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[TITLE SLIDE]

Thank you for inviting me to speak with you today. It's a pleasure to be here.

Today, I am going to talk about risk as it relates to unmanned aircraft systems. Specifically, how we manage risk as we work to integrate these systems into the nation's airspace.

Let me begin by sharing several questions that must be considered: What are some of the main risks associated with Unmanned Aircraft System or U-A-S integration? What are the potential consequences of opening our skies to UAS? What about people on the ground? What kind of injuries or damage can one of these aircraft cause **[SLIDE 2]** Let's begin the discussion by talking about an incident that occurred last fall. During the running of the bulls in Virginia, at the Virginia Motor Speedway, an unauthorized unmanned aircraft – a small, open-rotor hexa-copter – was used to film the event. Watch and see what happened.

[PLAY VIDEO]. The FAA investigated this incident and determined the identity of the operator. When questioned, the operator said he believed the crash was the result of a battery failure. Several people in the crowd sustained minor injuries as a result of this incident, but the potential for serious injury from a small unmanned aircraft is very real. This was not an isolated incident.

[SLIDE 3] During the Endure Batavia Triathlon in Australia earlier this year an athlete was injured when a small UAS commissioned to film the event fell from the sky, hitting her in the head. **[PLAY VIDEO]**

The Australian CAA investigated this incident. They questioned the operator, who had not been granted a license to operate the aircraft. The operator speculated that the crash was the result of numerous wi-fi devices in the area causing interference with the unmanned aircraft system's Command and Control link.

As a result of this incident, the competitor was unable to complete the race because she sustained injuries that required stitches.

What is also interesting about this video is that the narrator cites a recent NTSB administrative law judge's decision on the Raphael Pirker case and provides an incorrect assessment. I'll talk more about this particular case in a later slide, but let's just say that the media's reporting on this case has not been completely accurate or helpful. For now, let's get back to discussing risk.

[SLIDE 4] The risk of injury from unmanned aircraft is not limited to people on the ground. In March, a near mid-air collision was reported close to the Tallahassee, Florida airport. An airline pilot reported to Air Traffic Control what appeared to be a small, remotely piloted aircraft, at approximately 2,300 feet in the air. The airline pilot said that the UAS was so close to the jet that he may have collided with it. The FAA sent an inspector to interview the pilot and inspect the plane. Thankfully, no damage to the aircraft was detected. Unfortunately the operator of the UAS was not identified. **[SLIDE 5]** However, this incident highlights just one of the reasons why it is incredibly important for detect and avoid standards to be developed, and right-of-way rules to be obeyed. Most of the rules for

manned aircraft also apply to unmanned aircraft. But there are unique challenges that arise without an on-board pilot controlling the aircraft. Due to communication linkages and human interaction, reaction times can be slower. Since there is no pilot onboard an unmanned aircraft, “see and avoid” is not possible. Thus, the development of sophisticated “detect and avoid” systems is crucial. There are numerous “what ifs.” It’s important to develop solutions before we add risk to the world’s safest aviation system. It is important to note that all three of these events were the result of operations outside of the rules.

[SLIDE 6] One of the ways FAA mitigates risk in the aviation system is design and construction standards for aircraft. The incidents mentioned earlier point out exactly how important it is to have safety standards in place. These standards are currently in development, and will be critical in ensuring safe operation of all UAS. In the meantime, the FAA is working with ASTM International, a Globally recognized leader in the development and delivery of international voluntary consensus standards, to create standards for small unmanned aircraft. The initial release

of these standards occurred earlier this year. The FAA is in the process of evaluating the standards with the objective of recognizing them for use in certification of small unmanned aircraft. We believe that aircraft manufactured, operated, and maintained according to consensus standards will lower the risk for people and property on the ground.

[SLIDE 7] The process of creating and implementing standards is just one challenge. Safe, smart use of small UAS is another. Safety is always the FAA's number one priority. Small unmanned aircraft systems must not be operated carelessly or recklessly.

This is a perfect segue into a discussion about operational risk. As many of you know, in 2011, Raphael Pirker operated a small UAS over the University of Virginia campus, flying close to an active heliport, under a pedestrian bridge, and so close to one person that they had to leap out of the way. After a thorough investigation, the FAA assessed Mr. Pirker with a ten thousand dollar civil penalty for careless or reckless UAS operation. Mr. Pirker appealed the proposed penalty to the National Transportation Safety Board. In March of this year, an

NTSB Administrative Law Judge ruled in Pirker's favor. The FAA has since appealed this decision to the Board, and the resolution is stayed, pending a full NTSB decision. This means nothing has changed from a legal standpoint and the FAA continues to enforce the airspace rules on UAS.

So, you have seen a few examples of what not to do. These incidents may have only caused minor injuries, but there is significant risk. This is why integration will be an incremental process. While the national airspace system is not risk-free, establishing UAS operating standards and regulations will be critical to ensure that risks are managed appropriately and incidents, such as the ones I mentioned, are few and far between.

So, what steps are being taken to counteract these risks? How can we begin safely integrating these unmanned aircraft systems into our skies?

