays in contacting passengers.

The good news is that we have all learned from this experience – should SARS or a similar disease outbreak occur today, we are better prepared to respond swiftly and effectively. Working with the CDC, we have made sure that our members fully understand the reporting requirements for passengers with suspected communicable diseases. The expansion of the CDC's Quarantine Stations to additional airports has made both the reporting and the response to such reports more efficient and effective. With input from the airlines, the CDC has developed a "passenger locator card" to collect contact information from passengers in a machine-readable format. This locator card has been made available to the airlines, and they stand ready to use them when and if directed to do so by the CDC.

These locator cards would be used in the event of a disease outbreak involving international travelers. The CDC would identify both the countries where exposure to disease is most likely and, working with the airlines, the specific flights on which locator cards and health alert notices should be distributed. Using this targeted approach, the CDC would be able to gather information that may be necessary to contact passengers on these flights. Passenger locator cards could also be useful when there is notification of a passenger with a serious communicable disease prior to the aircraft's arrival, and could save time in following up with potentially-exposed passengers. The CDC has accommodated the logistical challenges faced by the airlines in terms of how, when and where these materials should be stored and distributed, so long as passengers receive them prior to disembarkation in the United States.

While perhaps not the ideal long-term method for passenger contact tracing, this is a valuable interim solution that represents a reasonable approach to the real-world challenges we face in collecting and transmitting personal passenger information to any government agency, regardless of its purpose. The goal remains a seamless electronic transfer of data, but the impediments to reaching that goal are significant. These include concerns about data privacy, incompatible computer systems in use by airlines and the agencies, as well as questions of reciprocity with other countries.

These issues are not limited to information required by the CDC to conduct contact tracing – the same issues, and much of the same information, are at the heart of debates about how best to provide advance passenger information to the Bureau of Customs and Border Protection, data needed by the Transportation Security Administration to screen passengers prior to boarding, and other federal requirements for collecting and sharing passenger information.

In the interest of public health, safety and national security, ATA's member airlines stand ready and willing to assist in each of these endeavors, but we cannot do so in an ad hoc, redundant and uncoordinated fashion. We have long called for unification of these functions within the federal government and believe that containing the spread of infections diseases is yet another justification. For each of these programs we have had to educate regulators and reinvent potential solutions in ways that may not be applicable to the next situation. We urge the various agencies that have a need for passenger information not only to continue working with us, but also to focus on working with each other.

Thank you for inviting me to come before the Committee. I look forward to your questions at the appropriate time.

OPENING STATEMENT OF
THE HONORABLE JAMES L. OBERSTAR
AVIATION SUBCOMMITTEE
EFFORTS TO PREVENT PANDEMICS BY AIR TRAVEL
APRIL 6, 2005

Thank you, Chairman Mica and Ranking Member Costello, for calling today's hearing on efforts to prevent pandemics by air travel. In the post-September 11th environment, there has been a heightened concern about the potential for spreading bio-terrorism agents or other infectious diseases via aircraft. As we learned with the Severe Acute Respiratory Syndrome (SARS) virus in 2002, the aircraft environment is one avenue for the transmission of contagious diseases, and the impact of such transmission aboard aircraft can have a deleterious effect on the aviation industry. Recently, several countries in Asia have experienced outbreaks of avian influenza (H5N1 strain). While there has been only limited human-to-human transmission of the avian flu, now is a good time to stop and take stock of the processes that we have in place to prevent or mitigate the transmission of such diseases via aircraft.

In the 14th century, it took 3 years for rats to spread the bubonic plague from Italy to Britain. During the 20th century, three separate pandemics -- the Spanish flu, the Asian flu, and the Hong Kong flu -- emerged and spread throughout the world within 1 year. Over 1 billion passengers worldwide travel by air annually, and approximately 50 million of these passengers travel in and out of the developing world. With the ease and affordability of air travel, and increased travel to developing countries, some experts estimate that diseases that have confirmed human-to-human transmission could spread more rapidly throughout the world, perhaps in just hours. For example, the SARS virus was transmitted during a flight of only 3 hours from China, and passengers as far as 7 rows away from the source passenger were infected. In addition, there have been other probable transmissions of disease via air travel, including: tuberculosis, influenza, measles, and meningococcal disease.

