

**SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION:
QUESTIONS FOR THE RECORD**

**HEARING ON
NASA AT A CROSSROADS: REASSERTING AMERICAN LEADERSHIP IN SPACE EXPLORATION
Wednesday, July 13, 2016**

Questions for Mr. Mark N. Sirangelo, Corporate Vice President for Space Systems, Sierra Nevada Corporation

From Senator Rubio

Question 1. Kennedy Space Center and the state of Florida is the world's space capital with the largest concentration of aerospace launch providers and suppliers. We've already seen Apollo, Shuttle, and ISS cargo launches from there and soon both Commercial Crew and SLS/Orion will be launching. Could you discuss what this means for the future of Florida's Space Coast, and what you foresee happening in the State in the next few years?

SNC Response: SNC will continue the long pedigree of launches from and landings on Florida's Space Coast with both its Dream Chaser reusable lifting body spacecraft, the launch of its small satellites and space technology products, and as part of the propulsion systems for new launch vehicles. SNC's Dream Chaser activities expects to leverage Florida's capabilities throughout the lifecycle starting with: final integration and test at Kennedy Space Center; payload processing; launch from Cape Canaveral; landing at the former Shuttle Landing Facility; payload, experiment, and cargo processing in the Space Exploration Park and nearby areas; refurbishment and reprocessing in NASA and Air Force facilities; and finally re-launch activities again from Florida's Space Coast. With preparation ongoing now, a first launch being planned, and multiple subsequent flights each year, SNC will be a regular and frequent customer, user, provider, and employer in the state of Florida.

Question 2. During the birth of the Apollo program, the United States, under the leadership from President John F. Kennedy, was determined to beat the Soviets to the moon. Is the United States still in a position to remain competitive and challenge the likes of other global powers?

SNC Response: Absolutely yes – if we remain bold and committed. The Dream Chaser is the only commercial, reusable lifting body in the world. It embodies the 21st Century capabilities of the United States in space by leveraging over 40 years of NASA and U.S. X-plane experience and operations, while harnessing the significant advancements in materials, systems, propulsion, and other technologies. Safe, affordable, flexible, evolvable, and reliable Dream Chaser space services and commercial transportation operations will create, enable, and sustain new missions and markets that generate significant value for the nation while advancing U.S. leadership in this vitally important sector to our global economic and national security.

Question 3. As the Senate looks to reauthorize NASA in the coming year, what reforms do you suggest?

SNC Response: SNC supports a strong level of bipartisan and bicameral support for a NASA reauthorization that provides stability, balance, continuity, and enabling policy leadership for the United States in the globally competitive space arena. Specifically, SNC recommends the following reforms in order to more efficiently and effectively enable U.S. leadership through NASA in aerospace: 1) Grant NASA the ability to do multi-year program planning and funding to provide stability for its strategic programs, 2) Apply International Traffic in Arms Regulations (ITAR) reform for human spaceflight such that commercial human spacecraft are governed by the Export Administration Regulations and the Commerce Control List rather than the ITAR control regime, thus enabling broader use of the Dream Chaser being developed under NASA contract, 3) Ensure the long-term continuity of the Commercial Cargo and Crew programs supporting the International Space Station in addition to a balanced portfolio of deep space exploration directives, 4) Stimulate the development of multiple commercial space platforms and capabilities in low Earth orbit in order to firmly establish and sustain U.S. leadership and jobs in these areas and to enable a later budgetary focus on inherently government missions, 5) Emphasize hypersonics as a national priority and provide the DoD and NASA a mandate for hypersonics research and development and leverage use of the Dream Chaser as a hypersonics testbed.

Question 4. What programs within the agency pull its focus away from its intended main goal of placing humans on the surface of Mars?

SNC Response: We have no direct view on the question. Placing humans on the surface of Mars is a compelling and challenging main goal for NASA that will require steady advancements, stability of purpose and programs, along with effective leadership and management of the programs necessary to develop the requisite capabilities and competency necessary to achieve this worthy goal. NASA must focus on cost and schedule execution consistent with the priorities provided to them as part of a balanced portfolio. It must also have the ability to plan and budget for the long-term so that enabling programs such as NEXTStep-2 are able to be funded concurrently along with the Orion and SLS programs.

