Risks, Opportunities, and Oversight of Commercial Space

Committee on Commerce, Science, and Transportation

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I appreciate this opportunity to testify in regard to the oversight of commercial space activities, particularly because the pace of Bigelow Aerospace's development and our ability to attract customers are both inherently tied to the future success of the commercial crew program. However, before addressing the opportunities and risks that we see ahead I will begin by providing some brief background on our company. Bigelow Aerospace was founded in the Spring of 1999 by Robert T. Bigelow. A Las Vegas native, Mr. Bigelow is dedicating his time and a significant amount of his personal fortune to Bigelow Aerospace's mission to revolutionize space commerce via the development and deployment of inflatable, or, as we prefer to call them, expandable space habitats. Expandable habitats provide greater volumes than traditional metallic structures, as well as enhanced protection from radiation and physical debris. Moreover, expandable habitats deliver these benefits while using less rocket fairing space, mass, and money. When NASA ran out of funding for expandable habitats more than a decade ago, Bigelow Aerospace picked up the torch and rescued this promising technology, which we will use to construct the world's first private sector space station.

In order to prove and demonstrate our designs and capabilities, Bigelow Aerospace deployed two sub-scale prototype habitats, Genesis I and Genesis II, which were launched in 2006 and 2007 respectively. To fly these spacecraft Bigelow Aerospace contracted with ISC Kosmotras, a joint Russian-Ukrainian company that takes decommissioned SS-18s (the old

backbone of the Soviet nuclear arsenal and designated 'Satan' by NATO) replaces their nuclear warheads with commercial fairings, and subsequently uses this retrofitted rocket, called the 'Dnepr', for global commercial space launch. In 2004, Bigelow Aerospace contracted with Kosmotras to launch the Dnepr with our unique expandable habitat prototypes from an active nuclear missile base in Siberia. Having spent the better part of three years traveling back and forth to this nuclear missile site, I can assure you that we were not going there to enjoy the good weather. Instead, Bigelow Aerospace was driven to Russia by one simple issue, price. While I cannot divulge the cost of our launches, I can tell the Committee that Kosmotras offered us a price that was a third of the closest domestic competitor. A lack of competitive pricing is one of the greatest risks that the commercial crew and cargo programs will face.

If reasonable costs are maintained for crew transportation systems we believe there is a substantial business case for commercial human spaceflight. Specifically, Bigelow Aerospace is focusing on what we term 'sovereign clients', which are international space agencies or foreign governments that wish to enjoy the benefits of human spaceflight and orbital activities. Bigelow Aerospace is actively courting these sovereign clients to lease space aboard our first station which will be comprised of two or more BA 330 habitats (BA 330 habitats provide roughly 330 cubic meters of internal volume and can support a crew of up to six). Bigelow Aerospace is also a strong supporter of microgravity research and development. We have conducted numerous discussions with public and private officials, both in the U.S. and abroad, and we believe that there are real and substantial benefits that companies and countries can enjoy, particularly in the pharmaceutical and biotech sectors, by gaining the capability to conduct microgravity R&D.

However, as mentioned previously, pricing remains a principal programmatic risk, and this is certainly true for either the sovereign client or the microgravity market. Non-competitive

domestic rocket pricing is what drove Bigelow Aerospace overseas previously, and is a real and present threat to prevent the next generation of commercial space activities from taking root here in America. Therefore, in its oversight of the commercial crew and cargo programs, we strongly urge this Committee to focus as much as possible on price, ensuring that both the commercial crew and cargo programs deliver services at costs that allow for the development of a truly commercial space industry.

In regard to the costs of space transportation systems, hardware expenses often have little to do with the actual pricing of services, which are driven to a surprising degree by the laws and regulatory framework that they are developed and operate under. I would like to take this opportunity to briefly address several of these issues.

First and foremost, there has been a great deal of debate over the use of Space Act Agreements versus the Federal Acquisition Regulations ("FAR"). Recently, Congressman Frank Wolf and Administrator Charles Bolden reached an understanding that NASA would continue to use Space Act Agreements ("SAAs") throughout the life of the Commercial Crew Integrated Capability ("CCiCap") program while future commercial crew procurements would be implemented under the auspices of the FAR. Congressman Wolf also asked that the FAR strategy be developed now in order to eliminate any gap between CCiCap and the actual procurement of services. Such a strategy directly parallels the successful cargo program comprised of the Commercial Orbital Transportation Services ("COTS") initiative and the Commercial Resupply Services contracts, wherein cargo delivery capabilities were developed and demonstrated via the SAA-driven COTS program, leading to the immediate implementation of a FAR-based procurement for services under CRS. What Congressman Wolf and the

Administrator laid out wasn't just a compromise, but was always the right thing to do, and we applaud their efforts.

