SPACE ACT AGREEMENT AMENDMENT ONE
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINSTRATION
AND
THE BOEING COMPANY
FOR
COMMERCIAL CREW DEVELOPMENT (CCDev)

PURPOSE AND AGENCY COMMITMENT

The purpose of this Amendment is to modify Space Act Agreement NNJ10TA05S to update the Appendix 2: Performance Milestones and Success Criteria and implement such other adjustments to timing and performance as agreed-to by NASA and Boeing.

NASA shall provide or identify all related ARRA guidance applicable to this Agreement as provided under ARTICLE 3. RESPONSIBILITIES, paragraph A.(3), no later than the date of NASA's acceptance of Milestone B1 of APPENDIX 2, as modified herein.

The last sentence of ARTICLE 5. FINANCIAL OBLIGATIONS, paragraph B.(1) is modified to read:

> NASA and Boeing agree that time is of the essence for the payment of milestones hereunder and each will make best efforts to ensure that milestones are accepted (if appropriate) and invoiced prior to December 31, 2010.

APPENDIX 2 is removed and replaced in its entirety with the following:

APPENDIX 2: Performance Milestones and Success Criteria

CCDev The Boeing Company Project Milestones

SDR Related Milestones

Milestone A1: Delta System Requirements Review Based on completed Interim Design Review-1, Boeing shall conduct a CCTS delta SRR to identify system requirements changes from their previous COTS cargo return vehicle and incorporate changes associated with CCTS mission objectives. Emphasis will be placed on vehicle, launch, and ground systems requirements, commercial customer requirements (Bigelow), and baselining a human rating strategy for the integrated flight vehicle and associated ground systems. This review will be conducted in accordance with the SRR definition specified in Appendix 2.a, Table 2.a. Success Criteria: Provided copy of IDR-1 presentation to NASA. Completion of CCTS Delta SRR with RIDs dispositioned and closure plans defined for major issues as described above.	Amount: $3.0M Date: March 2010
Milestone A2: LAS Down Select As part of a Trade Analysis Cycle (TAC), Boeing shall conduct a trade study between the pusher-type and tractor-style Launch Abort Systems to define a configuration that meets requirements for the CCTS LAS. The trade study results shall be presented to the Configuration Control Board (CCB). Success Criteria: Completion of trade study described above and submittal to NASA of LAS trade study results with recommended configuration for CCTS.	Amount: $1M Date: May 2010

Milestone A3: Long Lead Procurement Plan Boeing shall identify long lead procurement needs driving the development and delivery schedules for CCTS and define recommended purchase order release dates to reduce schedule impacts. Success Criteria: Submittal to NASA of long lead procurements list with required purchase order release dates.	Amount: $2.8M Date: May 2010
Milestone A4: System Definition Review Following the completion of trade studies, requirements analysis, design reviews, manufacturability assessments, and technology maturation demonstrations, Boeing shall prepare and conduct an SDR to review and define a preliminary system design for CCTS that is compliant with requirements baselined at the delta SRR. This review will be conducted in accordance with the SDR definition specified in Appendix 2.b, Table 2.b. Success Criteria: Completion of the System Definition Review per above description with RIDs dispositioned and closure plans defined for major issues.	Amount: $3M Date: October 2010

Abort System Hardware Demonstration

Milestone B1: Project Plan Boeing shall prepare, deliver, and provide a briefing to NASA of the project plan for the Abort System Hardware Demonstration, defining objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $400K Date: February 2010
Milestone B2: Demo Engine Long Lead Procurement Plan Boeing shall identify long lead procurement needs driving the development and delivery schedule for demo engine test and define recommended purchase order release dates. Success Criteria: Submittal to NASA of long lead procurements list with required purchase order release dates.	Amount: $500K Date: April 2010
Milestone B3: Demo Engine Assembly Complete Boeing shall fabricate and assemble the demo engine assembly to be used in the Abort System Hardware Demonstration test. Success Criteria: Completion of demo engine assembly for the Abort System Hardware Demonstration test.	Amount: $500K Date: September 2010

Milestone B4: Demonstration Complete Boeing shall prepare and deliver a preliminary report for the Abort System Hardware Demonstration test, including a summary of test results, post-test analysis, and assessment of design performance toward test requirements and intended objectives. Success Criteria: Completion of the Abort System Hardware Demonstration test as described above and submission of the preliminary report to NASA.	Amount: $1M Date: October 2010

