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LAUNCH SERVICES PROGRAM

NASA
LAUNCH SERVICES PROGRAM

HELIOPHYSICS SMALL EXPLORERS 2016
ANNOUNCEMENT OF OPPORTUNITY
PRE-PROPOSAL CONFERENCE

AUGUST 15, 2016

Alicia Mendoza-Hill
Flight Projects Office

Launch Services Program Relationships (NASA/HEOMD/KSC)

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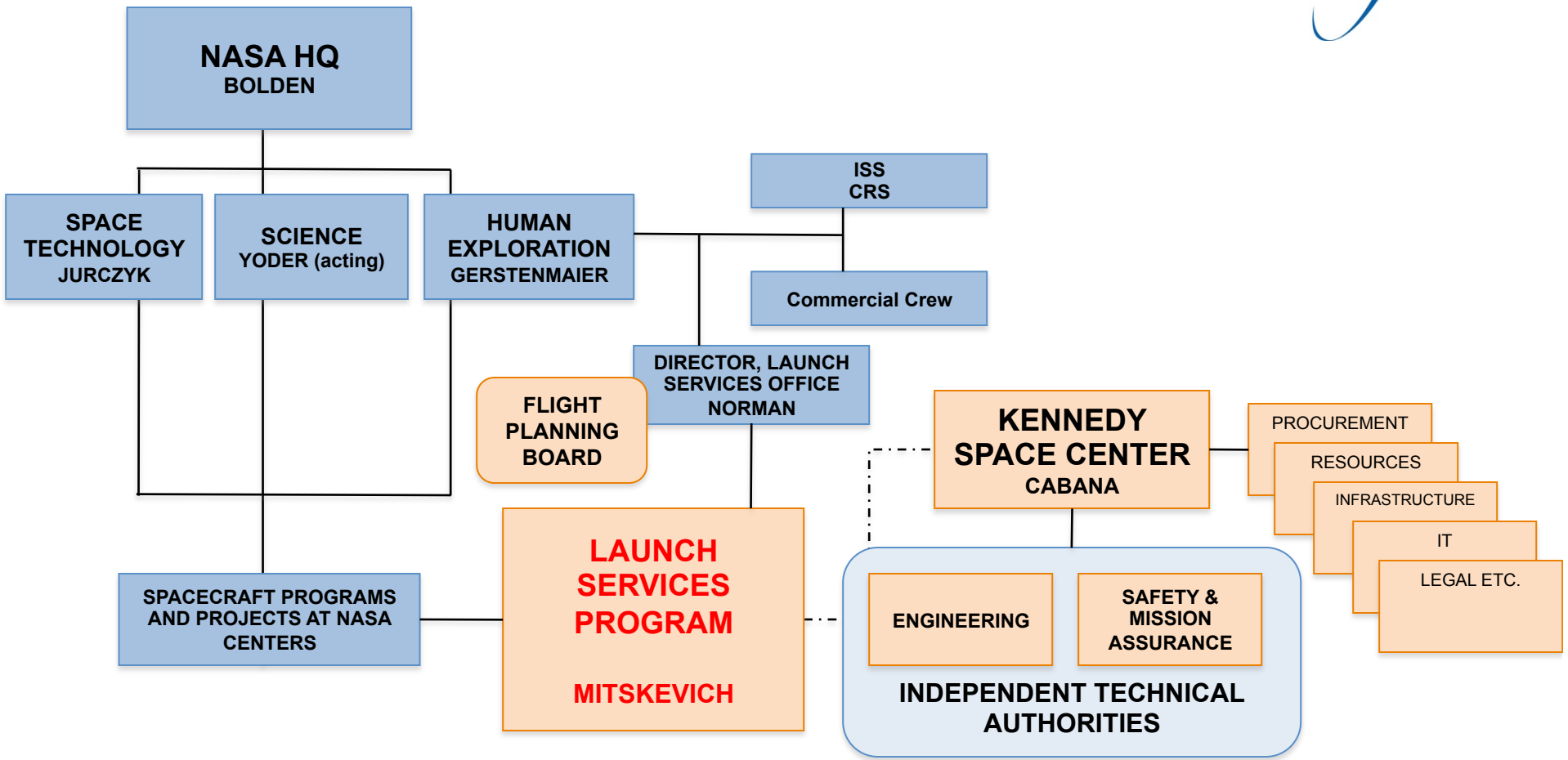

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Launch Services Program

The Launch Services Program provides

- **Management of the launch service**
- **Technical oversight of the launch vehicle production/test**
- **Coordination and approval of mission-specific integration activities**
- **Mission unique launch vehicle hardware/software development**
- **Payload-processing accommodations**
- **Launch campaign/countdown management**

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Launch Services Program

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NASA Strategic Plan 2014

Strategic Goal 3:
Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.

