SpaceX Commercial Crew Integrated Capability (CCiCap) Space Act Agreement

NNK12MS02S

SpaceX Space Act Agreement

SpaceX CCiCap Amendment 01

SpaceX CCiCap Amendment 02

SpaceX CCiCap Amendment 03

SpaceX CCiCap Amendment 04

Appendix A: Space Act Agreement (SAA)

SPACE ACT AGREEMENT NO. **NNK12MS02S**
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
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 Space Exploration Technology Corp.'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 Space Exploration Technologies Corp., (hereinafter referred to as "SpaceX" or "Participant") with a place of business at 1 Rocket Road, Hawthorne, CA. NASA and SpaceX 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 SpaceX's integrated Crew Transportation System (CTS). SpaceX will receive payments from NASA upon successful completion of agreed upon milestones as described in Appendix 2 of this Agreement.

ARTICLE 3. RESPONSIBILITIES

A. SpaceX 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 SpaceX 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 SpaceX 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) SpaceX 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, and NASA shall notify SpaceX in writing no later than 30 days from the completion date of the milestone event of NASA's acceptance or non-acceptance. Disagreement about the successful accomplishment of a milestone shall be deemed a Dispute and resolved in accordance with Article 18 of this Agreement.

(2) SpaceX 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. SpaceX 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: Space Exploration Technologies Corp.
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, SpaceX's relevant financial records associated with this Agreement are not subject to examination or audit by NASA.

D. Quarterly Project Status Briefings

SpaceX 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, milestone 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. SpaceX 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 SpaceX'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 SpaceX's 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 SpaceX has entered into for the execution of the milestone events in this Agreement.

ARTICLE 6. DISSEMINATION OF PUBLIC INFORMATION

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

B. SpaceX 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, SpaceX agrees that any proposed public use of the NASA name or initials shall be submitted by SpaceX 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. SpaceX 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. SpaceX agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of SpaceX resulting from activities conducted under this Agreement.

ARTICLE 7. NASA FURNISHED INFORMATION AND SERVICES

SpaceX 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. SpaceX 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 SpaceX.

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), SpaceX shall certify to the best of its knowledge and belief the following to the NASA Administrative Contact:

A. Neither SpaceX 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 SpaceX 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. SpaceX 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. SpaceX is an eligible participant as defined in Section 4.2 of the CCiCap Announcement.

ARTICLE 10. LIABILITY AND RISK OF LOSS

A. SpaceX 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, SpaceX employees or the employees of SpaceX's related entities, or for damage to, or loss of, SpaceX'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. SpaceX 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

SpaceX 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 SpaceX that is assigned, tasked, or contracted with to perform specified NASA or SpaceX 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 SpaceX and employees of any Related Entity of SpaceX. SpaceX shall ensure that its employees and employees of any Related Entity that perform SpaceX 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 SpaceX 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 SpaceX include a restrictive notice that NASA or SpaceX deems to be ambiguous or unauthorized, NASA or SpaceX 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 SpaceX believes that any of the events or conditions that remove restriction on the use, disclosure, or reproduction of the Data apply, NASA or SpaceX 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 SpaceX has furnished, or is required to furnish to the U.S. Government without restriction on disclosure and use.

(11) SpaceX 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, SpaceX 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 SpaceX 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 SpaceX under this Agreement

(1) Data first produced by SpaceX in carrying out SpaceX'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 SpaceX's performance of its milestones under this Agreement. If SpaceX 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 SpaceX 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:

(a) Such action is necessary because SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX Administrative Point of Contact. Upon mailing of such determination, SpaceX 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 SpaceX 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 SpaceX in carrying out SpaceX'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.

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 SpaceX, 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 SpaceX 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 behalf of the NASA for Government purposes in the event the NASA determines that:

(a) Such action is necessary because SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX Administrative Point of Contact. Upon mailing of such determination, SpaceX 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 SpaceX 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 SpaceX in a manner that allows SpaceX 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 SpaceX.

E. Data Disclosing an Invention

In the event Data exchanged between NASA and SpaceX 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 2 years 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 SpaceX 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 SpaceX 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 SpaceX's performance under this Agreement. Upon completion of activities under this Agreement, such Data will be disposed of as requested by SpaceX.

(2) The Parties agree that within 30 days of execution by NASA of this Agreement, SpaceX may provide NASA with a list of Background Data (Appendix 3), which embodies Proprietary Data, and NASA shall have 60 days following such delivery to object to such designation. Absent objection by NASA, such Data shall constitute Background Data. With respect to Data that NASA objects to being considered Background Data, the Parties will attempt to agree upon the portion of such Data, if any, that constitutes Background Data. All Background Data shall be appropriately marked as Proprietary Data.

H. Handling of Data

(1) In the performance of this Agreement, SpaceX and any Related Entity of SpaceX 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, SpaceX may request from NASA, and NASA may provide, Proprietary Data of third parties, with the express understanding that SpaceX will use and protect such Data in accordance with this Article.

(b) The Parties agree that, during the term of this Agreement, SpaceX may request from NASA, and NASA may provide, U.S. Government Data, with the express understanding that SpaceX 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 SpaceX, to the extent NASA has determined it has the right to distribute, under a separate Software Usage Agreement with the express understanding that SpaceX will use and protect such related Data in accordance with this Article: *<Insert software and related Data>*. Unless SpaceX 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, SpaceX 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, SpaceX 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 SpaceX'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 SpaceX 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) SpaceX orally informs NASA before initial disclosure that such information is considered to be Proprietary Data, and (2) SpaceX 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 SpaceX or that is assigned, tasked, or contracted with to perform specified NASA or SpaceX 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 SpaceX 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, SpaceX 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 SpaceX in any such statement and any other available information relating to the circumstances surrounding the making of the invention and will notify SpaceX 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 SpaceX'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 SpaceX, 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 SpaceX in the performance of work under this Agreement. Therefore, upon petition submitted by SpaceX, 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 or class of inventions that may be made under this Agreement, NASA will waive such rights to SpaceX. If such a petition is not submitted, SpaceX 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 SpaceX 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 SpaceX 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, 2020, 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 SpaceX

(1) SpaceX is hereby granted a revocable, nonexclusive, royalty-free license in each patent application filed in any country on an invention made by SpaceX under this Agreement and any resulting patent in which the Government acquires title, unless SpaceX fails to disclose such invention within the times specified in paragraph E.(2) of this clause. SpaceX 's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which SpaceX is a party and includes the right to grant sublicenses of the same scope to the extent SpaceX 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 SpaceX 's business to which the invention pertains.

(2) SpaceX '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 SpaceX 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 SpaceX, 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, SpaceX will be provided a written notice of the Administrator's intention to revoke or modify the license, and SpaceX will be allowed 30 calendar days (or such other time as may be authorized by the Administrator for good cause shown by SpaceX) after the notice to show cause why the license should not be revoked or modified. SpaceX 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) SpaceX shall establish and maintain active and effective procedures to assure that inventions made under this Agreement are promptly identified and disclosed to SpaceX 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, SpaceX shall furnish the Patent Representative a description of such procedures for evaluation and for determination as to their effectiveness.

(2) SpaceX will disclose each such invention to the Patent Representative within two months after the inventor discloses it in writing to SpaceX personnel responsible for the administration of this clause or, if earlier, within six months after SpaceX 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 SpaceX. SpaceX 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, SpaceX 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 SpaceX for such invention.

(3) SpaceX 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) SpaceX agrees, upon written request of the Patent Representative, to furnish additional technical and other information available to SpaceX 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 2 years 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 SpaceX 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) SpaceX has established and maintained the procedures required by paragraph E.(1) of this clause; and

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

(2) If the Patent Representative learns of an unreported SpaceX invention that the Patent Representative believes may have been made under this Agreement, SpaceX 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, SpaceX 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, [insert name of Related Entity] 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 SpaceX 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, SpaceX:

(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) SpaceX 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, SpaceX 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 SpaceX's substantial contribution of funds, facilities and/or equipment to the work performed under this Agreement, SpaceX 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 SpaceX 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 SpaceX 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, SpaceX 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) SpaceX 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX, 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 SpaceX 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 SpaceX makes express or implied warranties 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, SpaceX, 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 SpaceX 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 SpaceX to ascertain the cause of the failure and determine whether additional efforts are in the best interest of the Parties. Upon a Termination for Failure to Perform, NASA will take all rights identified in Articles 12 and 13 of this Agreement. 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.

