

Selection Statement
For
Commercial Crew Development
(Announcement Number JSC-CCDev-1)

On December 7, 2009, along with other senior officials of the National Aeronautics and Space Administration (NASA), I met with the Participant Evaluation Panel (PEP) appointed to evaluate proposals submitted in response to the Commercial Crew Development (CCDev) Announcement (Announcement Number JSC-CCDev-1).

I. Background and Evaluation Process

NASA established the Commercial Crew & Cargo Program Office (C3PO) at the Johnson Space Center as part of the Exploration Systems Mission Directorate. The objectives of the Commercial Crew & Cargo Program are to implement U.S. Space Exploration policy with investments to stimulate the commercial space industry; facilitate U.S. private industry demonstration of cargo and crew space transportation capabilities with the goal of achieving safe, reliable, cost effective access to low-Earth orbit; and create a market environment in which commercial space transportation services are available to Government and private sector customers.

The Commercial Crew & Cargo Program is applying Recovery Act funds to stimulate efforts within the private sector to develop and demonstrate human spaceflight capabilities. NASA plans to use funds appropriated for "Exploration" under the American Recovery & Reinvestment Act of 2009 (ARRA) through its C3PO to support efforts within the private sector to develop system concepts and capabilities that could ultimately lead to the availability of commercial human spaceflight services. These efforts are intended to foster entrepreneurial activity leading to job growth in engineering, analysis, design, and research and to promote economic recovery as capabilities for new markets are created.

ARRA provided \$400 million for space exploration related activities. Of this amount, \$50 million is to be used for the development of commercial crew space transportation concepts and enabling capabilities. This effort is known as CCDev. The purpose of this activity is to provide funding to assist viable commercial entities in the development of system concepts, key technologies, and capabilities that could ultimately be used in commercial crew human space transportation systems. This development work must show, within the timeframe of the agreement, significant progress on long lead capabilities, technologies and commercial crew risk mitigation tasks in order to accelerate the development of their commercial crew space transportation concept.

The Announcement solicited proposals from the U.S. space community to identify and mature the design and development of commercial crew space transportation concepts and enabling technologies. In order to open up the design trade space, encourage innovations and efficiencies in system design solutions, NASA did not dictate specific system goals or system concepts. Each participant determined the system requirements for its proposed concept that best served its target markets. The competition was conducted using NASA's Other Transaction authority under the National Aeronautics and Space Act of 1958, as amended.

The Announcement was released on August 10, 2009. It divided the proposals into three sections with one appendix, all due on September 22, 2009. Section 1 was an Executive Summary, Section 2 was the Commercial Crew Capability Maturation Plan, and Section 3 required Company Information. The appendix contained a proposed Space Act agreement. Proposals were received from the following companies (participants):

Ad Astra Rocket Company	Odyssey Space Research
AlphaSpaces	Orbital Outfitters
Andrews Space	Orbital Sciences Corporation
ARES	Orbital Technologies
ATK	Paragon Space Development Corporation
Ball Aerospace	Planetspace
Bigelow Aerospace	S.T.A.R. Systems
Blue Origin	Sierra Nevada Corporation
Blue Smoke	SpaceED – U.C. Davis
The Boeing Company	Space Exploration Technologies (SpaceX)
Dii Aerospace Laboratories	Stone Aerospace
Exploration Partners, LLC	The Expanding Universe, LLC
Firestar Engineering, LLC	Thomas Lee Elifritz
Global Outpost	United Launch Alliance (ULA)
HMX, Inc.	Universal Space Lines
IE Group, LLC	Universal Transport Systems
KT Engineering	Vivace
Oceanering Space Systems	XCOR Aerospace

Upon receipt, proposals went through an acceptance screening to confirm that they complied with the proposal instructions defined within the Announcement.

The proposal from The Expanding Universe, LLC did not pass the acceptance screening because it failed to comply with the proposal instructions in the Announcement and was, therefore, not reviewed by the voting members.

Evaluations were conducted using a four-step process.

Step 1 – Evaluation Screening
Step 2 – Due Diligence

Step 3 – Portfolio Selection
Step 4 – Finalize Space Act Agreements

Step 1 consists of an evaluation screening of each proposal that passed the acceptance screening and was evaluated on its Company Information and Commercial Crew Capability Maturation Plan sections on a stand-alone basis without comparison to other proposals. The voting members of the Participant Evaluation Panel (PEP) first read each proposal to determine whether it met the intent of the requirements and goals of the Announcement. If, after reading the entire proposal, it is determined that the proposal fails to meet the intent of the Announcement in either the Maturation Plan or Company Information, then it received a red level of confidence rating for that section. Proposals that receive a red rating in either Company Information or Maturation Plan shall be eliminated from further evaluation.

Based on the voting members' review, the following seventeen proposals were eliminated from further evaluation:

The proposal from the Ad Astra Rocket Company was not closely related to critical, near-term technologies and capabilities and failed to show significant progress during the timeframe of the CCDev activity.