Objective 3.2:
Ensure the availability and continued advancement of strategic, technical, and programmatic capabilities to sustain NASA's Mission

Key Strategy:
Provide access to space

Lead Office: **HEOMD**
Contributing Program: **LSP**

Key Strategy "Provide access to space" citation:

"…certify and procure domestic commercial space transportation services for the launch of robotic science, communication, weather, and other civil sector missions"

"…provide robust, reliable, commercial and cost-effective launch services"

"…assured access to space through a competitive 'mixed Fleet' approach utilizing the breadth of U.S. industry's capabilities"

LSP Strategic Goals 2014

Goal 1: Maximize Mission Success

Goal 2: Assure Long-Term Launch Services

Goal 3: Promote Evolution of a U.S. Commercial Space Launch Market

Goal 4: Continually Enhance LSP's Core Capabilities

LSP Functional Structure

- LSP procures/provides a Launch Service
  - Its more than the basic launch vehicle
  - We don't buy a tail number
  - This is a commercial FFP procurement with additional insight and oversight
- To enable this, LSP has two functional sides
  - Mission integration
    - » Mission Integration Team (MIT) assigned to each mission
    - » Manages mission specific procurement, integration, and analysis
    - » Includes launch site integration and processing
  - Fleet management
    - » Personnel assigned to each contracted rocket
    - » Includes resident offices within the production facilities of all active providers
    - » We watch the production and performance of entire fleet – we certify the manufacture's production line, not just a particular unit (tail number)
    - » We have a say in any change/upgrade/anomaly
- LSP maintains the final go or no-go for launch
- Interface with Safety and Mission Assurance
  - Safety
  - Quality

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Technical Information flow into the MIT

