

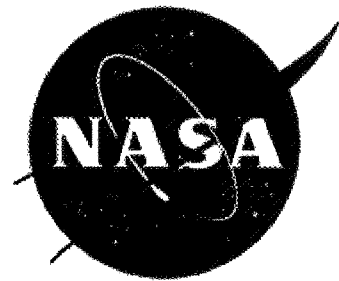
NASA and Federal Aviation Administration Joint Program Management Plan (PMP) for the Commercial Resupply Services (CRS) Contracts

International Space Station Program

Baseline

April 2011

**National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas
Contracts SpaceX NNJ09GA04B and
Orbital Sciences Corp NNJ09GA02B.**



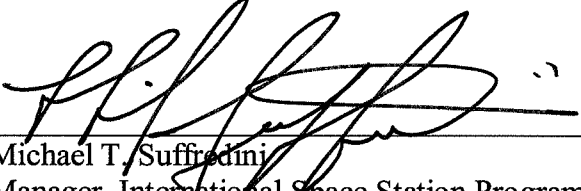
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PREFACE

The NASA and Federal Aviation Administration (FAA) Joint Program Management Plan (PMP) for the Commercial Resupply Services (CRS) Contracts, details the partnership between the National Aeronautics and Space Administration (NASA) managing the CRS Contracts delivering cargo to the International Space Station (ISS) and the FAA licensing the CRS Contractors for launch and reentry operations. Orbital Sciences Corporation and Space Exploration Technologies Corporation (SpaceX) are the CRS contractors for NASA and the FAA licensees discussed in this PMP.

The contents of this document apply equally to NASA and to the FAA. This document is under the control of the International Space Station Program Office with the concurrence of the Transportation Integration Office (ON) and the FAA Office of Commercial Space Transportation (AST). Any changes or revisions will be approved by the ISS Program Manager, the ON Manager and the FAA AST Associate Administrator.



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April 10, 2011
Date

April 2011

INTERNATIONAL SPACE STATION PROGRAM
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND FEDERAL AVIATION ADMINISTRATION
JOINT PROGRAM MANAGEMENT PLAN (PMP)
FOR THE COMMERCIAL RESUPPLY SERVICES (CRS) CONTRACT

April 2011

NASA CONCURRENCE



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NASA and Federal Aviation Administration
Joint Program Management Plan (PMP) for the
Commercial Resupply Services (CRS) Contracts

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INTERNATIONAL SPACE STATION PROGRAM
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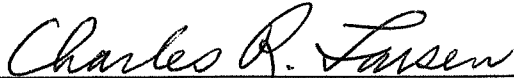
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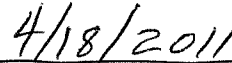
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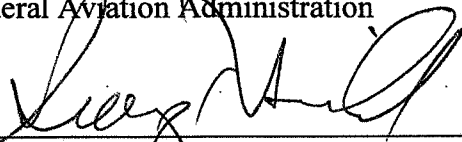
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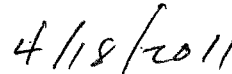
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April 2011

INTERNATIONAL SPACE STATION PROGRAM
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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JOINT PROGRAM MANAGEMENT PLAN (PMP)
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April 2011

LIST OF CHANGES

All changes to paragraphs, tables, and figures in this document are shown below:

Board Name	Entry Date	Change	Paragraph(s)
TICB	April 2011	Baseline	All

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1.0 BACKGROUND

The National Aeronautics and Space Administration (NASA) is responsible for providing resupply and return cargo services to the International Space Station (ISS) under its International Agreements as specified in the Intergovernmental Agreements (IGAs) and Implementing Arrangements, such as in the Balance of Contributions Agreement. The critical supplies that will be transported include: air, water, food, clothing, medicine, spare parts and scientific experiments. NASA originally intended to meet this requirement through Space Shuttle flights as well as through bartering with the International Partners (IPs) for transportation services on their agency vehicles. On January 14, 2004, President Bush announced a United States (U.S.) Space Exploration policy which mandated the retirement of the Space Shuttle in 2010, but did not relieve NASA from its obligations for ISS cargo transportation services. NASA's strategy to meet its cargo and crew transportation obligation after the Space Shuttle has retired includes partnering with private industry to assist in the development of private industry's transportation services and then to directly contract for resupply and return transportation services after these designs have proven reliable. NASA has selected two commercial providers under the Commercial Resupply Services (CRS) Contract.

The purpose of the above agreements and contracts is to procure critical cargo resupply services for the ISS from the end of the Space Shuttle Program to the end of the ISS Program (the period of performance for the current ISS acquisition is seven years, from January 1, 2009 through December 31, 2015). The fundamental purpose of the CRS Contract was that NASA would procure services and not hardware. In contrast to the Space Shuttle Program, NASA will not own or operate the launch vehicles and spacecraft that are used to deliver and return cargo.

Because the U.S. Government does not own nor operate these CRS launch vehicles or spacecraft, the launch and reentry of the cargo vehicle(s) is treated as a commercial activity that must be licensed by the Federal Aviation Administration (FAA) to ensure that public safety is maintained. The licensing process is designed to ensure government oversight for the protection of the public, property, and the national security and foreign policy interests of the U.S. during commercial launch or reentry activities. The CRS Contracts explicitly require licensing by the FAA Office of Commercial Space Transportation (AST). Both CRS licensees submit application packages to AST for both launch and reentry operations. The AST analyses of the license application packages result in a determination by AST on whether to issue launch and reentry licenses with the associated license terms and conditions. After AST issues a license, the AST safety inspectors monitor compliance by the licensee.

1.1 PURPOSE

A collaborative partnership has been established between the FAA and the NASA to achieve complementary goals in space transportation safety and the management of the CRS Contract activities.

Under the CRS contract, a launch operator must obtain a FAA license, necessitating AST review of the launch operator's engineering systems, component data, and safety processes relevant to these systems. AST also reviews and observes launch and reentry simulations and real-time CRS mission operations during launch and reentry. (see Appendix D).

NASA Johnson Space Center (JSC), ISS Transportation Integration Office carries out the CRS Contract management and surveillance as well as operations and engineering integration activities associated with the CRS Contract.

The primary goals of this partnership are to: (a) ensure each government organization has the appropriate and required insight into the various elements of the CRS mission to enable their organizations to perform all the required functions, and (b) to facilitate efficient technical data exchanges that avoid duplicative requests of the contractor

Fundamental to this agreement is the understanding that the CRS contractor/ FAA licensee shall provide to both the FAA and NASA the deliverables mandated by the contract and FAA license regulations. NASA and the FAA will each define and execute their own programs incorporating, where appropriate, common technical information and insight data. This Program Management Plan (PMP) defines the overall management structure, roles and responsibilities of each party, organizational interfaces, and technical data exchanges required to effectively manage the CRS Contracts and FAA licensing activities.

1.2 SCOPE

This PMP describes the partnership activities between NASA and FAA in support of the CRS Contracts and COTS demonstration flights leading to CRS missions, for both SpaceX and Orbital activities. As research and development activities may require one or more demonstration flights by either of the commercial entities, there will be NASA and FAA partnering during the time defined by the NASA Commercial Orbital Transportation Services (COTS) Demonstrations Program outlined in the respective Space Act Agreements. Subsequent CRS Contract modifications and Contract on-ramp provisions may require revisions to this PMP, depending upon the nature of any such modifications and provisions. This PMP is effective for the life of the CRS Contracts.

2.0 DOCUMENTS

The following documents of the exact issue shown, including any ISS outstanding approved changes, form a part of this document to the extent specified herein.

2.1 APPLICABLE DOCUMENTS

DOCUMENT NUMBER	TITLE
14 CFR Ch. III, Subchapter B	Requirements, Investigations and Enforcement
49 U.S.C. Subtitle IX, ch. 701	Commercial Space Launch Activities
AFSPCMAN 91-710	Air Force Space Command-Range Safety User Requirements Manual

2.2 REFERENCE DOCUMENTS

The following documents are referenced in this PMP for context and user convenience.

14 CFR Ch. III, parts 400-460	FAA Commercial Space Transportation Regulations
14 CFR 415	Launch License
14 CFR 417	Launch Safety
14 CFR 417.7	Public Safety Responsibility
14 CFR 431.71	Post Licensing Public Safety Responsibility
14 CFR 435	Reentry License
14 CFR 435.51	Reentry License Terms and Conditions
SSP 50808	International Space Station (ISS) to Commercial Orbital Transportation Services (COTS) Interface Requirement Document (IRD),

3.0 PROGRAM ROLES AND RESPONSIBILITIES

3.1 CRS NASA CONTRACTORS AND FAA LICENSEES

The CRS contractor will manage and integrate each resupply mission according to the contractual requirements set forth in Contract Number NNJ09GA04B for SpaceX and NNJ09GA02B for Orbital. For the performance of this Contract, NASA holds the contractor responsible for mission success. FAA regulation 14 CFR 417.7, Public Safety Responsibility, states that the “launch operator is responsible for ensuring the safe conduct of a licensed launch and for ensuring public safety and safety of property at all times during the conduct of a licensed launch.” Similar FAA regulations hold the operator responsible for public safety during licensed reentry operations (see 14 CFR 435.51, Reentry License Terms and Conditions, and 431.71, Post Licensing Public Safety Responsibility). Nothing in this PMP or Code of Federal Regulations (CFRs) shall be construed as relieving the contractor/licensee from any of its responsibilities under law or contractual obligation.