(2) SpaceX will not be entitled to any additional payments from the Government due to a termination for failure to meet a milestone. NASA and SpaceX 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 SpaceX's planned performance of an activity under this Agreement presents an unacceptable risk to human life. NASA shall provide written notice to SpaceX 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 SpaceX. Before making such a notification, NASA will consult with SpaceX 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, SpaceX 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 SpaceX wishes to pursue the activities defined in Appendix 2 exclusively using its own funding. Upon such a termination, NASA and SpaceX 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

(1) NASA 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; or (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, SpaceX 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 SpaceX wishes to pursue the activities defined in Appendix 2 exclusively using its own funding. Upon such a termination, NASA and SpaceX 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 SpaceX 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.

SpaceX will have title to property acquired or developed by SpaceX 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 Failure to Perform, NASA may purchase such property as provided in Article 27 below. Upon 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 SpaceX 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 the SpaceX President 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

SpaceX Administrative Contact

Julie Jiru
Contracts Officer
1 Rocket Road
Hawthorne, CA 90250

Phone: [redacted]
Fax: [redacted]
E-mail: [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

SpaceX Technical Contact
Garrett Reisman
Program Manager
1 Rocket Road
Hawthorne, CA 90250
Phone: [redacted]
Fax: [redacted]
E-mail: [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 into 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

SpaceX 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, SpaceX 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. SpaceX shall not provide NASA funding or NASA technical assistance received under this Agreement to any prohibited Russian entity. SpaceX 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 SpaceX to a prohibited Russian entity for the purchase of goods or services relating to human spaceflight.

ARTICLE 27. TITLE AND RIGHTS IN PROPERTY

SpaceX 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, 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 SpaceX'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 SpaceX 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 SpaceX'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 SpaceX. 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 H. Gerstenmaier

William Gerstenmaier
Associate Administrator for Human Exploration and Operations Mission Directorate

DATE: 2 Aug 2012

SPACE EXPLORATION TECHNOLOGIES CORP.

BY: [illegible]

Elon Musk
CEO/CTO

DATE: July 24, 2012

APPENDIX 1: EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Since its inception over a decade ago, SpaceX has focused on spacecraft, launch vehicles, ground systems and mission systems meant to enable safe, reliable and regular human spaceflight. Indeed, human spaceflight is the reason that SpaceX was founded. To this end, the company's major technology development and infrastructure efforts—specifically, the Falcon family of launch vehicles, Dragon spacecraft, production and mission control facilities in California, Rocket Development Facility in Texas and launch pad in Florida—have been focused in some fashion on human spaceflight from the beginning.

Since 2006, SpaceX has worked closely with NASA—first through the Commercial Orbital Transportation Services (COTS) program, then the Commercial Resupply Services (CRS) and Commercial Crew Development 2 (CCDev 2) programs. These partnerships are now paying dividends in the form of cargo delivery capability to the International Space Station (ISS), as well as enabling SpaceX's readiness to address the challenges of flying NASA astronauts to space using the Dragon-Falcon 9 crew transportation system. The Commercial Crew Integrated Capability (CCiCap) program will allow SpaceX and NASA to continue their partnership, yielding a certified human spaceflight capability for the United States.

SPACEX

Decade-long corporate commitment to human spaceflight

- Spacecraft and launch vehicle designed to accommodate human-rating since inception

An end-to-end integrated transportation system that has been demonstrated

- High percentage of work already completed
- Integrated system flown twice, and Dragon spacecraft successfully recovered both times
- 100% successful ISS rendezvous and berthing

Realistic business model and strong customer base

- Broad market accessibility and success
- Manifest of over 40 launches through 2017
- Sustainable capability through common elements serving all SpaceX customers

Safe and reliable

- Safety driven by culture and ingrained in our design and processes
- Failure modes minimized by design
- Independent Safety Advisory Panel established
- Nine cargo missions and up to 25 Falcon 9 flights scheduled to launch before transporting crew
- We will work with NASA toward full certification during CCiCap

Significant risk reduction during base period

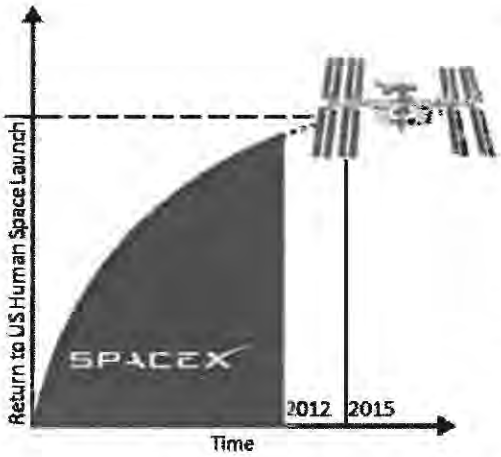
- Pad abort test, in-flight abort test and system-level tests of structures, propulsion, and mechanisms in base period

Orbital crew demonstration flight planned for 2015

[redacted]

SpaceX proposes a highly integrated crew transportation system.

SpaceX has successfully demonstrated a complete integrated space transportation system. The Dragon spacecraft and Falcon 9 launch vehicle along with our ground and mission operations infrastructure form the basis of our proposed crew transportation system. The Dragon has flown to orbit on a Falcon 9 launch vehicle and safely returned to Earth on two successive missions. In December 2010, SpaceX became the first private company to launch and retrieve a spacecraft from Earth orbit. In May 2012, SpaceX became the first private company to rendezvous, berth and deliver cargo to and from the ISS. For both of these flights, the Dragon spacecraft was processed by the same ground team and controlled by the same Launch Control and Mission Control personnel that will execute NASA's crew missions in the years to come.



A high percentage of the work is already completed.

A number of the most challenging core technical hurdles for any integrated crew transportation system have been addressed at some level by SpaceX in partnership with NASA. Specifically, the main propulsion system, structures, avionics, software, guidance, navigation and control (GN&C) systems, on-orbit propulsion systems, launch pad infrastructure, mission control center, ground processing, vehicle integration and ISS integration have already been addressed during the COTS and CRS programs. To achieve the goal of flying NASA astronauts to the ISS, we now will work to further evolve our existing systems, processes and infrastructure. Despite the advantages of having successfully flown our existing systems, **SpaceX is cognizant of the massive divide between launching cargo and launching people.** All of our efforts under CCiCap will be focused on working with NASA to provide the safest and most reliable human access to space.

DRAGON SPACECRAFT IS SAFE AND FLIGHT-PROVEN

- Traditional safe and robust capsule design
- Carries up to seven crew members and can accommodate pressurized and unpressurized cargo
- First private spacecraft to orbit the Earth and be recovered
- First private spacecraft to rendezvous and berth to the ISS
- Integrated launch abort system provides powered abort all the way to orbit
- Passively stable on entry
- Eight abort engines provide redundancy and are intended to work in concert with parachutes to allow soft ground landings
- SSP 50808 requirements already verified for cargo Dragon, and vehicle has passed the Phase Three Safety Review Process
- Flight-proven primary heat shield designed for three times the heat flux of a nominal entry
- Custom-fit seat liners and low vertical velocity during landing minimize risk of injury

SpaceX is safe and reliable.

At SpaceX, the alignment between mission success and corporate success is clear. For a launch services provider, every mission—and every safety decision impacting that mission—is critical. This understanding, along with the culture it breeds, yields an employee base that considers safety and mission assurance (S&MA) a personal commitment. Critically, our S&MA organization participates in all design, development, review and launch activities, offering an assessment completely independent of program management. Moreover, employee ownership of safety is stressed and made evident in the way we work, communicate and react to off-nominal conditions, creating an overall culture of safety at SpaceX.