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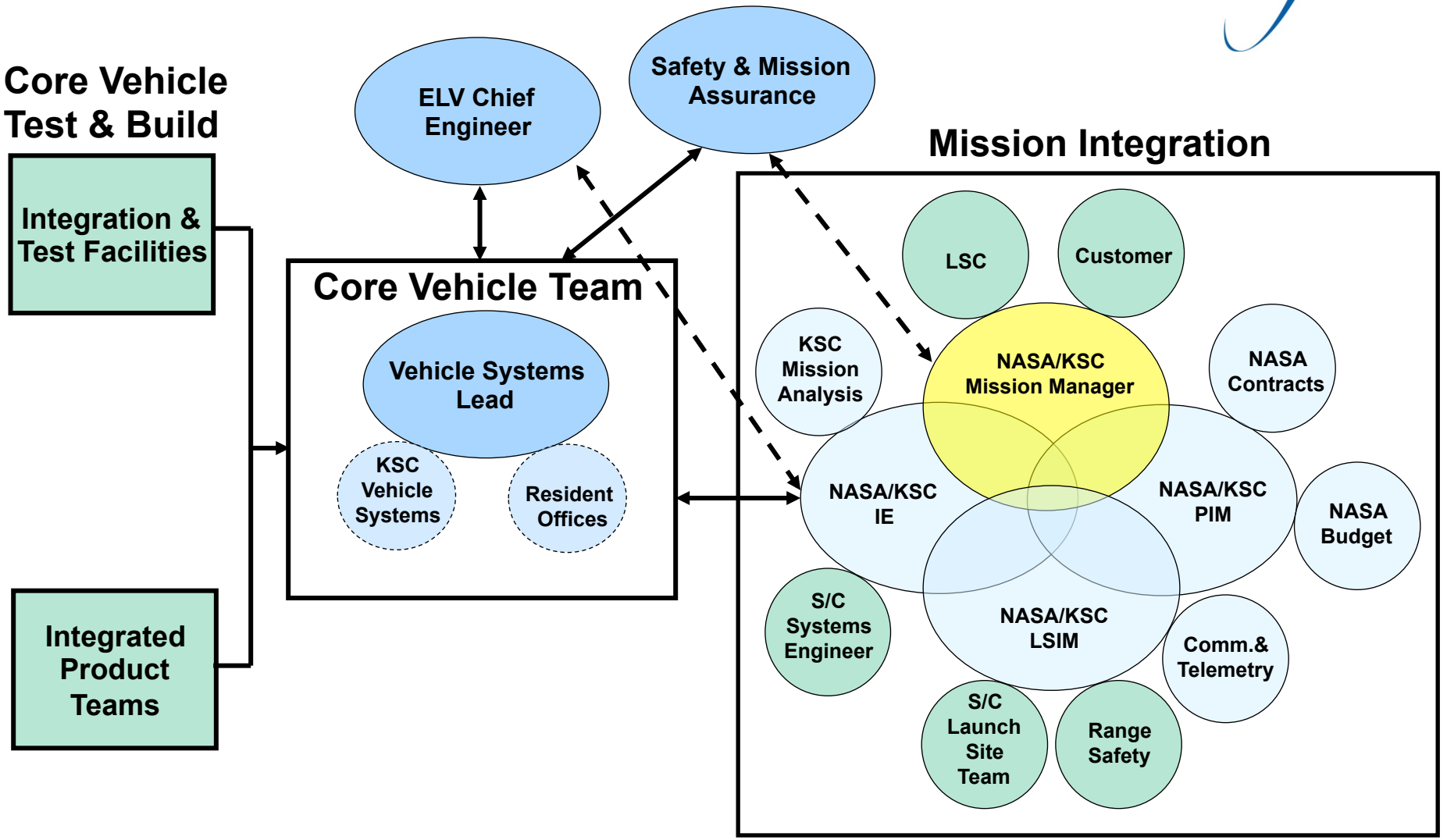

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Options available for this AO

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- **Several options are available to proposers for this Heliophysics SMEX AO**
  - **NASA provided launch services may be proposed at a charge of $50 million in FY 2017 dollars against the PI-Managed Mission Cost (provided under NLS II Contract)**
    - » **Unencumbered 25% reserve against launch costs are not required for NASA provided launch services**
  - **Alternative access to space (including contributed launch services), must be arranged by the proposer and funded within the PI-Managed Mission Cost, may also be proposed**
    - » **A charge to the PI-MMC of $2.0 million will be levied for the NASA launch vehicle monitoring functions and advisory services**
    - » **The proposal must describe the arrangement between the PI and the non-NASA launch service provider to enable the PI's insight for launch services, consistent with NASA Procedural Documents (NPD) 8610.7 and 8610.23.**

Supplemental Mission Advisory and Risk Team Tenets

- SMART (Supplemental Mission Advisory and Risk Team) services integrate LSP Program, Engineering, and SMA positions as advice to our customer/partner
  - Offering advisory services, but not inserting ourselves without customer request
  - Overall Advisory Plan Exists, but LSP will document each advisory service separately to define what LSP will do, responsibilities, and resources required
- LSP utilizes existing insight and risk management processes to provide evaluations of mutually agreeable items
  - Subject to constraints and data provided by the partner/customer
  - Reporting of risks by LSP shall be coordinated with the customer project and will include a range of mitigation options and offer a coherent go-forward plan
- LSP will not take overall mission assurance responsibility when in an advisory role because mission assurance is a complex combination of the full complement of LSP services
- The responsibility for overall mission success of the Mission rests with the Spacecraft Project and SMD
- A Memorandum of Understanding (MOU) will be created between LSP and the Project defining the roles and responsibilities associated with a SMART with SMD agreement and Agency Stakeholder knowledge

For additional information on SMART visit the AO Program Library (Item 6)
http://explorers.larc.nasa.gov/HPSMEX/SMEX/pdf_files/6_Launch_Services_Program_LSP_Advisory_Services_Plan.pdf

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NASA Provided Launch Services