AlphaSpaces, Dii Aerospace Laboratories, Global Outpost, IE Group LLC, and Universal Transport Systems submitted proposals that lacked sufficient detail in the Commercial Crew Capability Maturation Plan and Company Information sections for the evaluation team to be able to perform a comprehensive review. An entirely new proposal would be needed to evaluate this offeror's approach.

ARES, SpaceED-U.C. Davis, Universal Space Lines, and Vivace submitted proposals where the proposed activities were not considered key long lead capabilities that will accelerate the development of commercial crew space transportation systems during the time of the proposed CCDev Space Act agreement.

Blue Smoke, Exploration Partners LLC, S.T.A.R. Systems, and Thomas Lee Elifritz submitted proposals containing multiple and significant deficiencies in the Commercial Crew Capability Maturation Plan and Company Information sections, which presented significant risk in the completion of the proposed project.

KT Engineering, Orbital Technologies, and Stone Aerospace submitted proposals that were not found to substantially accelerate the development of a commercial crew transportation concept within the timeframe of the CCDev Space Act agreement.

The PEP members and the rest of the evaluation team then read each proposal not previously eliminated by the voting members of the PEP. Evaluators identified the distinguishing factors of each proposal, documented as findings of strengths and

weaknesses. The Company Information/Business and Maturation Plan/Technical team leads convened a meeting of the evaluation team to review all findings in their respective areas and prepared a draft evaluation summary of the Company Information and Maturation Plan sections along with a recommended level of confidence rating for that area based upon the draft evaluation summaries. The team leads then presented the proposed evaluation summaries and color rating recommendations for their respective areas to the PEP, who, through consensus, determined the level of confidence rating to be applied to both the Commercial Crew Capability Maturation Plan and Company Information and finalized the initial evaluation summary for that proposal.

There are five Level of Confidence color ratings:

Blue: Very High Level of Confidence – The proposal section is very highly effective and there is a very high likelihood of successful execution.

Green: High Level of Confidence – The proposal section is highly effective and there is at least a high likelihood of successful execution.

White: Moderate Level of Confidence – The proposal section is moderately effective and there is at least a moderate likelihood of successful execution.

Yellow: Low Level of Confidence – The proposal section has low effectiveness or there is a low likelihood of successful execution.

Red: Very Low Level of Confidence – The proposal section has very low effectiveness or there is a very low likelihood of successful execution.

After all stand alone evaluations were completed, the PEP determined the proposals most favorably evaluated as candidates for further due diligence. All other proposals received no further evaluation at this point but their evaluation results were presented to me during Step 3, Portfolio Selection.

In Step 2, NASA conducted teleconference and/or face-to-face due diligence meetings with participants whose proposals were most favorably evaluated. During these meetings, participants presented their overall CCDev proposed approach, responded to the initial proposal evaluation findings and questions submitted to them by NASA, and resolved issues associated with draft Space Act agreements and their proposed milestones. After completion of the due diligence meetings, the PEP reconvened to modify or amend the proposal evaluation summaries based on any new information obtained that may have impacted the initial evaluation screening results and assigned final level of confidence ratings based on the modified or amended evaluation summaries.

In Step 3, the PEP presented to me a summary of the proposal evaluations. This included the PEP's analysis and recommendation for selecting one or more of the proposals for award and the respective amount of NASA contribution to be offered. Once I have selected a participant(s), the final step of the competitive process will be to finalize and sign the Space Act agreements negotiated with the selected participant(s).

II. Initial Evaluation

Eighteen proposals passed the initial voting member evaluation screening and were evaluated by the full evaluation team. Each proposal received two level of confidence ratings, one for the Commercial Crew Capability Maturation Plan and one for the Company Information, based on the evaluation summaries prepared using the distinguishing factors (strengths or weaknesses) in the proposal.

ATK Space Systems

For the Commercial Crew Capability Maturation Plan evaluation, ATK received a level of confidence of **Yellow**. Strengths included identification of effective risk mitigation strategies; use of existing models, tools and proven subsystems and components; plan to substantially increase the Technology Readiness Level of materials; and leadership team and structure with notable SRQA background. Weaknesses included insufficient detail in some areas to evaluate the utility of its proposal; some vehicle design challenges and risks were not addressed; significant risk mitigation step is unsubstantiated; proposed testing to be completed by the Government rather than the proposer; many identified capabilities do not mature TRLs appreciably during timeframe of agreement; use of FMEA to reduce risks not tied to formal milestones; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; performance milestones lacked sufficient detail to evaluate risk; and relevant value to the government is not apparent in the proposed milestone amounts.

For the Company Information evaluation, ATK received a level of confidence rating of **White**. Strengths included strong ongoing operations and sales; management team with extensive development experience; and high confidence in ability to provide proposed financial contribution. Weaknesses included jobs creation, failure to indicate financial contribution toward some of its projects; proposed study lacks a connection to other tests in the proposal; and teaming arrangements not adequately described.