Base Heat Shield Fabrication Demonstration

Milestone C1: Project Plan Boeing shall prepare, deliver and provide a briefing to NASA of the project plan for the Base Heat Shield Fabrication Demonstration, defining objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $100K Date: February 2010
Milestone C2: Tool Fabrication Complete Boeing shall design, procure, and fabricate tooling to construct the carrier structure for the Base Heat Shield Fabrication Demonstration article. Success Criteria: Completion of Base Heat Shield Fabrication Demonstration tool fabrication as described above.	Amount: $200K Date: April 2010

Milestone C3: Carrier Structure Fabrication Complete Boeing shall design and fabricate the carrier structure for the Base Heat Shield Fabrication Demonstration article. Success Criteria: Completion of Base Heat Shield Fabrication Demonstration carrier structure as described above.	Amount: $150K Date: June 2010
Milestone C4: Fabrication Complete Boeing shall prepare and deliver a preliminary report for the Base Heat Shield Fabrication Demonstration, including a summary of the effectiveness of procedures developed for fabrication, NDE, handling, and installation, and an assessment of fabrication performance toward requirements and intended objectives. Success Criteria: Completion of the Base Heat Shield Fabrication Demonstration as described above and submission of preliminary report to NASA.	Amount: $300K Date: October 2010

Avionics Systems Integration Facility (ASIF) Demonstration

Milestone D1: Project Plan Boeing shall prepare and deliver a briefing to NASA of the project plan for the CCV ASIF Demonstration, defining objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $100K Date: February 2010

Milestone D2: Model Development Complete Boeing shall develop flight simulation models of various CCV avionics hardware and software components to support integrated simulation assessments in the ASIF. Success Criteria: Completion of flight simulation models as described above.	Amount: $200K Date: June 2010
Milestone D3: Model Integration Complete Boeing shall integrate simulation models of various CCV avionics hardware and software components into the ASIF simulation environment to support integrated avionics performance assessments. Success Criteria: Notification to NASA of CCV model integration complete.	Amount: $250K Date: September 2010
Milestone D4: Demonstration Complete Boeing shall prepare and deliver a preliminary report for the CCV ASIF Demonstration, including a summary of test results, post-test analysis, and assessment of design performance toward test requirements and intended objectives. Success Criteria: Completion of the CCV ASIF Demonstration as described above and submission of the preliminary report to NASA.	Amount: $350K Date: October 2010

CM Pressure Shell Fabrication Demonstration

Milestone E1: Project Plan Boeing shall prepare, deliver, and provide a briefing to NASA of the project plan for the CM Pressure Shell Fabrication Demonstration, defining objectives, requirements, implementation plans, and a mile-stone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $300K Date: February 2010
Milestone E2: Tooling Received Tooling has been procured and received at the supplier machine shop to begin fabrication of the CM pressure shell. Success Criteria: CCM pressure shell tooling delivered to supplier machine shop.	Amount: $450K Date: March 2010
Milestone E3: Test Requirements Complete Boeing shall prepare and deliver test requirements for the CM Pressure Shell Fabrication Demonstration, defining requirements for proof pressure testing and leak testing of the full-scale demonstration vessel to verify finite element model correlation and fabrication processes. Success Criteria: Test requirements submitted to NASA.	Amount: $450K Date: May 2010

Milestone E4: Demonstration Complete Boeing shall prepare and deliver a preliminary report for the CM Pressure Shell Fabrication Demonstration, including a summary of test results, post-test analysis, and assessment of design performance toward test requirements and intended objectives. Success Criteria: Completion of the CM Pressure Shell Fabrication Demonstration as described above and submission of the preliminary report to NASA.	Amount: $570K Date: October 2010

Landing System Demonstration

Milestone F1: Project Plan Boeing shall prepare, deliver, and provide briefing of the project plan for the Landing System Demonstration, defining drop test and water up-righting test objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $150K Date: February 2010
Milestone F2: Test Article Structural Design Complete Boeing shall design and prepare structural design drawings/models of the Landing System Boilerplate drop test article defining the structural design and assembly, including the integration of landing airbags, up-righting bags, and stroking crew seat benches to execute defined test objectives. Success Criteria: Completion of the Landing System Boilerplate drop test article structural design drawings/models as described above.	Amount: $250K Date: March 2010

Milestone F3: Test Article Assembly Complete Boeing shall fabricate and assemble the Landing System Boilerplate test article in preparation for defined testing. Success Criteria: Completion of test article assembly as described above.	Amount: $300K Date: July 2010
Milestone F4: Demonstration Complete Boeing shall prepare and deliver a preliminary report for the Landing System Demonstration, including a summary of drop test and water up-righting test results, post-test analysis, and assessment of design performance toward test requirements and intended objectives. Success Criteria: Completion of the Landing System Demonstration test as described above and submission of the preliminary report to NASA.	Amount: $400K Date: October 2010

