**Tracking Number 2010-04-12 (SOC-01)**
**Verifying and Certifying Commercial Crew Spacecraft**

**NASA Advisory Council Recommendation:**
NASA should expedite development of a strategy, plan and a team for defining and obtaining objective data which would indicate that a commercial vehicle is adequately verified, certified and tested to meet requirements. This strategy and plan should be part of the solicitation package. The plan should identify the analytical and test data, including flight test required, and NASA's involvement in the development activity to enable informed participation in reviews to ascertain that the requirements have been met. The NAC also suggests that part of the strategy should be a small technical team(s) with representatives from all critical disciplines, including flight crew personnel, to following the development of the vehicle and operations development. These teams should be limited in size and operate under guidelines defined in "the plan." These team(s) should cover all the bases, and should be staffed with specific named participants.

**NASA Response:**
NASA concurs that a strategy, plan and a team for defining and obtaining objective data which would indicate that a commercial vehicle is adequately verified, certified, and tested to meet requirements should be developed and expedited. NASA has identified a document architecture that would allow a commercial partner (CP) to provide innovative design solutions to meet NASA's needs. The Agency recognizes that in order to allow commercial innovation, NASA will need to identify firm requirements while giving the CPs the flexibility to leverage best commercial practices. NASA is parsing the document architecture into several documents to clearly communicate interfaces, requirements, standards, and processes for CPs. The framework and implementation process provided through this documentation architecture will allow NASA and CPs to ensure that all interfaces, requirements, standards, and processes are met by CPs to safely transport NASA/NASA-sponsored crewmembers. Furthermore, NASA will ensure that commercial missions are held to the same safety standards as Government missions. NASA refers to the document architecture as the "1100-series" documents. Document CCT-PLN-1100 establishes the planned roles and interfaces between the Agency and the CPs and describes the necessary elements for achieving certification to transport NASA/NASA-sponsored crewmembers. It should be noted that NASA intends to enable a diverse portfolio of commercial service capabilities. Thus, various launch systems with various levels of design and flight heritage are envisioned to potentially fill NASA's needs. NASA has adopted the approach in CCT-PLN-1100 to allow CPs to propose Certification Plans that address design, build, and demonstration tests and flights to ensure that a commercial vehicle could potentially be tested, verified, and certified. CCT-DRM-1110 contains sample Design Reference Missions (DRMs) that are top-level mission scenarios applicable to potential NASA missions to low-Earth orbit (LEO) destinations. CCT-REQ 1130 provides the CPs with the NASA-mandatory ISS crew transportation certification and service requirements, while CCT-STD-1140 describes the technical, safety, and crew health and medical processes and specifications as well as the criteria which will be used by NASA to evaluate the acceptability of the CPs' proposed design processes

and specifications. CCT-STD-1150 includes the standards intended to establish minimum criteria and practices that will be used by NASA to evaluate Human Space Flight operations. The entire 1100-series documents will be made available for industry review and comment to ensure that industry has a chance to provide comments to NASA's documents and approach. Once the documents are baselined, NASA will make these documents available for industry to use during proposal development in support of any NASA commercial crew competition activities. NASA plans to use insight and oversight of the CPs to ensure its access to analytical and test data, including flight tests. NASA's involvement through insight and oversight in the development activity will enable informed participation in reviews and throughout the life cycle to ensure that the requirements have been met to achieve crew transportation system certification for NASA missions. In order to ascertain this, NASA will identify the skill mix/disciplines, including flight crew personnel that would be needed to follow the design, development, and verification of an integrated end-to-end system and operations. Since NASA is expecting multiple CPs, the Agency will need to limit the insight teams to small technical teams that will perform the necessary insight with oversight performed by the NASA program. NASA plans to have a subset of the technical team reside with the CPs to increase communications and awareness between NASA and the CPs. This, in turn, will require that the Agency specify NASA team members to ensure consistency with the CPs and, internally, within NASA. NASA plans to bring additional technical expertise within the Agency, as required, for complex technical-issue resolution. This approach will minimize technical risk to the CP and NASA while leveraging the large human spaceflight technical expertise within NASA, whenever needed.