The Department of Health and Human Services (DHHS), through its Center for Disease Control and Prevention (CDC), is the lead on preventing the introduction, transmission, and spread of communicable disease in the United States. The CDC is also responsible for coordinating information dissemination between the government and the airlines in the event of a communicable disease outbreak, such as SARS. I look forward to hearing more about the CDC's responsibilities, as well as its coordination with international organizations, such as the World Health Organization, from Captain Anne Schuchat, Acting Director of the National Center for Infectious Diseases at the CDC. The Federal Aviation Administration (FAA) is also involved in monitoring developments in this field, and would be instrumental in ensuring that any changes to procedures or aircraft systems to combat airborne diseases would not have a negative impact on operations. I look forward to hearing from FAA's Dr. Jordan, in this regard.

We will also hear from Dr. Mark Gendreau, who will discuss his findings in his recently published study "*Transmission of infectious diseases during air travel*," including how better to manage infectious disease exposures aboard aircraft.

Thank you, Mr. Chairman for calling this hearing. I look forward to hearing from our witnesses on prevention efforts to halt the spread of diseases via aircraft.

Testimony
Before the Committee on Transportation and Infrastructure
Subcommittee on Aviation
United States House of Representatives

CDC Efforts to Prevent Pandemics by Air Travel

Statement of
Anne Schuchat, M.D.
Acting Director
National Center for Infectious Diseases
Centers for Disease Control and Prevention
U.S. Department of Health and Human Services

For Release on Delivery
Expected at 2:00PM
Wednesday, April 6, 2005

Good afternoon, Mr. Chairman and members of the Subcommittee. I am Dr. Anne Schuchat, Acting Director of the National Center for Infectious Diseases (NCID), Centers for Disease Control and Prevention (CDC). Accompanying me today is Dr. Ram Koppaka, Associate Director for Planning, Policy and Preparedness, NCID's Division of Global Migration and Quarantine. I am pleased to be here to discuss the important public health topic of mitigating the spread of infectious diseases by air travel. Infectious diseases do not recognize borders. In this age of expanding air travel and international trade, infectious microbes are transported across borders every day, carried by infected people, animals, animal products, insects, and food. CDC is committed to preventing the introduction of infectious agents into the United States. Because one route of introduction is air travel, and because of multiple outbreaks currently going on elsewhere in the world, today's hearing is particularly timely.

Diseases that could cause a pandemic

A *pandemic* is broadly defined as an epidemic occurring over a very wide area, crossing international boundaries and usually affecting a large number of people. HIV is an example of a current and ongoing pandemic. Other diseases that could cause a pandemic with high rates of morbidity and mortality among the population include dengue, influenza caused by certain strains of influenza virus, plague, severe acute respiratory syndrome (SARS), yellow fever and select agents that could be used in a bioterrorist attack. These diseases are capable of causing a pandemic because of the ease of their transmissibility among people, the severity of the illness they cause, the low level of immunity among the population, and the ease and speed with which people travel. There are other diseases, such as tuberculosis, meningococcal disease, and measles, that may pose less of a threat of causing a pandemic but are of significant public health concern because of their ease of spread from one location to another. These diseases could cause high rates of morbidity and mortality within a community.

Under authority delegated by the Secretary of the Department of Health and Human Services (HHS), the director of CDC is empowered to detain, medically examine, or conditionally release individuals reasonably believed to be carrying specific communicable diseases. These "quarantinable" diseases include cholera, diphtheria, infectious tuberculosis, plague, smallpox, yellow fever, and viral hemorrhagic fevers. SARS was added to the list by Executive Order 13295 in 2003, and on April 1 the President added influenza caused by novel or reemergent influenza viruses that are causing, or have the potential to cause, a pandemic to this list.

