Space Exploration Technologies Corp. Commercial Crew Development Round 2 (CCDev2) Space Act Agreement

NNK11MS04S

SpaceX CCDev2 Space Act Agreement

SPACE ACT AGREEMENT NO. NNK11MS04S
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
FOR
COMMERCIAL CREW DEVELOPMENT ROUND 2 (CCDev 2)

BACKGROUND

In 2009, the National Aeronautics and Space Administration ("NASA") began the Commercial Crew Development ("CCDev") initiatives to stimulate efforts within the private sector to develop system concepts and capabilities that could ultimately lead to the availability of commercial human spaceflight services. NASA is continuing that effort through a second round of CCDev initiatives ("CCDev 2") in order to further foster activity leading to the development of orbital commercial Crew Transportation Systems ("CTS"). Through this CCDev 2 activity, NASA may be able to continue to spur economic growth as capabilities for new space markets are created, and reduce the gap in U.S. human spaceflight capability.

The goals of the CCDev 2 investments are to advance orbital commercial CTS concepts and enable significant progress on maturing the design and development of elements of the system, such as launch vehicles and spacecraft, with the overall objective of accelerating the availability of U.S. CTS capabilities while ensuring crew and passenger safety. This Space Act Agreement (the "Agreement" or "SAA") represents SpaceX's and NASA's commitment to encourage innovations and efficiencies in CTS concepts and capabilities to achieve these CCDev 2 goals. Specifically, SpaceX's approach to meeting the goals of the CCDev 2 activity is outlined in Appendix 1.

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 SpaceX, (hereinafter referred to as "SpaceX" or "Participant") with a place of business at 1 Rocket Road, Hawthorne, California 90250. 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 203(c)(5) and 203(c)(6) 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 advancement of commercial crew space transportation systems concepts. SpaceX's development work must show, within the timeframe of the Agreement, significant progress in maturing the design and development of elements of a commercial CTS while ensuring crew and passenger safety. 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 CCDev 2 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 CCDev 2 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 space transportation system design, engineering 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 CCDev 2 effort are identified in Appendix 2 to this Agreement.

ARTICLE 5. FINANCIAL OBLIGATIONS AND TECHNICAL REPORTS

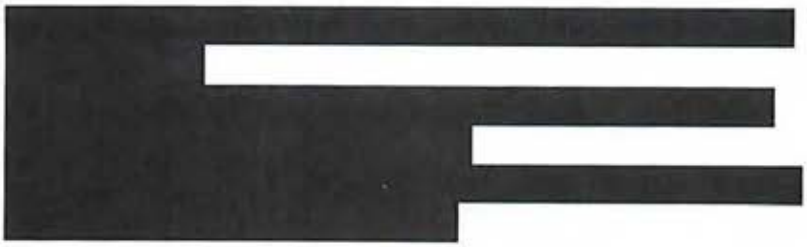
A. NASA's Payment Obligation

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 to arrange for the NASA Technical Contact or designee to witness the event or accept delivery of documents. NASA shall have 30 calendar days to determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix 2 of this Agreement and shall notify SpaceX 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:



(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 progress made since the last report, plans forward, and shall also describe any difficulties encountered and the corrective action necessary to recover. At each quarterly briefing, SpaceX will provide NASA with written certification that it has not provided U.S. Government funding to any Russian entity in the previous quarter. "Russian entity," for purposes of this Agreement, is defined in Article 25. The final briefing shall describe not only work completed but also shall document how this activity has reduced the overall risk to SpaceX's commercial crew space transportation concept 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 commercial crew space transportation concept.

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 as desired.

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

A. NASA may, at its sole discretion and on terms to be negotiated between the Parties, provide SpaceX services, technical expertise, or access to Government Property. Such NASA services, technical expertise, or access to Government Property may be provided on either a reimbursable or non-reimbursable basis. Specific services and property and any terms and conditions applicable to the provision of such services, technical expertise and access to Government property will be identified in appropriate appendices to this Agreement. Unless NASA specifically requires SpaceX to use NASA furnished services, technical expertise, or Government Property to fulfill its obligations under this Agreement, any decision by SpaceX to use NASA furnished services, technical expertise, or Government Property shall be at SpaceX's discretion. SpaceX shall remain solely responsible for completion of its milestones under this Agreement regardless of the availability or use of NASA services, technical expertise, or Government Property.

B. SpaceX may enter into separate Space Act agreements with NASA Centers to use NASA resources in performance of this Agreement. The terms and conditions of such other Space Act agreements will govern the use of NASA resources not being provided under this Agreement. SpaceX will be responsible for ensuring timely, accurate work of its team, including any NASA Centers, and, if necessary, replacing such subcontractors/partners in order to meet milestones.

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 CCDev 2 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 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.

(4) 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.

(4) The parties will negotiate rights in Data in the event of termination for any other reason.