Life Support Demonstration

Milestone G1: Project Plan Boeing shall prepare, deliver, and provide a briefing of the project plan for the Life Support Air Revitalization Demonstration, defining objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $70K Date: February 2010

Milestone G2: Test Plan Complete Boeing shall prepare and deliver a test plan for the Life Support Air Revitalization Demonstration, defining test objectives, test cases, evaluation criteria, and a test schedule. Success Criteria: Test plan submitted to NASA.	Amount: $70K Date April 2010
Milestone G3: Test Complete Boeing shall conduct demonstration testing consistent with plans and notify NASA upon completion of planned testing. Success Criteria: Completion of the Life Support Air Revitalization Demonstration testing as described above.	Amount: $100K Date: July 2010
Milestone G4: Demonstration Complete Boeing shall prepare and deliver a preliminary report for the Life Support Air Revitalization Demonstration, including a summary of test results, post-test analysis, and assessment of design performance toward test requirements and intended objectives. Success Criteria: Completion of Life Support Air Revitalization Demonstration testing as described above and submission of a preliminary report to NASA.	Amount: $130K Date: October 2010

Autonomous Rendezvous and Docking (AR&D)

Integrated Guidance, Navigation, and Control (GNC) Demonstration

Milestone H1: Project Plan Boeing shall prepare, deliver and provide a briefing to NASA of the project plan for the AR&D Integrated GNC Demonstration, defining objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $60K Date: February 2010
Milestone H2: ASIF/ASL Design Review Boeing shall conduct a design review for an AR&D demonstration jointly performed using the Houston ASIF and Huntington Beach Autonomous Systems Laboratory (ASL). The review will address simulation and facility architecture, required simulation modes, hardware/software design, and cross-facility integration. The review will permit evaluation of system design readiness toward achieving test objectives. Success Criteria: Completion of the AR&D Demonstration Design Review as described above.	Amount: $60K Date: May 2010

Milestone H3: ASIF/ASL Facility Integration Complete Boeing shall design and integrate an avionics simulation environment that operates interactively between the ASIF and ASL. The joint facility shall support demonstration of hardware/software technologies for CCV AR&D with the ISS. NASA will be notified when cross-facility integration is complete, in preparation for the demonstration, itself. Success Criteria: Completion of the ASIF and ASL cross-facility integration as described above.	Amount: $100K Date: August 2010
Milestone H4: AR&D Demonstration Complete Boeing shall conduct an AR&D hardware/software demonstration using the joint ASIF/ASL facility. Boeing shall prepare and deliver a re-port describing ASIF/ASL capabilities, maturity, performance, and demonstration results. Success Criteria: Completion of the AR&D Demonstration as described above and submission of the preliminary report to NASA.	Amount: $120K Date: October 2010

Crew Module Mockup Demonstration

Milestone I1: Project Plan Boeing shall prepare, deliver, and provide a briefing to NASA of the project plan for the Crew Module Mockup Demonstration, defining objectives, requirements, implementation plans, and a milestone schedule. Success Criteria: Briefing conducted and project plan submitted to NASA.	Amount: $100K Date: February 2010

Milestone I2: Mockup Design Configuration Complete Boeing shall design and prepare structural design drawings/models of the Crew Module Mockup Demonstration unit defining the structural design and assembly to execute defined test objectives. Success Criteria: Completion of Crew Module Mockup structural design drawings/models as described above.	Amount: $100K Date: February 2010
Milestone I3: Mockup Primary Structure Assembly Complete Boeing shall fabricate and assemble the primary structure of the Crew Module Mockup Demonstration unit (to inner & outer mold lines) in preparation for defined utilization assessment tests. Success Criteria: Completion of mockup primary structure assembly (to inner & outer mold lines) as described above.	Amount: $150K Date: April 2010
Milestone I4: Demonstration Complete Boeing shall prepare and deliver a preliminary report for the Crew Module Mockup Demonstration, including a summary of utilization test results, and assessment of design performance toward test requirements and intended objectives. Success Criteria: Completion of Crew Module Mockup Demonstration as described above and submission of a preliminary report to NASA.	Amount: $220K Date: September 2010

ARTICLE 27 SIGNATURE BLOCK

The terms and conditions of Space Act Agreement NNJ10TA05S, as modified by this amendment are hereby incorporated herein

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

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DATE: Feb 17, 2010

THE BOEING COMPANY

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DATE: Feb. 11, 2010