NASA Balloon Operations Contract (NBOC) Scenarios

General Background for All Scenarios

The NASA Balloon Program Office (BPO) at the Wallops Flight Facility (WFF) requires operations and maintenance and engineering services in support of the Baseline Mission Model of the Statement of Work. Operations and Maintenance activities managed and supported by the NASA Balloon Operations Contract (NBOC) Offeror range from the home institution to established remote sites and the establishment of new sites. Engineering services and technical activities range from continuous support of the Columbia Scientific Balloon Facility CSBF flight and ground systems and approved user support, to the research and development of new or enhanced systems and vehicles. The following scenarios capture a broad spectrum of the work expected on the NBOC contract.

The first scenario addresses how the Offeror would conduct a typical balloon flight during a Fall Ft. Sumner campaign. The support includes engineering, logistics, and support operations including ground, launch, flight, and termination activities.

The second scenario addresses the mission/campaign lifecycle of the Balloon Program's premier Long Duration Balloon (LDB) campaign. The support includes planning, fabrication, engineering, logistics, and operations.

For each scenario a brief background is given, followed by a scenario description and period of performance. A wide scope of support is required in these scenarios and the Offeror shall identify all assumptions made in its responses.

The following scenarios focus on major balloon mission and campaign planning and support. The scenarios should not be correlated to the Baseline Mission Model in the NBOC SOW – they are fictitious. The Offeror is required to support the entire mission manifest in the Baseline Mission Model. The mission manifest includes established campaigns as well as non-annual, temporary, or remote campaigns in a given year. Established campaigns include Palestine, Fort Sumner, and Antarctica; non-annual campaigns may include Sweden, Australia, and New Zealand and will be implemented on a program or science-initiated basis to be planned and conducted by the Offeror. Balloon campaigns including peripheral support represent a significant portion of the total Offeror workload and it is critical and contingent upon the Offeror to conduct operations in accordance with pre-established schedules and program-oriented priorities. The Offeror is required to maintain nominal CSBF onsite operations throughout the year which may include ongoing science support, flight support operations, facility operations and maintenance, fabrication, engineering, and administration; offsite operations may include launch campaigns as well as science support on an as requested basis. The NBOC Offeror shall make all efforts to pursue and take advantage of cost efficiencies through staffing, scheduling, project and program management.

Scenario #1

Fall Fort Sumner Science Flight

Background

The Fall Fort Sumner Campaign is the sole annual domestic campaign supported by the Balloon Program. It is the Program's workhorse campaign, providing a venue for conventional flights, LDB candidate flights, and test flights. It has the longest launch window, supports the most users and missions of all campaigns, and it requires major onsite support by the Offeror. The Offeror shall support user integration and test activities (as requested), flight preparations, launch services, ground and flight support operations, and termination and recovery operations. The Offeror shall provide all equipment and facilities support including payload bays, rigging/mechanical shop, telemetry/electronics shop, and facility support. The Offeror is responsible for maintaining equipment and facilities, providing the vast majority of onsite and offsite operations with regard to the campaign, as well as all coordination activities.

The Offeror shall assume during the Fall Fort Sumner campaign there are at least 4 other missions in preparation but there are no concurrent campaigns. Additionally, there will be no adjacent launch operations within 2 days of this launch. Onsite CSBF support for the Fort Sumner campaign shall include continuous mission control from the CSBF Fort Sumner Control Center throughout the mission's flight duration. The Fort Sumner facilities are typically established by mid-August. The Fort Sumner campaign will be de-established by mid October.

Scenario Description

A science payload from Monsters University is slated for Fall Ft. Sumner FY17. They are an LDB candidate and will require approximately 5 weeks preparation time in the field. This flight is considered their final verification and validation test flight prior to an FY19 Antarctic Campaign. They are scheduled to arrive August 12, 2017 and anticipate being flight ready by September 15, 2017. The science minimum requirements state at least 12 hours at float above a minimum of 10 millibar (mb). The comprehensive duration requirement requirements are 24 hours above 7mb. The suspended weight is 4000 pounds (lbs) (includes 600 lbs of steel ballast). The balloon selected is a 39.57 MCF zero pressure balloon. Constant Line of Sight (LOS) coverage is a mission critical requirement. The LDB candidate will require testing of Over The Horizon (OTH) systems during the Fort Sumner flight. The Offeror shall assume launch will occur on September 16, 2017 and the flight will track generally westward. The Offeror shall assume that termination will occur in the Northwest quadrant of Arizona 26 hours following launch.

