Sierra Nevada Corporation Commercial Crew Integrated Capability (CCiCap) Space Act Agreement

NNK12MS03S

SNC Space Act Agreement

SNC CCiCap Amendment 01

SNC CCiCap Amendment 02

SNC CCiCap Amendment 03

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Appendix A Space Act Agreement (SAA)

SPACE ACT AGREEMENT NO. **NNK12MS03S**

BETWEEN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AND

SIERRA NEVADA CORPORATION

FOR

COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

BACKGROUND

In 2009, the National Aeronautics and Space Administration (NASA) began commercial crew initiatives to stimulate the private sector to develop and demonstrate system concepts and capabilities that could ultimately lead to the availability of human spaceflight services for both commercial and Government customers. Those initiatives focused on maturing designs of elements of a crew transportation system (CTS). This Agreement for the Commercial Crew integrated Capability (CCiCap) begins a new initiative to facilitate industry's development of an integrated CTS. Facilitating development of this U.S. capability will provide national economic benefit and support safe, reliable, and cost effective transportation to low-Earth orbit (LEO).

The goals of the CCiCap investments are to enable significant progress on maturing the design and development of an integrated commercial space transportation system while ensuring crew and passenger safety. This Space Act Agreement (the "Agreement" or "SAA") represents Sierra Nevada Corporation's and NASA's commitment to encourage innovations and efficiencies in CTS design and capabilities to achieve these CCiCap goals.

ARTICLE 1. AUTHORITY

This Agreement is entered into by the National Aeronautics and Space Administration, located at 300 E Street, SW, Washington, D.C. (hereinafter referred to as "NASA" or Government), and Sierra Nevada Corporation, (hereinafter referred to as "SNC" or "Participant") with a place of business at 1722 Boxelder Street, Louisville, Colorado 80027. NASA and SNC may be individually referred to as a "Party" and collectively referred to as the "Parties". NASA's authority to enter into this Agreement is in accordance with the authority set forth in Sections 20113(e) and (f) of the National Aeronautics and Space Act of 1958, as amended. This agreement will be implemented by NASA at the John F. Kennedy Space Center in Brevard County, Florida.

ARTICLE 2. PURPOSE

The purpose of this Agreement is to provide financial and limited technical assistance to SNC's integrated crew transportation system (CTS). SNC will receive payments from NASA upon successful completion of agreed upon milestones as described in Appendix 2 of this Agreement.

ARTICLE 3. RESPONSIBILITIES

A. SNC shall:

(1) Conduct the CCiCap effort according to the milestones identified in Appendix 2 to this Agreement.

(2) Lead a quarterly project status briefing.

(3) Designate at least one seat on each review board described in Appendix 2 for a NASA representative.

B. NASA shall:

(1) Provide milestone payments to SNC upon successful completion of each CCiCap milestone, subject to limitations noted below.

(2) Participate in the quarterly project status briefing.

(3) Appoint a NASA representative to participate in each review board described in Appendix 2, who shall have concurrence authority on aspects of the CTS design, engineering, safety, and operations which could affect the ISS or NASA crew members.

ARTICLE 4. SCHEDULE AND MILESTONES

The scheduled major milestones and acceptance criteria for each milestone for the CCiCap effort are identified in Appendix 2 to this Agreement.

ARTICLE 5. FINANCIAL OBLIGATIONS AND TECHNICAL REPORTS

A. NASA's Payment Obligation

The Government's liability to make payments to SNC is limited to only those funds obligated under this Agreement or by amendment to the Agreement. NASA may obligate funds to the Agreement incrementally.

B. Acceptance and Payment for Milestones

(1) SNC shall notify the NASA Principal Points of Contact at least 30 calendar days prior to the completion of any milestone or the submission of milestone related data, whichever occurs earlier, to arrange for the NASA Technical Contact or designee to witness the event, request clarification on any entrance and exit criteria, or accept delivery of documents. NASA shall have 30 calendar days to determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix 2 of this Agreement. NASA shall notify SNC in writing no later than 30 calendar days from the completion date of the milestone event of NASA's acceptance or non-acceptance.

(2) SNC shall be able to submit an invoice requesting payment upon the accomplishment and acceptance by NASA of the milestone as identified and described in Appendix 2 of this Agreement. SNC shall submit an invoice via e-mail to the NASA Shared Services Center at NSSC-AccountsPayable@nasa.gov. There shall be no more than one (1) invoice per e-mail submission. After receipt and review of the invoice, the NASA Shared Services Center will coordinate with the NASA Administrative Contact to authorize payment.

Subject to change only through written Agreement modification, payment shall be made via electronic funds transfer to the address set forth below:

Bank Account of Payee:
Bank: [redacted]
Address: [redacted]
Routing Transit Number: [redacted]
Depositor Account Title: [redacted]
Depositor Number: [redacted]

(3) The following information shall be included on each invoice:

Agreement Number
Invoice Number
A description of milestone event
Terms of Payment
Payment Office
Agreed Milestone Amount

C. Financial Records and Reports

Except as otherwise provided in this Agreement, SNC's relevant financial records associated with this Agreement are not subject to examination or audit by NASA.

D. Quarterly Project Status Briefings

SNC shall conduct quarterly project status briefings with NASA. Progress made shall be estimated and reported in a mutually agreed to quantifiable performance method. The briefings shall describe: the technical progress made on the integrated CTS review milestones expectations for upcoming quarter, current risk assessment, and any life-cycle cost change since the last report; plans forward; and any difficulties encountered and the corrective action necessary to recover. SNC shall provide written certification that it has not provided, directly or indirectly, NASA funding or NASA technical assistance to any prohibited Russian entity in the previous quarter. The final briefing shall describe not only work completed but also shall document how this activity has advanced SNC's integrated CTS and shall also document the way in which lessons learned as the result of these activities are being incorporated into the design and manufacturing efforts of SNC CTS.

E. Access to Records

The Comptroller General of the United States, at its discretion and subject to applicable laws and policies, shall have access to and the right to examine records of any Party to the Agreement or any entity that participates in the performance of this Agreement that directly pertain to and involve transactions relating to the Agreement for a period of three (3) years after the Government makes the final payment under this Agreement. This paragraph only applies to any record that is created or maintained in the ordinary course of business or pursuant to a provision of law. The terms of this paragraph shall be included in arrangements in excess of $5,000,000.00, which SNC has entered into for the execution of the milestone events in this Agreement.

ARTICLE 6. DISSEMINATION OF PUBLIC INFORMATION

A. NASA or SNC may, consistent with Federal law and this Agreement, release general information regarding its participation in this Agreement. SNC shall coordinate in a timely manner with NASA Public Affairs all press or SNC social media releases regarding NASA CCiCap related developments. The use of any direct quote by a NASA official shall be submitted by SNC for NASA concurrence to ensure accuracy prior to its release.

B. SNC agrees the words "National Aeronautics and Space Administration" or the letters "NASA" will not be used in connection with a product or service in a manner reasonably calculated to convey any impression that such product or service has the authorization, support, sponsorship, or endorsement of NASA, which does not, in fact, exist. In addition, with the exception of release of general information in accordance with paragraph A above, SNC agrees that any proposed public use of the NASA name or initials shall be submitted by SNC in advance to the NASA Administrative Contact, who will submit the proposed use to the NASA Assistant Administrator for Public Affairs or designee ("NASA Public Affairs") for review and approval. NASA approval shall be based on applicable law and policy governing the use of the NASA name and initials. Such approval shall not be unreasonably withheld. Use of NASA emblems/devices (*i.e.*, NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. SNC agrees that any proposed use of such emblems/devices shall be submitted in advance to the NASA Administrative Contact, who will submit the proposed use to NASA Public Affairs for review and approval in accordance with such regulations.

C. NASA does not endorse or sponsor any commercial product, service, or activity. NASA's participation in this Agreement does not constitute endorsement by NASA. SNC agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of SNC resulting from activities conducted under this Agreement.

ARTICLE 7. NASA FURNISHED INFORMATION AND SERVICES

A. SNC may enter into separate Space Act Agreements and/or such other agreements with NASA Centers to use NASA resources, including facilities, property, services, and technical information, in performance of this Agreement. The terms and conditions of such other Space Act Agreements will govern the use of NASA resources. SNC shall remain solely responsible for timely completion of its milestones under this Agreement regardless of the availability, non-availability, or actual cost of NASA resources. Cost and schedule risk associated with activities that are dependent upon NASA Center support resides with SNC.

ARTICLE 8. NONEXCLUSIVITY

This Agreement is not exclusive; accordingly, NASA may enter into similar Agreements for the same or similar purpose with other entities.

ARTICLE 9: PARTICIPANT CERTIFICATIONS

Within 10 calendar days of the effective date of this Agreement, and within 10 calendar days of any change in status under A. through D. below (including the addition of any new contractor/partner), SNC shall certify to the best of its knowledge and belief the following to the NASA Administrative Contact:

A. Neither SNC nor any of its contractors/partners are presently debarred, suspended, proposed for debarment, or otherwise declared ineligible for award of funding by any Federal agency.

B. Neither SNC nor any of its contractors/partners have been convicted nor had a civil judgment rendered against it within the last three (3) years for fraud in obtaining, attempting to obtain, or performing a Government contract.

C. SNC or any of its contractors/partners receiving $100,000 or more in NASA funding for work performed under this Agreement must certify that they have not used any such funds for lobbying purposes prohibited by 31 U.S.C. 1352.

D. SNC is an eligible participant as defined in Section 4.2 of the CCiCap Announcement.

ARTICLE 10. LIABILITY AND RISK OF LOSS

A. SNC hereby waives any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, SNC employees or the employees of SNC's related entities, or for damage to, or loss of, SNC's property or the property of its related entities arising from or related to activities conducted under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct.

B. SNC further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and employees of NASA and employees of NASA's related entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement.

ARTICLE 11. LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS

SNC or its contractors/partners shall not use any funds provided under this Agreement to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA

A. General

(1) "Related Entity" as used in this Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or SNC that is assigned, tasked, or contracted with to perform specified NASA or SNC activities under this Agreement.

(2) "Data," as used in this Agreement, means recorded information, regardless of form, the media on which it may be recorded, or the method of recording. The term includes, but is not limited to, data of a scientific or technical nature, software and documentation thereof, and data comprising commercial and financial information.

(3) "Proprietary Data," as used in this Article, means Data embodying trade secrets or comprising commercial or financial information that is privileged or confidential.

(4) The Data rights set forth herein are applicable to employees of SNC and employees of any Related Entity of SNC. SNC shall ensure that its employees and employees of any Related Entity that perform SNC activities under this Agreement are aware of the obligations under this Article and that all such employees are bound to such obligations.

(5) Data exchanged between NASA and SNC under this Agreement will be exchanged without restriction as to its disclosure, use, or duplication except as otherwise provided in this Article.

(6) No preexisting Proprietary Data will be exchanged between the Parties under this Agreement unless specifically authorized in this Article or in writing by the owner of the Proprietary Data.

(7) In the event that Data exchanged between NASA and SNC include a restrictive notice that NASA or SNC deems to be ambiguous or unauthorized, NASA or SNC may inform the other Party of such condition. Notwithstanding such a notice, as long as such notice provides an indication that a restriction on use or disclosure was intended, the Party receiving such Data will treat the Data pursuant to the requirements of this clause unless otherwise directed in writing by the party providing such Data.

(8) Notwithstanding any restriction on use, disclosure, or reproduction of Data provided in this clause, the Parties will not be restricted in the use, disclosure, or reproduction of Data provided under this Agreement that: (a) is publicly available at the time of disclosure or thereafter becomes publicly available without breach of this Agreement; (b) is known to, in the possession of, or developed by the receiving Party independent of carrying out the receiving Party's responsibilities under this Agreement and independent of any disclosure of, or without reference to, Proprietary Data or otherwise protectable Data hereunder; (c) is received from a third party having the right to disclose such information without restriction; or (d) is required to be produced or released by the receiving Party pursuant to a court order or other legal requirement.

(9) If either NASA or SNC believes that any of the events or conditions that remove restriction on the use, disclosure, or reproduction of the Data apply, NASA or SNC will promptly notify the other Party of such belief prior to acting on such belief, and, in any

event, will notify the other Party prior to an unrestricted use, disclosure, or reproduction of such Data.

(10) Disclaimer of Liability: Notwithstanding any restriction on use, disclosure, or reproduction of Data provided in this Article, NASA will not be restricted in, nor incur any liability for, the use, disclosure, or reproduction of any Data not identified with a suitable restrictive notice in accordance with paragraphs B and G of this Article or of any Data included in Data which SNC has furnished, or is required to furnish to the U.S. Government without restriction on disclosure and use.

(11) SNC may use the following, or a similar, restrictive notice as required by paragraphs B and G of this Article. In addition to identifying Proprietary Data with such a restrictive notice, SNC should mark each page containing Proprietary Data with the following, or a similar, legend: "PROPRIETARY DATA – use and disclose only in accordance with notice on title or cover page."

Proprietary Data Notice

These data herein include <enter as applicable: "Background Data" or "Data Produced by SNC under a Space Act Agreement"> in accordance with the Data Rights provisions under Space Act Agreement <provide applicable identifying information> and embody Proprietary Data. In accordance with the Space Act Agreement, NASA will use reasonable efforts to maintain the data in confidence and limit use, disclosure, and reproduction by NASA and any Related Entity of NASA (under suitable protective conditions) in accordance with restrictions identified in the Space Act Agreement <may list specific restrictions listed in the Agreement>.

B. Data First Produced by SNC under this Agreement

(1) Data first produced by SNC in carrying out SNC's responsibilities under this Agreement, including but not limited to technical data related to inventions made under this Agreement, will be furnished to NASA upon request and such Data will be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) during the term of this Agreement only for evaluating SNC's performance of its milestones under this Agreement. If SNC considers any such Data to be Proprietary Data, and such Data is identified with a suitable restrictive notice, NASA will use reasonable efforts to maintain the Data in confidence.

(2) Upon a successful completion by SNC of any milestone under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA shall retain the right to: (1) maintain a copy of such Data for archival purposes; and (2) use or disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that

(a) Such action is necessary because SNC, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, or software related to such Data;

(b) Such action is necessary because SNC, its assignee, or other successor, having achieved practical application of inventions, hardware, or software related to such Data, has failed to maintain practical application;

(c) Such action is necessary because SNC, its assignee, or other successor has discontinued making the benefits of inventions, hardware, or software related to such Data available to the public or to the Federal Government;

(d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by SNC, its assignee, or other successor; or

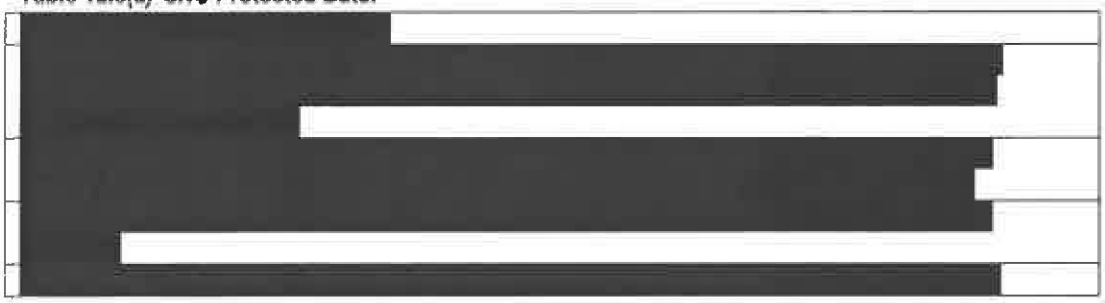
(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by SNC, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)–(e) above exists, NASA shall provide written notification to the SNC Administrative Point of Contact. Upon mailing of such determination, SNC shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that SNC does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

(3) In the event of Termination for Failure to perform and in accordance with Article 16.B, NASA shall have the right to use, reproduce, prepare derivative works, disclose or distribute to the public, display publicly, SNC Data first produced under this Agreement.

(a) In the event of termination for any reason, SNC shall retain all rights to preexisting Proprietary Data, Intellectual Property and Background Data identified in Table 12.3(a), marked in accordance with Article 12.A (11) and produced with SNC Private Funds under this Agreement.

Table 12.3(a) SNC Protected Data.



(b) NASA and SNC, by mutual agreement may choose to negotiate rights in Data in the event of termination for any other reason.

C. Data First Produced by NASA under this Agreement

(1) As to Data first produced by NASA (or any Related Entity of NASA) in carrying out NASA responsibilities under this Agreement that would be Proprietary Data if it had been obtained from SNC, such Data will be appropriately marked with a restrictive notice and maintained in confidence for the duration of this Agreement, with the express understanding that during the aforesaid restricted period such marked Data may be

disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for carrying out NASA responsibilities under this Agreement.

(2) Upon a successful completion by SNC of all milestone under this Agreement, NASA shall not use such Data for any purpose except that NASA shall retain the right to: (1) maintain and reproduce copies of such Data for archival purposes; and (2) use or disclose such archived Data by or behalf of the NASA for Government purposes in the event the NASA determines that

(a) Such action is necessary because SNC, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, or software related to such Data;

(b) Such action is necessary because SNC, its assignee, or other successor, having achieved practical application of inventions, hardware, or software related to such Data, has failed to maintain practical application;

(c) Such action is necessary because SNC, its assignee, or other successor has discontinued making the benefits of inventions, hardware, or software related to such Data available to the public or to the Federal Government;

(d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by SNC, its assignee, or other successor; or

(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by SNC, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)–(e) above exists, NASA shall provide written notification to the SNC Administrative Point of Contact. Upon mailing of such determination, SNC shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that SNC does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

(3) In the event NASA terminates this Agreement in accordance with Article 16.B., Termination for Failure to Perform, NASA shall have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by NASA in carrying out NASA's responsibilities under this Agreement by or on behalf of NASA for Government purposes. The parties will negotiate rights in Data in the event of termination for any other reason.

D. Publication of Results

(1) Recognizing that section 20112 of the National Aeronautics and Space Act of 1958 (51 U.S.C. § 20112) requires NASA to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof, and that

the dissemination of the results of NASA activities is one of the considerations for this Agreement, NASA will coordinate proposed publication of results with SNC in a manner that allows SNC a reasonable amount of time to review and comment on proposed publications.

(2) Consistent with other obligations in this Article, NASA agrees that it will not publish any results without first receiving permission from SNC.

E. Data Disclosing an Invention

In the event Data exchanged between NASA and SNC discloses an invention for which patent protection is being considered, the furnishing party specifically identifies such Data, and the disclosure and use of such Data is not otherwise limited or restricted herein, the receiving party agrees to withhold such Data from public disclosure for a reasonable time (presumed to be 1 year unless mutually agreed otherwise) in order for patent protection to be obtained.

F. Data Subject to Export Control

Technical data, whether or not specifically identified or marked, that is subject to the export laws and regulations of the United States and that is provided to SNC under this Agreement will be treated as such, and will not be further provided to any foreign persons or transmitted outside the United States without proper U.S. Government authorization, where required.

G. Background Data

(1) In the event SNC furnishes NASA with Data developed at private expense that existed prior to, or was produced outside of, this Agreement, and such Data embody Proprietary Data, and such Data is so identified with a suitable restrictive notice, NASA will use reasonable efforts to maintain the Data in confidence and such Data will be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for evaluating SNC's performance under this Agreement. Upon completion of activities under this Agreement, such Data will be disposed of as requested by SNC.

(2) At the time of execution of this Agreement, the Parties agree that the Background Data identified in Appendix 3 embodies Proprietary Data that will be provided to NASA.

H. Handling of Data

(1) In the performance of this Agreement, SNC and any Related Entity of SNC may have access to, be furnished with, or use the following categories of Data:

(a) Proprietary Data of third parties that the U.S. Government has agreed to handle under protective arrangements; and/or

(b) U.S. Government Data, the use and dissemination of which, the U.S. Government intends to control. (2) Data provided by the U.S. Government under the Agreement

(c) The Parties agree that, during the term of this Agreement, SNC may request from NASA, and NASA may provide, Proprietary Data of third parties, with the

express understanding that SNC will use and protect such Data in accordance with this Article.

(e) The Parties agree that, during the term of this Agreement, SNC may request from NASA, and NASA may provide, U.S. Government Data, with the express understanding that SNC will use and protect such U.S. Government Data in accordance with this Article.