Beyond its internal practices and culture, SpaceX has instituted an Independent Safety Advisory Panel composed of leading human spaceflight safety experts, including several former NASA astronauts and senior NASA officials. The panel's charter is to provide

independent and objective assessments of the safety of the Dragon-Falcon 9 system for human spaceflight and help SpaceX maintain the highest commitment to safety. The panel will complement the SpaceX culture and processes, along with the inherently reliable design of the Dragon-Falcon 9 system, to drive the safety and mission success of our integrated system.

Preliminary abort effectiveness assessment estimates indicate that the Dragon-Falcon 9 system has the potential to be the safest low Earth orbit crew transport vehicle in history.

The numerous safety features of our crew transportation system include an integrated launch abort system, a robust capsule thermal protection system and structural design, a minimal number of stage separation and other mechanical events, and engine-out capability for the majority of the ascent. The launch abort system allows for an unprecedented safety threshold because it will be the first system capable of providing a powered abort all the way to orbit, and it has enough thrust to escape from the Falcon 9 under worst-case conditions. Further, an upgrade to Falcon 9 that will improve safety, reliability, performance and producibility is underway. Our system's design is also bolstered by an unprecedented level of hardware and software testing.

FALCON 9: SAFE AND RELIABLE

- Two-stage launch vehicle inherently reliable due to minimal number of stage separation events and in-space engine starts
- Both stages powered by Merlin engines, using rocket-grade kerosene (RP-1) and liquid oxygen, providing benign environments and the ability to throttle and accommodate thrust termination
- Nine engines on first stage provide single and multiple engine-out capability for majority of flight, a capability not seen in a US system since Saturn V
- Hold before liftoff to validate booster performance before committing to flight
- Fault-tolerant avionics and controls
- Non-pyro separation systems, improving safety and reliability

Although the CCiCap Announcement asks only for a plan culminating in a participant-certified test flight with crew at the end of the optional period, **full NASA certification is completely aligned with SpaceX's vision.** Because SpaceX has a safety culture and processes developed with NASA over the past 6 years as a result of our work under COTS, CRS and CCDev 2, our certification process for the first test flights with non-NASA crew is the same as the process detailed in the NASA 1100-series documents.

Critically, the integrated Falcon 9 and Dragon system is scheduled for nine more flights before transporting crew, and Falcon 9 is scheduled to fly up to 25 times before crew transportation, giving SpaceX the unique opportunity to build flight heritage and collect flight data to support vehicle certification and maximize safety.

SpaceX offers a sustainable business solution.

SpaceX is the most sustainable partner available to NASA for commercial crew. Falcon 9 and Dragon, the major elements of the crew transportation system, have flown multiple times with 100% mission success. In addition to providing services to NASA, SpaceX uses Falcon 9 and/or Dragon to provide services to other markets including other US Government agencies, international government customers, and domestic and international commercial customers. There is commonality of spacecraft, launch vehicle, and ground and mission operations systems for crew missions, cargo missions and satellite launches. The viability of SpaceX's business case

GROUND OPERATIONS DESIGNED FOR FLEXIBLITY AND SAFETY

- Includes manufacturing in California, testing in California and Texas, and final integration and launch operations in Florida
- Crew launch operations similar to successful cargo launch operations
- Common ground system across all phases of testing and launch increases reliability
- Thorough testing of flight hardware, including full-stage static fire tests

does not depend solely on either NASA crew business or on unverifiable estimates of a space tourism market. Rather, the SpaceX business case closes due to consistent use of the crew transportation system elements, whether for cargo missions, crew missions or missions carrying satellites.

Our use of common elements for crew missions, cargo missions and satellite launches means that capabilities will be proven reliable with extensive flight heritage before any crew mission. All major assembly lines and facilities are continuously utilized, ensuring that the underlying processes and procedures are validated and current, and that personnel are proficient, producing extremely consistent results. This approach eliminates the need for standing armies that are underutilized or have to be kept sharp by simulations and drills, rather than actually producing and testing products. No major facility requires maintenance solely for crew missions. There will be one Falcon 9 and Dragon production team, one launch team, one mission control team and one recovery team, and all will operate at a steady pace, supporting other customers as well as the Commercial Crew Program. The other customers increase production volume and share overhead costs, resulting in the most sustainable NASA commercial crew capability.

SpaceX is financially sound, with a broad customer base and the most diverse source of committed revenue of any domestic launch provider. At present, SpaceX has more than 40 missions on its manifest for launches extending through 2017, representing a total backlog worth approximately [redacted] These launches have been purchased by domestic and international commercial, US government and international government customers (Figure 1) and have milestone-based payment schedules.

The SpaceX management team has successfully developed large, complex systems on a commercial basis with critical performance milestones and agency involvement and insight. SpaceX is the only bidder that has both demonstrated success with large-scale developments and met demanding ISS interface requirements using this procurement model.

SpaceX offers an all-American solution for crew transportation, with full control over all system elements. Both Dragon and Falcon 9 are SpaceX systems with all core elements manufactured in the US. SpaceX does not have suppliers whose other strategic business priorities or international dependencies could impact the delivery of this critical capability to NASA.

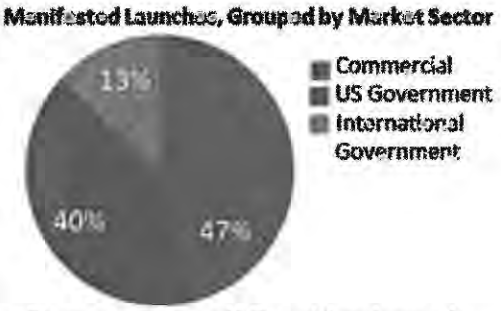


Figure 1: SpaceX Provides Launch Services to Industry's Three Core Markets

SpaceX and NASA have made significant progress during CCDev 2.

Although core elements of the SpaceX crew transportation system have successfully flown, critical modifications are necessary to carry humans to space. SpaceX is working on these upgrades with NASA under the CCDev 2 program. The most important modification to the Dragon spacecraft is the addition of a launch abort system (LAS). The LAS, whose components were largely developed under CCDev 2, takes advantage of SuperDraco engines (Figure 2) built into the sidewall of the Dragon capsule to provide powered abort capability all the way to orbit. Critically, this escape architecture eliminates the safety-critical separation event common in tower architectures. The SuperDracos use the same propellants and tanks as the existing Draco on-orbit propulsion system. Because they are not jettisoned during ascent, the SuperDracos can be used to cushion the ground landing of the crew Dragon. **The SuperDraco engines have already undergone extensive static-fire development testing during CCDev 2.**

Figure 2: SuperDraco Engines Undergo Testing in Texas

In addition to developing the LAS components, during CCDev 2 SpaceX completed substantial design and development work on other necessary modifications. This includes the addition of an environmental control and life support system (ECLSS) including space suits, and the design and development of prototype seats and structures, including crew trials in a crew cabin prototype. The successful conclusion of CCDev 2 leaves SpaceX poised to transition seamlessly with NASA into CCiCap.

SpaceX has a comprehensive plan for CCiCap.

During CCiCap, SpaceX proposes a series of milestones that focus on four main areas: reducing risk through hardware development and test, completing the design, ensuring safety, and preparing for NASA certification.

SpaceX will significantly reduce risk through hardware development and testing during the base period.

SpaceX offers a safety-focused plan and milestones that will reduce risk during the base period from August 2012 to May 2014 through several important tests. A **pad abort test** of a Dragon with an integrated LAS, parachutes and supporting avionics is proposed for December 2013. **An in-flight abort test** is proposed for April 2014. The in-flight abort will occur at the point of worst-case dynamic loads, when Dragon has minimum performance margin for separation

from the launch vehicle. During the base period, SpaceX will also conduct **flights of the upgraded Falcon 9**. Finally, SpaceX will conduct **numerous system-level hardware and software tests** including an integrated Dragon propulsion system test, a Dragon abort separation test, comprehensive aerodynamic tests, hardware-in-the-loop (HITL) avionics and software tests and structural qualification tests.