D. Publication of Results

(1) Recognizing that section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. § 2473), as amended, 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 two (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, Space X may provide NASA with a list of Background Data that 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: *<none>*. 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 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 (1) or (2) of section 305(a) (42 U.S.C. § 2457(a)) 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 (1) or (2) of section 305(a) 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 (1) or (2) of section 305(a) 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 (1) or (2) of section 305(a) 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 (1) or (2) of Section 305(a) 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 provisions of 14 C.F.R. Part 1245, Subpart 1, rights to 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 rights to any or all of the 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, in accordance with 14 C.F.R. 1245.112, 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 two (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 rights to any or all of the 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 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 Patent Representative 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 Representative of the Administrator's determination. The Patent Representative 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 Representative. All other petitions will be processed by the Patent Representative 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

With the exception of title to inventions made under this Agreement as provided in Article 13, goods (e.g., equipment, facilities, technical information, data, and prototypes) and services, if provided by one Party under this Agreement, are provided "AS IS" and 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. Other than title to inventions made under this Agreement as provided in Article 13, both Parties make no express or implied warranty as to any intellectual property, generated information, or product made or developed under this Agreement, or that the goods, services, materials, products, processes, information, or data to be furnished hereunder will accomplish intended results or are safe for any purpose including the intended purpose. Neither Party nor its contractors shall be liable for any direct, general, special, consequential, indirect, or incidental damages attributed to such goods, services, materials, products, processes, 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 two (2) years from the date of the last signature, 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 such a notification and determination, NASA will take all rights identified in Articles 12 and 13 of this Agreement.

(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. 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 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. SpaceX shall retain without liability or obligation of repayment all NASA payments made and received as of the date of termination.

D. 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 contractors, subcontractors, 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.

E. 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 any reason, NASA may purchase such property as provided in Article 26 below.

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 Development Program Manager and the President of SpaceX for joint resolution. If the Parties are still unable to resolve the dispute, the Associate Administrator for Exploration Systems 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 Development 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
David Shreve
Agreements Officer
John F. Kennedy Space Center
Mail Code: OP
NASA Kennedy Space Center, FL 32899

Phone: 321-867-3456
Fax: 321-867-1166
E-mail: david.shreve@nasa.gov

SpaceX Administrative Contact
[redacted]
Contracts Officer

1 Rocket Road
Hawthorne, CA 90250

Phone: 310-363-[redacted]
Fax: 310-363-6001
E-mail: [redacted]

NASA Technical Contact
Scott B. Thurston
Commercial Crew
John F. Kennedy Space Center
Mail Code: FA
NASA Kennedy Space Center, FL 32899

Phone: 321-861-9102
Fax: 321-867-9344
E-mail: scott.b.thurston@nasa.gov

SpaceX Technical Contact
[redacted]
Vice President for Astronaut Safety and Mission Assurance
1 Rocket Road
Hawthorne, CA 90250

Phone: 310-363-[redacted]
Fax: 310-363-6001
E-mail: [redacted]

ARTICLE 20. 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 21. 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 22. 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 23. 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 24. 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 CCDev 2 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 25. LIMITATIONS ON ACTIVITIES WITH RUSSIAN ENTITIES FOR GOODS OR SERVICES

A. SpaceX shall not provide funding received under this Agreement in connection with any transaction to purchase goods or services with Russian entities without first receiving written approval from the NASA Administrative Contact. In order to obtain this written approval to engage in such transactions with any Russian entity, SpaceX shall provide the NASA Administrative Contact with the following information related to each planned transaction:

(1) A detailed description of the Russian entity, including its name, address, and a point of contact, as well as a detailed description of the proposed transaction including the specific purpose of payments that will made under the transaction.

(2) SpaceX shall provide certification that the Russian entity is not on any of the denied parties, specially designated nationals and entities of concern, lists found at:

BIS's Listing of Entities of Concern: http://www.access.gpo.gov/bis/ear/pdf/744spir.pdf

BIS's List of Denied Parties: http://www.bis.doc.gov/dpl/default.shtm

OFAC's List of Specially Designated Nationals:
http://www.ustreas.gov/offices/enforcement/ofac/sdn/

List of Unverified Persons in Foreign Countries:
http://www.bis.doc.gov/enforcement/unverifiedlist/unverified_parties.html

State Department's List of Parties Statutorily Debarred for Arm Export Control Act Convictions: http://www.pmddtc.state.gov/compliance/debar.html

State Department's List of Proliferating Entities:
http://www.state.gov/t/isn/c15231.htm

B. Unless otherwise agreed by the NASA Administrative Contact, the information necessary to seek approval to enter into any transaction shall be provided to the NASA Administrative Contact 30 calendar days prior to entering into such transaction with any Russian entities.

C. After receiving approval to enter into a requested transaction, SpaceX shall provide the NASA Administrative Contact with a report not later than 10 calendar days after the end of each calendar quarter which documents the individual payments made to such Russian entity.

D. For the purpose of this Article 25, the term "Russian entities" includes the following:

(1) Russian persons, or

(2) Entities created under Russian law (including any organization, entity, or element of the Government of the Russian Federation) or owned, in whole or in part, by Russian persons or companies.