(e) At the time of execution of this Agreement, the Parties agree that the following software and related Data will be provided to SNC to the extent NASA has determined it has the right to distribute, under a separate Software Usage Agreement with the express understanding that SNC will use and protect such related Data in accordance with this Article:

Software Name (NASA Center)	Software Purpose	Status
AESOP-STAB Ablation Modeling and Optimization Program - (JSC) SUA9-24842-003	Used to evaluate ablation behavior of potential Dream Chaser (DC) flight control surface materials	Provided
WinPlot Graphical Display System - (MSFC) SUA8-31664-082	Used for graphical displays	Provided
Fully Implicit Ablation and Thermal Analysis Program (FIAT) – (ARC) SUA2-15779-0003	Used for ablation analyses	Provided
Generalized Fluid System Simulation Program (GFSSP) - (MSFC) SUA8-32648-003	Used for DC thermo-fluid analyses and model validation	Provided
ISS CAD Model - (JSC)	Used to evaluate DC appendage proximity to ISS	Provided
NASA Docking System CAD Model - (JSC)	Used for design of DC docking system	Provided
FCOD Rapid Prototyping Lab Generic Display Software - (JSC) SUA9-25185-002	To be used in developing DC cockpit displays	Request in process
BUMPER Meteoroid/ Orbital Debris (M/OD) Risk Assessment Code – (JSC) SUA9-23774-029	To be used for MMOD risk assessment studies	Request in process
Dynamic Skills Trainer Software - (JSC)	To be used in developing DC desktop training simulator	Request in process
Space Transportation Analysis and Mission Planning Simulator (STAMPS) 6-DOF Trajectory Software - (JSC)	To be used in developing and evaluating DC mission trajectories for all flight phases	Request in process
ISS Integrated Risk Management Application (IRMA) - (JSC)	To be evaluated for use in DC risk tracking	Request in process

Unless SNC has entered into a license, consistent with 37 C.F.R. Part 404, for software provided under this Agreement, upon completion of activities under this Agreement, such related Data will be disposed of as instructed by NASA. Note: From time to time during the term of this Agreement, SNC may request from NASA, and NASA may provide, such software and related data.

(3) With respect to such Data specifically identified in this Agreement or specifically marked with a restrictive notice, SNC agrees to:

(a) Use, disclose, or reproduce such Data only to the extent necessary to perform the work required under this Agreement;

(b) Safeguard such Data from unauthorized use and disclosure;

(c) Allow access to such Data only to its employees and any Related Entity that require access for their performance under this Agreement;

(d) Except as otherwise indicated in (3)(c) above, preclude access and disclosure of such Data outside SNC's organization;

(e) Notify its employees who may require access to such Data about the obligations under this Article, and ensure any Related Entity performs the same functions with respect to its employees; and

(f) Return or dispose of such Data, as NASA may direct, when the Data is no longer needed for performance under this Agreement.

I. Oral and Visual Information

If information that SNC considers to be Proprietary Data is disclosed orally or visually to NASA, NASA will have no duty to limit or restrict, and will not incur any liability for, any disclosure or use of such information unless (1) SNC orally informs NASA before initial disclosure that such information is considered to be Proprietary Data, and (2) SNC reduces such information to tangible, recorded form that is identified and marked with a suitable restrictive notice as required by paragraphs B and G above and furnishes the resulting Data to NASA within 10 calendar days after such oral or visual disclosure.

ARTICLE 13. INTELLECTUAL PROPERTY AND DATA RIGHTS - INVENTION AND PATENT RIGHTS

A. Definitions

(1) "Administrator," as used in this Article, means the Administrator of the National Aeronautics and Space Administration (NASA) or duly authorized representative.

(2) "Patent Representative" as used in this Article means the NASA Kennedy Space Center Patent Counsel. Correspondence with the Patent Representative under this clause will be sent to the address below:

Patent Counsel

Mail Code CC-A

Office of the Chief Counsel

NASA John F. Kennedy Space Center, FL 32899

(3) "Invention," as used in this Agreement, means any innovation or discovery that is or may be patentable or otherwise protectable under title 35 of the U.S.C.

(4) "Made," as used in relation to any invention, means the conception or first actual reduction to practice of such invention.

(5) "Practical application," as used in this Agreement, means to manufacture, in the case of a composition or product; to practice, in the case of a process or method; or to operate, in case of a machine or system; and, in each case, under such conditions as to establish that the invention, hardware, software, or related Data is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public or to the Federal Government on reasonable terms.

(6) "Related Entity" as used in this Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or SNC or that is assigned, tasked, or contracted with to perform specified NASA or SNC activities under this Agreement.

B. Allocation of principal rights

(1) Presumption of title

(a) Any invention made under this Agreement shall be presumed to have been made in the manner specified in paragraph (A) or (B) of section 20135(b)(1) (51 U.S.C. § 20135(b)(1)) of the National Aeronautics and Space Act of 1958 (hereinafter called "the Act"), and the above presumption shall be conclusive unless at the time of reporting such invention SNC submits to the Patent Representative a written statement, containing supporting details, demonstrating that the invention was not made in the manner specified in paragraph (A) or (B) of section 20135(b)(1) of the Act.

(b) Regardless of whether title to such an invention would otherwise be subject to an advance waiver or is the subject of a petition for waiver as described in paragraph B.(3) and paragraph I, SNC may nevertheless file the statement described in paragraph B.(1)(a) of this Article. The Administrator (or his designee) will review the information furnished by SNC in any such statement and any other available information relating to the circumstances surrounding the making of the invention and will notify SNC whether the Administrator has determined that the invention was made in the manner specified in paragraph (A) or (B) of section 20135(b)(1) of the Act.

(2) Property rights in inventions. Each invention made under this Agreement for which the presumption of paragraph B.(1)(a) of this clause is conclusive or for which there has been a determination that it was made in the manner specified in paragraph (A) or (B) of section 20135(b)(1) of the Act shall be the exclusive property of the United States as represented by the Administrator of NASA unless the Administrator waives all or any part of the rights of the United States to SNC's invention, as provided in paragraph B.(3) of this clause.

(3) Waiver of rights.

(a) The NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, have adopted the Presidential Memorandum on Government Patent Policy of February 18, 1983, as a guide in acting on petitions (requests) for waiver of rights

to any invention or class of inventions made or that may be made in the manner specified in paragraph (A) or (B) of Section 20135(b)(1) of the Act.

(b) NASA has determined that to stimulate and support the capability of a United States commercial provider to provide commercial crew space transportation services to the public and the Federal Government, the interest of the United States would be served by waiving to SNC, in accordance with Section 20135(g) of the Act and the provisions of 14 C.F.R. Part 1245, Subpart 1, rights to any inventions or class of inventions made by SNC in the performance of work under this Agreement. Therefore, upon petition submitted by SNC, as provided in 14 C.F.R. Part 1245, Subpart 1, either prior to execution of the Agreement or within 30 calendar days after execution of the Agreement, for advance waiver of all or any part of the rights of the United States to any invention of class of inventions that may be made under this Agreement, NASA will waive such rights to SNC. If such a petition is not submitted, SNC may petition for waiver of rights to an identified invention within eight months of first disclosure of invention in accordance with paragraph E.(2) of this clause or within such longer period as may be authorized in accordance with 14 CFR 1245.105. Further procedures are provided in paragraph I of this clause.

C. Minimum rights reserved by the Government

(1) With respect to each SNC invention made under this Agreement for which a waiver of rights is applicable in accordance with 14 C.F.R. Part 1245, Subpart 1, the Government reserves:

(a) An irrevocable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign Government in accordance with any treaty or agreement with the United States; and

(b) Such other March-in rights as given in Paragraph H below.

(2) NASA will not exercise the Government purpose license reserved in paragraph C. (1)(a) during the term of this Agreement.

(3) Upon a successful completion by SNC of all milestones under this Agreement, NASA will refrain from exercising the Government purpose license reserved in paragraph C. (1)(a) for a period of five (5) years following the expiration of this Agreement or until December 31, 2015, whichever is later.

(4) Nothing contained in this paragraph shall be considered to grant to the Government any rights with respect to any invention other than an invention made under this Agreement.

D. Minimum rights to SNC

(1) SNC is hereby granted a revocable, nonexclusive, royalty-free license in each patent application filed in any country on an invention made by SNC under this Agreement and any resulting patent in which the Government acquires title, unless SNC fails to disclose such invention within the times specified in paragraph E. (2) of this clause. SNC 's license

extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which SNC is a party and includes the right to grant sublicenses of the same scope to the extent SNC was legally obligated to do so at the time the Agreement was awarded. The license is transferable only with the approval of the Administrator except when transferred to the successor of that part of SNC's business to which the invention pertains.

(2) SNC 's domestic license may be revoked or modified by the Administrator to the extent necessary to achieve expeditious practical application of such invention pursuant to an application for an exclusive license submitted in accordance with 37 C.F.R. Part 404, Licensing of Government Owned Inventions. This license will not be revoked in that field of use or the geographical areas in which SNC has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the Administrator to the extent SNC, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, SNC will be provided a written notice of the Administrator's intention to revoke or modify the license, and SNC will be allowed 30 calendar days (or such other time as may be authorized by the Administrator for good cause shown by SNC) after the notice to show cause why the license should not be revoked or modified. SNC has the right to appeal to the Administrator any decision concerning the revocation or modification of its license.

E. Invention identification, disclosures, and reports

(1) SNC shall establish and maintain active and effective procedures to assure that inventions made under this Agreement are promptly identified and disclosed to SNC personnel responsible for the administration of this clause within six months of conception and/or first actual reduction to practice, whichever occurs first in the performance of work under this Agreement. These procedures shall include the maintenance of laboratory notebooks or equivalent records and other records as are reasonably necessary to document the conception and/or the first actual reduction to practice of such inventions, and records that show that the procedures for identifying and disclosing such inventions are followed. Upon request, SNC shall furnish the Patent Representative a description of such procedures for evaluation and for determination as to their effectiveness.

(2) SNC will disclose each such invention to the Patent Representative within two months after the inventor discloses it in writing to SNC personnel responsible for the administration of this clause or, if earlier, within six months after SNC becomes aware that such an invention has been made, but in any event before any on sale, public use, or publication of such invention known to SNC. SNC shall use the NASA electronic New Technology Reporting system (eNTRe), accessible at http://invention.nasa.gov, to disclose inventions. The invention disclosure shall identify this Agreement and shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical,

chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale, or public use of any such invention and whether a manuscript describing such invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to NASA, SNC will promptly notify NASA of the acceptance of any manuscript describing such an invention for publication or of any on sale or public use planned by SNC for such invention.

(3) SNC shall furnish the Patent Representative the following:

(a) Interim reports every 12 months (or such longer period as may be specified by the Patent Representative) from the date of the Agreement, listing inventions made under this Agreement during that period, and certifying that all such inventions have been disclosed (or that there are no such inventions) and that the procedures required by paragraph E. (2) of this clause have been followed.

(b) A final report, within three months after completion of the work, listing all inventions made under this Agreement or certifying that there were no such inventions, and listing all subcontracts or other agreements with a Related Entity containing a patent and invention rights clause (as required under paragraph G of this clause) or certifying that there were no such subcontracts or other agreements.

(c) Interim and final reports shall be submitted electronically at the eNTRe Web-site http://invention.nasa.gov.

(4) SNC agrees, upon written request of the Patent Representative, to furnish additional technical and other information available to SNC as is necessary for the preparation of a patent application on an invention made under this Agreement in which the Government retains title and for the prosecution of the patent application, and to execute all papers necessary to file patent applications on such inventions and to establish the Government's rights in the inventions.

(5) Protection of reported inventions. When inventions made under this Agreement are reported and disclosed to NASA in accordance with the provisions of this Article, NASA agrees to withhold such reports or disclosures from public access for a reasonable time (presumed to be 1 year unless otherwise mutually agreed) in order to facilitate the allocation and establishment of the invention and patent rights under these provisions.

F. Examination of records relating to inventions

(1) The Patent Representative or designee shall have the right to examine any books (including laboratory notebooks), records, and documents of SNC relating to the conception or first actual reduction to practice of inventions in the same field of technology as the work under this Agreement to determine whether

(a) Any such inventions were made in performance of this Agreement;

(b) SNC has established and maintained the procedures required by paragraph E.(1) of this clause; and

(c) SNC and its inventors have complied with the procedures.

(2) If the Patent Representative learns of an unreported SNC invention that the Patent Representative believes may have been made under this Agreement, SNC may be required to disclose the invention to NASA for a determination of ownership rights.

(3) Any examination of records under this paragraph will be subject to appropriate conditions to protect the confidentiality of the information involved.

G. Subcontracts or Other Agreements

(1) (a) Unless otherwise authorized or directed by the Patent Representative, SNC shall include this Invention and Patent Rights Article (suitably modified to identify the parties) in any subcontract or other agreement with a Related Entity hereunder (regardless of tier) for the performance of experimental, developmental, or research work.

(b) In the *Invention and Patent Rights* Article included in any such subcontract or other agreement, the following (suitably modified to identify the parties) shall be substituted for paragraph B(3)(b):

As provided in 14 C.F.R. Part 1245, Subpart 1, Sierra Nevada Corporation may petition, either prior to execution of the Agreement or within 30 calendar days after execution of the Agreement, for advance waiver of all of any part of the rights of the United States to any invention or class of inventions that may be made under this Agreement. If such a petition is not submitted, or if after submission it is denied, [insert name of Related Entity] may petition for waiver of rights to an identified invention within eight months of first disclosure of invention in accordance with paragraph E.(2) of this Article or within such longer period as may be authorized in accordance with 14 CFR 1245.105. Further procedures are provided in paragraph H of this Article.

(c) In the case of subcontracts or other agreements at any tier, NASA, the Related Entity, and SNC agree that the mutual obligations of the parties created by this Article constitute privity of contract between the Related Entity and NASA with respect to those matters covered by this Article.

(2) In the event of a refusal by a prospective Related Entity to accept such a clause, SNC:

(a) Shall promptly submit a written notice to the Patent Representative setting forth the prospective Related Entity's reasons for such refusal and other pertinent information that may expedite disposition of the matter; and

(b) Shall not proceed with such subcontract or other agreement without the written authorization of the Patent Representative.

(3) SNC shall promptly notify the Patent Representative in writing upon the award of any subcontract or other agreement with a Related Entity (at any tier) containing an invention and patent rights clause by identifying the Related Entity, the applicable invention and patent rights clause, the work to be performed under the subcontract or

other agreement, and the dates of award and estimated completion. Upon request of the Patent Representative, SNC shall furnish a copy of such subcontract or other agreement, and, no more frequently than annually, a listing of the subcontracts or other agreements that have been awarded.

(4) In recognition of SNC's substantial contribution of funds, facilities and/or equipment to the work performed under this Agreement, SNC is authorized, subject to the rights of NASA set forth elsewhere in this Article, to:

(a) Acquire by negotiation and mutual agreement rights to an invention made under this Agreement by a Related Entity as SNC may deem necessary to obtaining and maintaining of private support; and

(b) Request, in the event of an inability to reach agreement pursuant to paragraph G. (4)(a) of this Article, that NASA request that such rights for SNC be included as an additional reservation in a waiver granted pursuant to 14 CFR Part 1245, Subpart 1. Any such requests to NASA should be prepared in consideration of the following guidance and submitted to the Patent Representative. Notwithstanding paragraph B.(3)(b) of this Article, the Related Entity should be advised that unless it requests a waiver of title pursuant to the NASA Patent Waiver Regulations (14 C.F.R. Part 1245, Subpart 1), NASA will acquire title to inventions made under this Agreement. If a waiver is not requested or granted, SNC may request a license from NASA consistent with the requirements of 37 CFR Part 404. A Related Entity requesting a waiver must follow the procedures set forth in paragraph I of this Article.

H. March-in Rights

(1) SNC agrees that, with respect to any invention made under this Agreement in which it has acquired title, NASA has the right in accordance with the procedures in 37 CFR 401.6 and any supplemental regulations of the agency to require SNC, or an assignee or exclusive licensee of such an invention, to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if SNC, its assignee, or exclusive licensee refuses such a request NASA has the right to grant such a license itself if the Federal agency determines that

(a) Such action is necessary because SNC, assignee, or exclusive licensee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of such invention in such field of use;

(b) Such action is necessary because SNC, assignee, or exclusive licensee, having achieved practical application of such invention, has failed to maintain practical application of such invention in such field of use;

(c) Such action is necessary because SNC, assignee, or exclusive licensee has discontinued making the benefits of such invention available to the public or to the Federal Government;

(d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by SNC, assignee, or exclusive licensee; or

(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by SNC, assignee, or exclusive licensee.

I. Requests for Waiver of Rights

(1) In accordance with the NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, waiver of rights to any or all inventions made or that may be made under this Agreement may be requested at different time periods. Advance waiver of rights to any or all such inventions may be requested prior to the execution of the Agreement, or within 30 calendar days after execution thereof. In addition, waiver of rights to an identified invention made and reported under this Agreement may be requested, even though a request for an advance waiver was not previously requested or, if previously requested, was not granted.

(2) Each request for waiver of rights shall be by petition to the Administrator and shall include an identification of the petitioner; place of business and address; if petitioner is represented by counsel, the name, address, and telephone number of the counsel; the signature of the petitioner or authorized representative; and the date of signature. No specific forms need be used, but the request should contain a positive statement that waiver of rights is being requested under the NASA Patent Waiver Regulations; a clear indication of whether the request is for an advance waiver of rights to an invention or class of inventions, or for a waiver of rights for an individual identified invention; whether foreign rights are also requested and, if so, for which countries, and a citation of the specific section(s) of the regulations under which such rights are requested; and the name, address, and telephone number of the party with whom to communicate when the request is acted upon.

(3) All petitions for waiver, whether advanced or individual petitions, will be submitted to the Patent Representative designated in this Article.

(4) A Petition submitted in advance of this Agreement will be forwarded by the Agreement Officer to the Installation Patent Counsel for processing and then to the Inventions and Contributions Board. The Board will consider the petition and where the Board makes the findings to support the waiver, the Board will recommend to the Administrator that waiver be granted, and will notify the petitioner and the Patent Counsel of the Administrator's determination. The Patent Counsel will be informed by the Board whenever there is insufficient time or information to permit a decision to be made on an advance waiver without unduly delaying the execution of the Agreement. In the event a request for an advance waiver is not granted or is not decided upon before execution of the Agreement, the petitioner will be so notified by the Patent Counsel. All other petitions will be processed by the Patent Counsel and forwarded to the Board. The Board shall notify the petitioner of its action and if waiver is granted, the conditions, reservations, and obligations thereof will be included in the Instrument of Waiver.

Whenever the Board notifies a petitioner of a recommendation adverse to, or different from, the waiver requested, the petitioner may request reconsideration under procedures set forth in the NASA Patent Waiver Regulations.

ARTICLE 14. DISCLAIMER OF WARRANTY

Technical information and data provided by NASA or SNC under this Agreement are provided "as is". No warranty related to availability, title, or suitability for any particular use, nor any implied warranty of merchantability or fitness for a particular purpose, is provided under this Agreement. Neither NASA nor SNC make expressed or implied warranty as to any intellectual property, or information provided under this Agreement, or that the information or data to be furnished hereunder will accomplish intended results or are safe for any purpose including the intended purpose. Neither NASA, SNC nor its respective contractors shall be liable for any direct, general, special, consequential, indirect, or incidental damages attributed to such information or data furnished under this Agreement.

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or May 31, 2014, whichever comes first.

ARTICLE 16. TERMINATION

A. Termination by Mutual Consent

This Agreement may be terminated at any time upon mutual written consent of both Parties.

B. Termination for Failure to Perform

(1) At its discretion, NASA may terminate this Agreement 30 calendar days after issuance of a written notification that SNC has failed to perform under this Agreement, including failure to meet a scheduled milestone as identified and described in Appendix 2. Before making such a notification, NASA will consult with SNC to ascertain the cause of the failure and determine whether additional efforts are in the best interest of the Parties. If it is determined that the cause of the Failure to Perform is one of the circumstances enumerated in Article 16.D(1), NASA shall proceed under that paragraph. Upon a Termination for Failure to Perform, NASA will take all rights identified in Articles 12 and 13 of this Agreement.

(2) SNC will not be entitled to any additional payments from the Government due to a termination for failure to meet a milestone. NASA and SNC will negotiate in good faith any other outstanding issues between the Parties. Failure of the Parties to agree will be resolved pursuant to Article 18, Dispute Resolution.

C. Termination for Unacceptable Risk to Human Life

(1) NASA may terminate this Agreement if NASA determines that SNC's planned performance of an activity under this Agreement presents an unacceptable risk to human life. NASA shall provide written notice to SNC no later than 5 calendar days prior to the planned activity and may terminate the Agreement 30 calendar days after receipt

of the notice by SNC. Before making such a notification, NASA will consult with SNC to ascertain the risk and any mitigation strategies and determine whether additional efforts are in the best interest of the Parties.

(2) Upon receipt of written notification that the Government is terminating the Agreement, SNC shall immediately stop work under this Agreement and shall immediately cause any and all of its partners, subcontractors and suppliers to cease work, except to the extent that SNC wishes to pursue the activities defined in Appendix 2 exclusively using its own funding. Upon such a termination, NASA and SNC agree to negotiate in good faith a final settlement payment to be made by NASA. In no instance shall NASA's liability for termination exceed the total amount due under the next milestone of this Agreement and any payment is subject to the provisions of Article 5.