- The NLS II Contract is LSP's primary method to acquire all classes of Category 2 and Category 3 commercial launch services for spacecraft customers
- Provides NASA with domestic launch services that are safe, successful, reliable, and affordable
- Provides services for both NASA-Owned and NASA-Sponsored payloads through multiple Indefinite Delivery Indefinite Quantity (IDIQ) Launch Service Task Order (LSTO) contracts with negotiated Not To Exceed (NTE) Prices
- Provides services on a Firm-Fixed-Price (FFP) basis
  - Incorporates best commercial practices to the maximum extent practical
  - Includes Standard and Non-Standard services
  - Mission unique modifications
  - Special studies
- Allows LSP to turn on a Task Assignment or Non-Standard Service at any time for analyses

NLS II Contracts Overview

- **Launch Services Risk Mitigation Policy for NASA-owned and/or NASA-sponsored Payloads/Missions can be found under NPD 8610.7. Document can be found at http://nodis3.gsfc.nasa.gov**
  - **Risk Category 1: Low complexity and/or low cost payloads-Classified as Class D payloads pursuant to NPR 8705.4**
  - **Risk Category 2: Moderate complexity and/or moderate cost payloads-Classified as Class C payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4**
  - **Risk Category 3: Complex and/or high cost payloads-Classified as Class A payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4**
- **NLS II Launch Service Costs**
  - **Acquisition process begins at approximately L-36 months**
  - **Authority to Proceed (ATP) concurrent with Task Order Award at approximately L-30 months**
  - **$50M from the PI-Managed Mission Cost is allocated to the Explorer Program to pay all standard and some mission unique launch service costs**
  - **Costs not covered by the Explorer Program include**
    - » **Payload-caused Launch delay costs**
    - » **Some mission unique services such as a custom payload adapters, auxiliary propulsion, or costs due to a requirement for a unique launch site may require additional funding (SEE Attachment 2 of SMEX 2016 LSP Info Summary)**

NLS II Contracts Overview – Cont'd

- **Each Provider has their own unique Launch Delay Table**
  - **Delay terms are identical for both parties (Contractor/NASA)**
  - **No-fault Launch delays**
    - » **Include: range constraints, floods, acts of God, strikes and other conditions**
    - » **No adjustment made to mission price**
    - » **No limit on number of days**
- **For the remaining delay cases grace days are based on sliding scale for both Contractor and NASA delays**
  - **150 days of grace at ATP through L-24**
  - **Sliding down to 7 days of grace at L-10 days**

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Launch Service Budget

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- **Under a NASA provided Launch Service a standard launch service includes:**
  - **The launch vehicle, engineering, analysis, and minimum performance standards and services provided by the contract.**
  - **Mission integration**
  - **Launch Site Payload Processing**
  - **Range Support**
  - **Down Range Telemetry support (launch vehicle only)**
  - **Standard Mission Uniques – these are items typically necessary to customize the basic vehicle hardware to meet spacecraft driven requirements. Already budgeted for are items like Pre-ATP studies such as coupled loads and/or trajectories analysis, payload isolation system, a GN2 or pure air purge prior to T-0 and 10,000 Class integration environment.**
  - **Potential additional funding needed to support selectees requiring launch from sites other than the LV base launch complex**
- **Budget does not include launch delays**

Examples of Non-Standard Services/ Mission Unique Costs

Additional Options	Launch Date NLT	Total ($M)
Mission Unique Adapter	12/2022	0.5
Multiple Spacecraft Deployment Launch Vehicle Analyses	12/2022	0.75
Deployable Spacecraft telemetry tracking asset (ocean vs airborne vs ground)*	12/2022	1.4 – 4.0*
Supplemental Propulsion**	12/2022	Contact LSP POC

*Cost depends on locations of spacecraft separations and type of asset required (Contact LSP POC for cost for your specific configuration)

**Due to the multiple launch vehicle configurations within the launch vehicle class, supplemental propulsion systems must be defined and described by the proposer to meet mission requirements. The system proposed and the spacecraft shall remain within the fairing envelopes provided.