NASA develops a flight specific CRS work plan before the first milestone that delineates each deliverable for which the Contractor is accountable. The work plan will define schedule and the content of major reviews, deliverables and payment milestones.

In addition to the specific content addressed in each major review, the CRS contractor provides NASA with a Program Update/Quarterly Review. This review shall include: program status, an updated integrated mission schedule, schedule and technical risks, action item status, and status and closure plan for remaining ISS Integration and requirements compliance tasks.

In parallel with these contractual major reviews, the CRS contractor will initiate application requests for commercial space transportation (CST) licenses with the FAA. Data deliverables to be supplied by the CRS license applicant to the FAA are addressed in 14 CFR, Chap. III, Parts 400-460, FAA Commercial Space Transportation Regulations. During the FAA license evaluation process, the license applicant provides the FAA Licensing Team Lead with analyses and clarification data that supplements their license application sufficiently for the FAA to make a determination on whether to license the applicant’s CST operation. The resulting FAA license and its associated terms and conditions identify items with which the licensee must comply. The licensee is responsible for notifying the FAA if any representation contained in the license application that is material to public health and safety or the safety of property is no longer accurate and complete or does not reflect the licensee’s procedures governing the actual conduct of a mission. The FAA monitors licensee activities and data to ensure compliance with the license.

3.2 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The NASA ISS Program Office has the responsibility to manage overall mission success of the ISS Program and to fulfill the agency’s obligations to provide crew and cargo transportation. NASA shall manage the CRS contracts and the associated technical integration activities leading to the safe and reliable cargo integration and transportation to and from the ISS.

The fundamental purpose of the CRS procurement was that NASA would procure services and not hardware. In contrast to the Space Shuttle Program, NASA will not own or operate the launch vehicles and spacecraft that are used to provide the cargo service. Many of the traditional oversight functions for cargo that NASA has provided in the past will now be handled by the contractors themselves.

Nonetheless, NASA will be the primary customer of the contractors for the term of the contract and will have made a significant financial commitment in the form of milestone payments prior to actually receiving the final cargo delivery service. Additionally, the contractor owned and operated spacecraft will need to approach and berth to the ISS, for which NASA is responsible. These two factors mandate oversight as part of the management strategy. The management strategy will entail the insight of: contractor production and facilities, schedules, launch and reentry vehicle operations licensing, ground processing and range activities, and on orbit operations.

The ISS Program office will: provide contract direction, obtain the required data and/or access from the CRS contractor necessary for technical assessments, ensure the adequacy of the launch vehicle and spacecraft deliverables and reviews, determine the ultimate risk assessment of NASA flying cargo on the commercial service, coordinate launch and return manifest reviews, and resolve technical differences between affected organizations and the CRS contractor.

NASA reserves the right to utilize government-performed technical assessments of launch and cargo vehicle configurations to evaluate the readiness of the Contractor to deliver NASA cargo. Data may be obtained from various sources, including CRS contractor deliverables, communications with the contractor through formal reviews, facility and Research and Development (R&D) insight, and reports by other personnel/customers who observe or interact with the contractor.

Appendix E, CRS Contract Surveillance Approach Activities, outlines the NASA CRS plan for oversight and insight of the CRS contract.

3.3 FEDERAL AVIATION ADMINISTRATION

The commercial nature of the Contract requires the FAA to be responsible for commercial space transportation vehicle operations licensing activities to ensure government oversight of the safety of the public during launch and reentry flight phases. The CRS Contracts require SpaceX and Orbital to obtain licenses from the FAA.

The FAA has the authority to verify that a licensee complies with its license application representations; the FAA issued license, and the associated license terms and conditions of the launch and reentry licenses. Therefore, the FAA also requires a certain level of insight to determine the technical readiness of the licensee, and can significantly benefit from information gathered by the NASA processes. Conversely, NASA can benefit from gaining insight into the FAA licensing activities.

The FAA is an Administration under the Department of Transportation (DOT). The FAA's mission is to provide a safe, secure, and efficient global aerospace system that contributes to and

complies with national security, U.S. foreign policies and promotes the U.S. commercial space transportation industry and aerospace safety. The FAA's operations primarily focuses on more immediate needs in the areas of aviation safety, capacity, environmental compatibility, commercial space transportation safety, and international leadership in aviation.

The AST is a line of business within the FAA. The AST Associate Administrator reports directly to the FAA Administrator. AST:

- Regulates the commercial space transportation industry, to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security and foreign policy interests of the United States;
- Encourages, facilitates, and promotes commercial space launches and reentries by the private sector;
- Recommends appropriate changes in Federal statutes, treaties, regulations, policies, plans, and procedures; and
- Facilitates the strengthening and expansion of the United States space transportation infrastructure.

AST issues FAA licenses for commercial launches of orbital rockets and suborbital rockets. The first U.S. licensed launch was a suborbital launch of a Starfire vehicle on March 29, 1989. Since then, AST has licensed almost 200 launches. AST also issues licenses for the operations of non-federal launch sites, or "spaceports." Since 1996, AST has issued site operator licenses for eight spaceports: California Spaceport at Vandenberg Air Force Base; Spaceport Florida at Cape Canaveral Air Force Station; the Mid-Atlantic Regional Spaceport at Wallops Flight Facility in Virginia; Mojave Air and Space Port in California; Kodiak Launch Complex on Kodiak Island, Alaska; the Oklahoma Spaceport, Burns Flat, Oklahoma; Spaceport America, Las Cruces, New Mexico; and Cecil Field Spaceport in Jacksonville, Florida. The first launch from a licensed, non-federal facility was that of NASA's Lunar Prospector aboard a Lockheed Martin Athena 2 on January 6, 1998, from Spaceport Florida.

On December 23, 2004, the Commercial Space Launch Amendments Act of 2004 (CSLAA) was enacted. As a result, AST published FAA regulations which implement significant requirements outlined in the CSLAA. On April 6, 2007, the FAA issued the Final Rule on Experimental Permits for Reusable Suborbital Rockets, which establishes an experimental permit regime for developmental reusable suborbital rockets for testing purposes, e.g., new design concepts and new equipment. Currently, AST has authorized 20 permitted launches. On September 14, 2006, The FAA Safety Approval Final Rule (14 CFR Parts 413 and 414) (PDF) was effective on September 14, 2006, allowing AST to issue a safety approval for the following elements: (a) launch vehicle, reentry vehicle, safety system, process, service, or any identified component thereof; or (b) qualified and trained personnel, performing a process or function related to licensed launch activities. On February 13, 2007, the FAA Final Rule on Human Space Flight Requirements for Crew and Space Flight Participants, became effective, establishing requirements for crew and space flight participants (passengers) involved in private human space flight. This rule maintains FAA's commitment to protect the safety of the uninvolved public and call for measures that enable passengers to make informed decisions about their personal safety.

4.0 ORGANIZATIONAL AND DATA INTERFACES SUMMARY

The data required by NASA and the FAA should not be duplicative. If either agency finds an instance where this is the case, then efforts will be made to eliminate the deliverable excess in support of contractor efficiencies.

NASA

The NASA ISS Transportation Integration Office is responsible for the day to day management of the CRS Contracts. This entails management oversight and integration with all relevant organizations to ensure the spacecraft safely rendezvous and berths with the Space Station. As required by the Contract, deliverables will be provided based on a mission work plan. This deliverable data is made available to NASA electronically per the work plan schedule for that mission.

FAA

The FAA AST organization provides communication access to all ISS Program organizations throughout all the FAA lines of business. The ISS Program office organization provides communication access to the FAA AST organization throughout NASA and the CRS contractors. For simplicity, the rest of this document will refer to the AST organization as FAA.

The FAA communication with the CRS program began with input to the NASA CRS Request for Proposal (RFP) process and continues during the AST licensing process. The FAA Air Traffic Control agreements with the CRS licensees are part of the license evaluation and verification activities. Throughout the life of the CRS Contracts, the FAA personnel are able to communicate directly with the NASA ISSP Transportation Integration Office (ON), the NASA Commercial Crew and Cargo Program Office (C3PO), and other NASA organizations as required. As partners with NASA, FAA personnel participate as a non-voting member in NASA-led reviews, monitor mission control activities and observe mission management team meetings.

4.1 PRE-MISSION INTEGRATION REVIEWS AND MILESTONES

4.1.1 COTS DEMONSTRATION MISSIONS

Contractor Responsibilities

During the development phase of the CRS Contracts, the contractors are responsible for documenting performance according to the CRS Contract and the Space Act Agreement milestones developed by the C3PO. The contractors hold design reviews of the launch vehicle and spacecraft to determine the technical adequacy of the overall system design, performance against requirements, and the status of verification against those requirements. This includes reporting on compliance with launch and reentry safety requirements in FAA regulations. The contractor or licensee is responsible for reporting to NASA on the FAA licensing status.

NASA

The NASA C3PO provides the primary interface to the COTS partners for the milestone reviews associated with the Space Act Agreement. If specific requirements are not met or verification plans are inadequate, Review Item Discrepancies (RIDs) or action items may be written. NASA ISS is responsible to ensure that all interface requirements between the Spacecraft and the ISS have been adequately verified and that all issues have been resolved. NASA invites the FAA to participate as a non-voting member in the reviews, which includes safety reviews, so that the FAA can gain more insight for their licensing package review and be a resource if FAA licensing issues are addressed during the review.