D. Unilateral Termination by NASA or SNC.

(1) NASA or SNC may unilaterally terminate this Agreement upon written notice in the following circumstances: (a) upon a declaration of war by the Congress of the United States; or (b) upon a declaration of a national emergency by the President of the United States; (c) upon a NASA determination, in writing, that NASA is required to terminate for reasons beyond its control. For purposes of this Article, reasons beyond NASA's control include, but are not limited to, acts of God or of the public enemy, acts of the U.S. Government other than NASA, in either its sovereign or contractual capacity (to include failure of Congress to appropriate sufficient funding), fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather.

(2) Upon receipt of written notification that the Government is unilaterally terminating this Agreement, SNC shall immediately stop work under this Agreement and shall immediately cause any and all of its partners, subcontractors and suppliers to cease work, except to the extent that SNC wishes to pursue the activities defined in Appendix 2 exclusively using its own funding. Upon such a termination, NASA and SNC agree to negotiate in good faith a final settlement payment to be made by NASA. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone of this Agreement and any payment is subject to the provisions of Article 5.

E. Limitation on Damages.

In the event of any termination by NASA, neither NASA nor SNC shall be liable for any loss of profits, revenue, or any indirect or consequential damages incurred by the other Party, its partners, contractors, subcontractors, suppliers or customers as a result of any termination of this Agreement. A Party's liability for any damages under this Agreement is limited solely to direct damages, incurred by the other Party, as a result of any termination of this Agreement subject to mitigation of such damages by the complaining Party. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone under this Agreement.

F. Rights in Property.

SNC will have title to property acquired or developed by SNC and its contractors/partners with funding provided under this Agreement, in whole or in part to conduct the activities defined in Appendix 2. In the event of termination of this Agreement for any reason, NASA may purchase such property as provided in Article 27 below. Upon a Termination for Failure to Perform, NASA may immediately exercise all rights identified in Articles 12 and 13.

ARTICLE 17. CONTINUING OBLIGATIONS

The obligations of the Parties set forth in the provisions of Article 10 (Liability and Risk of Loss) and Articles 12-13 (Intellectual Property and Data Rights) of this Agreement, and such other rights and obligations which by their terms continue past the expiration or termination of this Agreement, shall so continue to apply.

ARTICLE 18. DISPUTE RESOLUTION

All disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the SNC Administrative Contact and the NASA Administrative Contact, who shall seek to resolve such disputes by mutual agreement. If they are unable to resolve the dispute, then the dispute will be referred to the KSC Commercial Crew Program Manager and Mark Sirangelo for joint resolution. If the Parties are still unable to resolve the dispute, the Associate Administrator for Human Exploration and Operations Mission Directorate, or the Deputy of the Directorate, will seek to resolve the dispute, and if necessary issue a written decision that shall be a final Agency decision for all purposes including judicial review.

Pending resolution of any disputes pursuant to this Article, the Parties agree that performance of all obligations shall be pursued diligently in accordance with the direction of the KSC Commercial Crew Program Manager.

The Parties agree that this Disputes Resolution procedure shall be the exclusive procedure followed by the Parties in resolving any dispute arising under, or based on, an express or implied provision of this Agreement, including an alleged breach.

ARTICLE 19. PRINCIPAL POINTS OF CONTACT

The following personnel are designated as the Administrative and Technical Contacts between the Parties in the performance of this Agreement.

NASA Administrative Contact
Emily Weiland
Agreements Officer
John F. Kennedy Space Center
Mail Code: OP-MS-B
NASA Kennedy Space Center, FL 32899
Phone: 321-867-4052
E-mail: emily.weiland@nasa.gov

SNC Administrative Contact
[redacted]

NASA Technical Contact
Scott Thurston
Commercial Crew
John F. Kennedy Space Center
Mail Code: FA-C
NASA Kennedy Space Center, FL 32899
Phone: 321-861-9102
Fax: 321-861-8923
E-mail: Scott.b.Thurston@nasa.gov

SNC Technical Contact
[redacted]

ARTICLE 20. MISHAP REPORTING

A. Definitions.

(1) "Accident" as used in this Article, means an undesirable or unplanned event that occurs unintentionally and usually results in harm, injury, damage, or loss.

(2) "Close Call" as used in this Article, means an event in which there is no injury or only minor injury requiring first aid and/or no equipment/property damage or minor equipment/property damage (less than $1,000).

(3) "Exposure" as used in this Article, means:

(a) Vulnerability of population, property, or other value system to a given activity or hazard; or

(b) Other measure of the opportunity for failure or mishap events to occur.

(4) "Mishap" as used in this Article, means an unplanned event or series of events resulting in death, serious injury, substantial damage to or loss of equipment or property, or damage to the environment.

(5) "Serious Injury" as used in this Article, means any injury resulting from a mishap in which any one or more of the following apply:

(a) Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received.

(b) Results in a fracture of any bone (except simple fractures of fingers, toes, or nose).

(c) Causes severe hemorrhages or nerve, muscle, or tendon damage.

(d) Involves any internal organ.

(e) Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

(6) "Substantial Damage to property or equipment" as used in this Article, means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the Commercial Crew Transportation System, and which would normally require major repair or replacement of the affected component.

B. The Participant shall notify and promptly report to the Agreements Officer, or a designee, any of the following associated with any work performed under this Agreement:

(1) Close calls, which possess the potential to cause a reportable Mishap.

(2) Exposures, which result in fatality; lost-time occupational injury; or occupational disease.

(3) Mishaps, which result in serious injury; fatality; lost-time occupational injury; occupational disease; any environmental damage; or substantial damage to or loss of equipment or property damage of at least $50,000.

C. If the Participant has knowledge that the press is inquiring to an accident, close call, exposure, or mishap the Participant shall promptly notify the Agreements Officer, or designee, of the event and, if requested, assist in the response.

D. If the Participant conducts its own mishap investigations for any mishaps that meet the above criteria, the Participant shall make available to NASA all reports and resulting data.

E. The Participant shall maintain the data of any mishap investigation referenced above for the term of this Agreement plus 3 years.

ARTICLE 21. MODIFICATION/AMENDMENTS

All modifications and amendments to this Agreement shall be by mutual agreement of the Parties and shall be executed, in writing, and signed by the signatories to this Agreement, or their respective successor or designee.

ARTICLE 22. ASSIGNMENT OF RIGHTS

Neither this Agreement nor any interest arising under it will be assigned by either Party without the express written consent of the other Party.

ARTICLE 23. ANTI-DEFICIENCY ACT

All activities under or pursuant to this Agreement are subject to the availability of appropriated funds, and no provision shall be interpreted to require obligation or provision of funds in violation of the Anti-Deficiency Act, 31 U.S.C. 1341.

ARTICLE 24. APPLICABLE LAW AND SEVERABILITY

A. U.S. Federal law governs this Agreement for all purposes, including, but not limited to, determining the validity of this Agreement, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

B. If any portion of this Agreement is held invalid by a court of competent jurisdiction, the Parties agree that such invalidity shall not affect the validity of the remaining portions of this Agreement, unless applying such remaining portions would frustrate the purpose of this Agreement.

ARTICLE 25. EXPORT LICENSES

SNC will be responsible for:

A. Compliance with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this Agreement. In the absence of available license exemptions/exceptions, SNC will be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

B. Obtaining export licenses, if required, before utilizing foreign persons in the performance of this Agreement, including instances where CCiCap efforts are to be performed on-site at NASA Centers, where the foreign person will have access to export-controlled technical data or software.

C. All regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

D. Ensuring that the provisions of this Article apply to its contractors/partners.

In the event that either Party intends to utilize a foreign person (as defined in the ITAR and the EAR) in the performance of this Agreement, such Party shall be responsible for obtaining the required export licenses in advance of the foreign person's participation.

ARTICLE 26. LIMITATIONS ON ACTIVITIES WITH RUSSIAN ENTITIES FOR GOODS OR SERVICES

A. SNC shall not provide NASA funding or NASA technical assistance received under this Agreement to any prohibited Russian entity. SNC may discuss with a prohibited Russian entity technical data, as defined under the ITAR, permitted pursuant to a Technical Assistance Agreement as long as none of the technical data consists of NASA technical assistance that was obtained during activities carried out pursuant to this Agreement.

B. For the purposes of this Article and Article 5 the term "prohibited Russian entity" means:

(1) An organization or entity under the jurisdiction or control of Roscosmos (The Russian Federal Space Agency) or its predecessor agencies (hereinafter "Roscosmos"), that is an organization or entity that:

(a) was made part of Roscosmos upon its establishment on February 25, 1992;

(b) was transferred to Roscosmos by decree of the Russian Government on July 25, 1994, or May 12, 1998;

(c) was or is transferred to Roscosmos by decree of the Russian Government at any other time before, on, or after the date of the enactment of the Iran Nonproliferation Act of March 14, 2000, P.L. 106-178; or

(d) is a joint stock company in which Roscosmos has at any time held controlling interest.

(2) Any organization or entity described in subparagraph (a) shall be deemed to be under the jurisdiction or control of Roscosmos regardless of whether—

(a) Such organization or entity, after being part of or transferred to Roscosmos, is removed from or transferred out of Roscosmos; or

(b) Roscosmos, after holding a controlling interest in such organization or entity, divests its controlling interest

(3) Any other organization, entity, or element of the Government of the Russian Federation.

C. For the purposes of this Article and Article 5, the term "NASA technical assistance" means any non-public information, whether provided orally or in any recorded form, by SNC to a prohibited Russian entity for the purchase of goods or services relating to human spaceflight.

ARTICLE 27. TITLE AND RIGHTS IN PROPERTY

SNC will have title to property it acquires or develops under this Agreement. In the event of termination of this Agreement for any reason under Article 16 Section B, NASA will have the right to purchase any such property. The Parties will negotiate in good faith purchase prices for specific items of property. The negotiated prices will be based on SNC's actual costs for purchase or development of the specific item(s), or fair market value, whichever is less. This price will then be discounted by a percentage that reflects the ratio of Government funding provided under the Agreement versus the amount of SNC funding used to develop the specific item(s) of property. ($2 of Government funds v. $1 of participant funds = 2/3 = 66.6% discount.).

ARTICLE 28. OPTIONAL MILESTONES

The milestones listed in Appendix 2(a), Performance Milestones and Success Criteria, form the awarded effort under this Agreement. Milestones in Appendix 2(b) are optional performance milestones related to SNC's CCiCap effort. These optional milestones create no obligation for

either Party unless the Government subsequently provides specific written authorization and funding and the Parties agree to add the milestone to this Agreement. If, during the period of this Agreement, NASA determines to add any of the optional milestones to the Agreement, NASA will provide written notice to SNC no later than (60) days prior to the SAA period of performance end date referenced in Article 15. The Parties will negotiate a completion date and funding amount for the optional milestone, not to exceed the amount of that milestone as listed in Appendix 2(b) at the time of Agreement award. Final awarded milestone amounts are subject to the availability of appropriated funds.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: William A Gerstenmaier

William Gerstenmaier
Associate Administrator for Human Exploration and Operations Mission Directorate

DATE: 2 Aug 2012

SIERRA NEVADA CORPORATION

BY: Mark N Sirangelo

Mark N. Sirangelo
Corporate Vice President
Space Systems
Sierra Nevada Corporation

DATE: JULY 23, 2012

Appendix 1 Executive Summary

1.0 Executive Summary

SNC is maturing an integrated crew transportation system that achieves a [redacted] orbital crewed demonstration flight.

- Sierra Nevada Corporation (SNC) will invest [redacted] through orbital flight and an additional [redacted] from its industrial partners. Prior Team investment is [redacted].
- Reliable, proven Atlas V launch vehicle and NASA heritage spacecraft design minimize development costs.
- Reusable spacecraft with efficient processing provides long-term, cost-effective access to LEO.
- Lifting body provides robust abort capability, low-g entry, gentle runway landing, and quick post-landing access.
- SNC aligned with NASA to use the best safety practices to ensure safe human spaceflight.
- Highly capable reusable spacecraft supports many markets and missions beyond ISS.

Sierra Nevada Corporation is the ideal partner for NASA to develop a U.S. capability to provide safe, reliable, and cost-effective access to low-Earth orbit. We are an experienced systems integrator and a 25-year builder of 100% reliable space hardware that meets the goals and objectives of the commercial crew program. We have been completely successful in the first two phases of the commercial crew program by performing extensive risk reduction and building hardware on time and on budget while providing NASA complete insight and access to our technical program. The Dream Chaser Space System includes a NASA heritage lifting body spacecraft, the reliable Atlas V launch vehicle, and ground and mission systems that leverage the infrastructure of the Kennedy and Johnson Space Centers. The Dream Chaser lifting body spacecraft offers significant advantages over capsules including mission versatility, low-g reentry, substantial cross range and gentle runway landings. With all of the necessary partnerships, facilities, and investment in place, we are ready to take the next step in the development of our integrated crew transportation system.

In the Commercial Crew integrated Capability (CCiCap) phase, SNC will complete the Dream Chaser Space System (DCSS) detailed design, start certification using NASA's requirements and standards, build hardware, and conduct significant risk reduction. These activities will result in the completion of integrated system safety reviews, integrated systems hardware testing, additional unpiloted Engineering Test Article (ETA) flights, and preparation for an Critical Design Review (CDR) during the base period. SNC has identified additional optional milestones that include a CDR, an SOV powered drop test, a pad abort test, and an uncrewed orbital vehicle (OV) flight test, culminating in a [redacted] orbital crewed demonstration flight. ***Figure 1-1*** shows the Dream Chaser (DC) integrated with the Atlas V in preparation for launch and ***Figure 1-2*** shows the DC docking to the ISS.

Figure 1-1. DCSS Ready for Launch. *SNC plans an uncrewed and crewed orbital flight in [redacted]*

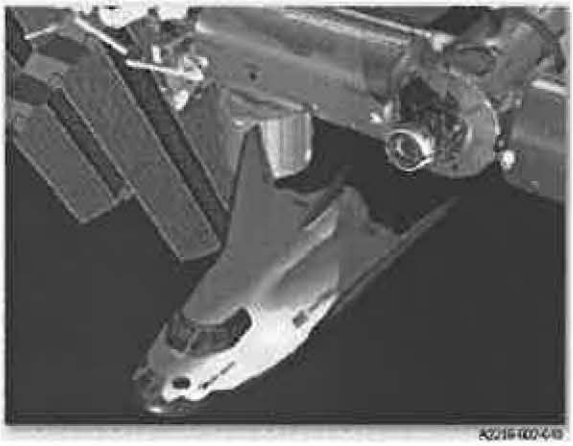


Figure 1-2. Docking to ISS. *The DC transports crew and cargo to the ISS and supports other commercial markets.*

1.1 Technical Approach

Our technical approach draws upon the experience of SNC as a complex system integrator by leading our partner companies to provide a complete, integrated system. Our development approach also maximizes mature technology and heritage design, development, and analysis. The DC heritage lifting body spacecraft launches on a flight-proven launch vehicle and leverages proven NASA ground and mission systems. Our design improves safety and operational flexibility with no black zones during ascent, a better entry environment for crew and science experiment return, and no hazardous post-landing ground support.

1.1.1 Prominent and Distinguishing Features of Technical Approach

The SNC DCSS Team offers NASA significant advantages over other concepts for a commercial crew transportation system (CTS). ***Table 1-1*** presents the prominent features and benefits of our CTS technical approach.

1.2 Proposed Integrated Crew Transportation System

Our DCSS is a fully integrated CTS consisting of the DC spacecraft, the Atlas V launch vehicle, ground systems, and mission systems. The ground systems include facilities at NASA KSC and Cape Canaveral Air Force Station, and the mission operations will be hosted at NASA JSC. The DCSS launches from Florida; the KSC Shuttle Landing Facility is the baseline landing site. SNC designed the reusable DC for piloted rendezvous and docking with the ISS and extended stays of 210 days or longer on-orbit. Post-flight DC spacecraft refurbishment and launch processing occurs at KSC prior to re-flight. ***Figure 1-3*** **(Concept of Operations Video)** illustrates the DCSS architecture and concept of operations.

The DCSS can safely abort to a runway landing from the launch pad through the entire ascent

Table 1-1. Technical Approach Prominent and Distinguishing Features and Benefits.

Design Feature	Benefits
Lifting Body Spacecraft	▪ Large cross range of > [redacted] nautical miles provides for a [redacted] ft. runway landing [redacted] for nominal and contingency operations as well as a rapid orbital return ▪ Reentry g-loads <1.5 g for more gentle return of deconditioned crew and delicate science ▪ Designed for runway return (no water entry damage or complex ocean recovery operations) ▪ Significant pressurized down-mass capability ▪ Leverages NASA investment in HL-20's extensive wind tunnel and aerodynamic database
Integrated Full Abort System	▪ Robust runway abort capability with no black zones from the pad through all phases of flight avoiding hazardous remote water landings ▪ Any orbit emergency deorbit capability to a hard surface runway
Atlas V and DC Integrated for Safety, Loads, and Performance	▪ 100 consecutive successful Atlas launches limits development risks of new rocket efforts ▪ 30 Atlas V launches to date with an expected 40+ launches by first Dream Chaser orbital flight ▪ Atlas V [redacted] design avoids risk associated with strap on solids ▪ [redacted] profile enables less lofted ascent trajectory and increases abort effectiveness ▪ [redacted], increases abort effectiveness ▪ Leverages ULA Emergency Detection System work for DC/Atlas V integrated system human rating
Crew Capability Enables Government and Commercial Missions	▪ Up to seven crew with flexibility to trade crew and cargo for wide range of manifests and missions ▪ Up to [redacted] lbm of pressurized cargo with a two-person crew to and from the ISS ▪ Human-in-the-loop control is adaptable and more reliable ▪ Pilot eliminates development risk of automated ISS rendezvous and proximity operations capability ▪ Auto entry and landing capability available to support a deconditioned or incapacitated crew
Onboard Hybrid Main Propulsion and Integrated Reaction Control System (RCS)	[redacted] ▪ Faster crew access and egress following landing since propellants are nontoxic ▪ Supports rapid ground processing (no hazardous operations required) ▪ Abort motors also provide excess performance enabling other missions beyond the ISS ▪ Proven rocket motor technology used for human sub-orbital spaceflight on SpaceShipOne

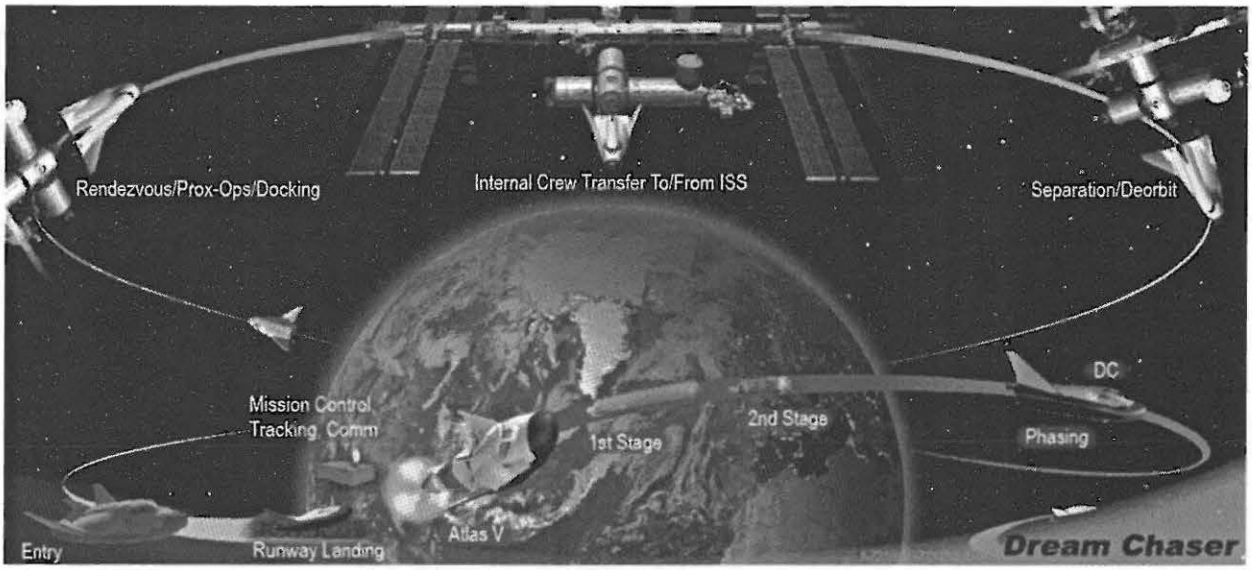


Figure 1-3. System Architecture and Concept of Operations. *The DCSS provides flexible capability to transport crew and cargo to and from the ISS.*

trajectory. There are no times during ascent when intact landings are not possible. A feature of our design philosophy is to provide the crew survival capability beyond our certified conditions; the DC design includes bailout capability because our safety goal of abort capability to a runway landing is feasible throughout the ascent profile.