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Launch Vehicle Acquisition

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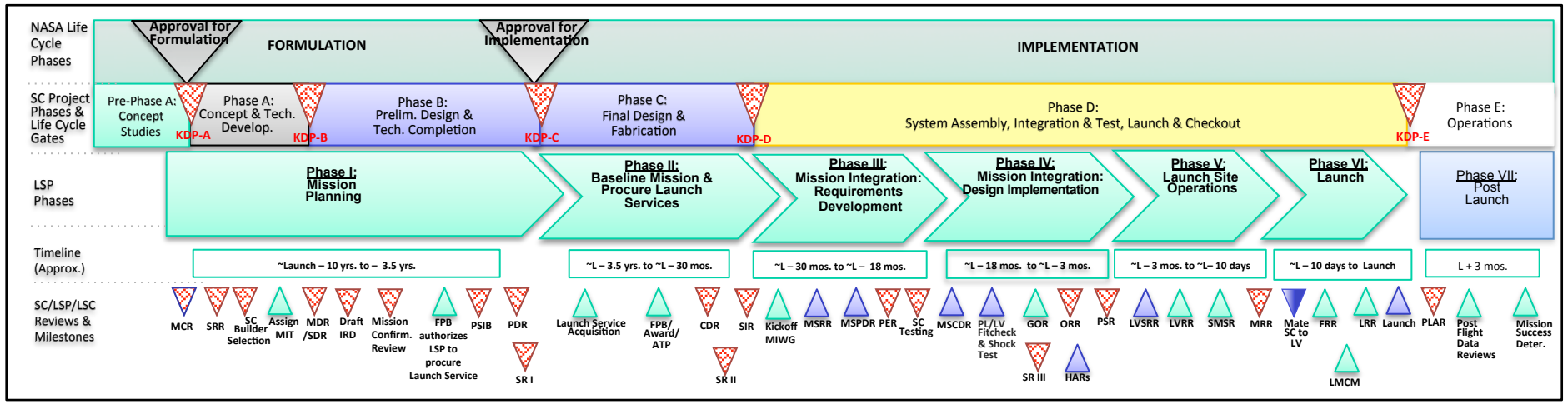
- **The acquisition of a NASA-provided domestic expendable launch vehicle proposed for this AO will be procured and managed by the NASA/Launch Services Program (LSP) via the NASA Launch Services II (NLS II) contract.**
- **The LSP will competitively select a launch service provider for these missions based on customer requirements and NASA Flight Planning Board (FPB) approval.**



Printed documents may be out of date; please validate with the LSP Flight Projects Office (FPO) prior to use. Update: Dec. 2015

Spacecraft reviews shown in red.

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Available Vehicles under NLS II

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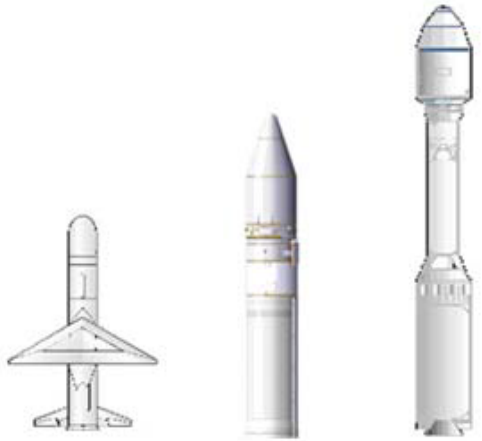
- **Most likely candidate vehicles for this SMEX AO that are available on the NLS II contract are**
  - **Pegasus XL**
  - **Athena 1C**
  - **Minotaur-C**
- **Assumption of a specific launch vehicle configuration as part of the AO proposal will not guarantee that the proposed LV configuration will be selected**
- **Proposers are advised to plan for compatibility with all small class vehicles that are expected to be available through spacecraft Preliminary Design Review.**
  - **Payload design should accommodate the limiting/enveloping launch characteristics and capabilities included in "ELV Launch Services Information" document**



Vehicle Class	Small		
Launch Vehicle	Pegasus XL	Athena 1C	Minotaur-C
Offeror	OSC	LMSSC	OSC
Perf@ 600 km Sun Synch	200 kg	300 kg	800 kg
Certification Category	Cat 3	n/a	Cat 2
Launch Sites	CCAFS WFF KWAJ VAFB	CCAFS KLC WFF	CCAFS WFF VAFB

http://elvperf.ksc.nasa.gov/Pages/Default.aspx/

For mission specific information, utilize the LSP performance website and/or the LSP POC.