MISSION OPERATIONS DESIGNED TO ENSURE EXCELLENCE

- Mission Control located at our facility in California, with demonstrated connectivity to NASA Mission Control in Houston
- Launch Control located at our facility in Florida
- Similar operations for crew and cargo missions increase crew safety
- Strong relationship with NASA Mission Operations Directorate built through work on simulations and actual flights

SpaceX will complete the detailed design of the entire crew transportation system during the base period.

SpaceX will conduct an integrated system requirements review (ISRR) in October 2012 and two separate preliminary design reviews (PDRs): one for the ground systems and ascent flight regime in December 2012, and one for the on-orbit and entry flight regimes in July 2013. The proposed hardware development testing will expedite design maturity, leading to an integrated critical design review (CDR) in March 2014. At this review, SpaceX will demonstrate that the maturity of the design is appropriate to proceed to full-scale fabrication, assembly, integration and test of the entire crew transportation system.

SpaceX will ensure safety and work toward NASA certification during the base period.

Throughout the base period, SpaceX will continue to improve the safety of its proposed crew transportation system and work toward the ultimate goal of NASA certification. While these efforts are embedded in all of our activities, two milestones in the base period—the Safety Review and the Human Certification Plan Review—focus exclusively on safety and certification. [redacted] because the cargo Dragon is already certified to visit the ISS, SpaceX has a clear and rapid path to full NASA certification early in an anticipated follow-on contract.

An **initial human certification plan** and an **initial master verification plan** will be delivered to NASA for the Human Certification Plan Review in May 2013. These documents will describe in detail exactly how SpaceX plans to achieve vehicle certification, including details on how requirements in CCT-REQ-1130 will be verified. These two documents will be matured to final versions that will be delivered at the critical design review (CDR).

At the Safety Review in October 2013, SpaceX will deliver critical S&MA products to NASA, including a Falcon 9 and Dragon **preliminary failure modes and effects analysis**, a **preliminary integrated hazard analysis** and a **preliminary probabilistic safety assessment**.

Work planned for the optional period provides high confidence in achieving an orbital crewed demonstration flight in 2015.

Optional funded milestones will further reduce risk, leading to an orbital demonstration flight with non-NASA crew in mid-2015 and achieving full ISS integration leading to the first crew Dragon flight to the ISS later that year. During the optional period, [redacted] followed by an **orbital flight test with non-NASA crew** [redacted] 2015. This flight will consist, at a minimum, of a 3-day mission to a 200-nm orbit performed with a minimal crew of non-NASA personnel. [redacted]

Our milestones in the optional period culminate in a **flight to the ISS with a non-NASA crew** in December 2015. At the conclusion of this optional period, all development, test and evaluation of the Dragon-Falcon 9 crew transportation system would be complete, allowing NASA to proceed seamlessly with immediate certification and the commencement of regular NASA crew transportation services to the ISS.

SpaceX meets the eligibility requirements for CCiCap.

Per Section 4.2 of the announcement, SpaceX is eligible to submit a proposal. Specifically, SpaceX is a US company incorporated in the state of Delaware and is more than 50% owned by US nationals. Its principal place of business is in Hawthorne, CA.

APPENDIX 2: PERFORMANCE MILESTONES AND SUCCESS CRITERIA

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Proprietary and Competition Sensitive Information

Appendix 2a: Base Period Performance Milestones

1. CCiCap Kickoff Meeting (August 2012)

Amount: $40 million

Date: August 2012

Scope: SpaceX will hold a kickoff meeting at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to review the current state of existing hardware, processes and designs, describe plans for CCiCap program execution during both the base period and the optional period and lay the groundwork for a successful partnership between NASA and SpaceX. The following actions will be accomplished: review the terms of the CCiCap Space Act Agreement (SAA); review driving NASA requirements; present the pre-CCiCap status of all systems including the Dragon spacecraft, Falcon 9 launch vehicle, and ground and mission operations; present the CCiCap project plan that meets the CCiCap strategic goals, base period goal, optional period goals and overall safety goal as defined in the AFP; and present key risks and mitigation plans. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. Electronic copy of the following technical products made available for NASA review at least 10 days before the review:
    a. Initial Integrated Master Schedule.
    b. Initial NASA Insight Plan.

Success Criteria:

Kickoff meeting held, including:

1. Terms of SAA reviewed.
2. Status of pre-CCiCap hardware, infrastructure and design presented for:
    a. Dragon spacecraft.
    b. Falcon 9 launch vehicle.
    c. Ground operations.
    d. Mission operations.
3. Program Plan presented with CCiCap goals addressed.
4. Initial Integrated Master Schedule presented.
5. Key risk and mitigation plans presented in a mutually agreed-to format.
6. SpaceX's plan for NASA insight presented to include:
    a. Approach to provide NASA insight team access to data and information during CCiCap.
    b. Approach to accommodate resolution of concerns and issues raised by the NASA insight team.
    c. Approach to support technical experts and four core members of the NASA insight team.
    d. Explanation of how the NASA Insight Plan meets or exceeds CCT-PLN-1100.

Electronic copy of as-presented materials distributed at the meeting.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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2. Financial and Business Review (August 2012)

Amount: $20 million

Date: August 2012

Scope: SpaceX will hold a financial and business review at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to accomplish verification of financial ability to meet NASA's stated goals for the CCiCap program by providing NASA insight into SpaceX finances. The review will demonstrate that SpaceX has the financial plan in place to support the CCiCap program, detail the SpaceX funding schedule & sources of funding for CCiCap, and demonstrate significant SpaceX investment.

Entry Criteria:

1. Any required financing activities are complete, including:
   a. Evidence of approval of internal corporate investment from majority shareholder(s) has been obtained.
   [redacted]
   c. New investment purchases have been defined to support the CCiCap effort.

Success Criteria:

1. Meeting held and documentation provided to demonstrate the internal SpaceX investments that have been committed to the CCiCap effort.

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3. Integrated System Requirements Review (ISRR) (October 2012)

Amount: $50 million

Date: October 2012

Scope: SpaceX will hold an Integrated System Requirements Review (ISRR) at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to examine the functional and performance requirements defined for the entire CTS for the Commercial Crew Program design reference mission per section 3.1 of CCT-DRM-1110, as well as to evaluate the interpretation and applicability of each requirement. The purpose of the ISRR is to ensure that the requirements and the selected concept will satisfy the mission. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback. This ISRR will cover spacecraft, launch vehicle, and ground and mission operations systems.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. All critical questions from the CCiCap Kickoff Meeting (Milestone 1) answered or dispositioned.
2. Scoping meeting held with NASA, either in person or remotely, no less than 30 days prior to the review. The purpose of the meeting is to define the review content details, and the expected outcome is a mutually agreed-to agenda for the review.
3. Electronic copy of the following technical products made available for NASA review at least 15 days before the review:
    a. Initial System Requirements Document.
    b. Initial Software Development Plan.
    c. Draft Concept of Operations.
    d. Initial Risk Management Plan.
    e. Initial Configuration Management Plan.
    f. Updated Integrated Master Schedule.
4. NASA comments to the technical products provided to SpaceX no less than 7 days before the review.
5. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
6. Electronic copy of the ISRR agenda and presentation materials made available for NASA review at least five days before the review.