ARTICLE 26. TITLE AND RIGHTS IN PROPERTY

SpaceX will have title to tangible personal property acquired or developed under this Agreement, including developed or acquired by SpaceX for CCDev 2 efforts. 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.

ARTICLE 27. [RESERVED]

ARTICLE 28. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: Philip R. McAlister
Phillip McAlister
Special Assistant to the Associate Administrator for Exploration Systems

DATE: 4/18/2011

SPACE EXPLORATION TECHNOLOGIES CORP.

BY: Gwynne E. Shotwell
Gwynne Shotwell
President

DATE: 03/29/2011

APPENDIX 1: Executive Summary

[INSERTED ON FOLLOWING PAGES]

The United States has a critical need to rapidly develop, demonstrate and deploy commercial human spaceflight capability. Developing a system that will rapidly and efficiently fill the gap in domestic manned spaceflight (Figure 1) requires a focus on safety, reliability, and sustainably low costs, combined with the demonstrated ability to execute rapid development. SpaceX—the first commercial company to return a private-sector craft from orbit—is an industry leader in rapid development and demonstration of new space technologies, with a clear record of reliable, efficient, and cost-effective solutions. If funded under NASA's Commercial Crew Development Round 2 (CCDev 2), SpaceX will:

- **Accelerate availability of commercial crew transportation services:** With CCDev 2 funding, we will cut in half the length of time to the first Dragon crew test flight, compared to an internally funded baseline. This acceleration provides the capability to launch crew to the ISS in 2014, thus limiting the need for Soyuz contract extensions.
- **Perform critical, long-lead propulsion development and test of the launch abort system:** Both the longest-lead and most safety-critical system, the launch abort system (LAS) will be SpaceX's focus during CCDev 2. An integrated, side-mounted LAS has been selected for its numerous safety benefits over tower systems, most notably abort capability throughout ascent and elimination of the safety-critical jettison event.
- **Meet high-visibility, hardware-based milestones:** Four of the ten CCDev 2 milestones are hardware-based, providing regular, demonstrated progress toward commercial crew transportation capability. These high-visibility milestones include LAS propulsion tests and two complete in-situ trials of crew accommodation prototypes with NASA crew evaluators.
- **Mature components and retire risk:** The majority of the Falcon 9/Dragon crew transportation system critical components are operational due to the commonality with the Falcon 9/Dragon cargo delivery system successfully demonstrated on December 8, 2010. Only the LAS requires major development, and our CCDev 2 design and testing activities will increase the technology readiness level (TRL) of the LAS from 3 to 5.
- **Collaborate with four NASA centers and eight industry-leading companies:** In pursuit of developing best-in-class capabilities, SpaceX is collaborating to ensure a design that captures industry's lessons learned and that is compatible with commercial systems. We will solicit requirements from industry leaders, share our design status and concepts, and collect feedback and suggestions from our integrated team.

Figure 1: SpaceX's Falcon9/Dragon System Matures Faster Than Other Systems, Rapidly Providing Crew Transportation

SpaceX proposes maturation of its flight-proven Falcon 9/Dragon transportation system, with a particular focus on developing an integrated LAS—the longest-lead and most safety-critical system. Hardware to be developed during CCDev 2 includes the LAS engine, and prototypes of the crew cabin, crew seats and restraints, crew control panel, and life support system. The first test flight of the Falcon 9/Dragon marked a key milestone in commercial spaceflight, and SpaceX looks forward to continuing this progress.

Co-investment enables 50% acceleration in availability of crew transportation system

Fully funded for the $75 million requested under CCDev 2 in conjunction with an internal cash investment of [redacted], SpaceX will be ready to demonstrate crew transportation capability 3 years after beginning the proposed work—accelerating our program by 50% compared to an internally funded baseline. This rapid availability is possible because our crew transportation system is based on the existing Falcon 9 launch vehicle and Dragon spacecraft, which have been designed since inception for crew carriage with relatively minimal modification.

Safe system enabled by flight experience, design choices, and quantitative risk analyses

Safety of the entire system is the critical factor in any human spaceflight project. The established Falcon 9/Dragon architecture is not only the fastest path to crew transportation capability; it is also the safest path because of the robust design and the commonality with the SpaceX systems used to carry cargo to the ISS and payloads to Earth orbit. Given the extensive manifest of Falcon and Dragon, this system will see maturity far before other systems could be developed. All mission objectives were met and expectations were far exceeded in the December 2010 flight. The Dragon spacecraft is scheduled to fly an additional 10 times, and the Falcon 9 launch vehicle is scheduled to fly a total of 15 times before the first Dragon crew flight. There is no substitute for recent, relevant flight experience when it comes to demonstrating flight safety.

INTEGRATED LAUNCH ABORT SYSTEM IS SAFER

- Provides abort capability all the way to orbit.
- Eliminates safety-critical jettison event required by a tower system.
- Consumes on-board hypergolic propellant, eliminating disposal requirement and maximizing mass-to-orbit.
- Allows adjustments in trajectory to avoid unfavorable landing zones.
- Provides fault-tolerant abort system that is still functional with failed LAS engines. Allows growth in capability for propulsive land landing, or use of the side-mounted engines for orbital maneuvering or de-orbit.
- With reusability, allows for multiple pad abort tests.
- Increases vehicle performance due to lower mass system.