FAA

The FAA reviewers gain access to NASA documents as required, attend NASA reviews and propose candidate RIDs or Action Items that NASA tracks. During these reviews with NASA, the contractor/licensee reports on FAA licensing status. The FAA may either concur on the status as presented or determine appropriate follow-up actions to implement and track until issue resolution.

4.1.2 CRS MISSIONS

Contractor Responsibilities under CRS Contracts

During the performance of the CRS Contract, the contractors will conduct technical and programmatic reviews to status compliance with NASA and FAA requirements, as well as end-to-end integration of the launch and orbital vehicles. The Contractor is required to provide the contractually required level of technical data for review and allow NASA participation in each review. The Contractor will provide to NASA the vehicle baseline for that particular mission. The contractor will provide to NASA an updated mission plan at the Vehicle Baseline Review (VBR). The mission plan will define the schedule and content of major reviews, deliverables, and payment milestones. Any mission design changes will be reviewed with the corresponding test and verification plan and schedule to accomplish the requirements verification closure. Any mission unique changes and first flight items will also be identified and analyses presented to NASA for any changes to vehicle safety, performance, reliability, and environments. The contractor commits to its launch readiness at the Launch Readiness Review (LRR) a CRS Milestone after the Stage Operations Readiness Review (SORR) and several days ahead of the launch.

NASA

NASA will hold a quarterly Program Management Review (PMR). The PMR is the primary surveillance method where insight into contractor performance is achieved through formal monthly or quarterly reviews of contractor generated data representing a status of contract performance requirements. The PMR will be conducted with the NASA Contracting Officer's Technical Representative (COTR) and his or her appointed surveillance team. This review will include: program status, an updated integrated mission schedule, analysis of critical paths and program risks, and status and closure plan for remaining ISS integration and verification closure.

NASA determines what cargo will be manifested and packs the cargo. The contractor is required to deliver a Mission Resource Allocation Document (MRAD) in response to an initial NASA cargo complement delivered at L-12 months. The Contractor's MRAD response shall address specific technical and operational issues pertaining to each proposed cargo item and contain recommendations for combining the proposed cargo items into an optimized internal and external configuration based on the priorities of the proposed cargo item and overall resource allocation. The MRAD shall be the source of accurate data pertaining to the mission-unique mass, volume and other resources allocated to each cargo item, and its supporting hardware, assigned to the Contractor. This MRAD data will be reviewed at the Cargo Integration Review CRS Milestone and all issues must be resolved by the contractor prior to cargo shipment. NASA conducts the SORR where the contractor's launch readiness is briefed. The FAA License (both launch and reentry) is issued before the SORR. NASA invites the FAA to observe and gain insight if any of the representations in the license application, the license and its associated license terms and conditions have changed or may potentially change before the Launch Readiness Assessment; which would mean a violation of the FAA's regulations or license.

The NASA ISS Transportation Integration Office is the primary interface to the contractor for all of these reviews. If specific requirements are not met or verification plans are inadequate, RIDs or action items may be written. NASA invites the FAA to participate as a non-voting member in the reviews, which includes safety reviews, to gain more insight for its license application review, for monitoring compliance, and to be a resource if FAA licensing issues are addressed during the review.

FAA

The FAA reviewers gain access to NASA WindChill and EDMS applications, attend reviews and propose candidate RIDs or Action Items that NASA tracks. The FAA will participate as a non-voting member in pre-mission assessments and preparation including the ISS Safety Review Panels (SRPs).

4.2 PRODUCTION AND FACILITY INSIGHT

NASA

NASA uses production and test facility insight as one of the mechanisms to determine the technical readiness of the contractor. Insight relies on gathering a minimum set of product or process data that provides adequate visibility into the integrity of the product or processes. The data may be acquired from contractor records, usually in a non-intrusive parallel method. The CRS Contract surveillance team will collect surveillance data as part of the daily interactions between NASA personnel and their contractor counterparts. Both NASA and the FAA will have staff available at the contractor site to provide insight throughout the life of the contracts. To ensure effective communication with the contractors, the intent of this partnership is to collaborate between the parties to gather required technical data that is relevant to both the FAA processes for vehicle operations licensing and ISS mission assurance strategy. In support of the CRS surveillance tasks that NASA must carry out a NASA ISS (ON) resident management office will be established at the prime contractor facilities where the majority of production will be performed. The NASA Resident Manager's Office (RMO) provides support across all levels of management and technical implementation for the CRS Contract and its associated projects. The RMO will facilitate in the dissemination and exchange of the data required to perform contract surveillance tasks. The RMO will also provide insight and evaluation of contractor's design, production, test and operational processes and performance as required by the ISS Program and the associated CRS Contract surveillance team.

NASA Risk assessments will be performed in areas such as hardware and software systems, discrepancies, anomalies, failures, deviations and waivers, as well as design changes. The International Space Station Program (ISSP) will conduct a Certification of Flight Readiness (COFR) confirming that the contractor has met the ISS-COTS Interface Requirements Document (IRD) requirements, that the ISSP has met its stage requirements, and that the contractor is meeting the contractual requirements for vehicle readiness and capability. The FAA can utilize this data from the ISSP to determine risk for public safety. NASA ISSP can also utilize FAA data and risk assessments to determine the technical readiness of the contractor or licensee.

FAA

The California-based FAA-AST Office can be utilized by the FAA-AST licensing team or the FAA-AST Houston Office to gather information at SpaceX Hawthorne. Information gathering will be coordinated with the NASA COTR and communicated with the RMO. The FAA-AST Washington, DC Headquarters Office can also supplement NASA's oversight of Orbital near Dulles.

The FAA can utilize the NASA data from the ISSP risk assessments and COFR to determine risk for public safety. NASA ISSP can also utilize FAA data and risk assessments to determine the technical readiness of the contractor or licensee.

4.3 LAUNCH AND RE-ENTRY LICENSING BY THE FAA

Licensee Responsibilities and CRS Contracts

The NASA CRS Contractors must submit license application packages to the FAA for both launch and reentry operations. The contractor or licensee is responsible for providing launch vehicle and spacecraft systems data and ground processing procedures for all hazardous and safety critical areas for evaluation by the United States Air Force (USAF) or Mid-Atlantic Regional Spaceport (MARS), NASA, and the FAA. The contractor or licensee is also responsible for performing to the terms and conditions of their FAA license. The contractor or licensee is responsible for notifying the FAA of any public safety updates that affect their latest application and license and its associated terms and conditions.

FAA

Once the license application is sufficiently complete to start review, the FAA licensing team has 180- calendar days by statute to complete a license determination as summarized in paragraph 4.3.1 below. Under the NASA COTS and CRS contracts, the NASA COTS and CRS personnel may request participation in FAA licensing meetings with their contractors. The FAA licensing approach for CRS licensees is to require and issue single launch and reentry licenses (a launch or reentry specific license) initially and evaluate when and if enough experience is gained to issue a launch or reentry license for a multiple number of flights (a launch or reentry operator's license). Licenses issued have terms and conditions that FAA personnel monitor for compliance at the licensee's facilities, launch complex and Mission Control Center-Houston (MCC-H). FAA personnel determine whether a licensee operates in accordance with FAA regulations and its license application commitments and whether the licensee complies with its specific license and its associated license terms and conditions. Violations of FAA regulations, license terms and conditions or inaccurate representation in a license application may lead to warning, notices or enforcement actions by the FAA.

4.3.1 FAA LAUNCH LICENSING PROCESS SUMMARY AND DATA EXAMPLES

Components of a License Application Evaluation:

A sample of the types of data looked at by the FAA to evaluate the license and monitor compliance is briefly listed below for both 14 CFR Part 415, Launch License, and 14 CFR Part 435, Reentry License.

4.3.1.1 POLICY EVALUATION

The FAA determines at a policy level, with interagency reviews, whether a proposed mission or operation poses a threat to U.S. National Security or foreign policy interests, constitutes a hazard to public health and safety or safety of property, or is inconsistent with international obligations of the U.S.

Data Examples: Evidence of International Traffic in Arms Regulation (ITAR) Controls, Launch or Land near Populations or Traffic Corridors, Agreements with Launch Site Operator, Range

Operator, Contact with FAA Air Traffic Control, DoD, Department of State (DOS), Department of Commerce (DOC), Federal Communications Commission (FCC), and NASA review inquiries.

4.3.1.2 PAYLOAD DETERMINATION

The FAA determines whether the proposed payload's launch would jeopardize public health and safety, safety of property, U.S. National Security interests, or U.S. foreign policy and international obligations. The FAA is working with NASA to evaluate if a generic payload manifest would jeopardize the above; rather than analyzing on a mission-by-mission basis. Assuming a quantitative analysis demonstrates that a generic payload manifest would not jeopardize the above; then each mission will only need to demonstrate that the payload manifest does not contain any unique material not represented in the generic payload.

From the FAA regulatory perspective, "payload" includes Cygnus or Dragon and the NASA cargo. The FAA may include interagency reviews by the State Department, Commerce Department and/or NASA Headquarters. FAA regulatory exempt payloads are those owned or operated by the U.S. Government or payloads subject to Federal Communications Commission (FCC) or National Oceanic and Atmospheric Administration (NOAA) regulation. However, on exempt payloads, the FAA will evaluate safety issues related to the safety of the launch itself for items like fuels.