Andrews Space

For the Commercial Crew Capability Maturation Plan evaluation, Andrews Space received a level of confidence of **White**. Strengths included a fully integrated system architecture concept; concept flexibility for optimizing crew and cargo; proposed plan has significant application to all space vehicles; rapid risk mitigation in proposed maturation plan; planned technology tests reduce costs and improve safety; leadership team and structure with notable SRQA background; and a comprehensive safety & mission assurance approach. Weaknesses included inadequate detail on key subsystems to fully evaluate concept; lack of demonstrated understanding of crew system requirements; insufficient information on system risks prevented adequate evaluation; technical and programmatic risks and

mitigation strategies not identified; overly optimistic schedule; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; proposed S&MA processes not tied to formal milestones; insufficient detail in some areas to assess crew safety and survivability; and lack of well-defined milestones with culminating points of value.

For the Company Information evaluation, Andrews Space received a level of confidence rating of **White**. Strengths included increased customer base; management team with experience in development and operations of space systems; and jobs creation. Weaknesses included unsubstantiated market capture rate; unclear governance structure; and ability to provide proposed financial contribution

Ball Aerospace

For the Commercial Crew Capability Maturation Plan evaluation, Ball received a level of confidence of **Green**. Strengths included a proposed concept that provides highly desirable features and improves upon the state of the art; leverages mature technologies at the component level; a thorough description of technical and programmatic risk and plan for retirement; a comprehensive systems engineering approach; leadership team and structure with notable SRQA background; a comprehensive safety & mission assurance approach; S&MA processes concretely tied to formal milestones; and rational performance milestones. Weaknesses included proposed capabilities not strictly required for piloted spacecraft; a complete concept of operations was not presented; immature integration of technology; and lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety.

For the Company Information evaluation, Ball received a level of confidence rating of **White**. Strengths included experience of proposer as viable company; supply of critical system for successful completion of commercial space flight; strong executive organization; experienced management team; jobs creation; confidence in ability to provide proposed funding contribution; and teaming with companies with demonstrated experience. Weaknesses included incomplete information on cost performance risk prevented full evaluation.

Bigelow Aerospace

For the Commercial Crew Capability Maturation Plan evaluation, Bigelow received a level of confidence of **Yellow**. Strengths included a proposed concept applicable to a broad range of commercial space systems; leveraging demonstrated technical approaches; proposed technologies to mitigate concept risks; and a proposed system that reduces risk to crew and vehicle. Weaknesses included failure to analyze the consequences of the proposed concept; proposal of an inherently high risk operation with no identified risk mitigation options; significant risks of scaling up the proposed system; inadequate discussion of crew survivability systems; lack

of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; and unclear leadership team contains appropriate SRQA focus.

For the Company Information evaluation, Bigelow received a level of confidence rating of **Green**. Strengths included a proposed concept that could make commercial crewed vehicle operations cheaper; jobs creation; and teaming arrangements with experienced companies. Weaknesses included dependence on continued investment in single individual; management team does not include strong space systems expertise; and inadequate funding source information.

Blue Origin

For the Commercial Crew Capability Maturation Plan evaluation, Blue Origin received a level of confidence of **White**. Strengths included effective use of commercially funded development of suborbital transportation system to address orbital system market; proposed vehicle design enhances reusability; concept is well aligned with needs of ISS and other commercial customers; selection of launch vehicle; development process already started, with sizable investments in early formulation; well-defined, incremental approach to risk reduction; risk identification; maturation plan appropriate for current maturity of concept; leadership team and structure with notable SRQA background; a comprehensive safety & mission assurance approach; robust capability for off-nominal ascent events; proposed landing system well suited for ISS and commercial markets; clearly defined performance milestones. Weaknesses included technical configuration of vehicle; lack of estimated date to field a commercial crew capability; use of lower TRL technologies that present significant programmatic risk; insufficient information on overall system risks; inadequate information on test article configuration for various proposed tests; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; and aggressive schedule at end of agreement term.

For the Company Information evaluation, Blue Origin received a level of confidence rating of **Green**. Strengths included reasonable business model proposed; jobs creation; confidence in ability to provide proposed funding contribution; significant existing investment in infrastructure and facilities; and teaming with experienced companies. Weaknesses included inadequate information on long-term viability; and INKSNA compliance after expiration of the 2016 waiver.

The Boeing Company

For the Commercial Crew Capability Maturation Plan evaluation, Boeing received a level of confidence of **Green**. Strengths included technically sound and fully integrated architecture proposal; demonstrated experience of proposer in developing human space systems; extensive leveraging of existing technologies and partner capabilities; concept flexibility; proposed landing system well suited for ISS

and commercial markets; proactive risk mitigation approach; utilization of high TRL components; comprehensive integration and processes; initiation of work prior to SAA award; detailed maturation plan; large number of technology demonstrations to mitigate risk within timeframe of agreement; good understanding of NASA human rating requirements; leadership team and structure with notable SRQA background; a comprehensive safety & mission assurance approach; and performance milestones align with culminating points of value. Weaknesses included unclear launch vehicle configurations; some advantages of technology development strategy not discussed; vehicle design tradeoffs not adequately discussed; and lack of correlation of some milestones to goals of activity.