SpaceX selected an integrated LAS because it offers numerous enhancements in crew safety and survivability over traditional tower-type systems and increases the mass-to-orbit performance. The liquid integrated LAS engine has design features that allow for maximum thrust to be achieved within 100 msec of abort initiation, along with rapid throttling for vehicle attitude control during the abort.

Safety and mission assurance (S&MA) at SpaceX is a comprehensive process, grounded in the company's approach of embedding reliability and technical simplicity in products through early design efforts. Throughout CCDev 2, the SpaceX team will be guided by probabilistic risk assessments (PRAs) and use risk-informed decision-making techniques. Comprehensive failure modes and effects, reliability, and risk analyses will guide the selection of abort triggers and abort trajectory profiles.

Hardware-based milestones combined with collaborative NASA/industry reviews

SpaceX's 10 proposed CCDev 2 performance milestones include high-visibility hardware demonstrations such as full-duration LAS engine firings and Dragon cockpit prototype in-situ trials with NASA crew members. Our program provides NASA with frequent, tangible, and concrete progress toward domestic commercial crew carriage by 2014.

CCDev 2 Milestones Include—

- Static-fire testing of LAS engine
- Initial design of abort engine and crew accommodations
- Vehicle design presented at first design status review
- Prototype evaluations by NASA crew for seat, panel, and cabin (two times)

To benefit from the lessons learned in human spaceflight over the past 49 years—and ensure our system is compatible with commercially available components—SpaceX's CCDev 2 program includes close collaboration with four NASA centers and eight leading aerospace companies including [redacted].

We will present our system concept to NASA representatives and teammates at three reviews during CCDev 2—two design status reviews and a final concept baseline review. These reviews will provide all parties insight into our plans, and SpaceX will have the opportunity to benefit from their feedback. SpaceX's CCDev 2 work will develop the Dragon crew transportation system to the cusp of the system definition review level. Once final NASA commercial crew transportation system requirements are released, SpaceX will be poised to quickly assess and address differences between the draft and final requirements, thereby enabling rapid commercial crew transportation capability.

Successful private company backed by major, sophisticated institutional investors

Commercial providers of crew transportation services must represent both long-term viability and agility to meet NASA's needs. The current SpaceX launch manifest has over 40 launches through 2017 with a total value of approximately $2.5 billion—a testament to the long-term viability of the company. The scheduled launches have been purchased by a diverse customer base in the US government, international government, and commercial markets, further solidifying economic strength.

SpaceX is in a strong financial position based on booked business and investments from outside venture capital. We have earned the confidence of [redacted]—all major, sophisticated institutional investors. SpaceX has been profitable and cash-flow positive since 2007 and has a steady income through commercial-based customer milestone payments provided from contract signature through launch.

SpaceX is a privately held company. The Board of Directors is made up of SpaceX senior officers, renowned entrepreneurs, and leading venture capitalists. Elon Musk, Chief Executive Officer and founder, is and plans to remain the company's controlling stockholder.

Key personnel provide deep expertise in human spaceflight and propulsion systems

Key members of the CCDev 2 team have combined experience exceeding 215 years in related aerospace programs. [redacted]

[redacted]

Designed to carry crew, many critical components are operational and flight-proven

The Falcon 9/Dragon system has been designed since inception to carry crew. As a result, many of the critical components of the Dragon crew transportation system are already operational and flight-proven. Others, such as the communication system and crew accommodations, require minor or medium development. Only the LAS requires major new development, and the TRL of the system, as the focus of our CCDev 2 work, will increase from 3 to 5, accelerating our crew transportation capability.

Ample resources available to support CCDev 2

With the recent successful Commercial Orbital Transportation Services (COTS) launch, SpaceX's experienced engineering team will be available to transition to supporting CCDev 2 as the COTS development effort tapers off in mid-2011 (Figure 2). SpaceX has sizable manufacturing, testing, and launch facilities in California, Texas, and Florida, which are actively designing, producing, testing and launching Falcon 9 and Dragon hardware. Our staff now numbers over 1,200 and is anticipated to grow by 20% in 2011. SpaceX has grown at a near-exponential rate, maintaining our pool of deep expertise in propulsion, structures, avionics, guidance, navigation and control (GNC), safety, quality assurance, mission operations, launch, mission management and systems integration. Our flat organizational structure allows senior leadership to participate in all technical decisions and enables rapid decision-making and easy formation of interdisciplinary teams to solve problems.

Risk assessment process that meets current NASA requirements

SpaceX has initiated rigorous risk assessment processes consistent with NASA NPR 8000.4A. For the proposed Falcon 9/Dragon crew transportation system, 4 areas of medium and high risk have been identified for CCDev 2, along with an additional 8 medium to high risk areas in the long-term. Initial assessments show that the CCDev 2 effort will reduce risk levels to low in 3 of the 4 risk areas identified for CCDev2. [redacted], in conjunction with the Launch Chief Engineer, will continue to lead reviews of risk throughout development of the Dragon crew transportation system. SpaceX has long worked with [redacted], a teammate on our CCDev 2 program, and we will leverage their understanding of NASA requirements and its experience developing safety and mission assurance products for various NASA programs.