Data Examples: Hazardous Cargo, CG envelope, planned mission trajectory.

4.3.1.3 SAFETY EVALUATION

The FAA determines whether an applicant can safely conduct the preparation and launch of the proposed launch vehicle and any payload.

Data Examples: Assembly and testing, Systems Checkout, Avionics, Guidance, Navigation & Control (GNC), Battery Power, Power to Critical Functions, Flight Termination System (FTS), Communications, Propulsion, Propellants, Thermal Protection System (TPS), Thermal Control System (TCS), Reentry Determination and Preparations, Landing Systems, Flight Safety Analysis, Flight Safety System, Ground Safety, Range Operations, Safety Organization, Flight Readiness Procedures, Safety At End of Launch through e.g., Upper Stage safing (e.g. depletion of residual propellants, discharging of batteries, venting pressurized system, leaving fuel line valves open, etc.), mission rules, Mishap Response and Investigation Plans.

4.3.1.4 ENVIRONMENTAL DETERMINATION

FAA licensing of launch and reentry is a major Federal action and, therefore, subject to National Environmental Protection Act (NEPA) provisions. The FAA requires that the licensee perform an environmental review and determination that ensures that the proposed prelaunch, launch, and site activities do not create a significant impact on the natural environment. The resultant environmental determination is documented in an Environmental Assessment, Environmental Impact Statement, Finding of No Significant Impact, and/or mitigation process agreements.

Data Examples: Propellant types; Rocket Noise; Launch, Over flight and Landing surroundings, Community Support, land use, hazardous material and waste, endangered species, air and water quality.

4.3.1.5 FINANCIAL RESPONSIBILITY AND CROSS-WAIVERS OF CLAIMS

Financial Responsibility:

The FAA requires a proof of Financial Responsibility from licensees as a requirement of a launch license. It is generally based upon Maximum Probable Loss (MPL) and includes insurance requirements for both government property and third party property. However, the amount of insurance required will not exceed \$100M of insurance for government property or \$500M for third party property.

Data Example: Proof of Purchase of Liability and Property Insurance

MPL Determination:

MPL is used to set financial responsibility requirements and is based on an analysis and assessment of the maximum probable monetary losses likely to be incurred by government personnel and third parties and U.S. Government property in the event of a mishap. The U.S. Government will conditionally “indemnify” a licensee for any claims above the insured amount (up to \$1.5 Billion, adjusted for inflation since 1988), subject to Congressional appropriation.

Data Examples: Launch, Over-flight and Landing populations and U.S. Government property values of nearest facilities and equipment to launch and landing sites.

Cross-Waivers

A licensee must sign reciprocal waivers of claims with its contractors, its customers, and the U.S. government. Each of these parties agrees to require its contractors and subcontractors to waive claims against the other parties and against the contractors and subcontractors of each and agrees to assume financial responsibility for:

Property damage it sustains, and

For bodily injury or property damage sustained by its own employees.

The purpose of a cross-waiver is to reduce litigation expenses by requiring launch participants to assume responsibility for their own losses.

Data Examples: Signed Cross-Waiver of Claims.

4.3.2 FAA REENTRY LICENSING PROCESS SUMMARY AND DATA EXAMPLES

The FAA Reentry License begins when the CRS Contractor or Licensee's vehicle begins reentry preparations. Reentry preparations begin, at the earliest, once the vehicle has detached from ISS, is outside the approach ellipsoid, and on a trajectory determined safe for the ISS for at least 24 hrs. The reentry licensing process involves activities shown above in 4.3.1 covering Policy Determination, Payload Determination, Environmental Review, and Financial Responsibility. These activities are very similar for reentry licensing as for launch licensing. The major difference is the process used for Safety Evaluation of the proposed reentry operations. The differences between missions and or vehicles could shift emphasis among the items below and others that might have more significance in a given situation.

Data Examples Consistent with 14 CFR 431 and 435:

Vehicle description – onboard energetic systems descriptions, onboard fuel types and quantities and levels as the mission progresses, onboard hazardous material, verification test data for safety-critical systems.

Contractor only mission rules, (identification of all parameters and acceptable values that must be evaluated, such as state vectors), systems readiness, contingency plans, health checks, etc.

Description of Safety Organization of licensee.

Description of nominal vehicle reentry trajectory and associated mission events.

Description of factors that can influence nominal flight trajectory analyses covering launch or ascent of the vehicle through orbital insertion and reentry or descent of the vehicle through landing, including its planned impact areas, vehicle aerodynamic properties, staging events, and any mitigation methods or techniques.

Debris dispersion data about nominal and contingency abort landings, vehicle breakup/thermal analysis, including associated debris catalog.

Description of vehicle safety-critical failure modes and their consequences that may affect public safety.

Emergency response plan, communications plan, accident investigation plan, reentry mission simulations or rehearsals.

4.4 RANGE ACTIVITIES

Range safety is a joint responsibility of the Range Users and the USAF at Cape Canaveral Air Force Station (CCAFS) and NASA at Wallops Flight Facility (WFF), as the owners and operators of the ranges. Refer to Appendix C. The responsibility for protecting the public, launch area, and launch complex personnel and resources is of paramount consideration in range launch operations. The FAA issues licenses if doing so is "consistent with the public health and safety, safety of property, and national security and foreign policy interests of the United States...." 49 U.S.C. 70105. The FAA in turn prescribes that a "launch operator is responsible for ensuring the

safe conduct of a licensed launch and for ensuring public safety and safety of property at all times during the conduct of a licensed launch.” 14 C.F.R. 417.7. Further, the launch operator’s agreements with a federal launch range generally require the launch operator to adhere to all range safety requirements. The general requirements for obtaining FAA safety approval if launching from a federal launch range are described in 14 CFR 415.31.

FAA requirements have been written with the intent of achieving commonality with the range safety requirements. The USAF and FAA have recently invited NASA to join the Common Standards Working Group (CSWG) for Range Activities.

The FAA has developed a Launch Site Safety Assessment (LSSA) checklist for the WFF, operated by NASA. The LSSA describes how the safety policies and practices used at a particular range compare to FAA regulations. This establishes a safety baseline used to help the FAA determine, through the licensing process, whether a commercial launch proposal adequately protects public health and safety. If a commercial operator proposes to launch from a launch site where the LSSA has shown the range policies and practice satisfy the FAA requirements (e.g. what the range requires with regards to safety functions from rehearsals to emergency response plans); then the commercial operator need only demonstrate to the FAA that it (1) satisfies the range requirements and (2) also complies with a small set of remaining FAA requirements. The LSSA for WFF was the first undertaken and completed since the major new requirements for a commercial launch license (14 CFR 417, Launch Safety) became effective.

Launch Operator Responsibilities

Range users at CCAFS are solely responsible for complying with requirements identified in AFSPCMAN 91-710, Air Force Space Command-Range Safety User Requirements Manual. The Launch Operator is responsible for the design, inspection, and testing of all hazardous and safety critical launch vehicle, payload, and ground support equipment, systems, facilities, and materials to be used at the ranges in accordance with the requirements defined in the above document. Range users at WFF are responsible for complying with the WFF range requirements RCC 319 “FTS Commonality Standards” and RCC 324 “Global Positioning and Inertial Measurements Range Safety Tracking Systems Commonality Standard”.

FAA

The FAA has Memorandums of Agreement (MOAs) with the Range Safety Offices where COTS or CRS launches will occur. The FAA also requires licensees to document their agreements with the ranges, as part of the launch license. The FAA License Team Lead in Washington D.C. assigns AST personnel to interface with the WFF Range Operations personnel and uses the Florida-based FAA personnel for CCAFS Range Operations personnel coordination. The FAA actively participates in the CSWG and leads some of the CSWG sub-teams that include the range safety offices where COTS/CRS launches will occur. FAA personnel participate in the Range Board Safety Review Meetings between the range and the licensee and also attend the relevant range scheduling meetings.

NASA

NASA is responsible to ensure that the CRS contractors are meeting all obligations within the CRS Contract. Achieving a launch and reentry license is a key factor in meeting the obligations of the Contract. NASA personnel may participate in the Range Board Safety Review Meetings between the range and the licensee and may also attend some of the range scheduling meetings. These activities allow NASA personnel sufficient insight into the contractor's progress in obtaining its license.

4.5 LAUNCH AND END OF LAUNCH

Contractor or Licensee Responsibilities

The contractor or licensee is responsible for its launch and vehicle operation throughout the mission. Appendix C shows various authorities for different flight phases and from different launch facilities.

FAA

The FAA monitors the performance of the licensee during the launch. Appendix D shows the potential staffing levels the FAA plans in various control rooms. The FAA will notify the licensee, and may notify NASA, whether or not the licensee is complying with FAA regulations, the license application, license and the terms and conditions of its launch license. For an ELV, the FAA licensed launch activities end as defined in 14 CFR 401.5(2)(i): "...launch ends after the licensee's last exercise of control over its launch vehicle". This usually translates into when the launch vehicle upper stage is safed (after e.g. depletion of residual propellants, discharging of batteries, venting of pressurized systems, leaving fuel line valves open). For an RLV, end of launch is defined at 14 CFR 401.5(2)(ii): "...launch ends after deployment of the payload". For any other orbital RLV, launch ends upon completion of the first sustained, steady-state orbit of an RLV at its intended location".