Volume and Speed Patterns of Global Migration

The dynamics of international travel have changed dramatically over the past 150 years. There used to be a relatively small volume of international travel, and it took almost a year to circumnavigate the globe. Today, the volume of international travel has risen by orders of magnitude and continues to rise to over 760 million annual international arrivals according to the World Tourism Organization. Today it takes less than 24 hours to travel to almost anywhere around the world; this is shorter than the incubation period for most communicable diseases. Over the past 14 years the largest increases in the volume of international travel have occurred in travel to Europe. However, the largest proportional increase in travel has been to East Asia and the Pacific Islands; this represents approximately a 30% increase over this time period. Because of the variety of infectious disease threats that exist in the world and the volume of people traveling internationally, the threat of infectious disease introduction and rapid spread is real.

Critical Control Points

To respond to the threat of an introduction of an infectious disease that could cause a pandemic in the United States, HHS and CDC have been enhancing our nation's ability to detect emerging or remerging pathogens, strengthening our presence and ability to respond at our borders, and building partnerships globally.

The best strategy for preventing disease introduction into the United States is through disease surveillance, early detection and rapid response. When we discuss prevention of illness by air travel, we are concerned about several different migrating populations entering the United States, including international travelers, immigrants, refugees, and asylum seekers. Preventing the importation of an infectious disease into the United States must address all these groups at these critical points: pre-departure, in-transit or upon arrival, and post-arrival.

Pre-departure Prevention

Pre-departure prevention includes health education at home prior to travel. CDC's travelers' health web site is a critical tool used to educate both health care providers and the public about the ways to prevent illness while traveling or living abroad. This website receives over 13 million hits per year and is accessed by people all over the globe. CDC posts travel notices and other important travel information to this website. Travel notices are tiered notices to inform travelers of health events taking place globally and steps they can take to avoid infection. The first level of notice, *In the News*, includes reports of sporadic cases of particular illnesses. The next level, *Outbreak Notices*, informs travelers of outbreaks that are occurring in limited geographic settings. The third level, *Travel Health Precautions*, can be issued in the event an outbreak's geographic distribution widens and the risk to a traveler is thought to be increased. The highest level of notice, a *Travel Health Warning*, can be issued when the U.S. government feels non-essential travel to an area should be avoided. This advice was issued during the SARS outbreak in 2003.

Information for International Travel is a biennial publication written by CDC staff and other experts that serves as the gold standard for travel health recommendations within the United States and elsewhere. Bilateral communications between those at the World Health Organization (WHO) responsible for health information for international travelers and those at CDC provide for the most accurate information both on the web site and in other communications.

Pre-departure prevention can be improved through surveillance for infectious diseases among traveling populations. GeoSentinel is a global network of 30 travel and tropical medicine providers established in 1995 by the International Society of Travel Medicine (ISTM) and CDC. GeoSentinel clinics are ideally situated to effectively detect geographic and temporal trends in morbidity among travelers, immigrants and refugees. Sites participate in surveillance and monitoring of all travel-related illnesses seen in their clinics. Sites were added recently in China, Japan and Singapore. In addition, CDC partners with ISTM and their network of members to informally provide leads and contacts when they encounter any patient having a concerning diagnosis or unusual event. This program allows large numbers of individual members in many countries to be rapidly linked together to share clinical observations and facilitates direct interaction with health authorities. CDC also partners with TropNetEurope, an electronic network of 46 clinical sites designed to effectively detect emerging infections of potential regional, national or global impact at their point of entry into the domestic population. TropNetEurope can serve as a tool to alert Public Health authorities and trigger further cluster investigation. Other communication networks are used to detect events that may be occurring among mobile populations. For example, through *Epi-X*, CDC's web-based communications tool for public health professionals, CDC officials, state and local health departments, poison control centers, and other public health professionals can quickly and securely access and share preliminary health surveillance information. Users can also be actively notified of breaking health events as they occur.