Orbital adjust and phasing burns use the SNC-developed onboard hybrid rocket motors and RCS. The hybrid motors are improved versions of the successful SNC-developed SpaceShipOne rocket motors which have sub-orbital flight heritage. The SpaceShipTwo program also uses this technology providing extensive flight heritage and experience of more than [redacted] flights before the first orbital flight of the DCSS. The motors use rubber (Hydroxyl-terminated polybutadiene [HTPB]) and nitrous oxide (N_2O); the RCS uses [redacted], all of which are safe, nontoxic propellants and make our propulsion system the safest of any current spacecraft propulsion system. Both the hybrid main propulsion system and the nontoxic RCS are key technologies developed and tested during Commercial Crew Development 1 and 2 (CCDev1 and CCDev2).

The DC's > [redacted] nautical mile cross-range capability is significantly better than the typical capsule providing deorbit capability to a runway landing during any orbit. The DC lifting body spacecraft has the advantage of low 1.5 g entry loads that are considerably less than those experienced by capsules. The DC has significant down-mass capability for g-sensitive science experiment return, and touchdown shock is far lower than capsule loads which can be as high as 15 g for water landing (*e.g.,* Apollo 12 and 15 splash down). This lessens the possibility of injury to a deconditioned crew member, post-mission spacecraft repair, or damage to returning science experiments. Runway landings also avoid ship-based recovery and salt water exposure. Unlike previous NASA missions, commercial operations will not have access to the U.S. Navy for recovery, possibly extending recovery times significantly for off-nominal capsule landings.

The heritage DC spacecraft evolved from the NASA Langley Research Center's (LaRC) HL-20 which was to have ISS emergency return as a key initial mission. During 10 years of development, NASA LaRC performed more than 1,200 wind tunnel tests and thousands of piloted simulations, refining HL-20 aerodynamics, performance, and controls. The HL-20 is an inherently stable design, made better through the use of a modern digital flight control system to ensure substantial stability margins through all flight regimes. ***Table 1-2*** shows DC systems.

Table 1-2. DC System Descriptions. Simple redundant systems provide a safe, reliable spacecraft.	
Subsystem	**Description**
Avionics and Flight Software (S/W)	
Guidance, Navigation, and Control	
Command and Data Handling	
Electrical Power System	
Communications	
Instrumentation	
Displays and Controls	
ECLSS	
Thermal Control	
Crew Systems	
Thermal Protection System (TPS)	
Propulsion	
Structures	
Mechanical Systems	

SNC selected the reliable Atlas V launch vehicle specifically for its demonstrated reliability, progress towards human rating, and complete compatibility with the DC spacecraft. The U.S. Government launches multi-billion dollar national security assets and NASA flagship spacecraft with nuclear payloads on the Atlas due to its reliability. The Atlas family has 100 consecutive successful launches since 1992 with more than 30 launches of the Atlas V. SNC and United Launch Alliance (ULA) have worked together for 6 years on DC/Atlas integration, completing analyses, wind-tunnel testing, and studies to define the DC/Atlas V launch system configuration and have completed structural interface and aerodynamic designs. We are collaborating with ULA to integrate the Atlas V emergency detection system (EDS) into our avionics and software to ensure the NASA requirements are met for ascent fault detection and resolution.

SNC worked with partners and ULA to develop ground operations plans that use facilities at NASA KSC to support a launch from Atlas pad LC-41 and with Space Florida to identify locations for DCSS ground facilities. SNC also worked with and NASA JSC to use existing mission operations capability in Houston. Using NASA experience and facilities reduces risk and extends the legacy of these flight-proven systems.

1.2.1 Demonstrated Significant Risk Reduction Activities

During the CCiCap base period, we will demonstrate significant risk reduction and mature our CTS capability, culminating in an orbital crewed flight in the optional period. Using a rapid prototyping approach, we completed risk reduction testing in many areas during CCDev1 and 2 (**Accomplishments Video**) and completed preliminary design in May 2012 and will conduct atmospheric flight tests in late 2012. ***Figure 1-4*** highlights some of our completed CCDev risk reduction activities.

Using many existing systems and others with high technology readiness levels (TRL) allows us to rapidly reach the CDR level of maturity and complete significant risk reduction activities during CCiCap. We plan to complete the subsonic Engineering Test Article test program, assemble and test the Structural Test Article, build and integrate our SOV, and initiate SOV unpowered drop testing. NASA's goals are met during the optional period as SNC continues integrated testing, performs powered flight tests, executes a pad abort test, and completes certification activities leading to uncrewed and crewed orbital demonstration flights by

SNC continues to capitalize on the extensive capabilities and lessons learned from our partner companies and their proven spacecraft design experience to speed development and

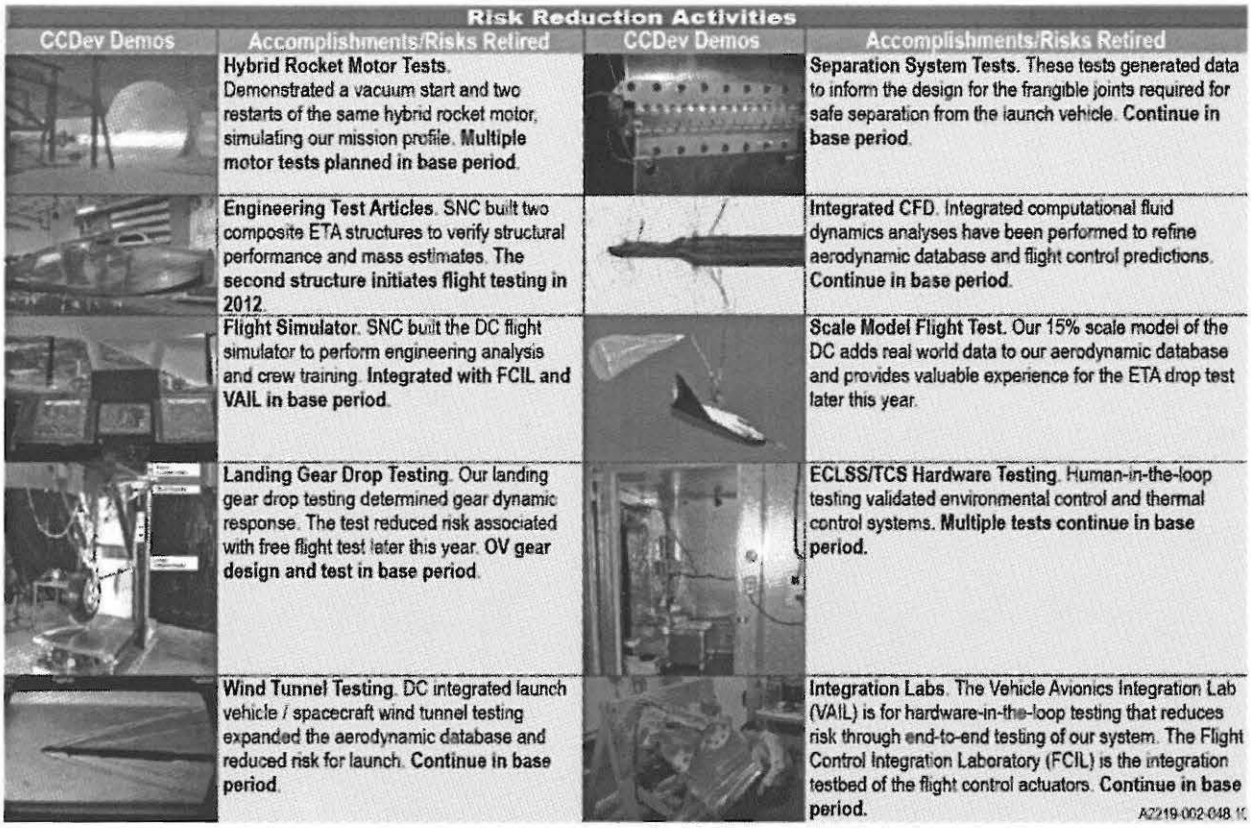


Figure 1-4. CCDev Risk Reduction Activities. *Hardware tests build confidence in SNC's design, schedule, and cost.*

reduce DCSS program risk. Examples are [redacted]. The DC design maturation and significant risk mitigation during CCiCap, and final development and certification testing during the optional milestone period support a [redacted] orbital crewed demonstration flight. [redacted] shows how the goals of the CCiCap program and schedule along with DCSS top risks drive SNC's selection of milestones and risk reduction activities in support of the orbital crewed demonstration flight.

1.2.2 Safety and Mission Assurance

While developing the DCSS, we plan to continue the SNC safety and reliability philosophy that has been successful over many years of space hardware design and development. SNC has manufactured hardware for more than 400 space missions, 70 of them for NASA, and has produced space products for some of the most difficult, can't fail missions. With more than 4,000 systems, subsystems, and components on orbit over 25 years, SNC has never had an on-orbit failure. Our Safety and Mission Assurance (S&MA) builds on decades of human spaceflight experience and includes best practices from the Space Station, Space Shuttle, and Constellation Programs. SNC has defined DC S&MA processes and standards governing safety, reliability, maintainability, supportability, quality management, risk management, software quality assurance, and human rating. We have developed a comprehensive Integrated Systems Safety Analysis approach that includes Hazard Analysis (HA), Failure Modes Effects and Criticality Analysis (FMECA), Functional Failure Tolerance Assessment (FFTA), and Probabilistic Safety Assessment (PSA). We perform these analyses in the context of iterative Design Cycles to inform design; these form the basis for establishing an operational accepted risk baseline with

defined risk controls and verifications to govern ongoing flight operations. SNC has established a rigorous quality assurance program including strong configuration management, supplier quality, and nonconformance management processes to ensure the highest standards for test and flight systems. The SNC risk management process has been in place and active during CCDev2, including use of our Risk Management Board to ensure that programmatic, technical, and operational risks are proactively identified and mitigated early and on a continuous basis. The S&MA Director reports directly to the Program Executive and has direct access to all levels of SNC executive management. This reflects the lesson learned from the Columbia Accident Investigation about the need for independent safety checks and balances. He provides independent feedback through the Safety Review Panel, and has independent approval of design documents as well as test and operations planning and execution. S&MA uses independent external assessment including NASA experts to ensure that risks are properly addressed. NASA's Insight Team has fully participated with all SNC S&MA processes during CCDev2, including Risk Management Board meetings, and will continue to do so during CCiCap.

1.3 Business Information

SNC is a proven systems integrator for large defense, aviation, and space systems with a reputation for rapid, innovative, and agile technology solutions. As a 100% U.S., privately held, woman-owned and operated business, SNC has been under the current ownership since 1993. SNC employs a highly talented staff of more than 2,200 people, the majority of whom are technical and engineering. We provide a turn-key solution from design through training and operations. SNC's strong financial record and stable leadership are key elements in the successful execution of hundreds of government contracts.

1.3.1 Prominent and Distinguishing Features of Business Approach

The SNC DCSS Team offers NASA several significant advantages over other concepts for a commercial CTS. ***Table 1-3*** presents the prominent features and benefits of our CTS business approach. SNC is a sound and viable company and has assembled an outstanding team to build and operate the DCSS.

The SNC business case is strong. We have performed multiple market research studies during our DCSS program. The commercial space market revenue projection is in excess of [redacted] per year by 2017, growing to [redacted] by 2019. We are already developing multiple potential markets for our CTS, many of which are best serviced by a lifting body. [redacted] All of our markets are expected to grow. [redacted] recognizes the market for the DCSS and joined our team to begin marketing and sales of orbital human transportation services. Our basic pricing model and forecast market share determine our range of expected seat prices to be [redacted]

Table 1-3. Business Information Prominent and Distinguishing Features and Benefits.

Feature	Benefits
SNC Business Viability	• 50 years as an aerospace company with constant revenue growth and profitable for the last 14 years; owned by its senior management consistently since 1993 • Solid financial foundation based on 2011 revenues of •
Strong Integrated Team	▪ SNC's experience as a system integrator coupled with world-class human spaceflight teammates, such as increases government confidence that DCSS development will be successful
Significant Investment	▪ Performed 4 years of work using internal funding and an unfunded NASA Space Act Agreement prior to CCDev1 ▪ SNC and partners have invested to date in the CCDev program ▪ SNC does not have to raise capital from external sources to provide our future investment. This includes:
Affordability	▪ Very successful execution of two fixed price Space Act Agreements (SAA) with 13 milestones completed on time and budget demonstrates affordable development costs ▪ Known Atlas costs, flight heritage systems, and minimal required technology development gives budget confidence ▪ Reusable DC, simple processing, and increased flight rate lead to long-term cost-effective LEO access
Sound Business Case	▪ DCSS reusable capabilities and lower per person cost enables more ISS utilization and more frequent crew rotations ▪
NASA Partnerships	▪ Leveraging extensive previous NASA HL-20 investment (decade of work) with modern improvements ▪ SNC entered into active SAAs with seven NASA Centers to access existing NASA human spaceflight expertise, ground infrastructure, and mission systems assets. ▪
SNC Systems Integrator Experience	▪ Prime and integrator of major defense programs such as Big Safari and Gorgon Stare ▪ Performance on more than 70 NASA missions, including 12 to Mars, NASA WB-57 Prominent Phoenix ▪ Largest manufacturer of small satellites including a future satellites ▪ NASA planetary programs including MER, MSL, GRAIL, Pluto-Kuiper, Juno, New Horizons
Experienced Management Team	▪ Our management team has an average of 22 years each in space experience with a deep understanding of NASA processes and operations through extensive personal experience in NASA leadership positions ▪ Diverse group of aerospace leaders composed of several 20+ years NASA veterans including a ▪ Our major partner companies are NASA human spaceflight veterans of Space Shuttle and ISS programs
Proven Insight Model	▪ SNC embraces the NASA insight model, allowing full and open access to all development activities ▪ During CCDev2, SNC opened its facilities to the NASA partner integration team (PIT) including supporting a NASA resident in SNC facilities to enable daily interaction for insight ▪ NASA PIT personnel participate on all program boards, integrated product teams (IPT), and risk reduction testing ▪ Close participation with PIT provides beneficial reach back to NASA expertise
Ingrained Safety Culture	▪ S&MA Director, a NASA safety veteran, ensures safety and risk management are part of all decisions ▪ Safety is a responsibility of every IPT ensuring checks, balances, and healthy tension with dedicated SNC and NASA safety organizations applying lessons learned of CAIB report ▪ S&MA are independent functions with direct access to all SNC executive management ▪ SNC is ISO 9000, AS9100, and NASA quality certified ▪ Fully understand NASA human rating and safety process and have acquired NASA experts in S&MA processes Integrated approach to risk assessment and hazard analysis developed in conjunction with NASA
Systems Engineering and Management Processes	▪ Systems Engineering processes based on established NASA NPR 7123.1a ▪ Risk management process is adapted from proven NASA approach ▪ Established control board structure includes NASA and partner participation ▪ Value-added independent review provided by Technical Advisory Group (TAG) and Strategic Advisory Group composed of senior leadership of major partners and former government executives ▪ SNC uses established and audited techniques to track performance, schedule, and cost such as Earned Value Management, Dynamic Object-Oriented Requirements System (DOORS) management, and configuration control

Our program management approach incorporates an expert management and engineering team that uses internal SNC resources and knowledge by bringing together the best team of human spaceflight companies in the world to utilize their experience and expertise. We have

assembled a strong staff of experienced human spaceflight managers and engineers to integrate our team of companies with proven human spaceflight experience (**Dream Chaser Team Video**). The senior technical management team is made up of highly experienced former NASA and aerospace industry human spaceflight experts: [redacted]

Table 1-4 shows our world-class CCiCap team of spaceflight-experienced partners assembled to execute the CCiCap program (**Dream Chaser Industry Partners Video**). Through two phases of demonstrated and successful CCDev programs, SNC has shown the ability to combine diverse companies into a united team working toward the common goal of delivering for our Nation a safe and reliable CTS for cost-effective access to LEO.

SNC uses our existing NASA partnership (**NASA Partnership Video**) to leverage expertise by continuing to provide NASA insight into all DC development activities and to seek assistance from government experts. We continue to host NASA personnel at our design and manufacturing facility and invite close participation in all development areas to work alongside our team to allow visibility into the work and processes. All of our DC work continues to be completely open to our government partners.

1.4 Eligibility

SNC is an entity organized under the laws of the United States and is more than 50% owned by U.S. nationals; therefore, we are eligible to submit a proposal under the provisions of Section 4.2 of the Commercial Crew Integrated Capability Announcement No. NASA-CCiCap.

Table 1-4. CCiCap's World-class Team of Spaceflight Partners.

Company / Partner	Responsibilities
Sierra Nevada Corporation	Manage and integrate team and all internal systems. Manage all processes including S&MA. Complete propulsion and structure design, development, and test. Perform aerodynamic and loads analysis, launch vehicle integration, and systems engineering.
NASA Centers (ARC, DFRC, GRC, JSC, KSC, LaRC, MSFC, NESC)	[redacted]
United Launch Alliance	
Draper Laboratory	
Aerojet	
[redacted]	
Orbitec/Hamilton Sundstrand	
MacDonald, Dettwiler and Associates (MDA)	
Lockheed Martin	
Scaled Composites	
Special Aerospace Services	
University of Colorado	
Virgin Galactic	
Thales Alenia Space	
Northrop Grumman	
AdamWorks	

Table F1. CCiCap Goals.

Goal #	CCiCap Strategic Goals
G1	Advancing multiple integrated CTS to an orbital crewed demonstration flight no later than the middle of the decade or as early as possible.
G2	Achieving significant industry financial investment.
G3	Achieving affordable development costs.
G4	Providing the initial CTS capability that will lead to long-term cost effective access to Low Earth Orbit (LEO).
G5	Developing a capability to LEO that supports commercial markets for both commercial and Government customers.
	Base Period Goals
G6	Complete the detailed integrated design of the CTS.
G7	Demonstrate a process to analyze, quantify, and understand the risks associated with the design.
G8	Establish the criteria and plans for the Participants' certification of the system for the orbital crewed demonstration flight, which considers potential customer standards (e.g. NASA's 1100 series, SSP 50808 and industry equivalents).
G9	Conduct significant risk reduction activities (for example, uncrewed test flight, pad abort test, or drop test).
	Optional Period Goals
G10	Perform significant test activities.
G11	Participant's certification of the system for orbital crewed demonstration flight.
G12	Perform orbital crewed demonstration flight.
G13	Demonstration should meet as many as possible: minimum 3 days on-orbit; minimum orbit altitude of 200 nm; demonstrate controlled maneuverability; demonstrate system sizing sufficient for a minimum of 4 crew members.
	Overall Safety Goal
G14	NASA has the goal of fostering a safety culture in the commercial space flight industry that ultimately will minimize the risks associated with human space flight to LEO. NASA's goal is for Participants to demonstrate safety processes that include strong in-line checks and balances, healthy tension between responsible organizations, value-added independent assessments and appropriate data archival, which will increase Government confidence in the Participant's approach to safety.

Table F4. CCiCap Base Milestones.

Milestone #	Base Period Milestones	Planned Date[1]
M1	Program Implementation Plan Review	Aug 2012
M2	Integrated System Baseline Review	Oct 2012
M3	Integrated System Safety Analysis Review #1	Jan 2013
M4	Engineering Test Article Flight Testing	Apr 2013
M5	SNC Investment Financing #1	Jul 2013
M6	Integrated System Safety Analysis Review #2	Oct 2013
M7	Certification Plan Review	Nov 2013
M8	Wind Tunnel Testing	Feb 2014
M9	Risk Reduction and TRL Advancement Testing	May 2014
M9A	Main Propulsion & RCS Risk Reduction and TRL Advancement Testing	May 2014

[1]

Figure 1-5. DCSS CCiCap Development Plan.