Question 5. It has come to my attention that basic infrastructure challenges are impacting the growth of the commercial space marketplace at Cape Canaveral. These infrastructure challenges range from gaseous Nitrogen and Helium pipelines to support launch operations, to deteriorating bridges and roads. Has Sierra Nevada encountered any infrastructure challenges in the development of your new role in the Commercial Cargo contract?

SNC Response: SNC agrees that a national investment in the nation's vital launch and range infrastructure on the Space Coast, and particularly at Kennedy Space Center and Cape Canaveral is essential to mission success and global leadership in this area. SNC seeks to avoid costly delays and high infrastructure costs for both basic and specialized capabilities by supporting early and sustained operations and maintenance activities that enable safe, timely, and affordable

execution of commercial launch and landing operations on Florida's Space Coast. Specifically, transportation, bridge fortification, facilities, and range capabilities have been identified as early elements requiring attention.

Question 6. Would you be supportive of more innovative solutions to meeting those basic infrastructure needs, such as better partnerships with the state?

SNC Response: Yes – SNC is always open to creative and innovative partnerships that serve as win-win relationships for all parties. As a firm fixed price commercial services contract provider, we are strongly motivated to control costs while maintaining an extremely high level of safety and mission assurance. The hallmarks that SNC seeks for any relationships, including the State of Florida or any other entity, are responsiveness, flexibility, agility, excellent communication, robust resourcing, simplicity, and timely decision-making. SNC is open to expanding existing partnerships or forging new ones.

Question 7. Can you speak to how policies need to be reformed in order to accommodate a robust and competitive U.S. commercial space sector, especially in low Earth orbit (LEO)?

SNC Response: Creating a robust and competitive U.S. Commercial space sector, especially in low Earth orbit (LEO) is fundamentally important to the United States. The U.S. must preserve and extend its lead in this area through smart incentives (space investment tax credits, access to national facilities and capabilities on a use basis instead of full cost basis, third party liability insurance), aggressive national policy making (elements of the House-proposed Space Renaissance Act) to create the “Most Conducive National Business Climate”, and assertive and forward-leaning leadership in the international law arena (Property rights, space salvage law, orbital debris mitigation). International Traffic in Arms Reduction (ITAR) reform should continue to specifically include human spaceflight. Specifically, the Senate should eliminate ITAR barriers to our ability to sell Dream Chaser missions commercially to those interested in buying into a launching and landing both uncrewed and crewed vehicles throughout the world. The Dream Chaser and similar commercial vehicles should be placed on the Commerce Control List under EAR control, rather than ITAR control.

The government's stimulation of a competitive U.S. commercial space industrial base and NASA's use of public-private partnerships (PPPs) has been very successful by reducing the cost of NASA programs such as crew and cargo transfer to ISS by hundreds of millions of dollars and also in stimulating a growing commercial space industry sector that is creating jobs and economic benefits in many states. Continue the emphasis on, and use of, PPPs, Firm Fixed Priced contracts, streamlined acquisition activities, and Enhanced Use Lease (EUL), allowing U.S. industry to apply innovation and lower government costs.

Additive Manufacturing, both terrestrially, and in-space, should be a key focus area for investment and broad application to enhance U.S. domestic manufacturing capabilities and associated business benefit. Investment tax credits, shared use of government facilities and equipment, plus national research and development grants and funding should be focused in this area. Similarly, advanced materials, nanomaterials, biomaterials, and advanced coatings/films should also be the focus of strategic investment and PPPs. Investments and PPPs focused on autonomy, Artificial Intelligence, and human-machine teaming should be an important focus area for research and development, investment, incentives, and collaborative government-industry focus. Finally, creation of a supportive policy, liability, international law/treaty, and

economic environment for the control, mitigation, and active removal of orbital debris in LEO and GEO is critical for use of space in and around the Earth.