STATEMENT OF WORK

Commercial Reusable Suborbital Research (CRuSR) Program

DEVELOPMENTAL TEST FLIGHT SERVICES

Initial Flight Services

Level 2 Program Office

June 18, 2010

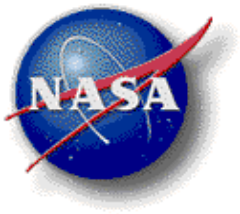

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Table of Contents

1.0 Background

NASA's Commercial Reusable Suborbital Research (CRuSR) program was established as part of the President's call to "…foster the development of the commercial reusable suborbital transportation industry, an important step in the longer-term path that envisions suborbital RLVs (reusable launch vehicles) evolving to provide the Nation with much lower-cost and much more reliable access to orbital space" [1] To help foster the commercial reusable suborbital transportation industry and promote U.S. competitiveness, NASA intends to procure flight services for suborbital science research, technology development, and educational enhancement. Effective Fiscal Year 2011, CRuSR will become part of the Flight Opportunities Program to be managed by the newly created Office of the Chief Technologist.

For this solicitation, the CRuSR program requires commercial suborbital flight services vendors to transport various Government-provided research payloads on the developmental test flights of vendor vehicles, including vehicle prototypes. As a result of this solicitation NASA intends to award multiple firm fixed price purchase orders to multiple vendors in accordance with the procedures of FAR 13, Simplified Acquisitions. Each award will be for the purchase of two (02) test flights and services, with an option to purchase additional quantities of flights. Each flight shall be in accordance with the requirements of this Statement of Work (SOW).

Each purchase order will have a base period of performance of six (06) months, and if exercised, each optional flight will extend the period of performance for approximately an additional three (03) months.

NASA plans to periodically solicit additional developmental test flight opportunities from industry to allow participation by new, qualified commercial companies as the commercial suborbital reusable launch vehicle industry develops.

Additional background and current information about the CRuSR program is available at the CRuSR website: http://crusr.arc.nasa.gov/

2.0 Objectives

The objective of this effort is to procure flight opportunities for Government-provided payloads on the test flights of commercial, suborbital reusable launch vehicles. NASA will use these rides to gather data on the conditions that future research payloads will be subjected to during flight and on the quality of the flight conditions that will be pertinent to the goals of these future payloads.

[1] *NASA Fiscal Year 2011 Budget Estimates, Section - Mission Directorate: Space Technology, page TECH – 16*

NASA will also use these rides as a means to learn, in collaboration with industry, about the logistics, processes and procedures necessary to support future suborbital research projects that will use these vehicles as platforms for their experiments.

3.0 Scope

NASA expects to award several purchase orders for initial flight services to commercial suborbital reusable launch vehicle companies to carry a variety of small payloads on the test flights of their new launch vehicles.

NASA will provide the payloads to the launch provider in a state ready to fly. Each payload will be self-sufficient, requiring no power or communication from the launch vehicle. Prior to delivery, NASA will provide an independent airworthiness and flight safety review of the payload, based on established NASA practices. NASA will be responsible for the payload until it is delivered to the launch provider and after it is retrieved from the launch provider. Interaction with the payload between flights will be performed in collaboration with the launch provider.

The launch provider shall be responsible for public safety and the safety of all personnel in proximity to the launch vehicle during the vehicle's launch, flight, and return to earth.

The launch provider shall be responsible for mounting the payload into or onto the vehicle prior to flight, and for removing the payload and returning it to NASA after the flight. The launch provider shall be responsible for the proper placement of the payload on the vehicle, and all aspects of the operation of the vehicle and the launch facilities.

Some payloads may fly on several flights. In these instances, the payloads may need to be refurbished between flights. This could entail inspection, data transfer and battery recharge. The processes, procedures and equipment for accomplishing this will be done in collaboration with the launch provider in advance of any flight.

At the end of the period of performance, all NASA payloads shall be returned to the Government.

All flights will be conducted at the launch providers' discretion. NASA recognizes that test flights are inherently risky and accepts that failures may occur. NASA will only pay for "successful" flights (see definition below), but will not hold the launch provider liable for damages to NASA-provided payloads or loss of data due to vehicle malfunctions or failures.

The launch provider shall provide Commercial Suborbital Test Flight services to NASA on Qualified Test Vehicles that meet the requirements and definitions as stated below.

4.0 Requirements and Definitions

4.1 Requirements

The launch vehicles shall operate under applicable Federal Aviation Administration regulations.

The launch provider shall have appropriate Federal Aviation Administration approval to launch.