Appendix 2 Performance Milestones and Success Criteria

Appendix 2.a Base Period Performance Milestones

Table 2.a. Base Period Performance Milestones	
Milestone 1: Program Implementation Plan Review **Scope:** The Program Implementation Plan Review is an initial meeting to describe the plan for implementing the Commercial Crew Integrated Capability Program, to include management planning for achieving CDR; Design, Development, Testing, and Evaluation activities; risk management to include mitigation plans, and certification activities planned during the CCiCap Base Period. SNC will describe plans for further testing, certification, and crewed orbital demonstration flight in the Optional Milestone Period. SNC will present the SAA agreed-to performance milestones to allow feedback on NASA expectations for completion of milestones. SNC shall provide to NASA a briefing to review the program implementation plan, and a hard copy of the presentation materials from the program implementation plan review meeting. **Success Criteria:** Completion of the program implementation plan review as described in Table 1.	Amount: $30M Date: Aug 2012
Milestone 2: Integrated System Baseline Review **Scope:** The Integrated System Baseline Review (ISBR) demonstrates the maturity of the baseline CTS integrated vehicle and operations design of the Dream Chaser Space System (DCSS) consisting of Dream Chaser spacecraft, Atlas launch vehicle, Mission Systems, and Ground Systems supports proceeding with the detailed CTS design. The ISBR is a post-PDR level review that demonstrates the DCSS design meets SNC system requirements with acceptable risk and within schedule constraints and establishes the basis for proceeding with detailed design. It will show that design options have been selected that meet SNC requirements, interfaces have been identified, and verification methods have been described. **Success Criteria:** Completion of the Integrated System Baseline Review as described in Table 2.	Amount: $45M Date: Oct 2012
Milestone 3: Integrated System Safety Analysis Review #1 **Scope:** The purpose of the Integrated System Safety Analysis Review #1 is to demonstrate that the systems safety analysis of the Dream Chaser Space System (DCSS) has been advanced to a preliminary maturity level, incorporating changes resulting from the Preliminary Design Review. The DCSS consists of the Dream Chaser spacecraft, launch vehicle, ground systems and mission systems. The ISSAR #1 is a post-PDR level review that includes discussion of the Hazard Analysis Methodology and a review of preliminary hazards, causes, and control strategies. **Success Criteria:** Completion of the SNC Integrated System Safety Analysis Review #1 as described in Table 3.	Amount: $20M Date: Jan 2013
Milestone 4: Engineering Test Article Flight Testing **Scope:** The purpose of these additional free flight test(s) is to reduce risk due to aerodynamic uncertainties in the subsonic approach and landing phase of flight and to mature the Dream Chaser aerodynamic database. A minimum of one and up to five additional Engineering Test Article free flight test(s) will be completed to characterize the aerodynamics and controllability of the Dream Chaser Orbital Vehicle outer mold line configuration during the subsonic approach and landing phase. **Success Criteria:** Completion of ETA Free Flight test(s) meeting objectives described in Table 4.	Amount: $15M Date: Apr 2013
Milestone 5: SNC Investment Financing #1 **Scope:** This funding represents SNC's commitment for significant investing financing. SNC to provide program co-investment of [redacted] **Success Criteria:** Completion of required investment as described in Table 5.	Amount: $12.5M Date: Jul 2013

Table 2.a. Base Period Performance Milestones	
Milestone 6: Integrated System Safety Analysis Review #2 **Scope:** The purpose of the Integrated System Safety Analysis Review #2 is to demonstrate that the systems safety analysis of the Dream Chaser Space System (DCSS) has been advanced to a post-PDR maturity level. The ISSAR #2 will include recent changes developed during Design Cycle 4 to: 1) inform the DCSS Critical Design Review, 2) show that hazards have been defined to a pre-CDR maturity level, and 3) document that the Safety Review Panel has reviewed and concurred on hazard reports. The DCSS consists of the Dream Chaser spacecraft, launch vehicle, ground systems and mission systems. The ISSAR #2 is a post ISBR review that includes discussion of the Hazard Methodology; a review of hazards, causes, and control strategies; and a review of the Safety Review Panel results. **Success Criteria:** Completion of the SNC Integrated System Safety Analysis Review #2 as described in Table 6.	Amount: $20M Date: Oct 2013
Milestone 7: Certification Plan Review **Scope:** The Certification Plan Review defines the top level strategy for certification of the DCSS that meets the objectives for the ISS Design Reference Mission described in CCT-DRM-1110 Rev Basic. SNC shall conduct a review of the verification and validation activities planned for the Dream Chaser Space System (Dream Chaser spacecraft, Atlas launch vehicle, Ground and Mission Systems). This certification plan review will ensure the integrated certification strategy, process, and plans are in place and sufficient to document that the DCSS design complies with approved functional, performance, and interface requirements while operating in the intended environments thereby leading to certification of the Dream Chaser Space System (DCSS) for an orbital crewed demonstration flight. **Success Criteria:** Completion of the Certification Plan Review as described in Table 7.	Amount: $25M Date: Nov 2013
Milestone 8: Wind Tunnel Testing **Scope:** The purpose of this testing is to reduce risk on both the DC vehicle and the DC/Atlas stack by maturing the DC and DC/Atlas aerodynamic databases, providing improved fidelity in Reynolds number effects and control surface interactions, and will help determine pre-CDR required updates to the OML or control surface geometry if required. Wind tunnel testing will be completed in the transonic and supersonic regimes (minimum range of Mach 0.6 to Mach 4) of the DC vehicle, and in the transonic and supersonic regimes (minimum range of Mach 0.9 to Mach 1.4) of the DC/Atlas ascent configuration. **Success Criteria:** Completion of the Wind Tunnel Testing as described in Table 8.	Amount: $20M Date: Feb 2014
Milestone 9: Risk Reduction and TRL Advancement Testing **Scope:** The purpose of these tests is to significantly mature all Dream Chaser systems to or beyond a CDR level. A series of risk reduction and Technology Readiness Level improvement tests will be completed for the following Dream Chaser systems: Crew Systems; Environmental Control and Life Support; Structures; Thermal Control; and Thermal Protection. Elements from this testing will satisfy certification requirements per the SNC Certification Plan. Trace to the Certification Plan will be presented at the milestone review meeting. SNC shall conduct a test review(s) where test results and resulting analysis will be presented. **Success Criteria:** Completion of the risk reduction and TRL advancement testing as described in Table 9.	Amount: $17M Date: May 2014
Milestone 9a: Main Propulsion and RCS Risk Reduction and TRL Advancement Testing **Scope:** The purpose of these tests is to significantly mature the Dream Chaser Main Propulsion System and Reaction Control System to or beyond a CDR level. Risk reduction and Technology Readiness Level improvement tests will be completed for these systems. Elements from this testing will satisfy certification requirements per the SNC Certification Plan. Trace to the Certification Plan will be presented at the milestone review meeting. SNC shall conduct a test review(s) where test results and resulting analysis will be presented. **Success Criteria:** Completion of the Main Propulsion System and Reaction Control System risk reduction and TRL advancement testing as described in Table 9a.	Amount: $8M Date: May 2014

Table 1: SNC CCiCap Base Period Milestone #1 Program Implementation Plan Review Entrance and Success Criteria

Table 1. SNC CCiCap Base Period Milestone #1—Program Implementation Plan Review.

Entrance Criteria	Success Criteria
1. The following Program Implementation Pian Review documentation provided to NASA prior to the Program Implementation Plan meeting: a. Program Plan schedule. b. Risk Management Plan. c. SNC Dream Chaser risk list with mitigation plans. d. Program Implementation Plan Review agenda. e. SAA agreed-to Milestone descriptions, entrance criteria, and success criteria. f. Organization chart. g. Board structure description. h. Overview description of planned Base Period Design, Development, Testing and Evaluation activities. 2. NASA invited to gain insight by participating in the Program Implementation Plan Review.	1. Completion of Program Implementation Plan Review. 2. Provide plan for disposition of NASA comments and closure of SNC actions resulting from review. 3. Paper and electronic copy of all presentation materials provided to NASA.

Table 2: SNC CCiCap Base Period Milestone #2 Integrated System Baseline Review Entrance and Success Criteria

Table 2. SNC CCiCap Base Period Milestone #2—Integrated System Baseline Review

Entrance Criteria	Success Criteria
1. Provide SNC ISBR review plan identifying ISBR review data, the date the data will be available, SNC success criteria, and plan to disposition comments. Plan will be provided to NASA at least 60 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. Utilize an iterative process (per SNC ISBR review plan) for ISBR review preparation, which includes NASA and provides data throughout the process, allowing for NASA insight and feedback prior to the formal milestone. 3. Disposition NASA review plan comments and provide ISBR data for review (per SNC ISBR review plan) at least 30 days prior to review. 4. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 5. The following Integrated System Baseline Review documentation provided to NASA at least 30 days prior to the review. Draft indicates the product has not been released, preliminary or updated indicates the product has been released and is being configuration managed as a post-PDR level of maturity product: a. Following updated baseline documentation if updated since PDR i. DCSS System Requirements Document ii. ISS Design Reference Mission iii. Design Reference Document (DRD) iv. DC CAD Model: Top Assembly (Master) v. Master Equipment List vi. Power Equipment List vii. Concept of Operations viii. Configuration Management Plan ix. Risk Management Plan x. Systems Engineering Management Plan xi. Environmental Design Database (includes natural and induced design-to environments) xii. Preliminary Driving Scenarios, Timelines, and Ground Rules Document xiii. Margins Management Plan b. Updated Element (Launch Vehicle (LV), Mission Systems (MS), Ground Systems (GS), and Dream Chaser (DC) spacecraft) and updated hardware system design specifications: i. Avionics ii. Communications	1. Completion of the Integrated System Baseline Review per the review plan. 2. Provide SNC's plan for disposition of NASA comments and closure of SNC actions resulting from review. 3. Paper and electronic copy of all presentation materials provided to NASA. 4. Demonstrated requirements traceability between NASA technical requirements and DCSS requirements documented through traceability matrices for the following NASA documents: a. ISS Crew Transportation and Services Requirements Document (CCT-REQ-1130). b. ISS to COTS Interface Requirements Document (SSP 50808). 5. For design options that are described in the DRD, interfaces have been identified in the provided IRDs and ICDs, and verification methods have been identified. 6. DCSS preliminary design baseline is documented in the DRD and approved by SNC Program Management. 7. Authority to proceed with detailed design approved by SNC DC Program Management. 8. Technical margins were presented during the ISBR. SNC DC Program Management has approved open work forward action plans. 9. Program risks are understood and are being addressed as defined by the RMP.

Table 2. SNC CCiCap Base Period Milestone #2—Integrated System Baseline Review.	
Entrance Criteria	**Success Criteria**
iii. Crew Systems iv. Electrical Power System v. Environmental Control and Life Support System vi. Mechanical Systems vii. Propulsion viii. Structures ix. Thermal Control System x. Thermal Protection system xi. Design Specification and architecture for the vehicle Primary Fault Tolerant Flight Computer Software xii. Launch Vehicle Specification and IRD xiii. Ground Systems Specification xiv. Mission Systems Specification xv. DC Spacecraft Specification **Note:** GNC requirements are carried in the DC Spacecraft Specification. c. The following draft, preliminary, and updated (if released since PDR) technical plans and products: i. Updated Electromagnetic Compatibility Control Plan ii. Updated Manufacturing Program Plan iii. Updated Safety and Reliability Plan iv. Updated Quality Management Plan v. Draft Occupational Safety and Health plan vi. Draft Environmental Management Plan vii. Updated Materials and Processes Plan viii. Updated Corrosion Control Plan ix. Updated Electrical, Electronic, and Electromechanical (EEE) Parts Plan x. Preliminary Master Measurement List xi. Draft Contamination Control Plan xii. Preliminary DC Hardware Accessibility List d. The draft Interface Requirements Document (IRD) with the following systems: i. Avionics ii. Communications iii. Crew Systems iv. Electrical Power System v. Environmental Control and Life Support vi. Mechanical Systems vii. Propulsion viii. Structures ix. Thermal Control System x. Thermal Protection system **Note:** ISS IRD requirements contained in DC Spacecraft Specification	

Table 2. SNC CCiCap Base Period Milestone #2—Integrated System Baseline Review.	
Entrance Criteria	**Success Criteria**
e. The following draft and updated IRD/Interface Control Documents (ICDs): i. Updated DC to MS IRD/ICD ii. Updated MS to ISS MCC-H IRD/ICD iii. Updated DC to Ground Systems IRD/ICD iv. Updated MS to GS IRD/ICD v. Draft DC to Atlas V 402 ICD f. Verification and Validation products are provided in the following documents: i. Updated Master Verification Plan ii. Updated Flight Test Validation Plan iii. Updated Structures Verification Plan iv. Updated TPS Certification Plan v. Updated DCSS SRD, DC Spacecraft Specification, and DC subsystem specifications include verification methods (inspection, analysis, demonstration, test) **Note:** Full Integrated Certification Strategy, Process, and Plan will be addressed in Milestone 7. g. Program Management Status to include: i. Program schedule ii. Programmatic risks h. Integrated DCSS Performance Summary presentation including: i. Dream Chaser Space System architectural description with functions, capabilities, and key driving design requirements summarized. ii. System level concept of operations with mission phase performance summaries. iii. Margins Management Summary (Mass, Power, Thermal, Volume, CG). iv. Integrated Thermal Analysis Summary v. Loads and Environments Summary i. Updated requirements implementation via traceability matrices, showing traceability of SNC documents (SRD, DC spec, LV spec, MS spec, GS spec, and subsystem level specification updates) to the following NASA documents: i. ISS Crew Transportation and Services Requirements Document (CCT-REQ-1130). ii. ISS to COTS Interface Requirements Document (SSP 50808). j. Risks and mitigations summary k. The following technical products have been made available to NASA prior to the review: i. Element, system (e.g., ECLSS, Propulsion), and subsystem (e.g., CO2 removal, batteries) design descriptions with applicable schematics, and flow diagrams.	

Table 2. SNC CCiCap Base Period Milestone #2—Integrated System Baseline Review.	
Entrance Criteria	**Success Criteria**
ii. DC engineering drawing trees to the assembly level. iii. Draft or updated Software Description Documents and Software Test Plans. iv. Preliminary Software Test and Integration Plan. v. Details of completed design trades since PDR. vi. Forward plan on any remaining open design trades. vii. Preliminary Communication Link Analysis and coverage. viii. Preliminary Radio Frequency Interference Analysis ix. Preliminary Instrumentation Plan x. Summary of human factors analyses and tests conducted during Design Cycle 3. xi. MMOD Analysis Report xii. Integrated Aborts Analysis update xiii. Technology maturation summary for technologies below TRL 6. xiv. System Analysis Plan for Design Cycle 4 xv. Summary of Flight Mechanics, Aerodynamics, and GNC Design Cycle 3 work. xvi. Draft ECLSS Venting Analysis xvii. Summary of Fracture and Stress Analysis during Design Cycle 3 xviii. Summary of Design Cycle 3 comparison of NASA Standards with Alternative Standards. xix. Safety and Mission Assurance Analysis Summary (Hazard Analysis, Probabilistic Safety Assessment, Failure Tolerance Assessment) **Note:** Additional System Safety Analysis Results will be discussed in detail in Milestone ISSAR1. 6. NASA invited to gain insight by participating in the processes leading to the Integrated System Baseline Review and participating in the review.	

Table 3: SNC CCiCap Base Period Milestone #3 Integrated System Safety Analysis Review #1 Entrance and Success Criteria

Table 3. SNC CCiCap Base Period Milestone #3—Integrated System Safety Analysis Review #1.

Entrance Criteria	Success Criteria
1. Provide SNC ISSAR #1 review plan identifying ISSAR #1 review data, the date the data will be available, SNC success criteria, and plan to disposition comments. Plan will be provided to NASA at least 60 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. Utilize an iterative process (per SNC ISSAR #1 review plan) for ISSAR #1 review preparation, which includes NASA and provides data throughout the process, allowing for NASA insight and feedback prior to the formal milestone. 3. Disposition NASA review plan comments and provide ISSAR #1 data for review (per SNC ISSAR #1 review plan) at least 30 days prior to review. 4. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 5. DCSS systems safety analysis has been defined to a preliminary maturity level including: a. Hazards, causes, likelihood / severity ratings b. Control strategies 6. Systems Safety and Reliability Plan has been updated to include: a. Hazard Analysis Methodology b. Phased Safety Review Process c. Safety Review Panel Process d. Approach for failure tolerance requirements and Design for Minimum Risk (DFMR) 7. The following Integrated System Safety Analysis Review #1 documentation provided to NASA prior to the review: a. Safety Analysis Report b. Safety and Reliability Plan 8. NASA invited to gain insight by participating in the Integrated System Safety Analysis Review #1.	1. Completion of the System Safety Analysis Review #1 per the review plan. 2. Provide plan for disposition of NASA comments and closure of SNC actions resulting from review. 3. Paper and electronic copy of all presentation materials provided to NASA.

Table 4: SNC CCiCap Base Period Milestone #4 Engineering Test Article Flight Testing Entrance and Success Criteria

Table 4. SNC CCiCap Base Period Milestone #4—Engineering Test Article Flight Testing.

Entrance Criteria	Success Criteria
1. ETA Flight Test Plan has been developed consisting of primary objectives, secondary objectives, configuration of the ETA, test conditions and environment, differences between Orbital Vehicle configuration and the ETA, and definition of information to be included in the post test quick look report. 2. Test plan provided to NASA at least 30 days prior to the Flight Test Readiness Review (FTRR). 3. ETA Flight Test Plan approved by SNC management. 4. Disposition of NASA comments and closure of SNC actions on Flight Test Plan prior to or at FTRR. 5. Completed the ETA Flight Test Readiness Review(s) to meet the intent of NPR 7123.1A Appendix G.14 criteria. 6. Closure of all applicable Flight Test Readiness Review actions prior to test. 7. Flight clearances have been coordinated and approved by either the FAA or through the DFRC Airworthiness and Flight Safety Review process, as appropriate. 8. Receive certification from SNC DC Program Management that integrated flight operations, including both the ETA and carrier vehicle can safely proceed. 9. Confirm that the ETA and carrier vehicle systems and support elements are properly configured and ready for captive carry flight and subsequent ETA drop. Minimum ETA systems include those required to meet the flight test objectives. 10. Completion of the carrier vehicle pilot briefing(s). 11. The following technical products have been made available to NASA prior to the milestone completion review : a. ETA Flight Test Readiness Review presentation documentation. 12. NASA invited to gain insight by participating in the build up and preparation for the flight tests, participating in all flight test readiness reviews, and observing the flight tests.	1. The ETA Flight Test(s) conducted per the approved ETA Flight Test Plan. 2. The following primary test objectives were met: [redacted] 3. Postflight quick look test report provided to NASA as defined in the Flight Test Plan 4. Paper and electronic copy of all presentation materials provided to NASA.

Table 5: SNC CCiCap Base Period Milestone #5
SNC Investment Financing #1
Entrance and Success Criteria

Table 5. SNC CCiCap Base Period Milestone #5—SNC Investment Financing #1.

Entrance Criteria	Success Criteria
1. SNC co-investment plan completed for period. Investment to be provided through one or more of the following: [redacted] g. [redacted]	1. Documentation provided that demonstrates SNC investments were committed to the CCiCap effort.

Table 6: SNC CCiCap Base Period Milestone #6 Integrated System Safety Analysis Review #2 Entrance and Success Criteria

Table 6. SNC CCiCap Base Period Milestone #6—Integrated System Safety Analysis Review #2

Entrance Criteria	Success Criteria
1. Provide SNC ISSAR #2 review plan identifying ISSAR #2 review data, the date the data will be available, SNC success criteria, and plan to disposition comments. Plan will be provided to NASA at least 60 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. Utilize an iterative process (per SNC ISSAR #2 review plan) for ISSAR #2 review preparation, which includes NASA and provides data throughout the process, allowing for NASA insight and feedback prior to the formal milestone. 3. Disposition NASA review plan comments and provide ISSAR #2 data for review (per SNC ISSAR #2 review plan) at least 30 days prior to review. 4. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 5. DCSS systems safety analysis has been defined to a pre-CDR maturity level, including: a. Hazards, causes, and likelihood / severity ratings b. Mitigations identified for eliminating, reducing, or controlling hazards c. Safety verification methods. d. Design for Minimum Risk (DFMR) items. 6. SNC Safety Review Panel has reviewed and concurred on hazard reports. NASA will be invited to participate in SRP. 7. Determined and documented compliance with NASA safety requirements in CCT-1100 series and SSP 50808 requirements. 8. The following Integrated System Safety Analysis Review #2 documentation provided to NASA prior to the review: a. Safety Analysis Report b. Requirements Compliance matrix 9. NASA invited to gain insight by participating in the hazard analysis process, the Safety Review Panel, and the Integrated System Safety Analysis Review #2.	1. Completion of System Safety Analysis Review #2 per review plan. 2. Potential non-compliances with NASA safety requirements in CCT-1100 series and SSP 50808 requirements or the SNC Human Rating Certification Plan have been identified for action. 3. Provide plan for disposition of NASA comments and closure of SNC actions resulting from the review. 4. Paper and electronic copy of all presentation materials provided to NASA.

Table 7: SNC CCiCap Base Period Milestone #7 Certification Plan Review Entrance and Success Criteria

Table 7. SNC CCiCap Base Period Milestone #7—Certification Plan Review.

Entrance Criteria	Success Criteria
1. Provide SNC Certification Plan review plan identifying review data, the date the data will be available, SNC success criteria, and plan to disposition comments. Plan will be provided to NASA at least 60 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. Utilize an iterative process (per SNC review plan) for review preparation, which includes NASA and provides data throughout the process, allowing for NASA insight and feedback prior to the formal milestone. 3. Disposition NASA review plan comments and provide data for review (per SNC review plan) at least 30 days prior to review. 4. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 5. The following Certification Plan Review documentation provided to NASA at least 30 days prior to the review: [redacted]	1. Completion of Certification Plan review per review plan. 2. Provide plan for disposition of NASA comments and closure of SNC actions resulting from the review. 3. SNC DC Program Management approval of the DCSS Certification Plan, verification/validation approach, and configuration management system required for data archival to support certification. 4. Paper and electronic copy of all presentation materials provided to NASA.