Success Criteria:

All topics listed in the agenda are covered, including:

1. Top-level requirements selected from NASA 1100-series and SSP 50808 documents briefed.
2. Preliminary requirements compliance matrix presented for NASA 1130 requirements.
3. Draft approaches for tracking and verifying requirements presented.
4. Updated program plan presented.
5. Major risks identified and assessed, and viable mitigation strategies defined.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

4. Ground Systems and Ascent Preliminary Design Review (PDR) (December 2012)

Amount: $35 million

Date: December 2012

Scope: SpaceX will hold a Ground Systems and Ascent Preliminary Design Review (PDR) at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to demonstrate that the overall CTS preliminary design for ground systems and ascent meets all requirements with acceptable risk and within schedule constraints and that it establishes the basis for proceeding with detailed design. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback. This PDR will cover ground systems including vehicle processing and launch pad operations as well as the Falcon 9 launch vehicle and the Dragon spacecraft, focusing on the ascent and abort flight regimes.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Technical analyses are labeled as either Preliminary, Detailed or Update according to the following definitions:
Preliminary – At PDR-level maturity.
Detailed – At CDR-level maturity.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. All critical questions from the Integrated System Requirements Review (ISRR) (Milestone 3) answered or dispositioned.
2. Scoping meeting held with NASA, either in person or remotely, no less than 30 days prior to the review. The purpose of the meeting is to define the review content details and the expected outcome is a mutually agreed-to agenda for the review.
3. Electronic copy of the following technical products made available for NASA review at least 15 days before the review:
    a. Updated Concept of Operations, if applicable.
    b. Requirements updates, if applicable.
    c. Draft Performance Margin Management Plan.
    d. Initial Quality Management Plan.
    e. Draft Alternate Technical Standards Selection.
    f. Preliminary loads, environments, and structural analysis.
    g. Preliminary launch vehicle GN&C Analysis.
    h. Preliminary abort trajectory design and analysis.
    i. Updated Integrated Master Schedule.
    j. Access to CAD model for Falcon 9, and applicable Dragon systems.
4. NASA comments to the technical products provided to SpaceX no less than 7 days before the review.
5. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
6. Electronic copy of the Ground Systems and Ascent PDR agenda and presentation materials made available for NASA review at least five days before the review.

Success Criteria:

1. Preliminary designs for the following systems and subsystems presented:
    a. Falcon 9 launch vehicle.
    b. Launch pad systems and spacecraft processing facilities.
    c. Launch control center architecture.
    d. Ascent-related Dragon spacecraft, specifically excluding docking systems, power generation, proximity navigation sensors, on-orbit propulsion system, and associated GN&C and flight software.

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2. Top-level requirements relevant to ground and ascent phase finalized and consistent with the preliminary design.
3. Positive system performance margins exist or "get well" plan defined.
4. Reviewed Quality Management Plan.
5. Facilities to perform manufacture, processing, test, integration, checkout and launch are identified.
6. Operational concept is technically sound and incorporates (where appropriate) human factors.
7. Updated program plan and schedule presented, if applicable.
8. Updates to risk assessments and mitigation strategies presented.
9. Project risks are understood and have been dispositioned.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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5. Pad Abort Test Review (March 2013)

Amount: $20 million

Date: March 2013

Scope: SpaceX will hold a Pad Abort Test Review at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to demonstrate the maturity of the pad abort test article design and test concept of operations. The review will show that the test plan, if successfully accomplished, will adequately demonstrate the effectiveness of the crew Dragon launch abort system in a pad abort scenario. Also, the review will determine that the test article is capable of meeting the pad abort test requirements and schedule. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback.

Technical analyses are labeled as either Preliminary, Detailed or Update according to the following definitions:
Preliminary – At PDR-level maturity.
Detailed – At CDR-level maturity.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. Electronic copy of the Initial Pad Abort Test Plan made available for NASA review at least 30 days before the review. The test plan will include, at a minimum:
    a. Primary and secondary objectives.
    b. Configuration of the test unit.
    c. Key differences between test unit and flight unit.
    d. Test conditions and environments.
2. NASA comments to the Initial Pad Abort Test Plan provided to SpaceX no less than 15 days before the review.
3. SpaceX will disposition NASA comments to the Initial Pad Abort Test Plan prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
4. Electronic copy of the Pad Abort Test Review presentation materials sent to NASA at least five days before the review.

Success Criteria:

1. Pad abort test plan presented.
2. SpaceX management gives authority to proceed with Pad Abort Test.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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6. Human Certification Plan Review (May 2013)

Amount: $50 million

Date: May 2013

Scope: SpaceX will hold a Human Certification Plan Review at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to present the Human Certification Plan. This Human Certification Plan Review will cover plans for certification of the design of the spacecraft, launch vehicle, and ground and mission operations systems. The purpose of the review is to define in detail the SpaceX strategy leading to an orbital demonstration flight with crew. The Human Certification Plan will provide a detailed step-by-step depiction of the path to certification including all required testing, demonstrations, analysis, inspections, verifications, and training events. A matrix similar to that shown in NPR 8705.2B, Appendix D will be presented. The Master Verification Plan will show traceability between proposed requirements and verification/validation activities. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. Electronic copy of the following technical products made available for NASA review at least 15 days before the review:
    a. Initial Human Certification Plan, to include:
        i. Series of Certification Networks showing scope of test and analysis and facilities and support equipment that will be used and the top-level schedule of execution.
        ii. Detailed description of Design Certification Review Package Contents, to address the following items:
            i. Description of design configuration to be certified.
            ii. Description of activities and design reference missions to be certified.
            iii. Requirements verification closure.
            iv. Design flight heritage and qualification summary.
            v. Baseline analyses.
            vi. Summary of ground and flight test activities.
            vii. Operating limits and restrictions.
            viii. Deviations, exceptions and waivers, if any.
            ix. Mission reconfigurable items.
    b. Initial Master Verification Plan.
    c. Draft Safety and Reliability Plan.
2. NASA comments to the technical products provided to SpaceX no less than 7 days before the review.
3. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
4. Electronic copy of the Human Certification Plan Review agenda and presentation materials made available for NASA review at least five days before the review.

Success Criteria:

1. Human Certification Plan presented.
2. Open issues identified.
3. Resolution plan for closure of each open issue agreed to.

Electronic copy of as-presented materials distributed.
Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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7. On-Orbit and Entry Preliminary Design Review (PDR) (July 2013)

Amount: $35 million

Date: July 2013

Scope: SpaceX will hold an On-Orbit and Entry Preliminary Design Review (PDR) at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to demonstrate that the overall CTS preliminary design for orbit, rendezvous and docking with the ISS, and entry flight regimes meets all requirements with acceptable risk and within schedule constraints and that it establishes the basis for proceeding with detailed design. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback. This PDR will cover mission operations as well as the Dragon spacecraft, focusing on the orbit and entry flight regimes.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Technical analyses are labeled as either Preliminary, Detailed or Update according to the following definitions:
Preliminary – At PDR-level maturity.
Detailed – At CDR-level maturity.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. All critical questions from the Ground Systems and Ascent Preliminary Design Review (PDR) (Milestone 4) answered or dispositioned.
2. Scoping meeting held with NASA, either in person or remotely, no less than 30 days prior to the review. The purpose of the meeting is to define the review content details, and the expected outcome is a mutually agreed-to agenda for the review.
3. Electronic copy of the following technical products made available for NASA review at least 15 days before the review:
    a. Updated Concept of Operations, if applicable.
    b. Initial Performance Margin Management Plan.
    c. Preliminary on-orbit GN&C analysis.
    d. Preliminary thermal and environmental control and life support system analysis
    e. Access to CAD model for Dragon.
    f. Draft Dragon Crew Display Dictionary.
    g. Updated Integrated Master Schedule.
4. NASA comments to the technical products provided to SpaceX no less than 7 days before the review.
5. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
6. Electronic copy of the On-Orbit and Entry PDR agenda and presentation materials made available for NASA review at least five days before the review.

Success Criteria:

1. Updated preliminary Dragon spacecraft design including docking system and proximity navigation sensors presented.
2. Top-level requirements finalized and consistent with the preliminary design.
3. Positive system performance margins exist or "get well" plan defined.
4. Operational concept is technically sound and incorporates (where appropriate) human factors.
5. Facilities to perform manufacture, processing, test, integration, checkout and launch are identified. (Only additions, changes or updates to the facilities identified in the Ground Systems and Ascent PDR required.)
6. Updated program plan and schedule presented, if applicable.
7. Updates to risk assessments and mitigation strategies presented.
8. Project risks are understood and have been dispositioned.

Electronic copy of as-presented materials distributed.

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Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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8. In-Flight Abort Test Review (September 2013)

Amount: $10 million

Date: September 2013

Scope: SpaceX will hold an In-Flight Abort Test Review at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to demonstrate the maturity of the in-flight abort test article design and test concept of operations. The review will show that the test plan, if successfully accomplished, will adequately demonstrate the effectiveness of the crew Dragon launch abort system in a selected in-flight abort scenario. The review will also determine that the test article is capable of meeting the in-flight abort test requirements and schedule. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback.