Figure 2: With the Success of the First COTS Demonstration Flight, SpaceX Engineers Intimately Familiar with Dragon/Falcon 9 Can Transition to Supporting CCDev 2 as Development Tapers Off

Eligible for CCDev 2 funding

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 more than 50% owned

by US nationals. Its principal place of business is in Hawthorne, California.

APPENDIX 2: Performance Milestones and Success Criteria

Milestone 1: CCDev 2 Kickoff SpaceX shall hold a kickoff meeting at the SpaceX headquarters in Hawthorne, CA, to review the terms of the SAA; review driving NASA requirements; present the pre-CCDev 2 design status of all systems, risks and anticipated mitigations; present the CCDev 2 project plan that meets the objectives of the proposed solution for CCDev 2; and solicit requirements and interface definitions from industry teammates. NASA and industry teammates will be invited to attend and to provide comments and feedback. NASA will be invited to brief their driving requirements. SpaceX will provide an electronic copy of the presentation materials. Note: The CCDev 2 project plan will be updated at the Quarterly Project Status (QPS) meetings. **Milestone Success Criteria:** Kickoff meeting held, including: 1) Terms of SAA reviewed. 2) NASA and SpaceX driving requirements briefed (either by SpaceX or by NASA) and agreed to. 3) Pre-CCDev 2 Falcon 9/Dragon design status presented to familiarize attendees with the system and other prior development relevant to the CCDev 2 scope of work. 4) Risks and mitigation plans presented. 5) Project plan presented. 6) Scope of NASA and industry teammate efforts presented. 7) Plan established between SpaceX and all attending industry teammates for sharing and definition of relevant requirements and interface (for example, customer portal or other data access enabled and access instructions briefed). Electronic copy of presented materials distributed. Meeting minutes distributed including action item tracking sheet. Critical questions from the meeting answered or dispositioned** to the satisfaction of the attendee. Non-critical questions captured as action items with assignees and resolve-by dates. Critical questions are those relating to risks designated as high, critical path schedule, or activities planned within the next 3 months; or as jointly agreed on by SpaceX and attendee. ** "Dispositioned" indicates that a plan for the resolution of the question has been established, including, at a minimum, an assignee and a resolve-by date. This definition applies for all milestones.	Amount: $10,000,000 Date: April 2011

Milestone 2: Launch Abort System (LAS) Propulsion Conceptual Design Review (ConDR) SpaceX shall hold an LAS Propulsion ConDR at the SpaceX headquarters in Hawthorne, CA, to present conceptual-level design information for the LAS Propulsion, including design data, documentation, risk assessments and mitigations and schedule data along with analysis and verification plans to show that the operational concept is technically sound and accommodates human factors requirements. LAS Propulsion is defined to comprise LAS propellant; propellant tanks; tank pressurization systems; propellant management systems; lines, valves and other plumbing components; and engines. NASA and relevant industry teammates will be invited to attend and to provide comments and feedback. SpaceX will demonstrate that the LAS Propulsion system conceptual design meets all system requirements with acceptable risk, and can be developed and implemented within schedule. This review establishes the basis for proceeding with preliminary LAS design. SpaceX will provide an electronic copy of the presentation materials and responses to any questions concerning the design status and/or plan. **Review Entrance Criteria:** Electronic copy of LAS Propulsion ConDR presentation materials sent to NASA at least 5 days before review. **Milestone Success Criteria:** LAS Propulsion conceptual design completed. LAS Propulsion ConDR held, including: 1) Launch abort requirements presented, including NASA requirements and SpaceX-derived requirements for the LAS and LAS Propulsion. 2) Conceptual LAS operations concept presented, including capabilities vs. requirements. 3) Conceptual launch abort environments presented, including human factors considerations. 4) Conceptual design data and documentation presented for LAS Propulsion, and LAS Propulsion Dragon integration. 5) Conceptual LAS Propulsion development and verification plan presented. 6) LAS Propulsion capabilities vs. requirements presented. 7) Updated risks and mitigation plans for LAS Propulsion development and operations presented. Mitigation plans are in place to reduce all risks to low by first LAS flight. 8) Updated LAS Propulsion project plan presented. Electronic copies of as-presented materials distributed, if changed from previous delivery. Meeting minutes distributed including action item tracking sheet.	Amount:$5,000,000 Date: July 2011

Critical attendee questions answered or dispositioned to the satisfaction of the attendee. Non-critical attendee questions captured as action items with resolve-by dates and personnel assignments. Critical questions are those relating to LAS Propulsion risks designated as high, LAS Propulsion critical path schedule, or LAS Propulsion activities planned within the next 3 months; or as jointly agreed on by SpaceX and attendees.	