NASA

NASA monitors the performance of the contractor and reserves the right to perform Government-performed technical assessments of launch and cargo vehicle configuration to evaluate the readiness of the Contractor to deliver NASA cargo to ISS including evaluation of both launch and cargo vehicle readiness and considering risk and contractual compliance. NASA will also monitor the performance of ISS prior to launch and will make a determination if the ISS is ready to receive the contractors vehicle. NASA does not have GO/NO GO authority for launch, but will provide a recommendation to the contractor to proceed into the launch countdown based on the readiness of ISS and a risk assessment for NASA cargo. A decision can be made to remove cargo prior to launch. Upon landing, NASA will have representatives at the contractors' facility to retrieve cargo and perform any necessary processing prior to shipment.

4.6 ON-ORBIT OPERATIONS

4.6.1 PROXIMITY OPERATIONS

Contractor Responsibilities

The COTS or CRS contractor is responsible for following joint NASA – Contractor operational products.. The contractor coordinates with MOD to facilitate the development of specific products required to manage ISS systems to support visiting vehicle (VV) operations. Vehicle design data must be provided to MOD and other NASA organizations as required in order to develop operational constraints and joint products such as flight rules.

NASA

NASA is responsible for overall authority for COTS or CRS integrated operations once the spacecraft is in proximity to ISS as defined in ISSP 50808, poses a potential hazard to ISS, or in other areas pre-negotiated with the contractor. The CRS Contract specifies Mission Success and Safety Criteria that will be followed during the requirements and flight documentation development. MOD will develop technical expertise on VV systems and rendezvous techniques to the level necessary to safely monitor the VV in real-time. NASA IMC will coordinate FAA personnel preparation for JSC ISS Management Center (IMC) attendance.

FAA

The FAA monitors the licensee's performance during the preparation for and execution of the launch and reentry phases in accordance with FAA regulations, the license application, the license and its associated license terms and conditions. The FAA will have a mission control seat at the licensee's MCC, the launch sites, and the JSC ISS IMC as an observer. Potential staffing for these seats and associated FAA MCC position responsibilities are shown in Appendices C, D, and F, and preparatory familiarity training with NASA and the contractor or licensee are required to be effective. The FAA participates in ISS Mission Management Teams (IMMTs) as an observer with NASA COTS or CRS personnel. The FAA will have access to flight control Device/Digital Voice Intercom System (DVIS) loops and flight control data to gain insight into the VV health status.

4.6.2 NASA CROSS-WAIVERS

NASA has cross-waivers with the CRS contractors and COTS Space Act Agreement (SAA). The Intergovernmental Agreement for the ISS contains a broad cross-waiver of liability provision to encourage participation in the exploration, exploitation and use of outer space through the ISS. The objective of the broad cross-waiver liability provision is to establish a cross-waiver of liability in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the ISS. The Parties intend that the cross-waiver of liability be broadly construed to achieve this objective. Each party waives and releases claims against the other parties to the waivers and agrees to assume financial responsibility for damage arising out of Protected Space Operations. The cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims. Damage is defined as:

- (i) Bodily injury to, or other impairment of health of, or death of, any person;
- (ii) Damage to, loss of, or loss of use of any property;
- (iii) Loss of revenue or profits; or
- (iv) Other direct, indirect, or consequential damage.

The purpose of a cross-waiver is to reduce litigation expenses by requiring launch and spacecraft participants to assume responsibility for their own losses. Refer to Appendix G.

4.7 REENTRY PREPARATIONS, OPERATIONS AND LANDING

Contractor or Licensee Responsibilities

The licensee is responsible for providing the FAA access to their reentry preparations. The FAA Reentry License begins when the CRS Contractor vehicle begins reentry preparations. At the earliest, reentry preparations begin when the vehicle has detached from ISS, is outside the approach ellipsoid, and on a trajectory that poses no hazard to ISS in the following 24 hrs. At the point when the CRS Contractor begins receiving sustainable, reliable data to analyze and determine reentry vehicle state of health, the FAA will perform a reentry assessment to determine if the requirements of the license are being met, .

NASA

Prior to unberthing, NASA and the contractor will jointly perform an assessment of the contractor's vehicle. This assessment will determine that the vehicle can perform a controlled reentry with minimum critical systems and sufficient consumables. A flight rule will be developed that documents the above constraints for a safe unberthing and departure from the ISS. NASA also observes its contractor's compliance to the FAA reentry licensing requirements and to contractual requirements regarding cargo return.

FAA

The FAA monitors the CRS licensee analyses of the data and subsequent operations (i.e. deorbit burn) to ensure a safe, controlled reentry process is followed, as required by FAA regulations, representations in the reentry license application and the reentry license and its license terms and conditions.

4.8 POST FLIGHT REVIEW

Contractor Responsibilities

The purpose of this CRS Milestone is to support Mission Success determination. The contractor provides NASA with a Preliminary Post Flight Assessment that includes: telemetry data confirming the required launch and orbit conditions and cargo environments were met as stated in the contract Interface Definition Document (IDD) as well as discussions on anomalies or potential problems.

NASA

NASA will be responsible for providing data about cargo status. NASA invites the FAA to the Post Flight Assessment(s) as a participant to review any anomalies encountered and anomaly resolutions employed. All entities will discuss lessons learned and develop common areas of improvement that will be documented by NASA.

FAA

The FAA participates in the NASA Post Flight Assessment(s) as an observer. The FAA personnel ensure that the licensee operated in accordance with FAA Regulations, its license application and complies with its specific license and its associated license terms and conditions. Violations of FAA regulatory requirements may lead to warning notices or enforcement action by the FAA. The FAA will communicate this to the licensee and may communicate it to NASA.

APPENDIX A ABBREVIATIONS AND ACRONYMS

AE	Approach Ellipsoid
AF	Air Force
AST	FAA Office of Commercial Space Transportation
C3PO	NASA Commercial Crew & Cargo Program Office (QA)
CCAFS	Cape Canaveral Air Force Station
CDR	Critical Design Review
CFR	Code of Federal Regulations
CG	Center of Gravity
CIR	Cargo Integration Review
COFR	Certification of Flight Readiness
COTR	Contract Officers Technical Representative
COTS	Commercial Orbital Transportation Services
CRS	Commercial Resupply Services
CSLAA	Commercial Space Launch Amendments Act
CST	Commercial Space Transportation
CSWG	Common Standards Working Group for Range Activities (USAF, AST & NASA)
DCMA	Defense Contract Management Administration
DOC	Department of Commerce
DoD	Department of Defense
DOS	Department of State
DOT	Department of Transportation
DRD	Data Requirements Document
DRR	Design Requirements Review
DVIS	Houston MCC Digital Voice Intercom System (Device)
EDMS	Electronic Data Management System
ELV	Expendable Launch Vehicle
EOM	End of Mission
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FCT	Flight Control Team
FRR	Flight Readiness Review
FTS	Flight Termination System
GNC	Guidance, Navigation & Control
HTV	H-II Transfer Vehicle
HQ	Headquarters
IDD	Interface Definition Document
IFI	In-flight Investigation

IGA	Intergovernmental Agreement
IMC	ISS Management Center at Houston Mission Control Center
IMMT	ISS Mission Management Team
IP	International Partner/Participant
IPLPT	IP Launch Package Team
IRD	Interface Requirements Document
ISS	International Space Station
ISSP	International Space Station Program (OA)
ITAR	International Traffic in Arms Regulation
IVA	Intravehicular Activity
JSC	Johnson Space Center
KSC	Kennedy Space Center
km	kilometer
KOS	Keep Out Sphere
LRR	Launch Readiness Review
LSP	Launch Service Providers, a NASA Organization at KSC
LSSA	Launch Site Safety Assessment
m	meter
MAS	MCC Automation System
MARS	Mid-Atlantic Regional Spaceport
MCC-H	Mission Control Center – Houston
MCC-D	Mission Control Center – Dulles
MCC-X	Mission Control Center - SpaceX
MEP	Mission Execution Plan
MER	Mission Evaluation Room
MIR	Mission Integration Review
MOA	Memorandum of Agreement
MOC	Mission Operations Center
MOD	NASA Mission Operations Directorate
MODM	MOC MCC Server
MOU	Memorandum of Understanding
MOWG	Mission Operations Working Group
MPL	Maximum Probable Loss
MRAD	Mission Requirements & Allocations Document
NAS	National Air Space
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Protection Act
NOAA	National Oceanic and Atmospheric Administration
ON	NASA Transportation Integration Office
OSC	Orbital Sciences Corporation

OSTPV	Onboard Short Term Plan Viewer
PDR	Preliminary Design Review
PMP	Program Management Plan
PMR	Program Management Review
R&D	Research and Development
RFP	Request for Proposal
RID	Review Item Discrepancy
RLV	Reusable Launch Vehicle
RMO	NASA Resident Manager's Office
RODF	Russian Operations Data File
SAA	Space Act Agreements
S&MA	Safety and Mission Assurance
SODF	System Operations Data File
SORR	Stage Operations Readiness Review
SOW	Statement of Work
SRP	Safety Review Panel
SRR	System Readiness Review
SpaceX	Space Exploration Technologies Corporation
TCS	Thermal Control System
TPS	Thermal Protection System
TWIG	Trash and Waste Integration Group
US	United States
USAF	United States Air Force
USC	United States Code
VBR	Vehicle Baseline Review
VV	Visiting Vehicle
WFF	Wallops Flight Facility

APPENDIX B – GLOSSARY OF TERMS

COMMERCIAL

(Resupply Services) — Any launch or reentry that is performed by U.S. citizens, but not carried out by and for the U.S. Government is treated as commercial and must be licensed by the FAA. The fundamental principle of the CRS procurement was that NASA would procure services and not hardware. In contrast to the Space Shuttle Program, NASA will not own or operate the launch vehicles and spacecraft that are used to provide the cargo service. Therefore, the CRS launches and reentries must be licensed by the FAA, and indeed the CRS Contracts explicitly require licensing by the FAA.