Period of Performance:

This scenario will start upon science customer arrival (August 12, 2017) and end upon science customer departure from Fort Sumner (September 22, 2017).

Scenario #2

Antarctic Campaign

Background

The Long Duration Balloon (LDB) Antarctic Campaign is the annual premier launch campaign for the NASA Balloon Program. The NBOC Offeror's campaign preparations, CSBF onsite integration, implementation, and execution encompass the entire year. The campaign will nominally support two to four LDB missions that require both onsite and remote support. For the purpose of this scenario, four missions will be manifested and are described below. The campaign is peripherally supported by the National Science Foundation (NSF) and its Antarctic Support Contract (ASC) contractors through transportation, housing, dining, facilities, and maintenance. The duration of the Antarctic campaign is typically mid-October through late January or early February. Launches are conducted during December and January during the austral summer stratospheric anti-cyclone. Mission durations typically last from 7 to 40 days and are determined by science requirements, weather, and support requirements. The Offeror shall support all phases of campaign preparation, science support, launch operations, and remote recovery operations. For the Antarctic Campaign, the Offeror shall establish and maintain working relationships with the science customer, NSF, ASC, NASA, et al.

The Offeror shall assume during the Antarctic launch campaign (December – January) there are no concurrent campaigns. However there will be overlap in the October timeframe due to ongoing Fall Fort Sumner Campaign launch operations or de-establishment. Additionally, the Offeror shall support CSBF onsite pre-integration of 2 missions for the upcoming Sweden LDB Campaign from January 10 to February 28, 2016. Onsite CSBF support for the Antarctic campaign will include continuous mission control from the CSBF Operations Control Center throughout each mission's flight duration.

Scenario Description

The Antarctic facilities will be established with support from the NSF and its contractors by October 23, 2015. NSF provides support contractors including a field camp manager, cook staff, and general facility support staff. Facilities include three (3) payload buildings, rigging shop, telemetry/electronics shop, galley, and facility support. Limited heavy equipment operations are provided by the NSF contractor for balloon pad (ice/snow) grooming and site support.

Standard CSBF support systems and vehicles are developed, fabricated, refurbished, and/or procured to meet the LDB mission profile unless otherwise noted.

All four launches are scheduled to occur between December 1, 2015 and January 15, 2016. For the purpose of this scenario, the Offeror shall assume these missions are a subset of 16 missions manifested for the 2016 fiscal year. The stratospheric anti-cyclone formation will be established on December 15, 2015. Launch opportunities present themselves every 5-7 days. A 4 day turnaround by the Offeror between missions is nominal. For recovery operations, the Twin Otter and Basler aircraft are available on a limited basis and highly dependent upon scheduling with the NSF contractor. Two Basler flights are guaranteed. Twin Otter flights are the principal recovery support aircraft. For the purpose of this scenario a total of 5 recovery flights have been scheduled by NSF. Any of the four missions can share payload buildings. Helium Iso-Packs are required to be pre-positioned the prior season, two 39.57 Million Cubic

Feet (MCF) balloons and one 34.43 MCF balloon are onsite in Antarctica from the previous season. Science equipment, CSBF equipment, expendables, and required balloon vehicles can be sea or air shipped to New Zealand. The final sea shipment occurs on September 10. The sole transport sources to Antarctica during the season are C-17 or C-130 aircraft support. There is no aircraft surveillance requirement for this campaign. The Offeror shall maintain constant command and control throughout the flight utilizing LOS and/or OTH. LOS shall be maintained only within the viewable radius of the LDB facility's ground station following launch. The Offeror shall meet all minimum and critical success requirements; comprehensive success (comprehensive requirements from the science team regarding altitude, duration, telemetry) shall be met on a best effort basis. The response shall outline all major deliverables and milestones. Non-standard support or development systems below shall be addressed in the response.