[SLIDE 8] There are several actions we are taking – and we are already working toward implementing them. First, we anticipate the Notice of Proposed Rulemaking for the small UAS rule will be released for public comment by

the end of the year. The rulemaking process is a lengthy one. This is just the first step to introducing UAS weighing less than 55 pounds into our skies.

It's important to mention that until the small UAS rule is finalized, commercial operations are only authorized by the FAA on a case-by-case basis. Currently, this has only happened once – in the Arctic.

[SLIDE 9] However, there is potentially good news for certain operators. Work is underway to implement the provisions of Section 333 of the FAA Modernization and Reform Act of 2012 to move forward with incremental UAS integration. This section of the Act can only be applied to specific, limited, low-risk uses in advance of the small UAS rule. I stress the word *may*, as we are still evaluating this option and developing our internal processes. If we are able to leverage Section 333 for these low-risk operations, there will be associated economic benefits as we begin to address the pent up demand for commercial UAS operations.

Companies from four industries have approached the FAA and are considering filing exemption requests which

would begin the process. These industries include precision agriculture, film making, power line and pipe line inspection, and oil and gas flare stack inspection.

Precision agriculture falls under two main categories, application of fertilizer or pesticides and, crop monitoring. In Japan farmers have used unmanned aircraft for precision agriculture for decades. Currently, more acres of Japanese crop land are treated by unmanned aircraft than manned aircraft.

Using unmanned aircraft lowers operating costs and enables Japanese farmers to apply exactly the right amount of fertilizer or pesticide. In addition, the small helicopters used for this purpose, create the right amount of rotor wash that enables the pesticide to be applied to the top and the *underside* of the leaves. In the US, large farms use manned aircraft for aerial application of chemicals. Historically, this is one of the highest risk forms of manned aviation. So, using unmanned aircraft for precision agricultural may actually *reduce* risk in the US airspace.

The film industry also has a great interest in using unmanned aircraft. Historically, filmmakers have hired

helicopters and airplanes for overhead shots. This can get expensive and it is dangerous. It can create extra noise and wind on-set. But these issues could become irrelevant with the use of unmanned aircraft on closed sets. Has anyone here seen the James Bond film, *Skyfall?* Much of the motorcycle chase scenes on the rooftop of the Grand Bazaar in Istanbul, Turkey were shot using a sophisticated unmanned aircraft. Note that these aircraft were flown by trained pilots on a closed set.

Potential UAS use is not all about economic benefits and getting the perfect shot for a film. There are real safety benefits for using UAS for certain applications – specifically for operations that fall under what we call the "3 Ds" - Work which is Dangerous, Dull or Dirty. Oil and gas flare stack inspection falls into the dangerous category. Use of unmanned aircraft in these situations may actually decrease risk to workers. Have you ever seen what a flare stack looks like? **[POINT TO PICTURE ON SLIDE]** These flames can shoot high up into the air. It's a little hot. Currently, the flare stacks can only be inspected when production is shut down because of the risk to the workers

who have to climb the stack. The company can save time and money if the inspection can occur while the flare stack is ignited. Using a manned helicopter is expensive, plus the helicopter cannot get to close as the rotors literally fan the flames. Using a small UAS solves these problems.

Workers can be more thorough in their work, while remaining out of harm's way. For example, when a lightning bolt hits a power line, the only way to assess damage is to inspect it. But there is a twist. Any damage to the wire is on the *top* side of the line. You can't see it from the ground. By using a UAS, you can see the power line from multiple angles. No ladders. No buckets. No fear of electric shock when you are a safe distance from the line. Yet you can see the line in its entirety, in real time with HD video. So the work using Section 333 to authorize some UAS operations is just beginning. I want to be sure that it is clear that the operations we are talking about are specific, limited, and low risk to people and property on the ground.

[SLIDE 7] I want to conclude by sharing with you one of our biggest accomplishments in 2013 – the first

authorized commercial UAS flight. The flight of a ScanEagle UAS took place in the Chukchi Sea in September, with operations conducted by ConocoPhillips and Insitu. ConocoPhillips used surplus military aircraft which allowed the FAA to accept the military certification of these aircraft. FAA was able to authorize these flights beyond line of sight due to the remote operating area and the safety procedures used during the mission. The FAA is tasked in the 2012 Reauthorization law with integrating small UAS in the Arctic on a permanent basis. This demonstration represents the first step toward accomplishing the goal set for us by Congress. While we are not quite there yet, we have additional demonstration flights planned for the Arctic this summer. Here is a video of the ScanEagle launch and capture. **[PLAY VIDEO]**.

As you can see, the future is now. This is an incredibly exciting time for aviation – but much work still remains to be done. The FAA is counting on our recently selected six Test Sites to help us meet the challenges ahead of us. Just last week the first two test sites began operations that will assist the FAA in developing the standards, procedures, and

regulatory structure needed to safely integrate UAS into the NAS.

As we enter these uncharted times, safety remains our number one priority. The FAA has the exclusive authority to regulate the airspace from the ground up, and a mandate to protect the safety of the American people in the air and on the ground. The public expects us to carry out this mission. Our challenge is to integrate unmanned aircraft into the busiest, most complex airspace in the world. Introduction of unmanned aircraft into America's airspace must take place incrementally and with the interest of safety first.

[SLIDE 11]

Thank you. And I will be happy to take questions.