Technical analyses are labeled as either Preliminary, Detailed or Update according to the following definitions:
Preliminary – At PDR-level maturity.
Detailed – At CDR-level maturity.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. Electronic copy of the initial in-flight abort test plan made available for NASA review at least 30 days before the review. The test plan will include, at a minimum:
    a. Primary and secondary objectives.
    b. Configuration of the test unit.
    c. Key differences between test unit and flight unit.
    d. Test conditions and environments.
2. NASA comments to the test plan provided to SpaceX no less than 15 days before the review.
3. SpaceX will disposition NASA comments to the test plan prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
4. Electronic copy of the in-flight abort test review presentation materials sent to NASA at least five days before the review.

Success Criteria:

1. In-flight abort test plan presented.
2. SpaceX management gives authority to proceed with In-Flight Abort Test.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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9. Safety Review (October 2013)

Amount: $50 million

Date: October 2013

Scope: SpaceX will hold a Safety Review at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to demonstrate that the CTS design is progressing toward meeting the Commercial Crew Program's safety goals. The purpose of this Safety Review is to meet some of the safety-related elements of the human certification plan and to determine that safety plans and assessments are at an appropriate level of development for this phase of the program in order to meet mission safety requirements and schedule. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback. This Safety Review will cover spacecraft, launch vehicle and flight operations.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Technical analyses are labeled as either Preliminary, Detailed or Update according to the following definitions:
Preliminary – At PDR-level maturity.
Detailed – At CDR-level maturity.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. All critical questions from the Human Certification Plan Review (Milestone 6), answered or dispositioned.
2. Scoping meeting held with NASA, either in person or remotely, no less than 30 days prior to the review. The purpose of the meeting is to define the review content details, and the expected outcome is a mutually agreed-to agenda for the review.
3. Electronic copy of the following technical products made available for NASA review at least 15 days before the review:
    a. Initial Safety and Reliability Plan.
    b. Final Software Development Plan
    c. Preliminary Falcon 9 Failure Modes & Effects Analysis.
    d. Preliminary Crew Dragon Failure Modes & Effects Analysis.
    e. Preliminary Hazard Analysis for the CTS.
    f. Preliminary Probabilistic Safety Assessment.
4. NASA comments to the technical products provided to SpaceX no less than 7 days before the review.
5. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
6. Electronic copy of the Safety Review agenda and presentation materials made available for NASA review at least five days before the review.

Success Criteria:

1. Initial Safety and Reliability Plan presented.
2. Explanation of how SpaceX develops, reviews and matures safety products provided.
3. Explanation of how SpaceX identifies, develops, and assures quality of safety-critical software provided. Preliminary Falcon 9 Failure Modes & Effects Analysis complete and any Criticality 1 & 1R rated failure modes discussed and resolution plan presented.
4. Preliminary Crew Dragon Failure Modes & Effects Analysis complete and any Criticality 1 & 1R failure modes discussed and resolution plan presented.
5. Preliminary Hazard Analysis complete and presented.
6. Preliminary Probabilistic Safety Assessment methodology and preliminary results presented.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical

path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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10. Flight Review of Upgraded Falcon 9 (November 2013)

Amount: $0

[redacted]

Date: November 2013

Scope: SpaceX will conduct a review of a launch of the upgraded Falcon 9 launch vehicle demonstrating the operation of enhanced first-stage M1D engines, stage separation systems, enhanced second-stage MVacD engine and mission-critical vehicle telemetry during flight. Demonstration of the upgraded launch vehicle will serve as a risk reduction for the planned in-flight abort test (Milestone 15). This review will also provide data to support human certification of the Falcon 9 launch vehicle. The upgraded vehicle has higher performance, adding additional margin for the Commercial Crew Program.

The SpaceX contribution value includes the Falcon 9 upgrade development work performed during the period from CCiCap authority to proceed through the first flight of the upgraded Falcon 9.

Entry Criteria:

1. Scoping meeting held with NASA, either in person or remotely, no less than 30 days prior to the review. The purpose of the meeting is to define the review content details, and the expected outcome is a mutually agreed-to agenda for the review.
2. Electronic copy of the presentation materials and data packages for the following reviews made available to NASA review at least 15 days before the review:
    a. F9 Integrated Stage Pre-Ship Reviews.
    b. Integrated Stage 1 Test Fire Data Review.
    c. Integrated Stage 2 Test Fire Data Review.
    d. Mission Timeline/Sequencing Review.
    e. Rollout/Flight Readiness Review.
    f. Launch Readiness Review.
3. These data packages will include, at a minimum, structural, engine and avionics qualification and acceptance test reports.
4. NASA comments to the presentation materials and data packages provided to SpaceX no less than 7 days before the review.
5. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.

Success Criteria:

1. Upgraded Falcon 9 flight conducted.
2. Post-flight review conducted.
3. All flight anomalies identified.
4. Quick-look report delivered to NASA.
5. Relevant Falcon 9 certification objectives have been met or a process is in place to disposition any open items.
6. Verification that SpaceX financial commitments for Falcon 9 upgrades made at milestone 2 have been met.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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11. Pad Abort Test (December 2013)

Amount: $30 million

Date: December 2013

Scope: SpaceX will conduct a pad abort test of the Dragon spacecraft. The scenario where an abort is initiated while the CTS is still on the pad is a design driver for the launch abort system as it dictates the total impulse and also requires parachute deployment in close proximity to the ground. The intent of the test is to integrate a complete propulsion system into Dragon to support the launch abort with command and control, as well as data acquisition. The test article would closely match the flight CTS in mechanical properties such as the outer mold line for aerodynamic accuracy, maximum gross weight and equivalent moment of inertia to evaluate performance metrics. The purpose for conducting the pad abort test is for risk reduction for the planned in-flight abort test, for demonstration of the effectiveness of the crew Dragon launch abort system, and to meet human certification plan requirements.

Entry Criteria:

1. Final Pad Abort Test Plan delivered to NASA at least 30 days prior to the test. The Test Plan will contain, at a minimum:
    a. Primary and Secondary (if any) test objectives.
    b. Configuration of the test unit.
    c. Key differences between test unit and flight unit.
    d. Test conditions and environment.
2. NASA comments to the test plan provided to SpaceX no less than 15 days before the test.
3. SpaceX will disposition NASA comments to the test plan prior to the test. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
4. Test operation procedures released at least 15 days prior to the test.
5. NASA comments to the test procedures provided to SpaceX no less than 7 days before the test.
6. SpaceX will disposition NASA comments to the test procedures prior to the test. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
7. Pad abort test dry runs/simulations completed.
8. All components qualified per predicted environments.
9. All applicable components acceptance tested.
10. Hardware-in-the-loop (HITL) testing of flight software performed.
11. Assembly of the pad abort test article completed.
12. Non-reactive testing of the pad abort test article completed, including:
    a. Structural loading testing.
    b. Propulsion system leak checks and functional tests.
    c. Avionics checkouts.
13. Test stand buildup and activation checkouts completed.
14. Test readiness review completed at least 7 days prior to test. NASA participation is requested but not required.
15. All critical questions from the test readiness review, if any, answered or dispositioned.
16. FAA, Range Safety and/or other applicable government approvals for the test demonstration received.

Success Criteria:

1. Pad abort test conducted.
2. Test results satisfy primary test plan objectives and support the certification plan, or a process is in place to disposition any open items.
3. Telemetry including propulsion and avionics sensors recorded or transmitted.
4. Environmental data for abort acoustics, induced random vibration, and landing dynamics recorded.
5. Quick-look test report delivered to NASA within 10 days of test completion.

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12. Dragon Primary Structure Qualification (January 2014)

Amount: $30 million

Date: January 2014

Scope: SpaceX will conduct static structural testing of all Dragon primary structure components to ultimate load factors, as applicable. This series of tests will validate the Dragon structure's ability to maintain integrity during all driving load cases as well as verify the accuracy of math models used to analyze the Dragon structure. Individual tests will be designed to exercise all credible failure modes and minimum margin areas. This test is intended to support the human certification plan.