For the Company Information evaluation, Boeing received a level of confidence rating of **Green**. Strengths included strong ongoing operations and sales; strong executive organization; experienced management team; jobs creation; strategic teaming arrangements permits development of immediately marketable products; and mitigation plan to address INKSNA compliance risk. Weaknesses included uncertainty in projected cost and pricing for transportation services.

Firestar Engineering, LLC

For the Commercial Crew Capability Maturation Plan evaluation, Firestar received a level of confidence of **Yellow**. Strengths included proposed concept could significantly reduce costs and improve safety; previous successful design and demonstration experience; adoption of DoD certification standards; and demonstrated thorough knowledge of technologies proposed. Weaknesses included insufficient detail on test facilities; insufficient information on technical aspects of concept to adequately evaluate either the approach or risk mitigation; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; unclear leadership team contains appropriate SRQA focus; and use of FMEA to reduce risks not tied to formal milestones.

For the Company Information evaluation, Firestar received a level of confidence rating of **Yellow**. Strengths included proposed team has relevant technical expertise and use of experienced organization in teaming arrangement. Weaknesses included insufficient information on current business viability; proposed governance structure; transition from current operations to CCDev operations; inadequate information on current financial condition and sources; tradeoffs when assessing resource utilization; and failure to address risk of maintaining funding to support teaming arrangements.

HMX, Inc.

For the Commercial Crew Capability Maturation Plan evaluation, HMX received a level of confidence of **Yellow**. Strengths included applicability of proposed approach to multiple launch vehicles; leveraging existing facilities to reduce schedule and cost risks; rapid prototyping; methodical maturation plan; and

detailed analysis used to inform design considerations. Weaknesses included insufficient detail on technical aspects of concept to adequately evaluate; failure to address system risks and mitigation strategies; inadequate support for proposed schedule; did not provide adequate mitigation plan for schedule risk; insufficient detail in Safety & Mission Assurance Plan; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; and unclear leadership team contains appropriate SRQA focus.

For the Company Information evaluation, HMX received a level of confidence rating of **Yellow**. Strengths included management team well suited for commercial development of space transportation technology and jobs creation. Weaknesses included inadequate proposed resources for operational production of concept; lack of experience in management team bringing products to market; inadequate information to demonstrate execution of proposed milestones within budget; and transition from development to operational production.

Oceaneering Space Systems

For the Commercial Crew Capability Maturation Plan evaluation, Oceaneering received a level of confidence of **Yellow**. Strengths included flexibility in scaling of concept; proven provider in proposed system technology; leveraging of existing manufacturing and testing facilities; and safety & mission assurance approach. Weaknesses included failure to demonstrate advantages of proposed concept or address technical aspects of concept; inadequate description of technical and programmatic risks and mitigation strategies; proposed TRLs are not supported by evidence in the proposal; insufficient evidence of availability of necessary components; insufficient detail on test objectives and parameters; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; unclear leadership team contains appropriate SRQA focus; and use of FMEA to reduce risks not tied to formal milestones.

For the Company Information evaluation, Oceaneering received a level of confidence rating of **Yellow**. Strengths included supplier experience; strong executive organization; management team with relevant background and experience; jobs creation; and confidence in ability to provide proposed financial contribution. Weaknesses included lack of defined market plan and reliance on outside developers to change their plans to include this proposed concept.

Odyssey Space Research

For the Commercial Crew Capability Maturation Plan evaluation, Odyssey received a level of confidence of **Red**. Strengths included a comprehensive safety & mission assurance approach; demonstrated understanding of NASA human rating requirements; redundancy in key areas to reduce crew safety risk; and rational performance milestones. Weaknesses included insufficient description of overall concept; failure of proposal to provide significant progress on long lead capabilities,

technologies, or commercial crew risk mitigation tasks; lack of demonstrated experience in hardware development; use of safety & mission assurance processes to reduce risks not tied to formal milestones; and failure of milestones to address an identified critical risk.

For the Company Information evaluation, Odyssey received a level of confidence rating of **White**. Strengths included recognized leadership in target market; management team have demonstrated knowledge and experience; jobs creation; and confidence in ability to provide proposed financial contribution. Weaknesses included insufficient evidence of market for proposed concept.

Orbital Outfitters

For the Commercial Crew Capability Maturation Plan evaluation, Orbital Outfitters received a level of confidence of **White**. Strengths included approach that accelerates progress on key long lead technologies; development process already underway; identified programmatic risks and mitigation strategies; demonstrated performance of programmatic milestones; integrated and detailed maturation plan; and detailed plan to accomplish performance milestones. Weaknesses included failure to address key areas of design; failure to include quantifiable performance criteria to measure improvements; risk management content lack sufficient detail; lack of demonstrated complete set of requirements; and incomplete information in performance milestones.

For the Company Information evaluation, Orbital Outfitters received a level of confidence rating of **White**. Strengths included significant market for proposed concept; qualified and experienced management team; jobs creation; high confidence in ability to provide proposed financial contribution; and innovative and experienced team members. Weaknesses included lack of relevant business experience in management team.