Mission 1

This LDB mission requires the selection of a NASA Standard balloon to be launched from the Long Duration Balloon facility located on the Ross Ice Shelf near McMurdo Station, Antarctica. The science instrument will be ready for shipment from CSBF by August 15. The science readiness window is December 1, 2015 through January 15, 2016, or as early as possible. The science minimum requirements state at least 2 rotations or 15 days at 4 millibar (mb) +/- 1mb. The comprehensive duration requirement requirements are 40 days above 5mb. The suspended weight is 6000 pounds (lbs) (includes 600 lbs of steel ballast). Line of Sight (LOS) and Over the Horizon (OTH) coverage are mission critical requirements. The science requires the NASA High Gain Antenna (Tracking and Data Relay Satellite System (TDRSS)) at 100kbps, Omni Antenna (TDRSS), IRIDIUM, and IRIDIUM Open Port. The science also requires the NASA Solar Pointing System (Rotator) augmented with Global Positioning System (GPS). The experiment dimensions are 14ft by 16ft by 13ft (LxWxH). The minimum recovery requirements are detectors and data drives, the largest of which are 150lb stacks, 6ft by 3ft by 1ft.

Mission 2

This LDB mission requires the selection of a NASA Standard balloon to be launched from the Long Duration Balloon facility located on the Ross Ice Shelf near McMurdo Station, Antarctica. The science instrument will be ready for shipment from CSBF by August 25. The science readiness window is December 5, 2015 through December 21, 2015. The science minimum requirements state 6 days minimum at 4mb +2/-1mb. The comprehensive duration requirement is 12 days at 3mb +/-1mb. The suspended weight is 5000 lbs (with 800 lbs of silica ballast). LOS and OTH coverage are mission critical requirements. The science requires the NASA Omni Antenna (TDRSS), IRIDIUM, and IRIDIUM Open Port. Science comprehensive requirements include High-Rate LOS data dumps to NASA's Deep Space Satellite Ground Station located at McMurdo, which is considered outside the normal support envelope. The experiment dimensions are 12ft by 12ft by 24ft (LxWxH). The science team requires 1800 liters of liquid Helium, 400 liters of liquid Nitrogen, and 5 compressed gas cylinders (k-bottles) of Nitrogen. The minimum recovery requirements are data drives and the telescope/ cryostat/ detectors, reconfigurable to no smaller than 3ft x 3ft x 7ft.

Mission 3

This LDB mission requires the selection of a NASA Standard balloon to be launched from the Long Duration Balloon facility located on the Ross Ice Shelf near McMurdo Station, Antarctica. The science instrument will be ready for shipment from CSBF by September 5. The science readiness window is December 20, 2015 through December 30, 2015. The science minimum requirements state 8 days minimum at 5mb +/2mb. The comprehensive duration requirement is 16 days at 5mb +/-1mb. The suspended weight is 7200 lbs (with 500 lbs silica ballast). LOS and OTH coverage are mission critical requirements. The science requires the NASA Omni Antenna (TDRSS) and IRIDIUM. The experiment dimensions are 14ft by 8ft by 20ft (LxWxH). The science team requires 2400 liters of liquid Helium, 800 liters of liquid Nitrogen, and 2 compressed gas cylinders (k-bottles) of Nitrogen. The minimum recovery requirements are data drives and detectors, reconfigurable to no smaller than 4ft x 1ft (DxH).

Mission 4

This Ultra Long Duration Balloon (ULDB) mission requires launch of the Super Pressure Balloon to be launched from the Long Duration Balloon facility located on the Ross Ice Shelf near McMurdo Station, Antarctica. The science instrument will be ready for shipment from CSBF by August 30. The balloon fabrication will be complete by September 30. The science readiness window is December 1, 2015 through January 15, 2016. The science minimum requirements state 10 days minimum at 7mb. The comprehensive duration requirement is 100 days at 7mb. International overflight and termination Clearances and Agreements are required for the planned mission of departing the continent and terminating over South America or Australia. The suspended weight is 5000 lbs (with 600 lbs steel ballast). LOS and OTH coverage are mission critical requirements. The science requires the NASA HGA (TDRSS), NASA Omni Antenna (TDRSS) and IRIDIUM. The experiment dimensions are 8ft by 8ft by 18ft (LxWxH). The science team requires 1400 liters of liquid Helium, 600 liters of liquid Nitrogen, and 6 compressed gas cylinders (k-bottles) of Nitrogen. The minimum recovery requirements are not applicable if the payload is allowed to depart continent. Minimum recovery of data drives, telescope, detectors is required if balloon fails, reconfigurable to no smaller than 3ft x 1ft (DxH).

Period of Performance:

This scenario will start after the beginning of Government Fiscal Year 15 and end at the conclusion of all campaign activities.

End of Enclosure 1