Table 7. SNC CCiCap Base Period Milestone #7—Certification Plan Review.

Entrance Criteria	Success Criteria
 6. NASA invited to gain insight by participating in the Certification Plan Review.	

Table 8: SNC CCiCap Base Period Milestone #8
Wind Tunnel Testing
Entrance and Success Criteria

Table 8. SNC CCiCap Base Period Milestone #8—Wind Tunnel Testing.

Entrance Criteria	Success Criteria
1. Contracts in place for wind tunnel usage for testing of transonic and supersonic regimes of the DC vehicle alone, and the DC/Atlas ascent configuration. 2. Model/instrumentation design packages have been completed and approved by SNC Analysis integrated Product Team. 3. Delivery of wind tunnel models is complete and accepted by SNC. 4. Wind Tunnel Test Plan has been developed consisting of primary objectives, secondary objectives, configuration of model(s), test conditions and environment, differences between the OV configuration and the model(s), and definition of information to be included in the post test quick look report. 5. Test plan provided to NASA at least 30 days prior to the Test Readiness Review (TRR). 6. Test plan(s) approved by SNC DC Program Management. 7. Disposition of NASA comments and closure of SNC actions for final test plan prior to or at TRR. 8. Completion of Wind Tunnel Test Readiness Review(s) to meet the intent of NPR 7123.1A Appendix G.11 criteria. 9. Closure of all applicable Test Readiness Review actions prior to test. 10. SNC Analysis Integrated Product Team has approved the plans for model installation, instrumentation calibration, test procedures including model configuration changes, the proposed run schedule, and data products. 11. Certification received from SNC DC Program Management that testing is ready to proceed. 12. The following technical products have been made available to NASA prior to the milestone completion review: a. Test Readiness Review presentation documentation. 13. NASA invited to gain insight by participating in the build up and preparation for the wind tunnel tests, to participate in all wind tunnel readiness reviews, and to observe wind tunnel tests.	1. Wind tunnel tests conducted from [redacted] for the DC vehicle and achieved the following objectives. [redacted] 2. Wind tunnel tests were completed for the integrated DC/Atlas and achieved the following objectives. [redacted] 3. Post test quick look report(s) provided to NASA as defined in the Test Plan. 4. Paper and electronic copy of all presentation materials provided to NASA.

Table 9: SNC CCiCap Base Period Milestone #9 Risk Reduction and TRL Advancement Testing Entrance and Success Criteria

Table 9. SNC CCiCap Base Period Milestone #9—Risk Reduction and TRL Advancement Testing.

Entrance Criteria	Success Criteria
1. The following pre-test actions are completed for each subsystem test listed below: a. Test Plan(s) have been developed consisting of primary objectives, secondary objectives, configuration of subsystem, test conditions and environment, differences between the tested subsystem and the OV subsystem, and definition of information to be included in the post test quick look report. b. Test plan(s) provided to NASA at least 30 days prior to Test Readiness Review (TRR). c. Test plan(s) approved by SNC DC Program management. d. Disposition of NASA comments and closure of SNC actions for Test Plan prior to or at TRR. e. Test procedures are approved by the applicable Integrated Product Team. f. Test hardware is delivered to the test facility, integrated, and ready for testing. g. Completion of the Test Readiness Review to meet the intent of NPR 7123.1A Appendix G.11 criteria Closure of all applicable Test Readiness Review actions prior to test. h. Certification received from SNC DC Program Management that testing is ready to proceed. i. The following technical products have been made available to NASA prior to the milestone completion review: i. Test Plans. ii. Test Readiness Review presentations documentation. 2. NASA invited to participate in the build up and preparation for the tests, to participate in all test readiness reviews, and to observe testing. 3. Specific Risk Reduction and TRL advancement testing: a. Crew Systems [redacted]	1. Risk reduction and TRL advancement testing conducted for the DC vehicle systems per the applicable test plans. a. Crew Systems tests were completed and achieved the following objectives: [redacted] b. ECLSS Integrated Performance Testing was completed and achieved the following objectives: [redacted] c. Structures tests were completed and achieved the following objectives: [redacted]

Table 9. SNC CCiCap Base Period Milestone #9—Risk Reduction and TRL Advancement Testing.

Entrance Criteria	Success Criteria
[redacted] b. Environmental Control and Life Support System (ECLSS) [redacted] c. Structures [redacted] d. Thermal Control System (TCS) [redacted] e. Thermal Protection System (TPS) [redacted] ii. [redacted]	[redacted] d. Thermal Control System tests were completed and achieved the following objectives: [redacted] e. Thermal Protection System tests were completed and achieved the following objectives: [redacted]

Table 9. SNC CCiCap Base Period Milestone #9—Risk Reduction and TRL Advancement Testing	
Entrance Criteria	**Success Criteria**
	[redacted] 2. Post test quick look report(s) provided to NASA as defined in the test plans. 3. Paper and electronic copy of all presentation materials provided to NASA. 4. The Certification Plan has been updated to show traceability to the applicable elements of this test. 5. Trace to the Certification Plan presented at the milestone review meeting.

Table 9a: SNC CCiCap Base Period Milestone #9a
Main Propulsion and RCS Risk Reduction and TRL Advancement Testing
Entrance and Success Criteria

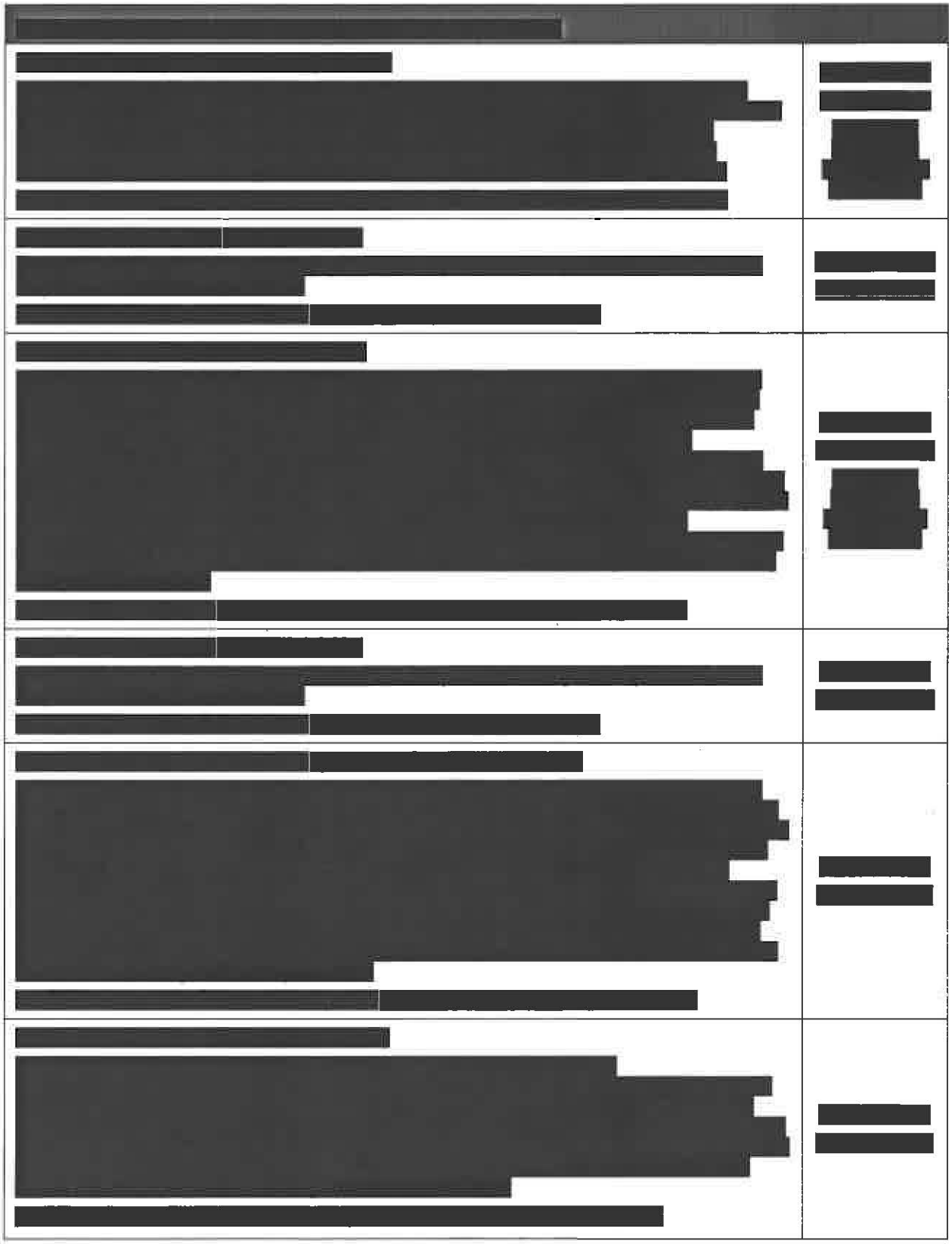
Table 9a. SNC CCiCap Base Period Milestone #9a—Main Propulsion and RCS Risk Reduction and TRL Advancement Testing.

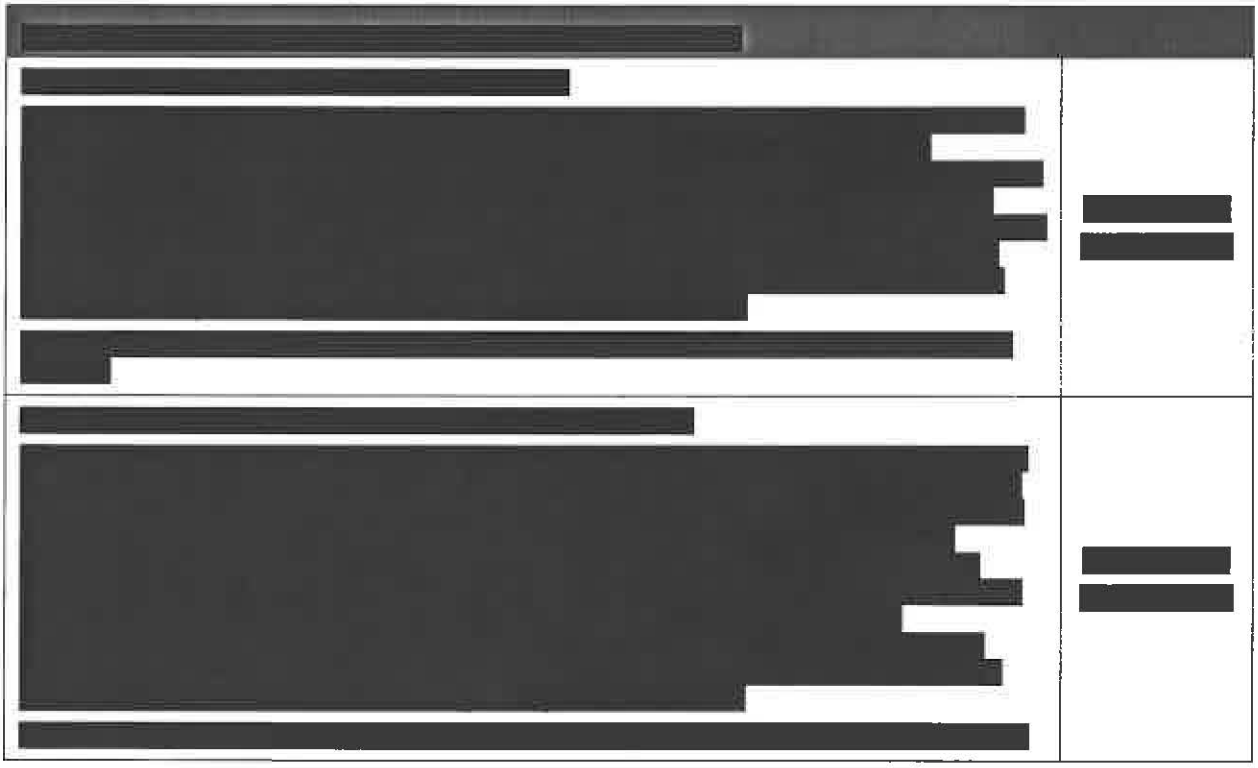
Entrance Criteria	Success Criteria
1. The following pre-test actions are completed for each subsystem test listed below: a. Test Plan(s) have been developed consisting of primary objectives, secondary objectives, configuration of subsystem, test conditions and environment, differences between the tested subsystem and the OV subsystem, and definition of information to be included in the post test quick look report. b. Test plan(s) provided to NASA at least 30 days prior to Test Readiness Review (TRR). c. Test plan(s) approved by SNC DC Program management. d. Disposition of NASA comments and closure of SNC actions for Test Plan prior to or at TRR. e. Test procedures are approved by the applicable Integrated Product Team. f. Test hardware is delivered to the test facility, integrated, and ready for testing. g. Completion of the Test Readiness Review to meet the intent of NPR 7123.1A Appendix G.11 criteria Closure of all applicable Test Readiness Review actions prior to test. h. Certification received from SNC DC Program Management that testing is ready to proceed. i. The following technical products have been made available to NASA prior to the milestone completion review: i. Test Plans. ii. Test Readiness Review presentations documentation. 2. NASA invited to participate in the build up and preparation for the tests, to participate in all test readiness reviews, and to observe testing. 3. Specific Risk Reduction and TRL advancement testing: a. Main Propulsion System (MPS) [redacted] b. Reaction Control System (RCS)	1. Risk reduction and TRL advancement testing conducted for the DC vehicle systems per the applicable test plans. a. Main Propulsion System tests were completed and achieved the following objectives: [redacted] b. RCS thruster development tests were completed and achieved the following objectives: [redacted]

Table 9a. SNC CCiCap Base Period Milestone #9a—Main Propulsion and RCS Risk Reduction and TRL Advancement Testing.

Entrance Criteria	Success Criteria
[redacted] d)	[redacted] 2. Post test quick look report(s) provided to NASA as defined in the test plans. 3. Paper and electronic copy of all presentation materials provided to NASA. 4. The Certification Plan has been updated to show traceability to the applicable elements of this test. 5. Trace to the Certification Plan presented at the milestone review meeting.

Appendix 2b Optional Period Optimized Funding Profile Milestones





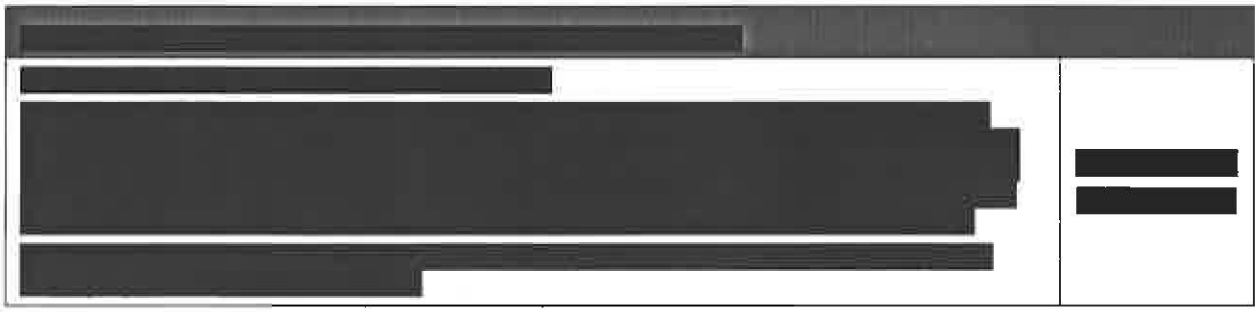


Table 10: SNC CCiCap Optional Period Milestone #10

[redacted]

Entrance and Success Criteria

Table 11: SNC CCiCap Optional Period Milestone #11

[redacted]

Entrance and Success Criteria

Table 12: SNC CCiCap Optional Period Milestone #12

[redacted]

Entrance and Success Criteria

Table 13: SNC CCiCap Optional Period Milestone #13

[redacted]

Entrance and Success Criteria

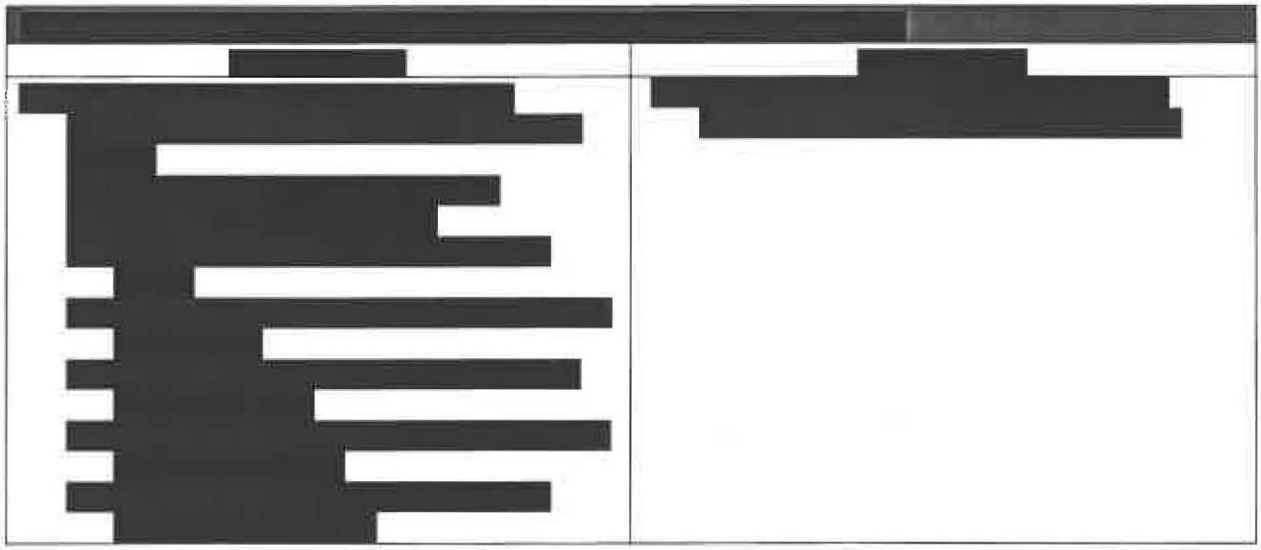


Table 14: SNC CCiCap Optional Period Milestone #14

[redacted]

Entrance and Success Criteria

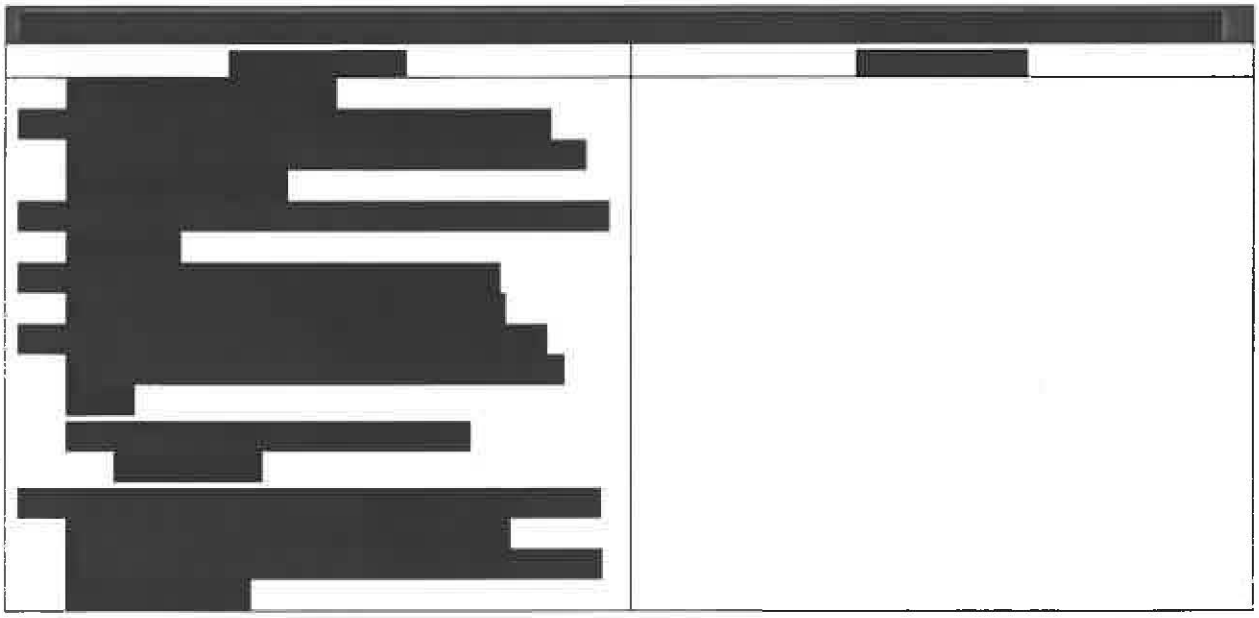


Table 15: SNC CCiCap Optional Period Milestone #15

[redacted]

Entrance and Success Criteria

Table 16: SNC CCiCap Optional Period Milestone #16

[redacted]