CYGNUS

The Orbital Sciences Corporation space capsule carrying ISS cargo atop the Taurus II Rocket. Cygnus will reenter although it is not designed to return to Earth substantially intact.

DRAGON

The SpaceX space capsule carrying ISS cargo atop the Falcon 9 Rocket. This is also the SpaceX reentry vehicle.

INSIGHT

Review activities such as reviewing Data Requirements Documents (DRDs), quarterly and mission-related reviews and Resident Manager's Office work.

OVERSIGHT

Approval activities (direction) such as approving DRDs, approving Mission or Work Plan documents and conducting NASA Launch Readiness Assessment. Oversight = Insight + Approval.

APPENDIX C – MISSION PHASES EMPHASIS

FLIGHT AUTHORITIES		
	SpaceX	OSC
PRE-LAUNCH & LIFTOFF	AF, NASA, FAA	NASA WFF, FAA
RANGE	AF, FAA	NASA WFF, FAA
SUB-ORBITAL	FAA	FAA
ORBITAL	NASA	NASA
PROX OPS-JOINT OPS (23KM)	NASA	NASA
AE (4X2X2KM)	NASA	NASA
KEEP OUT SPHERE (200M RADIUS)	NASA	NASA
ISS OPS	NASA	NASA
KOS/AE/PO (SAME AS ABOVE)	NASA	NASA
ORBITAL (PREP TO REENTER)*	FAA, NASA	FAA, NASA
SUB-ORBITAL	FAA	FAA
NATIONAL AIR SPACE (NAS)	FAA	FAA
LANDING	FAA	FAA
<p>*FAA has authority over <u>planned</u> deorbits.</p> <p>Note 1: SpaceX or Orbital Sciences Corporation (OSC) always has prime responsibility.</p> <p>Note 2: Some initial COTS Demo Missions do not berth with the ISS.</p>		

APPENDIX D – POTENTIAL FAA RESOURCES FOR CRS MISSIONS

(TO BE DECIDED ON A MISSION BY MISSION BASIS)

NOTE: Initial COTS and CRS Mission Resources will be higher than sustained CRS Mission Resources.

- **PRELAUNCH**
 - 3-4 AST at Launch Site L-60 days for Safety Inspections
 - 1 at JSC & 1 at SpaceX or OSC L-60 for series of Readiness Reviews
 - Increase to 2 at JSC L-14 for 2-shift coverage
 - Increase to 3 at JSC L-3 for 3-shift coverage and MCC-H prep details
 - Determine at L-3 if 2 or 3 needed at SpaceX or OSC MCC
(NOTE: LRR led by SpaceX or Orbital & Flight Readiness Review (FRR) led by NASA)
- **LAUNCH & RANGE OPS**
 - Decrease to 3 at Launch Site Mission Operations Center (MOC) through end of Range Ops
 - 3 at JSC MCC-H for 3-shift coverage
 - 2 at SpaceX or OSC MCC for 2-shift coverage (Mission Control Center – SpaceX (MCC-X) or Mission Control Center – Dulles (MCC-D))
- **REST OF MISSION**
 - [OSC 40 days Total = (Up to) 8 to ISS, 30 berthed & 2 Re-entry]
 - 3 at JSC for 3-shift coverage (except for 25 of the berthed central days)
 - 2 at SpaceX or OSC MCC for 2-shift coverage (except for 25)
 - 1-shift MCC coverage starts berth +2 at T-3 days unberthing.

APPENDIX E - NASA AND FAA SURVEILLANCE PLAN MAPPING

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference	Responsible Office/POC	Reviewing Offices
C1-1	Reserved						
C1-2	Mishap Notification , Investigation and Contingency Action Plan	Review	With Proposal	Updates at Program Reviews	SOW 2.5.4	OE/CRS Lead	ON, OE, FAA**
C1-3	Reserved						
C1-4	Configuration Management Plan	Review	With Proposal	Updates at Program Reviews	SOW 2.1.2	ON/COTR	ON, OE, FAA**
C1-5	Export Control Plan	Approve	Contract Award +30 days	Updates at Program Reviews	SOW 2.1.3, 2.3.3.1	OX/ISS Export Control Rep	ON, OX, FAA**
C1-6	Reserved						
C1-7	Mission Integration & Operations Management Plan	Approve	With Proposal	Updates at Program Reviews	SOW 2.1, 2.3.1, 2.4.3.1, 2.4.3.2, 2.4.7.2	ON/COTR	ON, OC, OB, OE, OZ, FAA**
C1-8	Work Plan	Approve	With Proposal	T.O. Award +30 days	SOW 2.3.1	ON/COTR	ON, OC, OB, OZ
C1-9	FAA	Approve	Prior to	Each mission	II.A.4 49	FAA	FAA**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference	Responsible Office/POC	Reviewing Offices
	Launch & Reentry License		Launch	for initial 4-6.	USC SUB IX, CH 701		
C1-10	Safety Data Package	Review	When delivered to Range	Each mission	SOW 2.5.3	OE/CRS Lead	ON, OE, FAA**
C2-1	Formal Review Documentation	Review	First formal review	At every review	SO W 2.1.1	ON/COTR	ON
C2-2	Integrated Schedules	Review	T.O. Award +30 days	Updates only, monthly	SO W 2.1.4	ON/COTR	ON, OC, OH, OB, OE, OZ, OM
C3-1	Vehicle Interface Definition Document (IDD)	Approve	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2, 2.2.2, 2.4.1	ON/Element Manager	ON, OM, OB, OZ, OC, OE, FAA**
C3-2	External Cargo Interface Control Agreement	Approve	L-14 months	Each mission	SOW 2.4.1, 2.4.3	ON/Element Manager	ON, OM, OB, OE, OZ, FAA**
C3-3	Launch Vehicle Flight Software Input for IV&V Review	Review	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2.1	ON/Element Manager	ON, KSC LSP, OD, OE, FAA**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference	Responsible Office/POC	Reviewing Offices
C3-4	Launch Vehicle Guidance, Navigation and Controls Input for IV&V	Review	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2.1	ON/Element Manager	ON, KSC LSP, EG, OE, FAA**
C3-5	Launch Vehicle Key Systems Qualification Data	Review	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2.1	ON/Element Manager	ON, KSC LSP, ES, OM, FAA**
C4-1	Engineering Computer-Aided Design (CAD) Models	Review	MIR for first mission	Within 7 days of any updated drawing release	SOW 2.3.2	ON/Element Manager	ON, KSC, ES, OM, OC, OB, DA, OZ, FAA**
C4-2	Initial Mission Resource Allocation Document	Approve	L-10 months	Each mission	SOW 2.3, 2.4, 2.5.2.1	ON/COTR	ON, OC, OB, OZ, OM, DA, OE
C4-3	Imagery Plan	Review			SOW 2.3.3.2	OC/Imagery Lead	ON, OC, OE
C4-4	Internal Cargo	Approve	L-8 months	Each mission	SOW 2.4	OC/Cargo Integration	ON, OC, OE

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference	Responsible Office/POC	Reviewing Offices
Interface Control Agreement							
C5-1	Initial Flight Products	Review	L-5 months	Each mission	SOW 2.3.3.3	DA/CRS Flight Director	ON, OC, DA, OB, OZ, OE
C5-2	Integrated Cargo Phase III Hazard Report	Approve	L-4 months	Each mission	SOW 2.5.2.1	OE/CRS Lead	ON, OE, FAA**
C6-1	Final Mission Resource Allocation Document	Approve	L-3 months	Each mission	SOW 2.4	ON/COTR	ON, OC, OB, OZ, OM, DA, OE
C6-2	Final Flight Products	Review	L-2 weeks	Each mission	SOW 2.3.3.3	DA/CRS Flight Director	ON, OC, DA, OB, OZ, OE, FAA**
C6-3	Delta Integrated Cargo Hazard Report	Approve	L-6 weeks	Each mission	SOW 2.5.2.1	OE/CRS Lead	ON, OE, FAA**
C7-1	Preliminary Post Flight Assessment	Review	EOM+ 7 days	Per mission (telemetry only, on non-CRS missions)	SOW 2.1.1.2.4, 2.2.2, 2.6	ON/COTR	ON, OC, OB, OZ, OM, DA, OE, KSC LSP, FAA**
	Final Post	Review	EOM+	Per mission	SOW	ON/COTR	ON, OC, OB, OZ, OM, DA,

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference	Responsible Office/POC	Reviewing Offices
C7-2	Flight Assessment		60 days	including non-CRS missions	2.1.1.2. 1, 2.6		OE, KSC LSP, FAA**

APPENDIX F - DESCRIPTION OF FAA RESPONSIBILITIES AT THE FAA LIAISON OFFICE AT NASA/JSC

1. Be the On-Site Interface with C3PO and ON, and other NASA organizations as required for FAA/Headquarters (HQ).

This requires working with all NASA JSC Offices that deal with the commercial space transportation efforts to both demonstrate and then deliver actual cargo to the ISS. The FAA participates in meetings with these JSC Offices to discuss items of mutual benefit and to develop methods and processes to work together to accomplish the goals of our respective FAA and NASA organizations.