Orbital Sciences Corporation

For the Commercial Crew Capability Maturation Plan evaluation, Orbital Sciences received a level of confidence of **White**. Strengths included a fully integrated system architecture concept; overall program strategy; leveraging existing and demonstrated components and subsystems; significant launch vehicle development record; early requirements development and validation; comprehensive hazard and probabilistic risk assessments; and broad safety & mission assurance integration. Weaknesses included failure to make significant progress on long lead capabilities within timeframe of agreement; lack of clarity in requirements definition; conflicting language to describe risk levels; failure to address and mitigate multiple technical and schedule risks; insufficient information on how referenced use of risk management processes will be incorporated into formal milestones; failure to demonstrate understanding of aspects of NASA human rating requirements process; inadequate definition of performance milestones.

For the Company Information evaluation, Orbital Sciences received a level of confidence rating of **White**. Strengths included demonstrated experience in providing space-related products commercially; strong executive organization; experienced management team; jobs creation; strong overall financial position; and experienced companies in teaming arrangements. Weaknesses included insufficient evidence of viable business case; proposed advisory board lacks independence; insufficient detail to support company proposed financial contribution; and approach includes companies that could trigger INKSNA compliance requirements after the 2016 waiver expiration.

Paragon Space Development Corporation

For the Commercial Crew Capability Maturation Plan evaluation, Paragon received a level of confidence of **Green**. Strengths included proposal of a system that addresses a critical, long-lead subsystem requirement; inclusion of several potential crew module developers as part of its Customer Requirements Review; leveraging existing facilities; effective description of risks and mitigation strategies; description of a complete design cycle that includes appropriate levels of efforts; leadership team and structure with notable SRQA background; and rational, well-defined performance milestones. Weaknesses included inability to monitor direct performance of proposed system; insufficient description of flexibility/adaptability of the proposed system; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; and S&MA processes not concretely tied to formal milestones.

For the Company Information evaluation, Paragon received a level of confidence rating of **Green**. Strengths included credible identification of potential market and market share; experienced management team; jobs creation; and innovative and experienced team members. Weaknesses included insufficient information to fully evaluate the financial condition of the company.

PlanetSpace

For the Commercial Crew Capability Maturation Plan evaluation, PlanetSpace received a level of confidence of **Yellow**. Strengths included improved utility of proposed system concept; reduction of long lead risk areas; leveraging of previous technology demonstrations and development efforts; proposed concept applicable to multiple commercial space companies; management team with notable SRQA background; proposed operations redundancy; inclusion of safety & mission assurance products in performance milestones; and clearly defined performance milestones. Weaknesses included insufficient detail on overall architecture concept and CCDev activities; insufficient information on overall system risks and mitigation strategies; insufficient detail on maturation plan execution; and lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety.

For the Company Information evaluation, PlanetSpace received a level of confidence rating of **White**. Strengths included viability of major CCDev partner; experienced management team; jobs creation; adequate resources to perform proposal; and experienced team members. Weaknesses included demonstrated level of commitment of major team member.

Sierra Nevada Corporation

For the Commercial Crew Capability Maturation Plan evaluation, Sierra Nevada received a level of confidence of **White**. Strengths included use of a heritage design; proposed concept with significant operational capability; innovation plan to develop environmentally friendly technology with significant application to all space vehicles; use of existing launch vehicle for concept; early risk identification; use of testing to reduce risks during term of agreement; robust capability for off-nominal ascent events. Weaknesses included complex vehicle design; crew vehicle attachment to launch vehicle not clear; failure to acknowledge and address some risks specific to the type of crew vehicle selected; concept for crew operations not discussed; proposed timeframe to field a commercial crew capability does not appear to accelerate development of capability; inadequate information on overall system risks; failure to address launch vehicle risks for crew; failure to address launch vehicle control analyses; some aspects of risk mitigation are unclear; proposed development plan results in low TRL technology areas; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; and insufficient information to fully evaluate pad abort concept.

For the Company Information evaluation, Sierra Nevada received a level of confidence rating of **Green**. Strengths included demonstrated technical and business success; marketing and business case development; credible near-term market for capability identified; approach to decision making at management level; jobs creation; and experienced team members. Weaknesses included optimistic sales assumptions; company commitment to provide proposed investment; and INKSNA compliance after expiration of the 2016 waiver.

Space Exploration Technologies, Inc. (SpaceX)

For the Commercial Crew Capability Maturation Plan evaluation, SpaceX received a level of confidence of **White**. Strengths included fully integrated system architecture concept; proposed concepts introduce new methods with advantages to all human rated vehicles; demonstrated ability to develop commercial space systems; leveraging existing production capabilities; sound maturation plan approach; early initiation of long-lead, high risk elements; clear understanding of the NASA human rating process; management team with notable SRQA background; and redundancy for critical flight risk phases. Weaknesses included insufficient data on overall system and development plan; failure to include information to allow full evaluation of overall concept; absence of demonstrated flight history on launch

vehicle; unclear rationale for additional launch site operations; insufficient information to address multiple technical risks; unclear S&MA products; inadequate definition of performance milestones.