Entrance and Success Criteria

[redacted]

Table 17: SNC CCiCap Optional Period Milestone #17

[redacted]

Entrance and Success Criteria

[redacted]

Table 18: SNC CCiCap Optional Period Milestone #18

[redacted]

Entrance and Success Criteria

[redacted]

Table 19: SNC CCiCap Optional Period Milestone #19

[redacted]

Entrance and Success Criteria

[redacted]	[redacted]
[redacted]	[redacted]

Table 20: SNC CCiCap Optional Period Milestone #20

[redacted]

Table 21: SNC CCiCap Optional Period Milestone #21

[redacted]

Entrance and Success Criteria

Table 22: SNC CCiCap Optional Period Milestone #22

[redacted]

Entrance and Success Criteria

[redacted]

Table 23: SNC CCiCap Optional Period Milestone #23

[redacted]

Entrance and Success Criteria

Table 24: SNC CCiCap Optional Period Milestone #24

[redacted]

Entrance and Success Criteria

[redacted]	[redacted]
[redacted]	[redacted]

Table 25: SNC CCiCap Optional Period Milestone #25

[redacted]

Entrance and Success Criteria

Table 26: SNC CCiCap Optional Period Milestone #26

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Entrance and Success Criteria

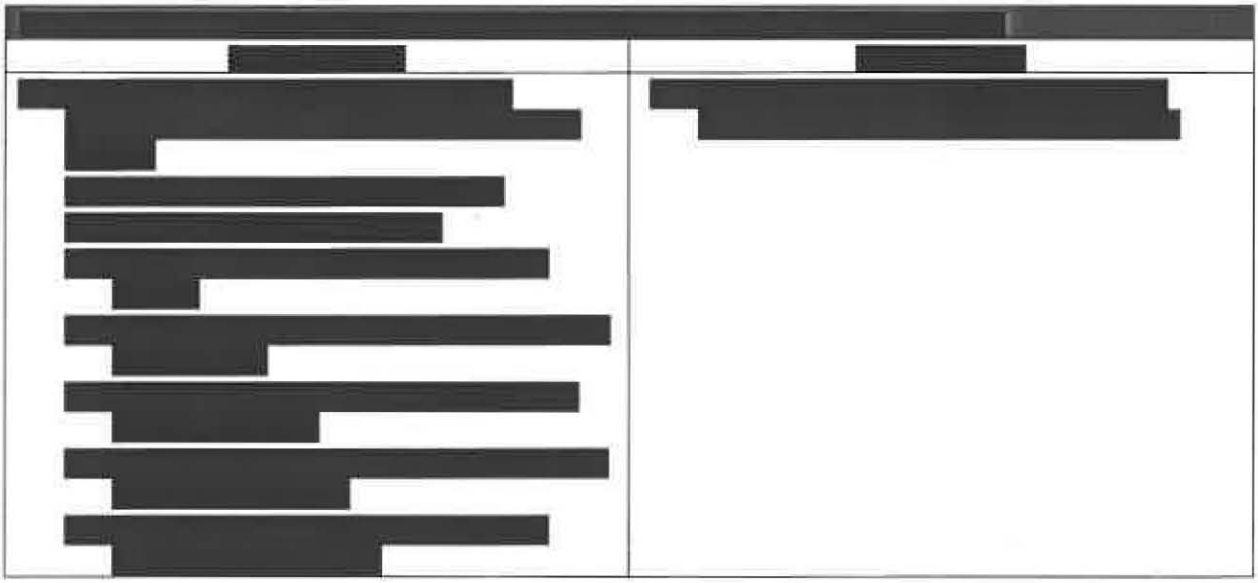


Table 27: SNC CCiCap Optional Period Milestone #27

[redacted]

Entrance and Success Criteria

Table 28: SNC CCiCap Optional Period Milestone #28

[redacted]

Entrance and Success Criteria

Table 29: SNC CCiCap Optional Period Milestone #29

[redacted]

Entrance and Success Criteria

Table 30: SNC CCiCap Optional Period Milestone #30

[redacted]

Entrance and Success Criteria

[redacted]

Table 31: SNC CCiCap Optional Period Milestone #31

[redacted]

Entrance and Success Criteria

Table 32: SNC CCiCap Optional Period Milestone #32

[redacted]

Entrance and Success Criteria

[redacted]	[redacted]
[redacted]	[redacted]

Table 33: SNC CCiCap Optional Period Milestone #33

[redacted]

Entrance and Success Criteria

[redacted]

Table 34: SNC CCiCap Optional Period Milestone #34

[redacted]

Entrance and Success Criteria

[redacted]	[redacted]
[redacted]	[redacted]

Table 35: SNC CCiCap Optional Period Milestone #35

[redacted]

Entrance and Success Criteria

Table 36: SNC CCiCap Optional Period Milestone #36

[redacted]

Entrance and Success Criteria

Table 37: SNC CCiCap Optional Period Milestone #37

[redacted]

Entrance and Success Criteria

Table 38: SNC CCiCap Optional Period Milestone #38

[redacted]

Entrance and Success Criteria

[redacted]	[redacted]
[redacted]	[redacted]

Table 39: SNC CCiCap Optional Period Milestone #39

[redacted]

Entrance and Success Criteria

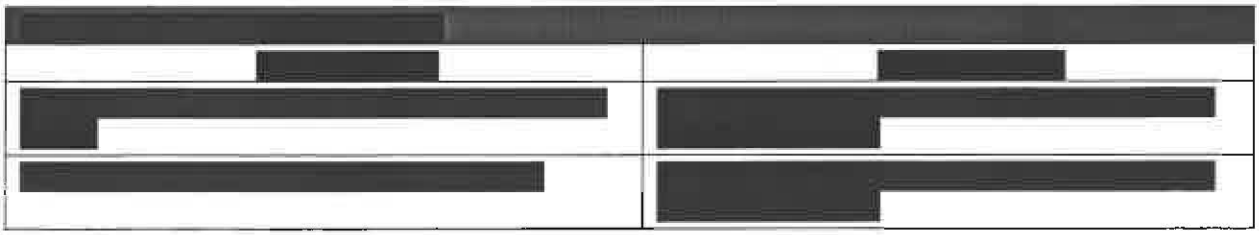
[redacted]

Table 40: SNC CCiCap Optional Period Milestone #40

[redacted]

Entrance and Success Criteria

Appendix 3 Intellectual Propery and Data Rights - Background Data



SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT ONE (01)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to make the following corrections to Space Act Agreement NNK12MS03S:

1.) Article 12.B(2) is modified to change the phrase "any milestone" to "all milestones".
2.) Article 12.B(3) language is modified, subparagraph (a) and Table 12.3(a) are removed.
3.) Article 12.C(2) is modified to change "all milestone" to "all milestones".
4.) Article 12.H(1)(b) is modified to move the last sentence to start a new paragraph and correct the numbering on the subsequent paragraphs.
5.) Article 16.D is modified to move the last two sentences of 16(D)(2) to be a separate paragraph- 16(D)(3).
6.) Appendix 3 is modified to add "Data produced under NNK11MS01S (SNC CCDev2 SAA), NNK11MS05S (ULA CCDev2 SAA) and NNJ10TA06S (ULA CCDev SAA)"

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA Paragraph B(2) is modified to be the following:

(2) Upon a successful completion by SNC of all milestones under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA shall retain the right to: (1) maintain a copy of such Data for archival purposes; and (2) use or disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that...

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA Paragraph B(3) is modified to be the following:

(3) In the event NASA terminates this Agreement in accordance with Article 16.B., Termination for Failure to Perform, NASA shall have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by SNC in carrying out SNC's responsibilities under this Agreement by or on behalf of NASA for Government purposes.

(a) [RESERVED]

(b) NASA and SNC, by mutual agreement may choose to negotiate rights in Data in the event of termination for any other reason.

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA Paragraph C(2) is modified to be the following:

(2) Upon a successful completion by SNC of all milestones under this Agreement, NASA shall not use such Data for any purpose except that NASA shall retain the right to: (1) maintain and reproduce copies of such Data for archival purposes; and (2) use or disclose such archived Data by or on behalf of the NASA for Government purposes in the event the NASA determines that...

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA Paragraph H is modified to be the following:

H. Handling of Data

(1) In the performance of this Agreement, SNC and any Related Entity of SNC may have access to, be furnished with, or use the following categories of Data:

(a) Proprietary Data of third parties that the U.S. Government has agreed to handle under protective arrangements; and/or

(b) U.S. Government Data, the use and dissemination of which, the U.S. Government intends to control.

(2) Data provided by the U.S. Government under the Agreement

(a) The Parties agree that, during the term of this Agreement, SNC may request from NASA, and NASA may provide, Proprietary Data of third parties, with the express understanding that SNC will use and protect such Data in accordance with this Article.

(b) The Parties agree that, during the term of this Agreement, SNC may request from NASA, and NASA may provide, U.S. Government Data, with the express understanding that SNC will use and protect such U.S. Government Data in accordance with this Article.

(c) At the time of execution of this Agreement, the Parties agree that the following software and related Data will be provided to SNC to the extent NASA has determined it has the right to distribute, under a separate Software Usage Agreement with the express understanding that SNC will use and protect such related Data in accordance with this Article...

ARTICLE 16. TERMINATION Paragraph D(2) is modified to be the following and create D(3):

(2) Upon receipt of written notification that the Government is unilaterally terminating this Agreement, SNC shall immediately stop work under this Agreement and shall immediately cause any and all of its partners, subcontractors and suppliers to cease work, except to the extent that SNC wishes to pursue the activities defined in Appendix 2 exclusively using its own funding.

(3) Upon such a termination, NASA and SNC agree to negotiate in good faith a final settlement payment to be made by NASA. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone of this Agreement and any payment is subject to the provisions of Article 5.

Appendix 3 Intellectual Property and Data Rights - Background Data is modified to add the following to the list:

"Data produced under NNK11MS01S (SNC CCDev2 SAA), NNK11MS05S (ULA CCDev2 SAA) and NNJ10TA06S (ULA CCDev SAA)"

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: _____ for

William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 5 March 2013

SIERRA NEVADA CORPORATION

BY: _____

Rita Tozzie
Sr. Contract Manager
Sierra Nevada Corporation

DATE: **5 March 2013**

SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT TWO (02)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to make the following changes to Space Act Agreement NNK12MS03S:

1) Split Optional Milestone 10, *Integrated Critical Design Review*, into two milestones (10a and 10b) and then add Optional Milestone 10a as a base milestone.
2) Split Optional Milestone 15, *Reaction Control System Testing*, into two milestones (15a and 15b) and then add Optional Milestone 15a as a base milestone.
3) Extend the Term of Agreement in Article 15

****

1) Optional Milestone 10, *Integrated Critical Design Review*, is split into Milestone 10a and 10b. Milestone 10a is added to the base milestones in Appendix 2.a. while Milestone 10b remains an optional milestone in Appendix 2.b.

    a. Appendix 2.a., *Base Period Performance Milestones*, is updated to incorporate Milestone 10a and Table 10a:

Milestone	
Milestone 10a: Critical Design Review (CDR) Incremental Design Review #1 **Scope:** The CDR Incremental Design Review (IDR) #1 is the first of a series of reviews that support the Dream Chaser Space System (Dream Chaser Spacecraft, Launch Vehicle, Mission and Ground Systems) ICDR. **Success Criteria:** Completion of the CDR Incremental Design Review #1 as described in Table 10a.	Amount: $5M Date: Oct 2013

Table 10a. SNC CCiCap Milestone #10a—CDR Incremental Design Review #1.	
Entrance Criteria	**Success Criteria**
1. Provide SNC IDR #1 review plan identifying IDR #1 review data, the date data will be available, SNC success criteria, and plan to	1. Completion of CDR Incremental Design Review #1 per the review plan. 2. Provide plan for disposition of NASA

Table 10a. SNC CCiCap Milestone #10a—CDR Incremental Design Review #1.	
Entrance Criteria	**Success Criteria**
disposition comments. Plan will be provided to NASA at least 60 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. Utilize an iterative process (per SNC IDR #1 review plan) for IDR #1 review preparation, which includes NASA and provides data throughout the process, allowing for NASA insight and feedback prior to the formal milestone. 3. Disposition NASA review plan comments and provide IDR #1 data for review (per SNC IDR #1 review plan) at least 30 days prior to review. 4. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 5. The following Incremental Design Review products and documentation provided to NASA at least 30 days prior to the review. Draft indicates the product has not been released, final indicates the product has been released at CDR level maturity and is being configuration managed, updated indicates products that are updated, released, and configuration managed but will be finalized in subsequent IDRs as all components and systems are matured to a CDR level of maturity: a. Updated baseline documentation if there has been a release since ISBR: i. Flight Test Campaign-1 (FTC-1) Architecture Design Document (updated) which includes documentation of differences between FTC-1 and the Orbital Vehicle (OV) ii. FTC-1 CAD Model Summary (updated) iii. FTC-1 Master Equipment List (updated) iv. FTC-1 Power Equipment List (updated) v. Configuration Management Plan (final)	comments and closure of SNC actions resulting from review. 3. Program risks are understood and are being addressed as defined by the RMP. 4. Paper and electronic copy of all presentation materials provided to NASA.

Table 10a. SNC CCiCap Milestone #10a—CDR Incremental Design Review #1.	
Entrance Criteria	**Success Criteria**
vi. Risk Management Plan (final) vii. Systems Engineering Management Plan (final) viii. FTC-1 Environmental Design Database (includes natural and induced design-to environments) (updated) ix. FTC-1 Driving Scenarios, Timelines, and Ground Rules Document (updated) x. Electromagnetic Compatibility Control Plan (final) xi. Safety and Reliability Plan (final) xii. Quality Management Plan (final) xiii. Environmental Management Plan (final) xiv. Materials and Processes Plan (final) xv. Corrosion Control Plan (final) xvi. Contamination Control Plan (final) xvii. Instrumentation Plan (final) b. Program Management Status to include: i. Program schedule (updated) ii. Programmatic risks (updated) 6. NASA invited to gain insight by participating in the IDR and the IDR Board.	

[redacted]

Milestone	
[redacted]	[redacted]

2) Optional Milestone 15, *Reaction Control System Testing*, is split into Milestone 15a and 15b. Milestone 15a is added to the base milestones in Appendix 2.a. while Milestone 15b remains an optional milestone in Appendix 2.b.

   a. Appendix 2.a., *Base Period Performance Milestones*, is updated to incorporate Milestone 15a and Table 15a:

Milestone	
Milestone 15a: Reaction Control System Testing - Incremental Test #1 **Scope:** The purpose of the test on this pre-qualification unit is to support eventual qualification/certification by testing the thruster in flight-like environments. Elements from this testing will satisfy certification requirements per the SNC Certification Plan. Trace to the Certification Plan will be presented at the milestone review meeting. The Reaction Control System (RCS) test will be conducted by firing a reaction control thruster in a vacuum environment. Thruster will include a chamber of flight-like columbium material. Test will be conducted in a test chamber with propellants provided through ground support facilities. **Success Criteria:** Completion of RCS testing meeting objectives described in Table 15a.	Amount: $10M Date: July 2014

Table 15a. SNC CCiCap Optional Period Milestone #15a — Reaction Control System Testing - Incremental Test #1.

Entrance Criteria	Success Criteria
1. RCS Test Plan has been developed consisting of primary objectives, secondary objectives, configuration of thruster/system, test conditions and environments, differences between the flight unit configuration and the pre-qualification unit, and definition of information to be included in the post test quick look report. 2. Test plan provided to NASA at least 30 days prior to TRR. 3. RCS Test Plan approved by SNC DC Program Management. 4. Disposition of NASA comments and closure of SNC actions for final test Plan prior to or at Test Readiness Review. 5. Test facility checked out and ready for testing, including vacuum chamber and fluid system verifications. 6. Fabrication and delivery of RCS thruster hardware. 7. RCS thruster hardware inspected and accepted ready for testing.	1. RCS thruster testing conducted per the test plan. 2. The following primary test objectives were met: a. Obtained data on start up and shutdown transients: i. Temperature transients. ii. Igniter timing. iii. Thermal soak back. b. Obtained data on steady state performance in a vacuum: i. Thermal soak back. ii. Thrust. iii. Isp. 3. Post test quick look report provided to NASA as defined in the Test Plan. 4. Paper and electronic copy of all presentation materials provided to NASA. 5. The Certification Plan has been updated to show traceability to the applicable

8. Completion of the Test Readiness Review to meet the intent of NPR 7123.1A Appendix G.11 criteria. Closure of all applicable Test Readiness Review actions prior to test. 9. Certification received from SNC DC Program Management that testing is ready to proceed. 10. The following technical products have been made available to NASA prior to the milestone completion review: a. Test Readiness Review presentation documentation. 11. NASA invited to gain insight by participating in the build up and preparation for the tests, participating in all test readiness reviews, and observing the tests.	elements of this test. 6. Trace to the Certification Plan presented at the milestone review meeting.

[redacted]

Milestone	
[redacted]	[redacted]

3) The date referenced in Article 15, TERM OF AGREEMENT is updated from May 31, 2014 to August 31, 2014. Article 15 is updated to the following:

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or August 31, 2014, whichever comes first.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

BY: William H Gerstenmaier

William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 7 Aug 2013

SIERRA NEVADA CORPORATION

BY: Rita Tozzie

Rita Tozzie
Sr. Contract Manager
Sierra Nevada Corporation

DATE: 17 July 2013

SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT THREE (03)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to extend the term of the agreement to allow completion of the work associated with Milestone 4b ETA Flight Testing #2.

Article 15 is modified as follows:

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or March 31, 2015, whichever comes first.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: _____
William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 19 MAY 2014

SIERRA NEVADA CORPORATION

BY: _____
Rita Tozzie
Sr. Contract Manager
Sierra Nevada Corporation

DATE: May 15, 2014

SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT FOUR (04)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to extend the term of the agreement to allow completion of the work associated with Milestone 4b ETA Flight Testing #2 and to add an unfunded milestone.

1. Article 15 is modified as follows:

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or March 31, 2016, whichever comes first.

2. Appendix 2.a., *Base Period Performance Milestones*, is updated to incorporate Milestone 41 and Table 41:

Milestone 41: Design Analysis Cycle-6 (DAC-6) Closeout Review **Scope:** The DAC-6 Closeout Review is the culmination of the Preliminary Design Review to Critical Design Review (CDR) level design maturation that demonstrates the Crew Transportation System (CTS) integrated vehicle and operations design of the Dream Chaser Space System (DCSS) consisting of Dream Chaser spacecraft, Atlas launch vehicle, Mission Systems, and Ground Systems supports proceeding with the CTS CDR. The DAC-6 Closeout is a pre-CDR level review that demonstrates the DCSS design meets Sierra Nevada Corporation (SNC) system requirements with acceptable risk, within schedule constraints, and with sufficient design maturity to proceed to the systems level detailed design reviews. Review will show latest architecture for all elements and subsystems and will demonstrate how design meets SNC requirements with appropriate verification and validation activities in work to certify the entire system. **Success Criteria:** Completion of the DAC-6 Close-Out Review as described in Table 41.	Amount: Unfunded Date: Nov 2015

Table 41: SNC CCiCap Base Period Milestone #41
Design Analysis Cycle Six (DAC-6) Closeout Review
Entrance and Success Criteria

Table 41. SNC CCiCap Milestone 41—Design Analysis Cycle-6 (DAC-6) Closeout Review	
Entrance Criteria	**Success Criteria**
1. Provide SNC DAC-6 review plan identifying DAC-6 review data, the date the data will be available, SNC success criteria. Plan will be provided to NASA at least 30 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 3. NASA invited to gain insight by participating in the processes leading to the DAC-6 review and participating in the review.	1. Completion of DAC-6 Review per the review plan. 2. SNC Driving Requirements presented to SNC management which demonstrates how DCSS Design meets the driving requirements with acceptable risk. 3. DAC-6 Design baseline is documented in the Dream Chaser Design Reference Document and approved by SNC Program Management. 4. Authority to proceed with detailed design approved by SNC DC Program Management. 5. Technical margins were presented during the DAC-6 Review. SNC DC Program Management has approved open work forward action plans. 6. Program risks are understood and are being addressed as defined by the RMP.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: William H Gerstenmaier

William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 2 March 2015

SIERRA NEVADA CORPORATION

BY: Rita Tozzie

Rita Tozzie
Director of Contracts
Sierra Nevada Corporation

DATE: 02/27/2015

SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT FIVE (05)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to extend the term of the agreement to allow completion of the work associated with Milestone 4b ETA Flight Testing #2 and unfunded Milestone 41 Design Analysis Cycle-6 (DAC-6) Closeout Review.

Article 15 is modified as follows:

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or August 1, 2017, whichever comes first.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: _____
William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 18 MARCH 2016

SIERRA NEVADA CORPORATION

BY: _____
Rita Tozzie
Director of Contracts
Sierra Nevada Corporation

DATE: 15 March 2016

SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT SIX (06)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to extend the term of the agreement, change Milestone 41 date and content, and add 8 unfunded milestones.