2. Support all COTS Demonstration Mission Activities (Design and Operations Reviews, Mission Readiness Reviews, Mission Support, Post Mission Debriefings & Lessons Learned Meetings).

This involves participating in COTS Participants System Readiness Reviews (SRRs), Preliminary Design Reviews (PDRs), Critical Design Reviews (CDRs), Design Requirements Review (DRRs), FRRs, as well as providing Mission Support and supporting Post Mission meetings. At these meetings the FAA reviews licensee COTS design and operations as applicable to FAA licensing activities and FAA roles in the COTS missions.

3. Support COTS/CRS ISS Mission Operations Working Group meetings & Joint Operational Panels with both the SpaceX and Orbital partners.

The FAA observes the COTS Mission Operations Working Groups (MOWGs) and COTS/CRS Joint Operational Panels (JOPs), as required, to gain insight into the launch, on-orbit, and reentry activities that the licensees are developing. This gives the FAA insight into how the joint NASA contractor plans are in concert with those that they have represented to the FAA in their license applications.

4. Support COTS/CRS ISS SRP meetings at NASA/JSC with both the SpaceX and Orbital partners.

The FAA participates as a non-voting member at the NASA/JSC ISS SRP meetings for Phases I, II, and III for the COTS/CRS missions. The FAA gains insight into the design and operations requirements that the ISS SRP determines will result in safe VV operations while the licensee's spacecraft are conducting proximity operations within the AE of the ISS.

5. Support the development of MCC Console Mission documentation for the FAA Support Console in the MCC IMC (Console handbook, Ops Procedures, Flight Rules, Communications Plan, Coordination and Integration Plan) for the COTS Demonstration & CRS missions.

The FAA develops appropriate mission control documents to facilitate understanding of the JSC realtime missions. These documents are developed from knowledge gained during the design and operations review meetings, the MOWG meetings, JOP meetings, and the ISS SRP meetings, as well as from the licensee FAA license application materials.

6. Observe the COTS Demonstration & CRS real time missions in the JSC/MCC IMCat the FAA Support Console position.

The FAA attends real time COTS Demonstration & CRS mission operations from the NASA/JSC MCC IMC. This involves attending and observing mission management team meetings to facilitate discussions if FAA licensing issues are involved and to help inform the decision making processes.

7. Support the ISS CRS Program Management Quarterly Review meetings at SpaceX and Orbital.

This involves the participation by the FAA in the NASA and Contractor Quarterly Review meetings from an FAA licensing and compliance monitor standpoint, as required.

8. Participate in ISS CRS Technical Reviews, including the Vehicle Baseline Review, Mission Integration Review, Cargo Integration Review, and Post Flight Review with both SpaceX and Orbital.

This involves participating in ISS CRS Contractor's VBRs, Mission Integration Reviews (MIRs), and Cargo Integration Review (CIRs) as well as providing Mission Support and supporting Post Mission meetings. At these meetings the FAA will be reviewing licensee's ISS CRS design and operations as applicable to their licensing activities and our FAA responsibilities for the ISS CRS missions.

9. Update MCC Console Mission documentation for the FAA Support Console in the MCC (Console handbook, Ops Procedures, Flight Rules, Communications Plan, Coordination and Integration Plan) used for the COTS Demonstration missions to reflect changes necessary for the ISS CRS missions.

This requires looking at the COTS Demonstrations missions documentation in light of how the COTS missions were performed and in light of any design and operations changes that the licensee may make between the COTS missions and the ISS CRS missions that may affect the FAA roles and documentation needed for the ISS CRS missions and making the appropriate changes to FAA documentation.

10. Support the FAA Licensing Teams working on licensing determinations for both the COTS Demonstrations and ISS CRS missions' operations.

Serve as a FAA Licensing Team member or support team member and summarize appropriate new information learned in COTS and CRS meetings to the FAA licensing team.

11. Develop, and maintain the Master Schedule for FAA Liaison Office support of all COTS and ISS CRS activities relating to FAA Licensing of Commercial Space Transportation operations.

Compile NASA COTS and CRS schedules, contractor or licensee schedules, FAA Licensing Team schedules and FAA Management schedules to determine the appropriate meetings and activities to participate in or attend either in person or via telecom.

APPENDIX G - NASA CROSS-WAIVERS

II.A.1 CROSS-WAIVER OF LIABILITY FOR SPACE STATION ACTIVITIES (NFS 1852.228-76) (DEC 1994) (DEVIATION)

1. The Intergovernmental Agreement for the ISS contains a broad cross-waiver of liability provision to encourage participation in the exploration, exploitation and use of outer space through the ISS. The objective of this clause is to establish a cross-waiver of liability in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the ISS. The Parties intend that the cross-waiver of liability be broadly construed to achieve this objective
2. For the purposes of this clause:
 - a. The term "Damage" means:
 - (i) Bodily injury to, or other impairment of health of, or death of, any person;
 - (ii) Damage to, loss of, or loss of use of any property;
 - (iii) Loss of revenue or profits; or
 - (iv) Other direct, indirect, or consequential Damage.
 - b. The term "Launch Vehicle" means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries Payloads or persons, or both.
 - c. The term "Partner State" includes each Contracting Party for which the Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station IGA has entered into force, pursuant to Article 25 of the IGA or pursuant to any successor Agreement. A Partner State includes its Cooperating Agency. It also includes any entity specified in the Memorandum of Understanding (MOU) between NASA and the Government of Japan to assist the Government of Japan's Cooperating Agency in the implementation of that MOU.
 - d. The term "Payload" means all property to be flown or used on or in a Launch Vehicle or the ISS.
 - e. The term "Protected Space Operations" means all launch or Transfer Vehicle activities, ISS activities, and Payload activities on Earth, in outer space, or in transit between Earth and outer space performed under this contract, or in implementation of the IGA, MOUs concluded pursuant to the IGA, and implementing arrangements. It includes, but is not limited to:
 - (i) Research, design, development, test, manufacture, assembly, integration, operation, or use of launch or Transfer Vehicles, the ISS, Payloads, or instruments, as well as related support equipment and facilities and services; and
 - (ii) All activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services. "Protected Space Operations" also includes all activities related to evolution of the ISS, as provided for in Article 14 of the IGA. "Protected Space Operations" excludes activities on Earth which are

conducted on return from the ISS to develop further a Payload's product or process for use other than for ISS-related activities in implementation of the IGA.

f. The term "Related Entity" means:

- (i) A contractor or subcontractor of a Party or a Partner State at any tier;
- (ii) A user or customer of a Party or a Partner State at any tier; or
- (iii) A contractor or subcontractor of a user or customer of a Party or a Partner State at any tier.

The terms "contractor" and "subcontractor" include suppliers of any kind.

The term "Related Entity" may also apply to a State, or an agency or institution of a State, having the same relationship to a Partner State as described in paragraphs (2)(f)(i) through (2)(f)(iii) of this clause or otherwise engaged in the implementation of Protected Space Operations as defined in paragraph (2)(e) above.

g. The term "Transfer Vehicle" means any vehicle that operates in space and transfers Payloads or persons or both between two different space objects, between two different locations on the same space object, or between a space object and the surface of a celestial body. A Transfer Vehicle also includes a vehicle that departs from and returns to the same location on a space object.

h. The term "Party" means a party to this contract.

3. Cross-waiver of liability:

a. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in paragraphs (3)(a)(i) through (3)(a)(iv) of this clause based on Damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:

- (i) The other Party;
- (ii) A Partner State other than the United States of America;
- (iii) A Related Entity of any entity identified in paragraph (3)(a)(i) or (3)(a)(ii) of this clause; or
- (iv) The employees of any of the entities identified in paragraphs (3)(a)(i) through (3)(a)(iii) of this clause.

b. In addition, each Party shall, by contract or otherwise, extend the cross-waiver of liability, as set forth in paragraph (3)(a) of this clause, to its Related Entities by requiring them, by contract or otherwise, to:

- (i) Waive all claims against the entities or persons identified in paragraphs (3)(a)(i) through (3)(a)(iv) of this clause; and
- (ii) Require that their Related Entities waive all claims against the entities or persons identified in paragraphs (3)(a)(i) through (3)(a)(iv) of this clause.

c. For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the *Convention on International Liability for Damage Caused by Space*

Objects, which entered into force on September 1, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

- d. Notwithstanding the other provisions of this clause, this cross-waiver of liability shall not be applicable to:
 - (i) Claims between a Party and its own Related Entity or between its own Related Entities;
 - (ii) Claims made by a natural person, his/her estate, survivors or subrogees (except when a subrogee is a Party to this Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of, such person;
 - (iii) Claims for Damage caused by willful misconduct;
 - (iv) Intellectual property claims;
 - (v) Claims for Damage resulting from a failure of a Party to extend the cross-waiver of liability to its Related Entities, pursuant to paragraph (3)(b) of this clause;
 - (vi) Claims by a Party arising out of or relating to the other Party's failure to perform its obligations under this Contractor.
- e. Nothing in this clause shall be construed to create the basis for a claim or suit where none would otherwise exist.
- f. This cross-waiver shall not be applicable when 49 U.S.C. Subtitle IX, Chapter. 701, Commercial Space Launch Activities, is applicable.
- g. In addition, this clause provides for a reciprocal waiver of claims between NASA and the Contractor as described in paragraph 3 above. This reciprocal waiver of claims between NASA and the Contractor, however, shall not apply to rights and obligations arising from the application of any of the other clauses in the contract or to rights and obligations arising from activities that are not within the scope of this contract.