For this procurement each flight shall meet the definition of Developmental Test Flight described below.

Each flight obtained through this procurement shall be provided by a vehicle meeting the Qualified Test Vehicle definition described below.

Flights shall be launched from vendor-provided launch facilities.

The flight vehicle shall accommodate payloads weighing at least 5 kg with minimum dimensions of 25 cm x 25 cm x 25 cm. The cargo bay shall maintain a pressure of 0.75 to 1.25 bars and a temperature between -20 to +60 deg C.

For each test flight ride ordered by NASA, the contractor shall deliver all services and milestones as follows:

Task 4.1 Pre-flight Documentation
Task 4.2 Flight Readiness Review
Task 4.3 Test Flight Ride
Task 4.4 Post-flight Review
Task 4.5 Post-flight Documentation
Task 4.6 Standardized Procedures and Lessons Learned Documentation

Project Milestones/Completion Dates (Estimates and as applicable)

Task Number	Milestones	Projected Completion Date
4.1	Pre-flight documentation: deliver final / updated interface requirements, safety procedures, flight plans and schedule, and required forms. (Initial requirements shall be submitted with proposal, first update required 2 weeks after contract award. Updates as needed, but required at least quarterly thereafter until Final.)	No later than 2 weeks after contract award

4.2	Flight Readiness Review (FRR) during which the payloads, vehicle and all launch systems are determined to be ready for the flight. (The Payload Airworthiness Review shall be completed prior to the FRR.)	No later than 24 hours before flight
4.3	Accept and integrate payload, fly test flight, and return payload or deliver data and refurbish payload.	Day of flight
4.4	Post-Flight review	No later than 24 hours after flight
4.5	Provide or review post-flight documentation	No later than 1 week after flight
4.6	Provide or review standard processing procedures and lessons learned documentation	No later than one month after Final Contract flight.

Task 4.1 Pre-flight Documentation

For each test flight ride, the vendor shall provide the documentation necessary for payloads to fly on the vehicle designated for the flight. This includes, but is not limited to payload-vehicle interface requirements, launch safety procedures, mishap response and contingency action plan, test flight schedules and locations, planned test flight profiles, contact information, descriptions of pertinent equipment to be provided by the launch provider, Informed Consent, Non-Disclosure Agreements and Responsibility Transfer forms, etc. Initial documentation shall be submitted as part of vendor's proposal package. These documents shall be updated and submitted to NASA for review 2 weeks after contract award. This documentation shall be updated or revised as needed, but at least Quarterly submittals are required until submittal of Pre-Flight Documentation for the final flight. Updates to the Pre-Flight Documentation shall be submitted no later than two weeks before the next scheduled flight. All documentation shall be provided in both hard copies (2) and electronic format (1). Electronic text documentation shall be provided in PDF format unless specifically requested otherwise by Government.

Task 4.2 Flight Readiness Review

No later than 24 hours before each test flight ride, the vendor shall participate in a telecom or in-person review with NASA to review the final flight plans and approve the readiness of the vehicle, the payload(s) and all related ground support systems. Payload airworthiness reviews shall be completed prior to the Flight Readiness Review.

Task 4.3 Test Flight Ride

For each test flight ride, the vendor shall – Review flight plans with NASA, discuss safety procedures and roles and responsibilities before each flight, accept the payload from NASA, integrate the payload onto the flight vehicle, allow for payload activation if necessary, carry payload throughout the test flight and deliver the payload back to NASA after the flight or allow NASA to collect data from the payload and refurbish the payload before the next flight.

Task 4.4 Post Flight Review

No later than 24 hours after the completion of each test flight ride, the vendor shall participate in a telecom or in-person review to discuss the results of the flight test, the data gathered by the experiment payload, lessons learned, any deviations from the mission or flight plan, and suggestions for changes to future plans or operations.

Task 4.5 Post-flight Documentation

No later than one week after the completion of each test flight ride, the vendor shall provide to NASA documentation of the flight. This will include formal flight data, video recordings, etc if available. If necessary, provide mishap reports after failed flights.

Task 4.6 Contract Completion Document: Standardized Procedures and Lessons Learned Documentation and Final pre-flight documentation

No later than one month after the completion of the Final Contract Flight (see definition below), the vendor shall collaborate with NASA to develop standard payload processing procedures for future test flights and future commercial flights, and to document lessons learned. This information shall be documented in the written Contract Completion Document to be submitted for NASA approval.