Entry Criteria:

1. Test unit completed including all primary structure:
    a. Pressure vessel with mounts for seat structure, SuperDracos, and nose cone.
    b. Thermal protection system support structure.
    c. Trunk with mounts for solar arrays and solar array fairings.
    d. Nose cone.
2. Test stand(s) completed, integrated with test unit and checked out.
3. Test plan completed and submitted to NASA at least 15 days prior to test. The Test Plan will contain:
    a. Primary and Secondary (if any) test objectives.
    b. Configuration of the test unit.
    c. Key differences between test unit and flight unit.
4. NASA comments to the test plan provided to SpaceX no less than 7 days before the test.
5. SpaceX will disposition NASA comments to the test plan prior to the test. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
6. Test readiness review completed at least 7 days prior to test. NASA participation is requested but not required.
7. All critical questions from the test readiness review answered or dispositioned.

Success Criteria:

1. All driving load cases tested to ultimate load.
2. Test results satisfy primary test plan objectives and support the certification plan, or a process is in place to disposition any open items.
3. Quick-look report provided to NASA within 10 days of test including the following:
    a. Description of major anomalies.
    b. Plots of predicted versus measured strain and deflection (as applicable).
    c. Photographic coverage.

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13. Integrated Critical Design Review (CDR) (March 2014)

Amount: $40 million

Date: March 2014

Scope: SpaceX will hold an Integrated Critical Design Review (CDR) at the SpaceX headquarters in Hawthorne, CA, or a nearby facility to demonstrate that the maturity of the CTS design is appropriate to support proceeding with full-scale fabrication, assembly, integration and test. This integrated CDR will determine that the technical effort is on track to complete the flight and ground system development and mission operations in order to meet mission performance requirements and schedule. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback. This integrated CDR will cover spacecraft, launch vehicle, and ground and mission operations systems.

Technical documents are labeled as either Draft, Initial, Final or Update according to the following definitions:
Draft – Overview of the document purpose and approach with an outline of the content to be included with less than 75% of the content populated. Document not ready for baseline approval.
Initial – More than 75% of the content populated and document available for comment. Document is baselined, version controlled and approved for use.
Final – More than 97% of content populated with open work clearly identified within the document.
Update – Update of a previous version due to changes or closure of open work.

Technical analyses are labeled as either Preliminary, Detailed or Update according to the following definitions:
Preliminary – At PDR-level maturity.
Detailed – At CDR-level maturity.
Update – Update of a previous version due to changes or closure of open work.

Entry Criteria:

1. All critical questions from the On-Orbit and Entry Preliminary Design Review (PDR) (Milestone 7), Human Certification Plan Review (Milestone 6), and Safety Review (Milestone 10) answered or dispositioned.
2. Scoping meeting held with NASA, either in person or remotely, no less than 30 days prior to the review. The purpose of the meeting is to define the review content details, and the expected outcome is a mutually agreed-to agenda for the review.
3. Electronic copy of the following technical products made available for NASA review at least 15 days before the review:
    a. Initial Concept of Operations.
    b. Final Configuration Management Plan.
    c. Final Risk Management Plan.
    d. Final Performance Margin Management Plan.
    e. Final Quality Management Plan.
    f. Final Safety and Reliability Plan.
    g. Detailed Probabilistic Safety Assessment.
    h. Detailed Hazard Analysis.
    i. Range Safety Documentation, if applicable.
    j. Initial Alternate Technical Standards Selection.
    k. Final Human Certification Plan.
    l. Final Master Verification Plan.
    m. Detailed Trajectory Analysis.
    n. Detailed Dragon-Falcon 9 Failure Modes and Effects Analysis.
    o. Detailed GN&C Analysis.
    p. Final thermal and environmental control and life support system analysis
    q. Detailed loads, environments and structural analysis.
    r. Transonic Ascent and Entry Wind Tunnel Test Report.
    s. Access to updated CAD model.
    t. Schematics for all Falcon 9 and Dragon systems.
    u. Draft Flight Crew Procedures.
    v. Updated Integrated Master Schedule.
4. NASA comments to the technical products provided to SpaceX no less than 7 days before the review.
5. SpaceX will disposition NASA comments to the technical products prior to the review. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
6. Electronic copy of the integrated CDR agenda and presentation materials made available for NASA review at least

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five days before the review.

Success Criteria:

1. Critical designs for all relevant CTS systems and subsystems presented.
2. Review of the comprehensive CTS baseline design presented at sufficient maturity to show system requirements will be met and the program is ready to proceed with fabrication, assembly, integration and test of all articles required for the optional period milestones.
3. Testing approach is comprehensive, and planning for system assembly integration, test, and launch site and mission operations is sufficient to progress into the next phase.
4. Updated program plan and schedule presented, if applicable.
5. Adequate technical and programmatic margins and resources exist to complete the development within budget, schedule and risk constraints.
6. Updates to risk assessments and mitigation strategies presented.
7. Risks to mission success are understood, and plans and resources exist to effectively manage them.
8. Safety and mission assurance have been adequately addressed in system and operational designs, and applicable S&MA products have been delivered.

Electronic copy of as-presented materials distributed.

Critical questions from the meeting answered or a plan for the resolution of the question established, including, at a minimum, an assignee and a resolve-by date. Critical questions are those relating to risks designated as high, on the critical path, or planned within the next three months; or as jointly agreed to by SpaceX and attendee.

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14. In-Flight Abort Test (April 2014)

Amount: $30 million

[redacted]

Date: April 2014

Scope: SpaceX will conduct an in-flight abort test of the Dragon spacecraft. The in-flight abort test will supplement the pad abort test and complete the corners-of-the-box stress cases. The in-flight abort scenario represents a Dragon abort while under propulsive flight of the launch vehicle during the worst-case dynamic loads on the CTS. This point in the trajectory produces the most drag on the aborting Dragon spacecraft and therefore drives the peak axial thrust requirement for the launch abort system. This test will demonstrate positive relative acceleration and controllability even under worst-case dynamic conditions. A successful test would result in the separation of the Dragon spacecraft at desired in-flight dynamic conditions followed by controlled positive relative acceleration of the spacecraft away from the launch vehicle. Additionally, a successful in-flight abort test would demonstrate parachute deployment, safe landing and recovery of the Dragon test article. The purpose of conducting the in-flight abort test is to demonstrate the effectiveness of the crew Dragon launch abort system and to meet human certification plan requirements.

SpaceX's contribution value will be satisfied by provision of the launch vehicle and spacecraft test articles and related launch services.

Entry Criteria:

1. Final in-flight abort test plan delivered to NASA at least 30 days prior to the test. The Test Plan will contain:
    a. Primary and Secondary (if any) test objectives.
    b. Configuration of the test unit.
    c. Key differences between test unit and flight unit.
    d. Test conditions and environment.
2. NASA comments to the test plan provided to SpaceX no less than 15 days before the test.
3. SpaceX will disposition NASA comments to the test plan prior to the test. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
4. Test operation procedures including contingency procedures released at least 15 days prior to the test.
5. NASA comments to the test procedures provided to SpaceX no less than 7 days before the test.
6. SpaceX will disposition NASA comments to the test procedures prior to the test. 'Disposition' options include accept, accept with modification, reject, withdrawn, or no action taken.
7. In-flight abort test dry runs/simulations completed.
8. All components per predicted environments qualified.
9. All applicable components acceptance tested.
10. Aerodynamics analysis for the in-flight abort condition presented.
11. Dragon spacecraft separation tests completed.
12. HITL testing of flight software performed.
13. Assembly of the in-flight abort test article completed.
14. Non-reactive testing of the in-flight abort test article completed including:
    a. Structural loading testing.
    b. Propulsion system leak checks and functional tests.
    c. Avionics checkouts.
15. Test stand buildup and activation checkouts completed.
16. Test readiness review completed at least 7 days prior to test. NASA participation is requested but not required.
17. All critical questions from the test readiness review, if any, answered or dispositioned.
18. FAA, Range Safety and/or other applicable government approvals for the test demonstration received.