For the Company Information evaluation, SpaceX received a level of confidence rating of **White**. Strengths included strong ongoing operations and sales; market extension; strong management team; jobs creation; and ability of company to provide confidence in ability to provide proposed funding contribution. Weaknesses included limited number of resources to complete proposed work.

United Launch Alliance (ULA)

For the Commercial Crew Capability Maturation Plan evaluation, ULA received a level of confidence of **Green**. Strengths included advancement of system critical to use of launch vehicle for crew; leveraging existing facilities and processes; previous requirements development baseline; highly effective testing proposed for system; excellent understanding of NASA human rating requirements; utilization of high TRL components; use of hazard and risk processes early in development; and well-defined, costed performance milestones. Weaknesses included incomplete identification of needed vehicle modifications; insufficient information on project execution risks; S&MA processes not concretely tied to milestones; management team does not reflect any notable SRQA background; and milestone content.

For the Company Information evaluation, ULA received a level of confidence rating of **Blue**. Strengths included strong ongoing operations and sales; experienced management team; jobs creation; confidence in ability to provide proposed funding contribution; and experienced team members. No weaknesses were identified.

XCOR Aerospace

For the Commercial Crew Capability Maturation Plan evaluation, XCOR received a level of confidence of **Green**. Strengths included development of an environmentally friendly concept with significant application to all space vehicles and meets an important crew capability goal; early engagement of potential component and vehicle system developers; thorough understanding of technical and programmatic risks; detailed maturation plan; early understanding of crew and launch vehicle requirements; comprehensive safety & mission assurance approach; and well-defined performance milestones. Weaknesses included insufficient data on necessary DoD classification; failure to completely address commercial implementation; failure to quantify some technology advancement claims; lack of description of plan to meet NASA human rating requirements to evaluate assurance of crew safety; and S&MA processes not concretely tied to formal milestones.

For the Company Information evaluation, XCOR received a level of confidence rating of **Green**. Strengths included description of additional potential sales base; increased investor support; experienced management team; and experienced team

members. Weaknesses included confidence in ability to provide proposed financial contribution.

III. Final Evaluation after Due Diligence

In accordance with the Announcement and Evaluation Plan, the most favorably evaluated proposals were selected for further due diligence. Eight proposals received further due diligence: Ball Aerospace, Blue Origin, The Boeing Company, Paragon Space Development Corp., Sierra Nevada Corp., Space Exploration Technologies, United Launch Alliance, and XCOR Aerospace. Ten proposals did not receive any further evaluation: ATK Space Systems, Andrews Space, Bigelow Aerospace, Firestar Engineering LLC, HMX Inc., Oceaneering Space Systems, Odyssey Space Research, Orbital Outfitters, Orbital Sciences Corp., and PlanetSpace.

The PEP modified the proposal evaluation summaries and level of confidence color ratings based on the results of further due diligence. These final evaluation summaries and confidence ratings were presented to me on December 7, 2009 and are summarized below.

Ball Aerospace

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating remained **Green**. The confidence rating was found to be somewhat improved (from *high* to *very high* likelihood) but the PEP did not find this improvement significant enough to increase the overall confidence rating. There were no new strengths identified. All weaknesses were fully addressed, except for showing whether proposed concept demonstrated significant progress on key long lead technology, which was partially addressed.

For the Company Information evaluation, the level of confidence rating changed from **White** to **Green**. The confidence rating was found to be improved (from *some* to *most* of the goals) and the PEP found this improvement significant enough to increase the overall confidence rating. There were no new strengths identified, although the company provided additional clarification on its jobs data. The one identified weakness on cost performance risk was substantially, but not fully, addressed.

Blue Origin

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating changed from **White** to **Green**. There were no new strengths identified. All weaknesses were fully addressed, except for weaknesses related to a lack of estimated date to field a commercial crew capability; insufficient information on overall system risks; lack of description of plan to meet NASA human rating

requirements to evaluate assurance of crew safety, which were all partially addressed.

For the Company Information evaluation, the level of confidence rating remained **Green**. The confidence rating was found to be somewhat improved but the PEP did not find that this improvement significant enough to increase the overall confidence rating. There were no new strengths identified, although the company provided additional clarification on its jobs data. All weaknesses were fully addressed, except for inadequate information on long-term viability, which was partially addressed.

The Boeing Company

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating changed from **Green** to **Blue**. The confidence rating was found to be improved (from *most* to *meet or exceed all* of the goals) and the PEP found this improvement significant enough to increase the overall confidence rating. There were no new strengths identified. All weaknesses were fully addressed, except for lack of correlation of some milestones to goals of activity, which was partially addressed.

For the Company Information evaluation, the level of confidence rating remained **Green**. The overall confidence rating was found to be unchanged, however, based upon the information provided during due diligence, the PEP changed the elements of the overall confidence rating (from *very high* to *high* likelihood and from *most* to *meets or exceeds all* goals). There are no new strengths identified, although the company provided additional clarification on its jobs data and its business viability. The one identified weakness related to uncertainty in projected cost and pricing for transportation services was partially addressed.