4.2 Definitions

For the purposes of this SOW the following definitions shall apply:

- **Developmental Test Flight** is defined as a flight opportunity onboard a ***Qualified Test Vehicle*** that can accommodate and carry a NASA-provided research and test payload package weighing a minimum of 5 kilograms to at least 5 kilometers altitude above ground level and, then, safely land. The launch vehicles should operate under the FAA amateur rocketry rules or be licensed by the FAA for launch operations.

- **Qualified Test Vehicle** is defined as a ***Reusable Launch Vehicle*** whose *intended* normal ***Commercial Flight Operations*** will be suborbital flights whose apogee is higher than 100 kilometers above sea level, or the prototype for such a vehicle.

- **Reusable Launch Vehicle** is defined for this procurement as a single or two-stage rocket propelled vehicle that can fly twice within a consecutive two-week period. Balloons, sounding rockets, orbital spacecraft, and spacecraft intended for flights beyond low earth orbit (LEO) are excluded from this procurement.

- **Commercial Flight Operations** are defined as regular suborbital launch flights offered to the public for pay.

- **Successful Flight** is defined as a flight that has met the above requirements, and the payload has been returned completely intact and fully operational to the Government, or, in the instance of repeat flights between which the payload is not removed from the vehicle, when the flight has met the above requirements and the data has been retrieved from the payload.

- **Flight Opportunity** is defined as the transportation of a payload on a Developmental Test Flight.

- **Final Contract Flight** is defined as the last Developmental Test Flight purchased under a given contract.

5.0 Deliverables

Vendors shall provide the following services for each flight carrying a NASA-provided payload:

- The Vendor shall provide the following User Support Documentation:
    - Users Manual describing the vendor's vehicle launch profiles, environmental data, attachment specifications, payload services, data recovery options, safety requirements, accommodations and constraints, and other information necessary for the user to craft a successful flight investigation.
    - Interface control document
    - Flight environmental parameters (predicted and actual when available)
    - Integration and safety procedures required by the Vendor and the launch facility.

- Payload integration– Vendor shall provide all necessary equipment and processes to transport the payload from the payload acceptance area to the vehicle, mount the payload into or onto the vehicle as required by the payload, activate the payload (if necessary), and close the payload faring, if necessary.
- Pre-flight launch support – Vendor shall provide documented requirements for integrating the payload with the vehicle, flight schedules with details of the flight day, pre-flight reviews and safety briefings.
- Developmental Test Flight on vendor's Qualified Test Vehicle carrying NASA-provided payload(s).
- Post-flight payload recovery– Vendor shall be responsible for removing the payload from the vehicle after a flight and delivering it to the Government for acceptance. If the payload is to be flown again on the next flight, vendor shall provide NASA access to the payload while on the vehicle between flights so that NASA can retrieve the data and refurbish the payload.

6.0 Safety

Payload safety – Vendor shall be responsible for the safety of the payload from the time of delivery to the vendor from the Government before the flight to the time of acceptance of the payload by the Government from the Vendor after the flight. If other payloads are also carried on any flight, the Vendor is responsible for assuring that there is no interference between payloads. The Vendor can refuse any Government payload that does not meet the vendor's safety requirements. The Government will reimburse the vendor for costs incurred because of the rejection of demonstrably unsafe payloads supplied by the Government.

Operational safety – Vendor shall be responsible for the safety of all equipment and personnel involved with the integration, launch, flight, and recovery operations of each flight.

7.0 Government-Furnished Property, Material, Equipment, or Information (GFP, GFM, GFE, or GFI)

Each purchase order will specify the NASA-provided payload for each test flight ordered.

All payloads provided by NASA to the vendor for transport will weigh100 kg. or less, and will fit within a 75 cm diameter cylinder that is 50 cm tall.

8.0 Security

The vendor is responsible for the security of all operations at the launch site.

9.0 Travel

All travel-related expenses incurred by the vendor and not pre-authorized by the Government during the period of performance are the responsibility of the vendor.

10.0 Special Material Requirements

N/A

11.0 Other Unique Requirements

The Vendor shall be responsible for assuring that all FAA regulations are met and that the required approvals, licenses, and certifications have been obtained. Copies of these approvals, licenses, and/or certifications, or their drafts, shall be included in the proposal package.

No later than 7 days after contract award, the vendor shall provide NASA with the contact information for the Launch Facility Officer along with any special requirements, licenses or permits that may be required for access by NASA.

12.0 Place of Performance

The place of performance shall be at the Contractor's provided launch facility or at other locations specified by the Contracting Officer.

13.0 Period of Performance

The performance period for Flights # 1 and #2 shall be for six months from the date of contract award. If options for additional flight services are exercised, the performance period shall be extended TBD.