

Keynote Address by Dr. Steve Predmore,
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Good morning. It's my very great pleasure to have an opportunity to kick off what I believe will be a tremendously rewarding few days of discussion and learning about the threat to aviation posed by bird and wildlife strikes. Before I begin my remarks let me extend my thanks and congratulations to the Bird Strike Committees of USA and Canada...not just for this world-class conference, but for the tremendous work and progress made since the last meeting in Vancouver. Some great work has taken place and we're going to hear about it through the course of the next 3 days. In particular let me thank Dr. Dolbeer for his gracious invitation to join you and offer some opening remarks.

I'm looking forward to learning a lot from the best experts in the field, and to exchanging information and ideas with them and my colleagues in aviation. Most of all, I'm fascinated and admittedly nervous to find out what's on the menu at tonight's Birdstrike Barbecue. Rumor has it that Carla Dove was spotted at the airport with a cooler, so if I see her behind the grill, I guarantee I'll be eating a lot of potato salad!

I'm willing to bet that practically everyone in this hall is here because he or she believes that birdstrikes pose a significant threat to aviation both in terms of safety and economics. Certainly, the statistics support that position:

- Over 195 people have been killed world-wide as a result of bird strikes since 1988.
- Over 5,100 bird strikes were reported by the U.S. Air Force and over 7,100 bird and other wildlife strikes were reported for USA civil aircraft in 2005.
- Bird and other wildlife strikes cost US civil aviation over \$500 million/year, 1990-2005; although this figure is suspect given that an estimated 80% of birdstrikes go unreported.

The hazard isn't going away, either. Conservation efforts over the past 40 years aimed at increasing the populations of endangered bird species have been wildly successful. I won't recite the relevant statistics...most of you know them much better than I do, and they're well documented in your registration packet. Let me summarize:

There are a lot more big birds than there were 40 years ago, and they're hitting aircraft with greater frequency.

Our REAL challenge is to reach those who for the most part are NOT here this week...those who remain unconvinced that birdstrikes are a real threat. Why are they unconvinced?

Some are simply uninformed. I'm not bothered by that. We simply have to continue our efforts to educate and inform them, particularly those who are in a position to commit resources that will advance the science and effect positive change.

Some of our colleagues are focused on other risks. They're working hard to enhance aviation safety in other areas and

should be recognized and thanked for their hard work. Again, they're not the problem.

What's troubling are those who see the threat, acknowledge the risk, and dismiss it or throw up their arms and say, "There have always been birds...there will always be birds...we share the sky with 'em...what are you gonna do?!?" Has anyone heard that?!?!

Fortunately, we didn't adopt the same attitude with other threats to aviation safety, such as mountains, thunderstorms, or humans in the cockpit!!

Where does this resolute fatalism come from? Well, I think in part it stems from the lack of clear "silver bullet" solution or even a definitive action plan to address the threat, which is admittedly ever-present...we DO share the skies with the birds. But there has to be more to it. After all...there have always been mountains and thunderstorms as well, but we have made strides in reducing CFIT and weather-related accidents.

(I would be remiss at this point, of course, not to mention a couple of key differences between mountains and birds as threats...we generally know where the mountains are before the flight and we haven't seen a significant increase in the number of mountains over the past 3 decades!!)

There certainly have been incidents, accidents, and even fatalities as a result of bird and wildlife encounters. Nevertheless, we are fortunate in that thus far the aviation system has proven to be somewhat resilient when it comes to the types of horrific, tragic outcomes that often drive dramatic safety enhancements. We are, and should be, thankful that there hasn't been tragedy on such a grand

scale, but the risk is that we can fall prey to something called “the normalization of deviance.”

That’s a fancy sociological term that may be new to some of you. However, its consequences are well known to all of you.

On January 16, 2003, at 10:39am, Space Shuttle Columbia lifted off from Launch Complex 39-A at Kennedy Space Center on mission #107 with a crew of 7 for 16 days of planned microgravity research. Of course, this mission would ultimately be remembered for the tragedy that took place 16 days later than for its scientific accomplishments.