In addition, CDC partners with the private sector. During the 2003 SARS outbreak, weekly teleconferences were held with the medical committee from Air Transport Association (ATA) providing SARS updates. CDC has an open invitation to ATA medical meetings that are held quarterly. Agenda items are added as appropriate regarding changes in guidance for prevention of infectious disease transmission as it relates to air travel. CDC and HHS also work closely with other international health authorities including ministries of health and WHO.

Approximately 1 million immigrants and refugees enter the United States annually and, unlike travelers, undergo a medical exam. Under the authority of the Immigration and Nationality Act (INA) and the Public Health Service Act, the Secretary of Health and Human Services promulgates regulations outlining the requirements for the medical examination of aliens seeking admission into the United States. The Department of State (DOS) and U.S. Citizenship and Immigration Services (USCIS) in the Department of Homeland Security designate licensed and experienced doctors as either Civil Surgeons (in the United States) or Panel Physicians (outside the United States) to give these medical examinations. In performing these examinations, designated physicians use technical medical screening guidelines provided by CDC. The purpose of the medical examination is to identify, for DOS and USCIS, applicants inadmissible because of health conditions.

The required medical examination for refugees presently does not address some important current public health issues. To address some of these issues, CDC, in collaboration with DOS, has established a pilot program for expanded assessment and treatment among refugee populations. This program has proved successful for targeted groups of refugees and specific conditions, such as malaria, intestinal parasites and multidrug-resistant tuberculosis. For example, during the large population movements of 8,000 Liberians from Côte d'Ivoire and 10,000 Somali Bantu from Kenya, refugees were given presumptive treatment for malaria and intestinal parasites.

In-transit and On-arrival Prevention

HHS and CDC also have precautions in place to detect infectious diseases in people in-transit to or on arrival in the United States. In accordance with 42 CFR Part 71.21(b), CDC requires the commander of an aircraft destined for a U.S. airport to report the presence on board of any death or any ill person among passengers or crew to the quarantine station at or nearest the port of arrival. An ill passenger is defined as a person with diarrhea or a person with a temperature of 100°F or greater accompanied by one or more of the following: rash, glandular swelling, jaundice, or a persistent temperature of more than 48 hours. Upon learning that a person exhibiting any of these signs or symptoms is on board, the captain or designee must immediately contact Flight Control, who in turn contacts the quarantine station at or nearest the port of arrival. CDC Quarantine Stations have established protocols with state and local public health authorities for handling ill passengers, coordinating care with local hospitals, and handling of contacts.

In the late 1960s, before the Division of Quarantine came to CDC, over 200 U.S. ports of entry, overseas Consular Affairs offices, and maritime vessels were fully staffed, including medical officers. During the 1970s, after the eradication of smallpox and the perceived diminishing of infectious disease threats, port presence was significantly downsized and covered only 6 ports of entry. Recent events have shown that there is once again a need to revitalize this capacity, and CDC is in the process of revamping its quarantine infrastructure.

CDC currently has 11 Quarantine Stations at our largest ports of entry and we continue to increase our presence at U.S. ports of entry. This past year we have increased the number of Quarantine Stations in the United States by three and plan to have up to 18 stations by the end of this year. CDC's goal is to have 25 stations at ports of entry in FY 2006 that represent over 80% of international arrivals entering the United States. We also are working to enhance the capacities of the existing stations by employing additional medical officers and epidemiologists to carry out critical functions. Station officers routinely evaluate travelers arriving from affected areas by visual inspection of all travelers as they disembark and responding to reports of ill passengers on conveyances.

In the event of a known outbreak, other steps can be taken to prevent introduction and transmission of disease. For example, CDC would provide guidance to in-bound travelers on monitoring their health and reporting illness to appropriate authorities. This may be accomplished by use of videos or public announcements on the conveyance prior to arrival, distribution of Health Alert Notices on arrival, and posters or public announcements posted in airports.