1. Article 15 is modified as follows:

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or August 1, 2022, whichever comes first.

2. Appendix 2.a. *Base Period Performance Milestones*, is updated to change Milestone 41 date and content, and to add 8 unfunded milestones as identified in the attachments.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: William H. Gerstenmaier

William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 25 May 2017

SIERRA NEVADA CORPORATION

BY: Rita Tozzie

Rita Tozzie
Director of Contracts
Sierra Nevada Corporation

DATE: 6/14/2017

Attachment to SNC CCiCap Amendment 06
Milestone 41 Changes

Appendix 2.a., *Base Period Performance Milestones*, is updated to modify Milestone 41 and Table 41:

FROM:

Milestone 41: Design Analysis Cycle-6 (DAC-6) Closeout Review **Scope:** The DAC-6 Closeout Review is the culmination of the Preliminary Design Review to Critical Design Review (CDR) level design maturation that demonstrates the Crew Transportation System (CTS) integrated vehicle and operations design of the Dream Chaser Space System (DCSS) consisting of Dream Chaser spacecraft, Atlas launch vehicle, Mission Systems, and Ground Systems supports proceeding with the CTS CDR. The DAC-6 Closeout is a pre-CDR level review that demonstrates the DCSS design meets Sierra Nevada Corporation (SNC) system requirements with acceptable risk, within schedule constraints, and with sufficient design maturity to proceed to the systems level detailed design reviews. Review will show latest architecture for all elements and subsystems and will demonstrate how design meets SNC requirements with appropriate verification and validation activities in work to certify the entire system. **Success Criteria:** Completion of the DAC-6 Close-Out Review as described in Table 41.	Amount: Unfunded Date: July 2017

Table 41: SNC CCiCap Base Period Milestone #41
Design Analysis Cycle Six (DAC-6) Closeout Review
Entrance and Success Criteria

Table 41. SNC CCiCap Milestone 41—Design Analysis Cycle-6 (DAC-6) Closeout Review	
Entrance Criteria	**Success Criteria**
1. Provide SNC DAC-6 review plan identifying DAC-6 review data, the date the data will be available, SNC success criteria. Plan will be provided to NASA at least 30 days prior to review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. SNC's safety product review, maturation, and approval process, and NASA's role in the SNC process will be described in the Safety and Reliability plan. 3. NASA invited to gain insight by participating in the processes leading to the DAC-6 review and participating in the review.	1. Completion of DAC-6 Review per the review plan. 2. SNC Driving Requirements presented to SNC management which demonstrates how DCSS Design meets the driving requirements with acceptable risk. 3. DAC-6 Design baseline is documented in the Dream Chaser Design Reference Document and approved by SNC Program Management. 4. Authority to proceed with detailed design approved by SNC DC Program Management. 5. Technical margins were presented during the DAC-6 Review. SNC DC Program Management has approved open work forward action plans. 6. Program risks are understood and are being addressed as defined by the RMP.

Attachment to SNC CCiCap Amendment 06
Milestone 41 Changes

TO:

Milestone	Date
Milestone 41: Design Analysis Cycle (DAC) 6 Closeout Review **Scope:** The DAC-6 Closeout Review will identify crew mission unique subsystems and elements not contained within the Dream Chaser Cargo System (DCCS) design to be added to the crewed mission architecture and certified for crewed flight. SNC will show a summary of how the crewed elements will be integrated into the Dream Chaser cargo design and certified for crewed orbital flight. **Success Criteria:** Completion of the DAC-6 Closeout Review as described in Table 41	Amount: Unfunded Date: July 2018

***Table 41. SNC CCiCap Milestone #41*— Design Analysis Cycle (DAC) 6 Closeout Review**	
Entrance Criteria	**Success Criteria**
1. Provide SNC DAC-6 review plan identifying review agenda, the date review data will be available, and SNC success criteria. Plan will be provided to NASA approximately 90 days prior to the review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. NASA invited to gain insight by participating in the processes leading to the DAC-6 review and participating in the review.	1. Completion of the DAC-6 Review per the review plan 2. SNC crew mission driving requirements presented to SNC management which describe how Dream Chaser Space System (DCSS) Design meets the driving requirements with acceptable risk. 3. DAC-6 Design baseline is documented in the Dream Chaser Design Reference Document and approved by SNC Program Management. 4. Technical margins were presented during the DAC-6 Review. SNC DC Program Management has approved open work forward action plans. 5. Program risks are understood and are being addressed as defined by the SNC Risk Management Plan.

Attachment to SNC CCiCap Amendment 06
New Milestones

Appendix 2.a., *Base Period Performance Milestones*, is updated to add the following milestones:

Milestone	Date
Milestone 42: Dream Chaser RCS Development Testing Recent Progress and Status **Description:** The purpose of this review is to summarize the development testing completed on the Dream Chaser Reaction Control System (RCS) Thruster design since CCiCap Milestone 15a was completed. NASA will be invited to observe relavent RCS testing event(s) prior to this milestone. **Success Criteria:** Completion of RCS Development Testing as described in Table 42.	Date: 1st Qtr CY 2018 (Specific date(s) shall be established via mutual agreement at least 2 months prior to the milestone)
Milestone 43: Aero Database Review **Description:** The purpose of this comprehensive review is to detail Dream Chaser Cargo System (DCCS) aero database maturity after completion of planned DCCS wind tunnel testing activities. The aero DCCS database updates include consequences of outer mold line (OML) changes from the crewed Dream Chaser (DC) to the Uncrewed Dream Chaser (UDC) (e.g. removal of UDC windows allow for improved aerodynamics). Updates also include data integration from multiple sources including extensive new Computational Fluid Dynamics (CFD) analysis cases, new wind tunnel tests, the Engineering Test Article (ETA) Approach and Landing Test #2 (ALT-2) flight test, and the Entry, Descent and Landing (EDL) mission phase. A number of effective aerodynamics TIMs occurred during funded CCiCap work which demonstrated lifting body design capability to safely return to Earth, as well as during ascent abort scenarios. Milestone 43 will cover the EDL portion of aerodynamics to update the NASA aerodynamics community on the SNC DCCS design as compared to the crewed Dream Chaser Space System (DCSS) variant. **Success Criteria:** Completion of Aero Database Review objectives described in Table 43.	Date: 2nd Qtr CY 2018 (Specific date(s) shall be established via mutual agreement of the parties at least 2 months prior to the milestone)
Milestone 44: Lessons Learned For Commercial Crew Transportation Technical Interchange Meeting (TIM) Description: The purpose of this Milestone is for the SNC Dream Chaser team and NASA to discuss planned updates to the SNC Crewed Vehicle certification requirements that have been contemplated by SNC since the beginning of the CCiCap SAA and any relevant generic Commercial Crew Program lessons learned the CCP team has gained for commercial crew missions to and from Low Earth Orbit (LEO). **Success Criteria:** Completion of Lessons Learned For Commercial Crew Transportation Technical Interchange Meeting (TIM) objectives described in Table 44.	Date: 1st Qtr CY 2019 (Specific date(s) shall be established via mutual agreement of the parties at least 2 months prior to the milestone)
Milestone 45: Dream Chaser Structural Test Article (STA) Results and Lessons Learned Technical Interchange Meeting (TIM) **Description:** The purpose of this milestone is to summarize key results from structural testing of SNC's all composite Dream Chaser design. SNC will share lessons learned from that testing that can be transferred to future Dream Chaser designs as well as other future orbital spacecraft that might be considering an all composite design. **Success Criteria:** Completion of Dream Chaser STA TIM objectives described in Table	Date: 3rd Qtr CY 2019 (Specific mo/yr date shall be established via mutual agreement at

45.	least 2 months prior to milestone)
Milestone	**Date**
Milestone 46: SNC Pre-launch Processing/Ops Technical Interchange Meeting (TIM) **Description:** The purpose of this Milestone is to review SNC's Florida prelaunch processing plans/schedule for each cargo flight to ISS. SNC will share current Florida Assembly, Integration & Test (AI&T) and Prelaunch Processing timelines for DCCS to allow the group to jointly discuss any efficiencies that may be gained for SNC DCSS processing. Discussions will include summaries of Florida ground operations timelines for DCCS and DCSS and how crewed mission differences are integrated into overall ground operations plans for crew missions. **Success Criteria:** Completion of SNC Pre-launch Processing/Ops Technical Interchange Meeting (TIM) objectives described in Table 46.	Date: 1st Qtr CY 2020 (The specific date(s) shall be established via mutual agreement of the parties at least 2 months prior to the milestone)
Milestone 47: SNC Brief CCP on DCCS flight results and applicability to crew capability **Description:** The purpose of this Milestone is to summarize DCCS flight mission results and discuss technical performance results of key capabilities that are relevant to future crewed mission design (e.g. UDC as-flown performance versus as designed). SNC will provide NASA CCP with a summary of key Mission performance by comparing actual DCCS mission performance to the DCCS certified design for areas that are relevant to a crewed mission and DCSS implimentation. **Success Criteria:** Completion of SNC Brief to CCP on DCCS flight results and applicability to crewed capability meeting objectives described in Table 47.	**Date: 3rd Quarter CY 2020** (The specific date(s) shall be established via mutual agreement of the parties at least 2 months prior to the milestone)
Milestone 48: DCCS and DCSS Sustaining Operations Technical Interchange Meeting (TIM) **Description:** The purpose of this Milestone is to summarize DCCS sustaining operations and plans for executing multiple cargo missions and also to discuss how a separate crewed Dream Chaser capability would be integrated into the overall Dream Chaser sustaining operations program. This TIM will include discussions of how SNC would perform sustaining operations for cargo missions and crewed missions simultaneously. **Success Criteria:** Completion of DCCS and DCSS Sustaining Operations TIM objectives described in Table 48.	**Date: 1st Quarter CY 2021** (The specific date(s) shall be established via mutual agreement of the parties at least 2 months prior to the milestone)
Milestone 49: SNC Launch Vehicle Summary Go forward Plan Technical Interchange Meeting (TIM) **Description:** The purpose of this Milestone is to summarize SNC plans to launch DCCS on an alternate launch vehicle and discuss implications, options, and benefits for future crewed missions. SNC will discuss plans to fly on this rocket for uncrewed missions and discuss any implications for future crewed missions to Low Earth Orbit (LEO). SNC and CCP will also discuss lessons learned from their experience with development and recertification of alternate launch vehicles to meet crew requirements.	**Date: 3rd Quarter CY 2021** (The specific date(s) shall be established via mutual agreement at least 2 months

Success Criteria: Completion of SNC Launch Vehicle Summary Go forward Plan Technical Interchange Meeting (TIM) objectives described in Table 49.	prior to the milestone)

Entrance/Success Criteria (Milestones 42 through 49)

Table 42. SNC CCiCap Milestone #42 — Dream Chaser RCS Development Testing Recent Progress and Status	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC provides NASA with Agenda and any Charts to be presented at least 30 days prior to the review (to give NASA time to review) 3. NASA invited to RCS development testing session(s) at least 30 days prior to the test event(s) 4. NASA is invited to the review to gain insight into Dream Chaser Reaction Control System (RCS) Thruster design and development since completion of CCiCap Milestone 15a.	1. Completion of the RCS Testing Status Review. 2. SNC DC Program Management approved open work forward action plans from the review. 3. SNC-provided summary of recent RCS testing progress (since 15A testing completed). 4. This review supports the progression of the Dream Chaser Space System concept for manned spaceflight to LEO.

Table 43. SNC CCiCap Milestone #43 — **Aero Database Review**	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC provides NASA with Agenda and any Charts to be presented at least 30 days prior to the review (to give NASA time to review) 3. NASA is invited to the review to gain insight into the results of the latest Dream Chaser aero testing and analysis resulting in updates to the DCCS aero database.	1. Completion of the Aero Database Review. 2. SNC DC Program Management approved open work forward action plans from the review.

Table 44. SNC CCiCap Milestone #44 — **Lessons Learned For Commercial Crew Transportation Technical Interchange Meeting (TIM)**	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC submit to NASA the TIM Review plan to include TIM agenda, and charts for the review at least 30 days prior to the review. 3. NASA is invited to this TIM to discuss planned updates to the SNC Crewed Vehicle certification requirements that have been contemplated by SNC since the beginning of the CCiCap SAA and any relevant generic Commercial Crew Program lessons learned the CCP team has gained for commercial crew missions to and from Low Earth Orbit (LEO).	1. Completion of the TIM per the Review Plan. 2. SNC DC Program Management approved open work forward action plans from the review.

Table 45. SNC CCiCap Milestone #45 — **Dream Chaser Structural Test Article (STA) Results and Lessons Learned Technical Interchange Meeting (TIM)**	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC submit to NASA the TIM Review plan to include TIM agenda, and charts for the review at least 30 days prior to the review. 3. NASA is invited to this TIM to learn about key results from structural testing of SNC's all composite Dream Chaser design as well as discuss any thoughts or ideas regarding the SNC design and NASA experience from similar composite technology programs (e.g. Composite Crew Module)	1. Completion of the TIM per the Review Plan. 2. SNC DC Program Management approved open work forward action plans from the review. 3. SNC shared lessons learned from STA testing that can be transferred to future Dream Chaser designs as well as other future orbital spacecraft that might be considering an all composite design.

Table 46. SNC CCiCap Milestone #46 — CCP Lessons Learned, KSC/CCAFS Pre-launch Processing/Operations Lessons Learned Technical Interchange Meeting (TIM)	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC submit to NASA the TIM Review plan to include TIM agenda, and charts for the review at least 30 days prior to the review. 3. NASA is invited to this TIM to discuss SNC's Florida prelaunch processing plans/schedule for each cargo flight to ISS and to jointly discuss any efficiencies that may be gained for SNC DCSS processing for crew missions.	1. Completion of the TIM per the Review Plan. 2. SNC DC Program Management approved open work forward action plans from the review. 3. SNC-provided summary of current DCCS plans for KSC/CCAFS Horizontal processing, final Assembly, Integration, and Test (AI&T), and Prelaunch processing in Florida prior to each mission and discussed modifications to be made in support of crewed operations. 4. SNC-provided ground processing timeline modifications and efficiencies to be gained for DCSS processing. 5. This review supports the progression of the DCSS concept for manned spaceflight to LEO.

Table 47. SNC CCiCap Milestone #47 — SNC Review of DCCS flight Results and applicability to crewed capability	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone. 2. SNC submit to NASA the Review plan to include Review agenda, and charts for the review at least 30 days prior to the review. 3. NASA is invited to this review to learn about the DCCS flight mission results and discuss technical performance results of key capabilities that are relevant to future crewed mission design.	1. Completion of the TIM per the Review Plan. 2. SNC DC Program Management approved open work forward action plans from the review. 3. This review supports the progression of the DCSS concept for manned spaceflight to LEO.

Table 48. SNC CCiCap Milestone #48 — DCCS and DCSS Sustaining Operations Technical Interchange Meeting (TIM)	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC submit to NASA the TIM Review plan to include TIM agenda, and charts for the review at least 30 days prior to the review. 3. NASA is invited to this TIM to learn about SNC's DCCS sustaining operations and plans for executing multiple cargo missions and also to discuss how a separate crewed Dream Chaser capability would be integrated into the overall Dream Chaser sustaining operations program	1. Completion of the TIM per the Review Plan. 2. SNC DC Program Management approved open work forward action plans from the review. 3. This review supports the progression of the DCSS concept for manned spaceflight to LEO.

Table 49. SNC CCiCap Milestone #49 — SNC Launch Vehicle Summary Go forward Plan Technical Interchange Meeting (TIM)	
Entrance Criteria	**Success Criteria**
1. Specific date(s) for this milestone shall be established via mutual agreement of SNC and NASA at least 2 months prior to the milestone 2. SNC submit to NASA the Review plan to include Review agenda, and charts for the review at least 30 days prior to the review. 3. NASA is invited to this TIM to learn about SNC plans to launch DreamChaser on alternate launch vehicle(s) and discuss implications, options, and benefits for future crewed missions.	1. Completion of the TIM per the Review Plan. 2. SNC DC Program Management approved open work forward action plans from the review. 3. This review supports the progression of the DCSS concept for manned spaceflight to LEO. 4. SNC-provided summary of plans for launching DreamChaser on alternate launch vehicle(s) and identification of implications, options, and benefits for future crewed missions.

SPACE ACT AGREEMENT NO. NNK12MS03S, AMENDMENT SEVEN (07)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE AND AGENCY COMMITMENT

The purpose of this Amendment is to modify Space Act Agreement (SAA) NNK12MS03S to reduce the frequency of the briefings, which results in a modification to Article 15, Term of Agreement.

ARTICLE 5.D. Quarterly Project Status Briefings is revised to add the following paragraph:

For the period beginning after the quarterly briefing held in December 2017 until the end of the SAA, Sierra Nevada Corporation shall conduct project status briefings semi-annually instead of quarterly. The semi-annual briefings shall cover the same content as required in the quarterly briefings, which is also referenced in Article 3.A.(2) and 3.B.(2) of this SAA.

ARTICLE 15. TERM OF AGREEMENT is amended to the following:

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or August 1, 2022, whichever comes first.

ARTICLE 28. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

BY: William H Gerstenmaier
William H. Gerstenmaier
Associate Administrator for Human
Exploration and Operations

DATE: 27 April 2018

SIERRA NEVADA, Corp

BY : Rita Tozzie
Rita Tozzie
Director of Contracts
Sierra Nevada Corporation

DATE: 4/25/18

SPACE ACT AGREEMENT – NNK12MS03S, AMENDMENT EIGHT (08)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCICap)

PURPOSE and AGENCY COMMITTMENT

The purpose of this Amendment is to change Milestone 41 date and content as follows:

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: William H Gerstenmaier

William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 1 Feb 2019

SIERRA NEVADA CORPORATION

BY: Robert Tatum

~~Kimberly Kulp~~ ROBERT TATUM
VP ~~Director~~ of Contracts
Sierra Nevada Corporation

DATE: 6 FEB 2019

Appendix 2.a., *Base Period Performance Milestones*, is updated to modify Milestone 41 and Table 41:

FROM:

Table 41: SNC CCiCap Base Period Milestone #41
Design Analysis Cycle Six (DAC-6) Closeout Review
Entrance and Success Criteria

Milestone	Date
Milestone 41: Design Analysis Cycle (DAC) 6 Closeout Review **Scope:** The DAC-6 Closeout Review will identify crew mission unique subsystems and elements not contained within the Dream Chaser Cargo System (DCCS) design to be added to the crewed mission architecture and certified for crewed flight. SNC will show a summary of how the crewed elements will be integrated into the Dream Chaser cargo design and certified for crewed orbital flight. **Success Criteria:** Completion of the DAC-6 Closeout Review as described in Table 41	Amount: Unfunded Date: July 2018

Table 41. SNC CCiCap Milestone #41— Design Analysis Cycle (DAC) 6 Closeout Review	
Entrance Criteria	**Success Criteria**
1. Provide SNC DAC-6 review plan identifying review agenda, the date review data will be available, and SNC success criteria. Plan will be provided to NASA approximately 90 days prior to the review. This plan will be accomplished via a kickoff presentation and will not be a formal document. 2. NASA invited to gain insight by participating in the processes leading to the DAC-6 review and participating in the review.	1. Completion of the DAC-6 Review per the review plan 2. SNC crew mission driving requirements presented to SNC management which describe how Dream Chaser Space System (DCSS) Design meets the driving requirements with acceptable risk. 3. DAC-6 Design baseline is documented in the Dream Chaser Design Reference Document and approved by SNC Program Management. 4. Technical margins were presented during the DAC-6 Review. SNC DC Program Management has approved open work forward action plans. 5. Program risks are understood and are being addressed as defined by the SNC Risk Management Plan.

TO:

Milestone 41: Dream Chaser CDR Design Summary **Scope:** SNC will brief CCP on the capabilities/features of the Uncrewed Dream Chaser (UDC) design which is at CDR maturity as part of the Dream Chaser Cargo System (DCCS) and will identify crew mission unique subsystems and components that would need to be added to transition from an Uncrewed Dream Chaser to a crewed Dream Chaser architecture. SNC will show design concepts for how the crew unique capabilities may be augmented in the DCCS CDR design as well as plans to certify the crewed variant. **Entrance Criteria:** SNC will send meeting announcement and agenda for the meeting to NASA CCP prior to the meeting. This Milestone 41 review may occur concurrently with CCiCap semi-annual status meeting. **Success Criteria:** SNC presents a "This is Dream Chaser" pitch showing CDR design overview of the UDC with emphasis on elements that are common between UDC and crewed Dream Chaser variants. SNC also presents a 1-2 chart summary of Crew Unique elements (e.g. Seats, Flight Controls, Abort capability, etc.) which would be included in the UDC design to make it viable for crewed missions into Low Earth Orbit (LEO).	Amount: Unfunded Date: November 2018