Success Criteria:

1. In-flight abort test conducted.
2. Test results satisfy primary test plan objectives and support the certification plan, or a process is in place to disposition any open items.
3. Telemetry including propulsion and avionics sensors recorded or transmitted.
4. Environmental data recorded.
5. Quick-look test report delivered to NASA within 10 days of test completion.
6. Verification that SpaceX financial commitments for the In-Flight Abort Test made at milestone 2 have been met.

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Appendix 2b: Optional Period Optimal Funding Performance Milestones

[redacted]

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[redacted] Orbital Flight Test with Crew [redacted] 2015)

[redacted]

Date: [redacted] 2015

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[redacted]

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[redacted]Flight to ISS with non-NASA Crew [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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APPENDIX 3: Article 12. Intellectual Property & Data Rights - Rights In Data; G (2) – Background Data

Background Data that may be used in this Agreement, including SpaceX Background Data that embodies Proprietary Data:

[redacted]

[redacted]

SPACE ACT AGREEMENT – NNK12MS02S, AMENDMENT ONE (01)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITMENT

The purpose of this Amendment is to make the following changes to Space Act Agreement NNK12MS02S:

1) Update Optional Milestone 1, *Dragon Parachute Tests*, and add it to Appendix 2a as Base Milestone 15.
2) Extend the Term of Agreement in Article 15

****

1) Optional Milestone 1, *Dragon Parachute Tests*, is updated to the following Milestone 15 and is added to Appendix 2a, *Base Period Performance Milestones*:

15. Dragon Parachute Tests (November 2013)

Amount: $20 Million
[redacted]
Date: November 2013

Scope: SpaceX will conduct parachute drop tests in order to validate the new parachute design as capable of supporting a pad abort event. These tests are intended as risk reduction for the Pad Abort Test (Milestone 12). [redacted] This test will prove that the new design will perform adequately for a pad abort scenario by lifting the test article to the appropriate altitude and initiating the parachute sequence.

Test 1: Drogue and Parachute Attach Fitting Structural Qualification

Entry Criteria:

1. Test Plan is delivered to NASA and a Test Plan Review meeting is held no later than 7 days prior to the test. NASA personnel are invited to attend the Test Plan Review either in person or remotely. The Test Plan Review will consist of an

overview of the test plan with the opportunity provided for NASA representatives to ask questions and offer suggestions.

2. NASA personnel are invited but not required to attend the test.

Success Criteria:

1. Test is completed and either deemed successful (no retest required) by SpaceX or a plan is provided that shows how the discrepancies will be resolved prior to the Pad Abort Test Milestone.
2. A summary report with a description of the post-test inspections and plots of recorded data is provided to NASA within 30 days.

Test 2: Drogue Mortar Firing

Entry Criteria:

1. A drogue mortar with flight-intent gas generator and a flight drogue parachute (or flight-like with representative mass/density/packaging) is acquired by SpaceX.
2. Test Plan is delivered to NASA and a Test Plan Review meeting is held no later than 3 days prior to the test. NASA personnel are invited to attend the Test Plan Review either in person or remotely. The Test Plan Review will consist of an overview of the test plan with the opportunity provided for NASA representatives to ask questions and offer suggestions.
3. NASA personnel are invited but not required to attend the test.

Success Criteria:

1. Test is completed and either deemed successful (no retest required) by SpaceX or a plan is provided that shows how the discrepancies will be resolved prior to the Pad Abort Test Milestone.
2. A summary report with a description of the post-test inspections and plots of recorded data (with video, if acquired) is provided to NASA within 30 days.

Test 3: Crane Drop Test

Entry Criteria:

1. Full-scale Dragon test unit prepared with all characteristics deemed appropriate by SpaceX (mass, moment of inertia, etc.) as close to those of the flight configuration following an on-pad abort as possible.
2. Test Plan is delivered to NASA and a Test Plan Review meeting is held no later than 7 days prior to the test. NASA personnel are invited to attend the Test Plan Review either in person or remotely. The Test Plan Review will consist of an

overview of the test plan with the opportunity provided for NASA representatives to ask questions and offer suggestions.

3. NASA personnel are invited but not required to attend the test.

Success Criteria:

1. Test is completed and either deemed successful (no retest required) by SpaceX or a plan is provided that shows how the discrepancies will be resolved prior to the Pad Abort Test Milestone.
2. A summary report with a description of the post-test inspections and plots of recorded data (with video, if acquired) is provided to NASA within 30 days.

Test 4: Helicopter/Airplane Drop Test

Entry Criteria:

1. Tests 1, 2 and 3 have been completed and satisfied their success criteria.
2. Full-scale Dragon test unit prepared with all characteristics deemed applicable by SpaceX (mass, moment of inertia, etc.) as close to those of the flight configuration following an on-pad abort as possible.
3. Flight-intent drogue parachute Design Analysis Report [redacted] is provided to NASA, which shows capability of the drogue parachute to sustain the pad abort maximum predicted deploy conditions [redacted] no later than 14 days prior to the planned test date.
4. Test Plan delivered to NASA no later than 21 days prior to the planned test date. NASA comments to the test plan may be provided prior to the Test Readiness Review.
5. NASA personnel are invited to attend a Test Readiness Review containing a summary of the objectives, test location and conditions (including helicopter/airplane conditions and test setup), model predictions (including basis of the predictions), configuration/design of the test article (including a list of deltas between flight and test configuration), planned test timeline, and planned instrumentation. Briefing will be provided to NASA no later than 14 days prior to the planned test date.
6. Any NASA comments from Test 4 Test Readiness Review and the Test Plan have been dispositioned by SpaceX at least 7 days prior to the planned test date.
7. NASA personnel are invited but not required to attend the test on location.

Success Criteria:

1. Test is completed and either deemed successful (no retest required) by SpaceX or a plan is provided that shows how the discrepancies will be resolved prior to the Pad Abort Test Milestone.
2. A post-test report is provided to NASA within 30 days that includes a summary of the results, a description of the post-test inspections, and plots of recorded data as well as access to video.

2) 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 Gerstenmaier
Associate Administrator for Human Exploration and Operations

DATE: 7 Aug 2013

SPACE EXPLORATION TECHNOLOGIES CORP.

BY: _____

Elon Musk
CEO/CTO

DATE: _____

SPACE ACT AGREEMENT – NNK12MS02S, AMENDMENT TWO (02)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITMENT

The purpose of this Amendment is to extend the term of the agreement to allow completion of the work associated with Milestone 14 In-Flight Abort Test.

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: 16 May 2014

SPACE EXPLORATION TECHNOLOGIES CORP.

BY: _____
Elon Musk
CEO/CTO

DATE: 05/14/2014

SPACE ACT AGREEMENT – NNK12MS02S, AMENDMENT THREE (03)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITMENT

The purpose of this Amendment is to extend the term of the agreement to allow completion of the work associated with Milestone 12B Dragon Primary Structure Qualification- Hatch Open Test, Milestone 13E Delta Crew Vehicle Critical Design Review, and Milestone 14 In-Flight Abort Test.

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 December 31, 2015, 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: 27 Feb 2015

SPACE EXPLORATION TECHNOLOGIES CORP.

BY: [signature]

Julie A. Jiru
Contracts Officer

DATE: 27 Feb 2015

SPACE ACT AGREEMENT – NNK12MS02S, AMENDMENT FOUR (04)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
FOR
COMMERCIAL CREW INTEGRATED CAPABILITY (CCiCap)

PURPOSE and AGENCY COMMITMENT

The purpose of this Amendment is to extend the term of the agreement to allow completion of the work associated with Milestone 12B Dragon Primary Structure Qualification- Hatch Open Test and Milestone 14 In-Flight Abort Test.

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: 8/28/15

SPACE EXPLORATION TECHNOLOGIES CORP.

BY: _____
Julie A. Jiru
Contracts Officer

DATE: 8 Sep 2015