Post-arrival Prevention

Mechanisms have also been put in place to prevent transmission of disease in the event a person was infectious while traveling, but whose infection was not determined until after arrival in the United States. If a suspected-contagious passenger is identified prior to landing, CDC officials meet the flight and obtain location and contact information from both passengers and crew members before disembarkation. However, when a case is identified after disembarkation, CDC relies on a manual system of gathering, compiling, and processing data from flight manifests, customs declarations, and any other available sources relevant to the case. Quarantine stations routinely work with state and local health departments to contact passengers who may have been exposed to an infectious disease during a flight and provide guidance on what to do, including symptoms to look for, or post-exposure prophylaxis or vaccination. In most instances, these are limited events and only involve one aircraft. However, during the outbreak of SARS in 2003, this notification process was determined to be ineffective for an outbreak that would require notification of passengers on more than a few flights, primarily because this is a manual paper-based process that is slow, labor-intensive, costly, and dependent upon possibly obsolete or inaccurate data.

In response to the need for timely and efficient methods to trace passengers on an aircraft that may have been exposed to an infectious disease, several steps have been taken. CDC has developed a passenger locator form that can be used to gather emergency contact information on passengers and scanned into an electronic data base. This form could be used when a quarantine station is notified of an ill passenger on board an aircraft, or could also be used during a global outbreak to collect emergency contact information on all travelers on flights coming from affected areas. This form has been shared with U.S. airlines and international partners including WHO and the International Air Transport Association. In addition, CDC has developed an electronic database that will be able to capture emergency contact information on passengers. CDC continues to work with our federal and private sector partners to improve our ability to notify passengers of a possible exposure.

The CDC website is also a venue to alert health-care providers about infectious diseases, the symptoms to be aware of and a reminder to discuss with patients if they have recently traveled to areas of concern. It was used widely by providers during SARS and most recently during the tsunami that hit South Asia.

Infected human passengers are not the only potential sources of infectious diseases imported through international travel. Zoonotic infections, or diseases that can be transmitted from animals to humans, can be introduced through imported animals and animal products, and animals, like humans, can be infectious even if they do not appear to be sick. According to the U.S. Fish and Wildlife Service, the United States imports over a quarter of a billion live animals every year. To reduce the risk of importing exotic zoonotic diseases, CDC administers the Foreign Quarantine Regulations found in 42 CFR Part 71 allow CDC to regulate and restrict the importation of animals, animal products and other related cargo. In response to specific disease threats including avian influenza, Ebola hemorrhagic fever, monkeypox, rabies, *Salmonella*, SARS, and yellow fever, CDC currently regulates the importation of dogs, cats, small turtles, nonhuman primates, and bats, and has prohibited the import of certain African rodents, civets, and Asian birds. Should new threats emerge, these regulations can be used on an emergency basis to regulate or restrict the importation of additional animals or animal products to reduce the risk of inadvertently importing the pathogens along with the animals.

Imported Lassa Fever: A Case Study

When SARS emerged in 2003 and spread to over two dozen countries, it necessitated implementing and enhancing many of these containment measures.

By doing so, we were able to contribute to keeping the number of U.S. cases relatively low. Another, more recent example that received less national attention, but is quite relevant to today's topic, was an incident in August and September 2004, when a New Jersey resident died from Lassa fever after returning from West Africa. Lassa fever is an acute viral illness that occurs in West Africa. It is zoonotic, or animal-borne, and in areas of Africa where the disease is endemic—that is, constantly present—it is a significant cause of morbidity and mortality. While Lassa fever is mild or has no observable symptoms in about 80% of people infected with the virus, the remaining 20% have a severe multisystem disease, characterized by fever, muscle aches, sore throat, nausea, vomiting, and chest and abdominal pain. Overall, about 1% of infections are fatal. In the 2004 case, the patient became ill in Sierra Leone and flew to New Jersey via London. Upon arrival in Newark, he took a train to his home. Within hours of arrival in the United States, he sought treatment and was hospitalized. After several days of hospitalization and before a definitive diagnosis could be made, the patient died. Lassa fever was subsequently confirmed by CDC.