Paragon Space Development Corporation

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating remained **Green**. The overall confidence rating was found to be unchanged, however, based upon the information provided during due diligence, the PEP changed the elements of the overall confidence rating (from *high* to *very high* likelihood and from *meets or exceeds all* to *meets most* goals). There were no new strengths identified. All weaknesses were fully addressed.

For the Company Information evaluation, the level of confidence rating changed from **Green** to **Blue**. The confidence rating was found to be improved and the PEP found this improvement significant enough to increase the overall confidence rating. There were no new strengths identified, although the company provided additional clarification on its jobs data. All weaknesses were fully addressed.

Sierra Nevada Corporation

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating changed from **White** to **Green**. The confidence rating was found to be improved (from *some* to *most* of the goals) and the PEP found this improvement significant enough to increase the overall confidence rating. There were new strengths added related to achieving NASA human rating requirements. All weaknesses were fully addressed, except for failure to acknowledge and address some risks specific to the type of crew vehicle selected and insufficient information to fully evaluate pad abort concept, which were partially addressed.

For the Company Information evaluation, the level of confidence rating changed from **Green** to **Blue**. The confidence rating was found to be improved and the PEP found this improvement significant enough to increase the overall confidence rating. A new strength was added for the company's closely held corporate arrangement the company provided additional clarification on its jobs data. All weaknesses were fully addressed.

Space Exploration Technologies

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating changed from **White** to **Green**. The confidence rating was found to be improved and the PEP found this improvement significant enough to increase the overall confidence rating. There were no new strengths identified. Weaknesses were fully addressed, except for insufficient information to address a technical/schedule risk, which was partially addressed.

For the Company Information evaluation, the level of confidence rating changed from **White** to **Green**. The confidence rating was found to be improved and the PEP found this improvement significant enough to increase the overall confidence rating. There were no new strengths identified, although the company provided additional clarification on its jobs data. The one identified weaknesses related to resources was partially addressed.

United Launch Alliance

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating remained **Green**. The confidence rating was found to be somewhat improved but the PEP did not find that this improvement significant enough to increase the overall confidence rating. There were a new strength for proposing a management team with appropriate SRQA focus. All weaknesses were fully addressed, except for identification of long lead risk capabilities, which was partially addressed.

For the Company Information evaluation, the level of confidence rating remained **Blue**. There were no new strengths identified, although the company provided additional clarification on its jobs data. No weaknesses were identified.

XCOR Aerospace

For the Commercial Crew Capability Maturation Plan evaluation, the level of confidence rating remained **Green**. The confidence rating was found to be somewhat improved but the PEP did not find that this improvement significant enough to increase the overall confidence rating. There were no new strengths identified. All weaknesses were fully addressed.

For the Company Information evaluation, the level of confidence rating remained **Green**. The confidence rating was found to be somewhat improved (from *high* to *very high* likelihood) but the PEP did not find that this improvement significant enough to increase the overall confidence rating. There were no new strengths identified. All weaknesses were fully addressed.

After resolution of issues during due diligence, all eight companies submitted acceptable draft Space Act agreements.

IV. Portfolio Selection Decision

Following the presentation by the PEP, I fully considered the findings presented to me, as well as the information I gained from reading all the proposals, and held an executive session with my advisors to discuss the evaluation results. I asked the opinion of the advisors present and asked for their comments, objections, or concerns with the materials presented. Following this discussion, I compared the proposals against one another to select a portfolio of approaches that best meets the objectives of the CCDev activity, as stated in the Announcement. I explain the discriminating factors and the significance of those discriminators in my selection decision, as follows:

A key objective of CCDev is to provide funding to assist viable commercial entities in the development of system concepts, key technologies, and capabilities that show, within the timeframe of the agreement, significant progress on long lead capabilities, technologies and commercial crew risk mitigation tasks in order to accelerate the development of their commercial crew space transportation concepts. With this in mind, my focus was on those proposals that showed the greatest potential to accelerate the development of competitive commercial crew transportation capabilities.

The proposal from Ball Aerospace seemed to advance the development of a particular space transportation technology without showing how it accelerated the development of a crew transportation capability in particular. The proposed

technology did not appear to address any critical path risks identified by other providers in the commercial crew market and the functions this technology would serve appear to be addressed by similar systems already available to industry. Based on this, I did not provide Ball Aerospace with any further consideration.

Similarly, XCOR Aerospace proposed advancing the development of a promising technology, but not one that would significantly accelerate the development of a commercial crew transportation capability within the timeframe of the agreement. Based on the state of the technology, it did not appear to me that it would be available for other providers to take advantage of in a manner that would accelerate the development of a crew transportation capability and, therefore, I did not provide XCOR with further consideration.