(End of clause)

APPENDIX H - COTS SAA CROSS WAIVER

ARTICLE 10. LIABILITY AND RISK OF LOSS

[FOR ISS-RELATED COTS ACTIVITIES]

- A. FAA license(s) or permit(s), including cross-waivers and insurance requirements, for COTS demonstrations conducted by XYZ under this Agreement shall govern the allocation of risks and liability, if any, of the U.S. government – including NASA – and XYZ. To the extent the FAA license(s) or permit(s) do not apply to activities under this Agreement, the following cross-waiver will apply. Under no circumstances will NASA be liable for indemnification of third-party claims:
- (1) Purpose: The objective of this Article is to establish a cross-waiver of liability by the Parties and their related entities in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the COTS demonstrations.
 - (2) For the purposes of this Article:
 - (a) The term “Partner State” includes each contracting party for which the Agreement Among The Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station (ISS) (signed January 29, 1998; hereinafter the “Intergovernmental Agreement”) has entered into force or become operative (pursuant to Sections 25 and 26, respectively, of the Intergovernmental Agreement), or any successor agreement. A Partner State includes its Cooperating Agency. It also includes any entity specified in the MOU between NASA and the Government of Japan to assist the Government of Japan's Cooperating Agency in the implementation of that MOU.
 - (b) The term “related entity” means:
 - (i) a contractor or subcontractor of a Party or a Partner State at any tier;
 - (ii) a user or customer of a Party or a Partner State at any tier; or
 - (iii) a contractor or subcontractor of a user or customer of a Party or a Partner State at any tier.
 - (c) The term “damage” means:
 - (i) bodily injury to, or other impairment of health of, or death of, any person;
 - (ii) damage to, loss of, or loss of use of any property;
 - (iii) loss of revenue or profits; or
 - (iv) other direct, indirect or consequential damage.
 - (d) The term “launch vehicle” means an object or any part thereof intended for launch, launched from Earth, or returning to Earth which carries payloads or persons, or both.
 - (e) The term “Party” means a Party to this agreement.
 - (f) The term “payload” means all property to be flown or used on or in a launch vehicle or the ISS.

- (g) The term “Protected Space Operations” means all launch vehicle activities, ISS activities, and payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of the IGA, MOUs concluded pursuant to the IGA, and implementing arrangements. It includes, but is not limited to:
 - (i) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles, the ISS, or a payload, as well as related support equipment and facilities and services; and
 - (ii) all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services. “Protected Space Operations” also includes all activities related to evolution of the ISS, as provided for in Article 14 of the IGA. “Protected Space Operations” excludes activities on Earth which are conducted on return from the ISS to develop further a payload's product or process for use other than for ISS related activities in implementation of the IGA.
- (3) Cross Waiver of Liability
 - (a) Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in subsections (3)(a)(i) through (3)(a)(iv) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims against:
 - (i) another Party;
 - (ii) a Partner State other than the United States of America;
 - (iii) a related entity of any entity identified in subparagraphs (3)(a)(i) or (3)(a)(ii) above;
 - (iv) the employees of any of the entities identified in subsections (3)(a)(i) through (3)(a)(iii) above.
 - (b) In addition, each Party shall, by contract or otherwise, extend the cross-waiver of liability as set forth in subsection (3)(a) above to its related entities by requiring them to:
 - (i) waive all claims against the entities or persons identified in subsections (3)(a)(i) through (3)(a)(iv) above; and
 - (ii) require that their related entities waive all claims against the entities or persons identified in subsections (3)(a)(i) through (3)(a)(iv) above.
 - (c) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the Convention on International Liability for Damage Caused by Space Objects (which entered into force on September 1, 1972), where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

- (d) Notwithstanding the other provisions of this section, this cross-waiver of liability shall not be applicable to:
 - (i) claims between a Party and its related entities or between its related entities;
 - (ii) claims made by a natural person, his/her estate, survivors or subrogees (except when a subrogee is a Party to this Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of such natural person;
 - (iii) claims for damage caused by willful misconduct;
 - (iv) intellectual property claims;
 - (v) claims for damage resulting from a failure of a Party to extend the cross-waiver of liability to its related entities, pursuant to subsection (c)(2) above;
 - (vi) claims by or against a Party arising out of the other Party's failure to meet its contractual obligations as set forth in the Agreement.
- (e) Nothing in this section shall be construed to create the basis for a claim or suit where none would otherwise exist.
- (f) This cross-waiver shall not be applicable when the Commercial Space Launch Act cross-waiver (49 U.S.C. 70101 *et seq*) is applicable.

B. Government Provided Property

For all property provided by NASA to XYZ under this agreement, including property provided on a reimbursable or non-reimbursable basis, the following provisions apply:

1. XYZ 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, XYZ employees or the employees of XYZ's related entities, or for damage to, or loss of, XYZ 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.
2. XYZ 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.

[Insert if using alternate test bed or for non-ISS related COTS activities]

- A. FAA license(s) or permit(s), including cross-waivers and insurance requirements, for COTS demonstrations conducted by XYZ under this Agreement will govern allocation of risks and liability of the U.S. government – including NASA – and XYZ. To the extent the FAA license(s) or permit(s) do not apply to activities under this Agreement, the

following cross-waiver will apply. Under no circumstances will NASA be liable for indemnification of third-party claims:

- (1) Purpose: The objective of this Article is to establish a cross-waiver of liability by the Parties and their related entities in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the COTS demonstrations.
- (2) For purposes of this Article:
 - (a) The term "Party" means a party to this Agreement.
 - (b) The term "related entity" means:
 - (i) a contractor or subcontractor of a Party at any tier;
 - (ii) a user or customer of a Party at any tier; or
 - (iii) a contractor or subcontractor of a user or customer of a Party at any tier.
 - (c) The term "damage" means:
 - (i) bodily injury to, or other impairment of health of, or death of, any person;
 - (ii) damage to, loss of, or loss of use of any property;
 - (iii) loss of revenue or profits; or
 - (iv) other direct, indirect, or consequential damage.
 - (d) The term "launch vehicle" means an object or any part thereof intended for launch, launched from Earth, or returning to Earth which carries payloads or persons, or both.
 - (e) The term "payload" means all property to be flown or used on or in a launch vehicle.
 - (f) The term "Protected Space Operations" means all expendable or reusable launch vehicle activities and payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of this Agreement. It includes, but is not limited to:
 - (i) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles, payloads, or instruments, as well as related support equipment and facilities and services;
 - (ii) all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services. The term "Protected Space Operations" excludes activities on Earth that are conducted on return from space to develop further a payload's product or process for use other than for the activities within the scope of this Agreement.
- (3) Cross-waiver of liability
 - (a) Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in subsections (3)(a)(i) through (3)(a)(iv) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for damage against:
 - (i) another Party;

- (ii) a party to another NASA agreement that includes flight on the same launch vehicle;
 - (iii) a related entity of any entity identified in subsection (3)(a) or (3)(b) above;
 - (iv) the employees of any of the entities identified in subsections (3)(a) through (3)(c) above.
- (b) In addition, each Party shall extend the cross-waiver of liability as set forth in subsection (3)(a) to its own related entities by requiring them, by contract or otherwise, to:
 - (i) waive all claims against the entities or persons identified in subsections (3)(a)(i) through (3)(a)(iv) above; and
 - (ii) require that their related entities waive all claims against the entities or persons identified in subsections (3)(a)(i) through (3)(a)(iv) above.
- (c) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects (which entered into force on September 1, 1972), where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.
- (d) Notwithstanding the other provisions of this section, this cross-waiver of liability shall not be applicable to:
 - (i) claims between a Party and its own related entity or between its own related entities;
 - (ii) claims made by a natural person, his/her estate, survivors, or subrogees (except when a subrogee is a Party to this Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of such natural person;
 - (iii) claims for damage caused by willful misconduct;
 - (iv) intellectual property claims;
 - (v) claims for damages resulting from a failure of a Party to extend the cross-waiver of liability to its related entities, pursuant to subsection (c)(2) above; or
 - (vi) claims by or against a Party arising out of or relating to the other Party's failure to meet its contractual obligations set forth in the Agreement.
- (e) Nothing in this section shall be construed to create the basis for a claim or suit where none would otherwise exist.
- (f) This cross-waiver shall not be applicable when the Commercial Space Launch Act cross-waiver (49 U.S.C. 70101 *et seq*) is applicable.]