At 0730 on the day of the launch, the crew was driven from their quarters to the launch facility. Commander Rick Husband was the first crewmember to enter Columbia at the 195-foot level of the launch tower at 0753. Mission Specialist Kalpana Chawla was the last to enter at 0845, and the hatch was closed and locked at 0917.

The countdown was uneventful, and at 1039, Mission #107 began with ignition of the solid rocket boosters.

The ascent was largely uneventful, except that windshear was encountered about 57 seconds after launch. However, at 81.7 seconds after launch, one large piece and at least 2 smaller pieces of insulating foam separated from the External Tank left bipod ramp area. The larger piece struck Columbia on the underside of the left wing. This large piece of insulating foam was approximately 21 to 27 inches long and 12 to 18 inches wide, tumbling at a minimum of 18 times per second, and moving at a relative velocity to the Shuttle of 416 to 573 miles per hour at the time of impact.

As is done after every launch, within 2 hours of the liftoff, the Intercenter Photo Working Group examined video from tracking cameras. Their initial review did not reveal any unusual events. However, the next day, after receiving film with much higher resolution, they detected the debris strike that had occurred at approximately 82 seconds after liftoff.

The working group personnel were concerned that the size and velocity of the debris may have caused damage to Columbia that was not detectable by the conventional tracking cameras. As a result, the Chair of the working group requested that a high-resolution image of the orbiter, in orbit, be obtained by the Department of Defense. Their request was denied.

A Debris Assessment Team was formed to conduct a formal review of the debris strike and potential damage to the orbiter. The first meeting of this team was held 5 days into the mission. It ended with the highest ranking NASA engineer on the Team agreeing to bring the team's request for imaging of the orbiter wing to the Johnson Space Center's Engineering Management Directorate. The imaging was needed by the team to provide better information on which to base their analysis of potential damage. Their request for imaging was declined.

Without pictures of the potential damage, the team was forced to rely on mathematical modeling to assess the damage and consequences. The team concluded over the next 6 days of analysis that some localized heating was likely during re-entry, but they couldn't reach consensus as to whether structural failure would result. The Debris Assessment Team briefed its findings to the Mission Evaluation Room, whose manager gave an oral summary (without data) to the Mission Management Team. Based on

this summary, the Mission Management Team declared the debris strike a “turnaround” issue and did not request further imagery.

Of course, we’re all well aware of the tragedy which occurred when the Columbia attempted re-entry at the end of their mission on February 1, 2003. A breach in the Thermal Protection System on the leading edge of the left wing caused superheated air to penetrate the leading-edge insulation and progressively melt the aluminum structure of the wing, resulting in a weakening of the structure until increasing aero-dynamic forces caused loss of control, failure of the wing, and breakup of the Orbiter. The cause of the breach in the Thermal Protection System was the debris strike that occurred at approximately 82 seconds after liftoff 16 days prior.

As we all watched countless hours of video depicting the breakup of the Shuttle against clear blue Texas skies, we undoubtedly were asking “How could such a tragedy happen.”

Over the next few weeks, as we learned about the occurrence of the debris strike and the failure to pursue imaging that would have better defined the damage to the orbiter, our questions turned to “Why would such an esteemed institution as NASA not do everything in its power to understand and mitigate the risk posed by the debris strike?”

To answer this question, the Columbia accident investigation board evaluated the actions and decisions related to this event within the context of the operational history of the shuttle program. And that operational history clearly showed

that the shedding of debris from the external fuel tanks was a longstanding problem.