Milestone 3: Design Status Review (DSR) 1 SpaceX shall hold a Design Status Review (DSR) 1 at the SpaceX headquarters in Hawthorne, CA, to present the first draft of the Falcon 9/Dragon crew transportation system design to the system level. NASA and industry teammates will be invited to attend and to provide comments and feedback. SpaceX will provide NASA with comprehensive Falcon 9/Dragon crew systems concept design insight including layout, seat design, abort scenarios, concepts for the LAS, ground systems, trajectory, aerodynamics of ascent and entry, and mass. DSR 1 will provide an opportunity to make crew system design concept course corrections based on peer review and customer feedback on the system-level designs and concepts. **Review Entrance Criteria:** Electronic copy of DSR 1 presentation materials sent to NASA at least 5 days before review. Falcon 9/Dragon integrated crew systems design and analysis cycle 1 completed. All questions from Kickoff (Milestone 1), including non-critical questions, answered or dispositioned to the satisfaction of the attendees. **Milestone Success Criteria:** DSR 1 held, including: 1) Draft crew transport requirements presented, including available NASA requirements and SpaceX-derived requirements for the crew accommodation systems and delta-requirements to Falcon 9/Dragon to accommodate crew. 2) Draft crew transportation concept of operations presented, including capabilities vs. requirements. 3) System-level descriptions provided for cabin layout; seat design; environmental control and life support; abort scenarios; LAS concepts; ground systems; trajectory; and ascent and entry aerodynamics. 4) System-level mass budget, launch mass performance, and system mass margins presented. 5) Plans for crew accommodation concept prototypes for In-Situ Trials 1 (Milestone 5) presented. 6) Updated risks and mitigation plans for Falcon 9/Dragon crew systems development and operations. Mitigation plans are in place to reduce all risks to low by first crew demonstration flight. 7) Updated Falcon 9/Dragon crew systems project plan presented. Electronic copies of as-presented materials distributed, if changed from previous delivery. Meeting minutes distributed including action item tracking sheets. Critical attendee questions answered or dispositioned to the satisfaction of the attendee. Non-critical attendee questions captured as action items with resolve-	Amount: $15,000,000 Date: August 2011

by dates and personnel assignments. Critical questions are those relating to architecture-level crew system design change recommendations, crew system risks designated as high, crew system critical path schedule, or crew system activities planned within the next 3 months; or as jointly agreed on by SpaceX and attendees.	

Milestone 4: LAS Propulsion Components Preliminary Design Review SpaceX shall hold an LAS Propulsion Components PDR at SpaceX headquarters in Hawthorne, CA, to demonstrate that the maturity of the LAS Propulsion Components design is appropriate to support proceeding with detailed design, fabrication, assembly, integration, and test of LAS Propulsion Components test articles; and to provide evidence that the LAS Propulsion design meets all system requirements with acceptable risk and can be developed within schedule. For purposes of CCDev 2, LAS Propulsion Components are defined as the LAS engine, the LAS propellant tank, and key LAS Propulsion components such as high-flow regulator(s), bust disk assembly(s), and helium isolation valve(s). This definition of LAS Propulsion Components explicitly does not include a full flight configuration of the LAS Propulsion system, and is explicitly not in a flight-like Dragon-integrated configuration. **Review Entrance Criteria:** Electronic copy of LAS Propulsion Component PDR presentation materials sent to NASA at least 5 days before review. LAS Propulsion Component preliminary designs completed. All questions from LAS Propulsion ConDR (Milestone 2), including non-critical questions, answered or dispositioned to the satisfaction of the attendees. **Milestone Success Criteria:** LAS Propulsion Components PDR held, including: 1) Any changes to launch abort requirements presented. 2) Updated LAS operations concept presented, including capabilities vs. requirements. 3) Updated launch abort environments presented, including human factors considerations. 4) Preliminary design data and documentation presented for LAS Propulsion Components. 5) Preliminary design presented for LAS Propulsion test system (i.e., the test configuration of the components presented above). 6) Final LAS Components development and verification plan presented. 7) Updated LAS Components capabilities vs. requirements presented. 8) Updated risks and mitigation plans for LAS Propulsion development and operations. Mitigation plans are in place to reduce all risks to low by first LAS flight. 9) Updated LAS Propulsion project plan presented, including detailed information on the procurement, fabrication, test and verification plan. Electronic copies of as-presented materials distributed, if changed from previous delivery.	Amount: $10,000,000 Date: September 2011

Meeting minutes distributed including action item tracking sheets. Critical attendee questions answered or dispositioned to the satisfaction of the attendee. Non-critical attendee questions captured as action items with resolve-by dates and personnel assignments. Critical questions are those relating to LAS Propulsion risks designated as high, LAS Propulsion critical path schedule, or LAS Propulsion activities planned within the next 3 months; or as jointly agreed on by SpaceX and attendees.	