CDC worked closely with the New Jersey Department of Health and Senior Services, the airline and rail carrier, the hospital, commercial laboratories, and other partners to identify persons who may have had contact with the patient or his body fluids. The investigation identified a total of 188 at-risk persons, and it included searching for airline passengers who had been seated within six feet of the patient. Passengers were traced by using information from travel reservation records and customs declaration forms. Nineteen passengers were identified as potentially at-risk, and 16 of those were ultimately contacted, 13 within five days. All passengers who were contacted were followed until the end of the 21-day incubation period for Lassa fever, and all were healthy. This incident and response illustrates the need for detection and containment measures as well as the importance of collaboration with state, local, and industry partners. It also highlights how increased international air travel contributes to a need for enhanced preparedness to detect and respond to emerging infectious disease threats.

Conclusion

The current Marburg hemorrhagic fever outbreak in Angola reinforces the importance of global surveillance, prompt reporting, and adequate containment measures to prevent a localized outbreak spreading to other countries and becoming a pandemic. It underscores the need for strong global public health systems, robust health service infrastructures, flexible quarantine and containment measures, and expertise that can be mobilized quickly across national boundaries to mirror disease movements. CDC will continue to collaborate with state and local health departments, industry partners, other federal agencies, health care providers and health care networks, international organizations, and other partners. A strong and flexible public health infrastructure is the best defense against any disease outbreak.

Thank you very much for your attention. I will be happy to answer any questions you may have.

Statement for the Record

Dr. Penrose C. Albright
Assistant Secretary for Science and Technology
Department of Homeland Security

Before the U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Aviation

April 6, 2005

Introduction

Thank you very much for this opportunity to submit written testimony to the Committee on Transportation and Infrastructure, Subcommittee on Aviation's hearing on "Efforts to Prevent Pandemics by Air Travel." The Department of Homeland's Security's Science and Technology Directorate, for which I am the Assistant Secretary, has a major program on Biological Countermeasures to help prevent, protect against and mitigate the possible consequences of biological attacks on this nation's population and infrastructure. The protection of critical transportation hubs, including air transportation is an important part of those activities.

These DHS Biological Countermeasures activities are part of the Nation's broader biodefense strategy as articulated in Homeland Security Presidential Directive (HSPD) - 10: *Biodefense for the 21st Century.* Within that strategy, DHS S&T roles are focused on providing a scientific assessment of the threat, coordinating surveillance and detection activities, and conducting forensics analysis to support attribution. The Department of Health and Human Services is given the lead for human health and medical issues. Therefore, when it comes to the protection of the air transportation system, the DHS S&T activities have focused on non-medical countermeasures and it is on these systems that I have focused my comments.

DHS S&T activities related to the protection of the air transportation system fall into two major areas: (1) systems designs, concepts of operations and detection systems that can be used to protect airports against biological attacks; and (2) development of advanced detection technologies that, if cost-benefit analyses warrant, can be used to protect individual aircraft. In addition, we are just initiating a systems study to explore the need, cost-benefit tradeoffs and design of chemical, biological, radiological and nuclear (CBRN) detection systems under our Commercial Aircraft Protection (CAP) program. Each of these areas is discussed below.

The Protection of Airports

Because an attack with a biological agent within an airport can affect many more people than an attack within a single aircraft, we have focused much of our attention on airports. These efforts range from prevention and protection through detection and warning to recovery from an attack and restoring operations.

Integrated systems demonstration of chemical and biological protection in airports: In partnership with the San Francisco International Airport (SFO), the S&T Directorate has been taking an end-to-end look at protecting airports against chemical and biological attacks. These studies have included characterization of airflows within the airport, placement and performance of potential detection systems, and evaluation of various mitigation strategies (e.g. altering the airflow in the terminal or evacuating the terminal). Simple guidelines have been developed for improving airport preparation and protection and the Transportation Security Administration is in the process of finalizing these for distribution to the broader air transport community. Recently we have begun pilot testing of a limited biological early-warning system and are working with the airport, regional, state and Federal personnel who would be involved in a response to such an event to better understand consequence management issues and concepts of operations (CONOPS) in using such biological early warning systems.