With your permission, I'd like to read directly from the Accident Board report:

“The shedding of External Tank foam—the physical cause of the Columbia accident—had a long history. Damage caused by debris has occurred on every Space Shuttle flight, and most missions have had insulating foam shed during ascent. This raises the obvious question: Why did NASA continue flying the Shuttle with a known problem that violated design requirements? It would seem that the longer the Shuttle Program allowed debris to continue striking the Orbiters, the more opportunity existed to detect the serious threat it posed. But this is not what happened. Although engineers have made numerous changes in foam design and application in the 25 years that the External Tank has been in production, the problem of foam-shedding has not been solved, ***nor has the Orbiter's ability to tolerate impacts from foam or other debris been significantly improved.***”

In other words, the hazard was known. The consequences of encountering that hazard were known through engineering analysis to be potentially severe. And yet, over a period of years of experience, the relative risk associated with the hazard diminished over time—even though there was no engineering basis for reducing the evaluation of risk.

Over time, encounters with foam-shedding were downgraded from a safety event to a maintenance event—even though there were no changes to the design of the shuttle that would warrant a reduction in the likelihood of a catastrophic outcome. It's as if they were saying “If it hasn't happened by now, it won't happen...or can't happen.”

This progressive acceptance, over time, of events that are initially considered high-risk and not supposed to happen, is termed “the normalization of deviance.”

So, what does this have to do with birdstrikes? I think the answer is fairly obvious. As an industry, we cannot afford to accept the position that birdstrikes are inevitable and pose minimal risk to the operation.

How do we avoid the trap of “normalizing” the risk associated with birdstrikes.

First, I believe we have to take the words of the Columbia Accident Investigation Board to heart, and begin to treat every birdstrike as an opportunity to learn.

That means we must renew our commitment and support for the establishment and maintenance of the National Wildlife Strike Database so that we can define the nature and extent of the problem, and provide a scientific foundation for wildlife management activities.

As Chairman of the Safety Council of the Air Transport Association, I’m proud of the progress our member carriers have made recently to institutionalize the reporting of birdstrikes. This past Spring, with support from Mont Smith and the ATA staff, we assembled and distributed a thousand birdstrike reporting kits to our personnel working at three major aviation hubs: New York, Atlanta, and the SF Bay Area. The kits include a reporting form, instructions for collecting and mailing remains, and cleaning materials. Early indications are that the kits are being used and reporting is up significantly at those locations.

Speaking on behalf of JetBlue, these kits were enthusiastically received by our Pilots and Maintenance Technicians who have to deal on a daily basis with the outcomes of birdstrikes. The use of the kits at JetBlue has been so successful, in fact, that we're in the process of distributing them throughout the Jetblue network, so that systematic reporting of birdstrikes is institutionalized within our operation.

Of course, more data is just more data unless it's turned into actionable information by informed experts. So, ensuring that the data are accessible for use by all stakeholders—airports, airlines, regulators, wildlife biologists--in collaboration to effect positive safety enhancement is essential to success.

We have to have all parties at the table, looking at the same data, and making informed decisions. We can no longer rely on anecdotes, subjective assessments, or summarizations without data or with incomplete data...the stakes are too high and resources are too scarce.

That means that we, as airlines, have to make the commitment to collect data that is consistent, reliable, and valid. It means that we need the FAA and our Airport partners at the table as well to evaluate those data and provide support with corrective action, and we need the scientific community to help us develop mitigation strategies that are based on local conditions.

Of course, all of this work requires resources...people, time, money. And if you haven't picked up a paper lately, all seem to be in short supply these days in N. American commercial aviation. Short of demonstrating a link between birdstrike mitigation programs and significant savings in fuel

burn, I don't see a significant windfall of resources on the near horizon.

However, we should continue to beat the bushes for additional funding and support, and the ATA Safety Council supports the proposed re-direction of \$3 million in Federal Funds to mitigate wildlife hazards at airports.

There's a lot at stake, ladies and gentlemen. I'm excited and encouraged by the progress that's been made and will be reported out over the next three days. But I think we all recognize that there is much work ahead of us, and that the threat is every bit as real as it ever was. On behalf of JetBlue and the member carriers of the Air Transport Association, we stand in support of your efforts, thank you for the tremendous progress you've made, and look forward to working collaboratively with you to find real solutions. Make no mistake...the work you're doing saves lives. So on behalf of our crewmembers and customers, Thank you.