Milestone 5: Crew Accommodation Concept Prototype and In-Situ Trial 1 SpaceX shall complete initial concept prototypes of crew accommodations including the seat, control panel layout, and crew cabin. NASA crew will be invited to evaluate the concept prototypes and provide feedback. SpaceX shall prepare and deliver a preliminary report for Trial 1, including a summary of the internal and NASA crew (if available) feedback received and resulting actions. **Trial Entrance Criteria:** DSR 1 held. Initial concept prototypes of seat, control panel and crew cabin completed. Concept prototypes are representative of the design presented at DSR 1 or of further-matured designs. Concept prototype operability and human factors assessment performed internal to SpaceX (pre-trial 1). Trial Plan developed and submitted to NASA for review at least 20 days before Trial 1. The trial plan will outline the operations to be simulated in the trial, mapping of these operations to the overall CTS operations flow, the procedures to be used during the trial, and the overall trial timeline. NASA approval of Trial Plan received. Trial 1 Readiness Review held. NASA participation is requested but not required (formal NASA approval is provided via the Trial Plan described above). **Milestone Success Criteria:** Concept prototype operability and human factors assessment performed by NASA and/or by human factors and crew operations expert industry teammates. Feedback from SpaceX, NASA and industry assessments dispositioned to the satisfaction of the participants. Trial 1 report generated and delivered to NASA.	(SpaceX internally-funded milestone) Date: October 2011

Milestone 6: DSR 2	Amount:$15,000,000 Date: December 2011
SpaceX shall hold a DSR 2 at the SpaceX headquarters in Hawthorne, CA, to present the second draft of the Falcon 9/Dragon crew system design to the system and component levels. NASA and certain industry teammates will be invited to attend and to provide comments and feedback. SpaceX will provide NASA with updated comprehensive crew system/component design insight for items from DSR 1. SpaceX will present the first draft of Safety and Mission Assurance products, the first draft of Abort System Design Requirements (including triggers), and the first draft of the Human Certification Plan. DSR 2 will provide an opportunity to make crew system design concept course corrections based on peer review and customer feedback on the system-level and component-level designs, concepts, analysis and plans. The crew system is defined as the integrated Falcon 9/Dragon system. **Review Entrance Criteria:** Electronic copy of DSR 2 presentation materials sent to NASA at least 5 days before review. Falcon 9/Dragon integrated crew systems design and analysis cycle 2 completed. All questions from DSR 1 (Milestone 3) and Concept Prototype Trial 1 (Milestone 5), including non-critical questions, answered or dispositioned to the satisfaction of the attendees. **Milestone Success Criteria:** DSR 2 held, including: 1) Updates to draft crew transport requirements, if any. 2) Updated draft crew transportation concept of operations previously presented, including capabilities vs. requirements, focusing on changes since DSR 1. 3) Updated system-level descriptions provided for cabin layout; seat design; environmental control and life support; abort scenarios; LAS concepts; ground systems; trajectory; and ascent and entry aerodynamics, focusing on changes since DSR 1. 4) Descriptions of a limited set of critical subsystem- and component-level aspects of the items presented in (3). 5) Safety and mission assurance products, including an ascent functional failure modes and effects analysis (FMEA), identification of abort-triggering parameters, and accident environment and abort effectiveness assessments, presented. 6) Updated system-level mass budget, launch mass performance, and mass margins presented, if changed. 7) Plans for crew accommodation concept delta-prototypes for In-Situ Trials 2 presented. 8) First draft of Human Certification Plan for integrated Falcon 9/Dragon crew transportation system presented.	

9) Updated risks and mitigation plans for crew systems development and operations. Mitigation plans are in place to reduce all risks to low by first crew demonstration flight. 10) Updated crew systems project plan presented. Electronic copies of as-presented materials distributed, if changed from previous delivery. Meeting minutes distributed including action item tracking sheets. Critical attendee questions answered or dispositioned to the satisfaction of the attendee. Non-critical attendee questions captured as action items with resolve-by dates and personnel assignments. Critical questions are those relating to architecture-level crew system design change recommendations, crew system risks designated as high, crew system critical path schedule, or crew system activities planned within the next 3 months; or as jointly agreed on by SpaceX and attendees.	

Milestone 7: Crew Accommodation Concept Delta-Prototype and In-Situ Trial 2 SpaceX shall complete concept delta-prototypes of crew accommodations including the seat, control panel, and crew cabin. NASA crew will be invited to evaluate the concept delta-prototypes and provide feedback. SpaceX shall prepare and deliver a preliminary report for Trial 2, including a summary of the internal and NASA crew (if available) feedback received in both Trials 1 and 2, the changes made to concept delta-prototypes for Trial 2, and resulting actions. **Trial Entrance Criteria:** DSR 2 held. Concept delta-prototypes of seat, control panel and crew cabin completed. Concept delta-prototypes are representative of the design presented at DSR 2 or of further-matured designs. Concept delta-prototype operability and human factors assessment performed internal to SpaceX (pre-trial 2). Trial Plan developed and submitted to NASA for review at least 20 days before Trail 2. The trial plan will outline the operations to be simulated in the trial, mapping of these operations to the overall CTS operations flow, the procedures to be used during the trial, the overall trial timeline, and significant changes between Trial 1 (Milestone 5) and Trial 2. NASA approval of Trial Plan received. Trial 2 Readiness review held. NASA participation is requested but not required (formal NASA approval is provided via the Trial Plan described above.) **Milestone Success Criteria:** Concept delta-prototype operability and human factors assessment performed by NASA and/or by human factors and crew operations expert industry teammates. Feedback from SpaceX, NASA and industry assessments dispositioned to the satisfaction of the participants. Trial 2 report generated and delivered to NASA.	(SpaceX internally-funded milestone) Date: January 2012