Detection and warning: Early detection of a biological release is critical to initiating timely prophylaxis to greatly reduce the consequences of a biological event. Such early detection systems fall into two broad categories: (1) detect-to-treat systems which detect the agent on timescales of hours to a day, quick enough to begin prophylaxis, but not quick enough to prevent individuals from getting exposed; and (2) detect-to-protect system, which detect the agent in minutes thereby allowing for some response (e.g. changing the airflow in a facility or evacuating the facility) that could minimize exposure.

The S&T Directorate is working on both detect-to-treat and detect-to-protect systems. In the detect-to-treat category, we are currently expanding our BioWatch system in high threat cities to include adding collectors to critical facilities such as airports. This system provides information at least daily and, if and where needed, more frequently. We have also developed and field-tested, but not yet deployed, advanced technology that can conduct detect-to-treat detection in one to three hours in indoor facilities such as airports. These shorter times are important in airports because if an agent were released, it could be detected before many of the passengers arrived at their subsequent destination. We are also actively working on detect-to-protect systems. These are technically much more challenging than detect-to-treat systems because of very short detection times (minutes) and the attendant large number of measurements that are then required to provide continuous coverage. Our on-going programs in this area are: characterizing the natural biological backgrounds in airports, so as to better understand the background signal against which we would have to detect a biological agent; field testing some early rapid bioaerosol detectors that can at least tell us that there is an abnormal rise in biological backgrounds but cannot identify the biological substance causing that rise; and conducting research and development (R&D) on still more advanced systems that will not only be able to detect the presence of a biological agent in minutes but be able to identify it with very high sensitivity and specificity.

Recovering from an attack and restoring operations: Should an attack occur, the resulting contamination could shut down the facility, interrupting critical services and also causing large economic losses. The S&T Directorate is working with SFO and other local, regional and Federal partners to develop pre-reviewed templates and processes to speed the decontamination of the facility and the restoration of operations. Current activities are focused on those time-consuming steps related to preparing the facility for decontamination, the fumigation process itself, and the subsequent 'clearance' sampling that is done to ensure the facility is safe. Some of our key partners, in addition to SFO, include the Environmental Protection Agency (EPA), the National Institute of Occupational Safety and Health (NIOSH), and the Transportation Security Administration (TSA). Once developed, these pre-reviewed templates and processes would apply not only to SFO but to a large family of airports.

The Protection of Aircraft

As noted above, most of our effort in the S&T Directorate to date has focused on protecting airports, as an agent released in an airport potentially affects the largest number of people, especially as passengers are transported to other destinations throughout the Nation and the world. However, we have also begun a systems study to explore the needs, issues, technologies, concepts of operations and cost-benefit tradeoffs of possible CBRN detection systems as part of our Commercial Aircraft Protection system. The initial phase of this study will be completed by the end of this year and will guide our subsequent actions in this area.

A number of biological detections developed, or now under development, in the S&T Directorate are possible candidates for such a system. Options range from deploying simple filters in the air handling system of aircraft with subsequent removal and analysis of the filter when it lands (a BioWatch analog) to the deployment of rapid-acting, but non-specific, bioaerosol detection systems that in a minute or so can detect an unusually high bioaerosol loading in the aircraft cabin but will not be able to determine whether it is harmful or not. First generation versions of such bioaerosol detection systems currently exist and research and development programs are now underway in both DHS and the Department of Defense's Defense Advanced Research Project Agency (DARPA) to significantly enhance the performance of these systems while at the same time reducing their cost and size.

Conclusion

Let me conclude my statement by again thanking you, Chairman Mica, Congressman Costello and the members of the Subcommittee for looking into this important question and for providing us the opportunity to submit written testimony.

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