Available Launch Site Info

Representative Launch Site Inclinations

Launch Site	Assumed Inclinations
CCAFS	28.5° - 51.6°
RTS	0° - 20°, 60°
VAFB	70° - 90° Sun-synch
Kodiak	70° - 90° Sun-synch
WFF	38° - 51.6°

For mission specific information, utilize the LSP performance website and/or the LSP POC.

Static Payload Fairing Envelope

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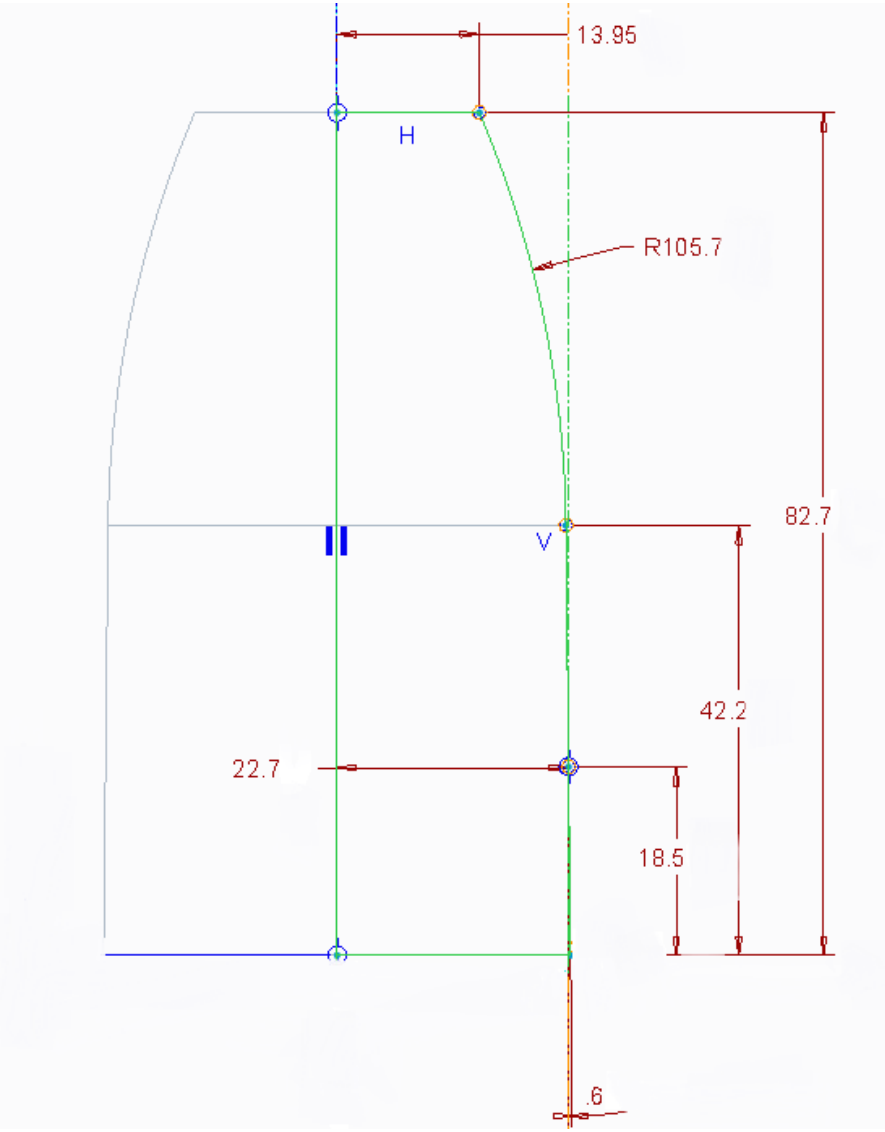

Encompassing Case

* Proposals should include sufficient S/C dimensions to validate fit within this PLF static envelope, including any close approaches.

* Figure has been reduced by 1.5" to account for a typical payload isolation system. If the provider is providing their own isolation system, 1.5 inches may be added to overall height shown.