A key discriminator for me in this decision was whether a proposer reached out to other providers to learn what gaps existed in available technology required for crew transportation services in order to demonstrate that the proposed development activities supported integrating its systems with potential service providers. I found the proposals from Paragon, ULA, and Boeing to be good examples of this. Paragon proposed further technology development in an area that is important for any crewed transportation system and its proposal contained letters from four companies that are currently developing commercial crew transportation capabilities expressing support for the Paragon technology and indicating a commitment to working with Paragon to develop the requirements for the system being developed. This increased my confidence that funding the Paragon proposal would contribute to the overall acceleration of commercial crew transportation capabilities. United Launch Alliance also exhibited a strong likelihood to have its proposed technology development proposal contribute to the overall acceleration of commercial crew transportation capabilities. Multiple entities proposed using the Atlas V or Delta IV as the primary launch vehicle for their commercial crew transportation concept in this competition. ULA's proposal to mature aspects of these vehicles to support the commercial crew transportation market would have far reaching impacts on a number of potential commercial crew transportation service providers and was a significant strength in its proposal. Boeing included as part of its proposal a teaming arrangement with Bigelow Aerospace, which is a potential customer for a commercial crew transportation capability in the future along with NASA. By engaging with potential customers early in development, there is a higher likelihood that its development activities will contribute to accelerating a commercial crew transportation capability

Another key discriminator for me in this decision was whether companies proposed tangible test or demonstration milestones within the timeframe of the proposed Space Act agreements. The proposals from Blue Origin, Boeing, Sierra Nevada, and SpaceX all provided performance milestones in their proposed Space Act agreements that either included motor test firings, hardware demonstrations, system demonstrations, or materials testing. Inclusion of these tangible advancements in technology and systems within the timeframe of these Space Act

agreements is of great value to the Government and the commercial space industry in gaining good information about various critical areas of technology development of benefit to the development of a commercial crew transportation capability.

Other aspects of the proposals that are worth mentioning and that factored into my decision are as follows:

Boeing's proposal included a number of significant demonstration tasks that I consider important to have in any integrated crewed transportation system. In addition, the technology approaches being pursued provide additional options and widen the trade space in several core areas of development. This will enhance the knowledge base of the industry and may result in better crewed transportation capability concepts in the future. With Boeing's experience as a systems integrator and its previous work on the NASA's human space flight programs, Space Shuttle and International Space Station, I have high confidence that its final product will have the appropriate emphasis on crew safety.

Sierra Nevada's proposed concept provides NASA with insight into the development of a lifting body system versus a capsule design. Its teaming arrangements with experienced companies such as Boeing and Draper Labs as well as the heritage knowledge it has gained from NASA's Langley Research Center and NASA's HL-20 development increases my confidence that it can successfully execute its proposed performance milestones and will add another crew return option to the existing trade space.

Blue Origin proposes to mature a pusher escape system that will provide information on pusher concepts, which is a different concept than the pull escape system used in crew transportation systems to date. Development of additional options in a key risk area such as crew escape is valuable to the Government and commercial space transportation providers alike in accelerating commercial crew transportation capabilities. Another key area of testing proposed by Blue Origin involves composite structures and materials. Increased knowledge and advancement in these materials is also of significant interest and value to both the Government and commercial space transportation providers. While I must note that I do not believe the proposed activities by Blue Origin will significantly accelerate the availability of its suborbital vehicle as an orbital commercial crew transportation capability, these other areas of emphasis in the proposal outweigh this concern.

SpaceX proposed some valuable technology development and testing activities, however, a concern to me with this proposal was how much financial contribution the company was asking for from NASA in exchange for the technology development and risk mitigation activities it would undertake during the timeframe of the proposed Space Act agreement. Comparing the many early stage development activities in the SpaceX proposal with the level of support for the acceleration of system concepts, key technologies, and capabilities that are potentially achieved by

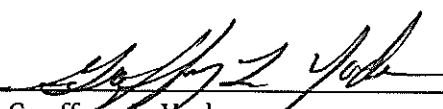
the proposals from other companies, such as Boeing and Sierra Nevada, I did not see the relative value to the Government in applying the limited ARRA funding available to the CCDev effort overall to this proposal.

All participant proposals that were presented to me agreed to comply with the ARRA reporting requirements in the Space Act agreements and did not raise any concerns that would preclude compliance. Therefore, ARRA compliance was not a discriminating factor for me in this decision.

As part of due diligence, the eight participants provided the PEP with alternate milestone proposals consistent with NASA's request in the Announcement to receive prioritized lists of activities for funding from each company should the amount offered by NASA be more or less than proposed. While the PEP did not evaluate the alternate milestone proposals as part of the evaluation summaries and the assignment of level of confidence ratings, I did consider this information in my portfolio selection decision in order to determine how to maximize the value to the Government in spending the funding provided by ARRA.

In light of the discriminators I have described above, I select the following companies for award of a funded Space Act agreement under the Commercial Crew Development activity in the following amounts:

Blue Origin	\$3.7 million
The Boeing Company	\$18 million
Paragon Space Development Corporation	\$1.44 million
Sierra Nevada Corporation	\$20 million
United Launch Alliance	\$6.7 million



Geoffrey L. Yoder
Selection Authority

12-8-09
Date