However, I would be remiss if I did not bring to the Committee's attention what I believe to be a gross distortion of the law surrounding Space Act Agreements. Specifically, a review of relevant GAO decisions and policy directives demonstrate that NASA can in fact conduct certifications and mandate safety requirements under a SAA. NASA's current understanding of the situation is that the government cannot directly benefit in any way from a SAA and that to levy safety requirements would therefore violate this inherent limitation. I believe that such an interpretation of the law is simply wrong. Per NASA's own policy directives, funded SAAs are meant to be used to "accomplish an Agency mission". Moreover, in reviewing this very issue the GAO stated that SAAs can be used so long as the principal purpose of the program is to stimulate a commercial market from which both the government and private sector can purchase services. To meet our needs, Bigelow Aerospace has certainly shared our requirements with potential crew transportation providers, and I see nothing in the relevant GAO decisions that would prevent NASA from doing the same. As a matter of fact, the GAO decisions appear to actually encourage NASA to integrate the Agency's requirements, since if these transportation systems are to meet not just private sector needs but support government acquisitions as well, this would be impossible to accomplish without receiving mandatory Agency safety requirements. Per his dialogue with Congressman Wolf, Administrator Bolden has stated that the primary purpose of the commercial crew program is to service the International Space Station. In other words, this program is being used to accomplish an Agency mission, and therefore no artificial limitations should placed on what NASA can do relative to safety and certification regimes under SAA auspices. Since there are differing legal opinions on this topic,

I would strongly encourage this Committee to reach out to the ultimate arbiter of the issue, the GAO, for their advice and guidance.

Of equal importance to how a system is procured is who regulates it. We at Bigelow Aerospace have always been staunch advocates for strong, commonsense safety practices, and we believe that there is no better place for federal regulatory authority to reside than with the Federal Aviation Administration's Office of Commercial Space Transportation ("FAA-AST"). Led by the very capable Dr. George Nield, and supported by an excellent staff including my fellow witness and astronaut Pamela Melroy, the FAA-AST has experience in working with civil, commercial, and military launches, and thereby has an unparalleled broad swath of knowledge to draw upon. In stark contrast to the FAA, NASA is not a regulatory agency, and Administrator Bolden himself has made it publicly and explicitly clear that NASA is not and should never become a regulatory agency. In order to enjoy the opportunity presented by commercial space the risk of regulatory confusion must be eliminated as quickly as possible. Therefore, we hope the Committee will work with the FAA, NASA, and commercial space companies to firmly ensconce regulatory authority over commercial space activities with the FAA-AST, since the AST is the only federal entity with the staff, capabilities, and background to effectively play this role.

Yet another regulatory risk is America's obsolete and counterproductive export control regime. Second only to gravity, the International Traffic in Arms Regulations ("ITAR") had the greatest chance of preventing our spacecraft from leaving the Earth. With the recent release of the Section 1248 report, both the Department of Defense and the Department of State are now on the record that export control reform can be implemented without risking national security. As a matter of fact, I believe export control reform is unique in that it would bolster both national

defense and commerce simultaneously. To address this problematic issue that has festered for over a decade, I urge the Members of this Committee to support including export control reform measures within the Fiscal Year 2013 National Defense Authorization Act. I would also like to enter into the Congressional record the attached law review article published in 2009 addressing the Constitutional shortcomings of the ITAR.

Finally, I would like to end my testimony by addressing the future opportunity that continuing a balanced approach for NASA's human spaceflight activities will provide. Expandable habitats were originally developed to take astronauts to Mars, and we would very much like to see this technology come full circle and again be used for beyond-Low Earth Orbit ("LEO") exploration activities. Our BA 330s could be stationed at L1 or L2, or serve as habitats on the surface of the Moon. Moreover, expandable habitat technology is eminently scalable, and we could leverage heavy-lift capacity to, in a single launch, place massive structures in space that could provide roughly 2,100 cubic meters of internal volume. Like NASA, Bigelow Aerospace desperately needs commercial crew capability to support our LEO operations, but we also could make great use of a heavy-lift system to support U.S. government and international human exploration activities. Commercial crew and heavy-lift should not be viewed as competitors but instead as complimentary capabilities, with both playing a vital role in supporting America's future in space.

I hope this testimony has been helpful, and look forward to answering any questions the Committee may have.