Milestone 8: LAS Propulsion Component Test Articles Complete	Amount: $5,000,000
SpaceX shall fabricate and assemble the LAS Propulsion Component test articles to be used in the LAS Propulsion Component Initial Test Cycle (Milestone 9). Verification of component build is necessary prior to the test readiness review. LAS Propulsion Components are defined within Milestone 4, above. **Milestone Success Criteria:** All questions from LAS Propulsion Components PDR (Milestone 4), including non-critical questions, answered or dispositioned to the satisfaction of the attendees. Initial LAS Propulsion Components test plan completed and submitted to NASA. LAS Propulsion Components test articles fabricated, including: 1) LAS engine test article; 2) LAS propellant tank test article; and 3) LAS key components test articles. As-designed vs. as-built summary delivered to NASA. Completion of LAS Component test articles pre-ship review.	Date: April 2012

Milestone 9: LAS Propulsion Component Initial Test Cycle	Amount: $5,000,000 Date: May 2012
SpaceX shall execute an initial LAS Propulsion Component test cycle and deliver a preliminary report for the LAS Propulsion Component Initial Test Cycle to NASA. The report will capture test results along with any observations and/or anomalous behavior. This report will serve as evidence of test completion. LAS Propulsion Components are defined within Milestone 4, above. **Test Entrance Criteria:** Final LAS Propulsion Component test plan completed and submitted to NASA at least 10 days before test. NASA approval of test plan received. LAS Propulsion Component test readiness review completed. NASA participation is requested but not required (formal NASA approval is provided via the test plan described above). NASA questions regarding test plan and actions from test readiness review resolved to the satisfaction of NASA. **Milestone Success Criteria:** LAS Propulsion Component test executed, including: 1) Initial static-fire testing of the engine a. Injector screening tests to optimize performance and thermal characteristics of the engine b. Full-duration firing of the thruster c. Demonstration of start-up response d. Demonstration of throttle capability 2) Initial testing of the tank a. Proof and leak-check tests b. Vibration test c. Bubble point tests d. Expulsion tests 3) Initial testing of key components a. Proof and leak-check tests b. Vibration tests (if appropriate for component) c. Functional testing Preliminary LAS Propulsion Component Initial Test Report generated and submitted to NASA.	

Milestone 10: Concept Baseline Review (CBR)	Amount:$10,000,000 Date: May 2012
SpaceX shall present a system design requirements-level design* based on draft customer requirements, incorporating suggestions, comments, and analyses during CCDev 2. NASA and certain industry teammates will be invited to attend, provide comments and feedback. This review affirms the mission need and examines the requirements and the current baseline design indicating how it meets the requirements and mission objectives. SpaceX will present a final draft System Requirements Document, Structural Design Model, and the Abort System Design Requirements. In addition, SpaceX will present the Safety and Mission Assurance products and a final draft of the Human Certification Plan. **Review Entrance Criteria:** Electronic copy of CBR presentation materials sent to NASA at least 5 days before review. Falcon 9/Dragon integrated crew systems CBR design cycle completed. **Milestone Success Criteria:** CBR held, including: 1) Updates to previously presented crew transport requirements, including available NASA requirements and SpaceX-derived requirements for the crew accommodation systems. 2) Updated crew transportation concept of operations previously presented, including capabilities vs. requirements, focusing on changes since DSR 2. 3) Updated system-level descriptions provided for cabin layout; seat design; environmental control and life support; abort scenarios; LAS concepts; ground systems; trajectory; and ascent and entry aerodynamics, focusing on changes since DSR 2. 4) Updated safety and mission assurance products, including an ascent functional FMEA, identification of abort-triggering parameters, and accident environment and abort effectiveness assessments, presented. 5) Updated system-level mass budget, launch mass performance, and mass margins presented, if changed. 6) Summary of lessons learned and design changes implemented from Crew Accommodation Trial 1 and Trial 2. 7) Final draft of Human Certification Plan for integrated Falcon 9/Dragon crew transportation system. 8) Updated risks and mitigation plans for crew systems development and operations. Mitigation plans are in place to reduce all risks to low by first crew demo flight. 9) Notional follow-on developments plan presented. Electronic copies of as-presented materials distributed, if changed from previous delivery.	

Meeting minutes distributed including action item tracking sheets. All comments/feedback/recommendations from DSR 2 (Milestone 6) and any other questions outstanding, including non-critical questions, answered to the satisfaction of the attendees. * SpaceX is unable to offer a formal System Design Review (SDR) since final crew requirements are not anticipated to be available at this point. Some SpaceX CTS system may be at or beyond the SDR level of maturity, but the CBR level of maturity will be the lowest common denominator amongst our various systems.	