* In the case of a Pegasus XL, inclusion of the HAPS reduces available fairing envelope. See Pegasus User's Guide (https://www.orbitalatk.com/flight-systems/space-launch-vehicles/pegasus/docs/Pegasus_UsersGuide.pdf)

Enveloping Mass Performance

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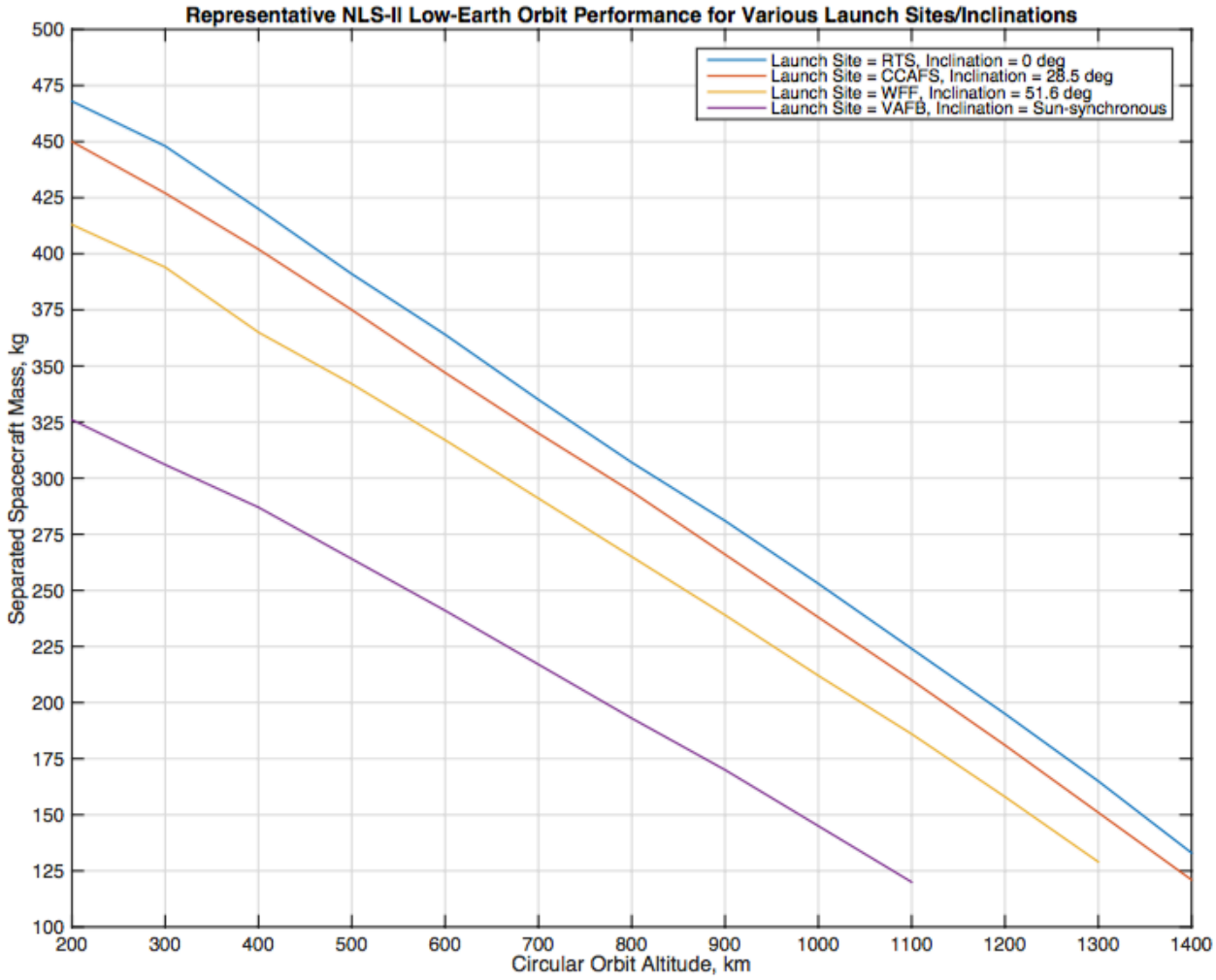

Limiting Orbit Performance Curves

Figure depicts representative nominal performance to various circular orbits. Vehicle injection dispersion capabilities will determine the accuracy of targeting these orbits.

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Summary

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- **It is the Launch Service Program's goal to ensure the highest practicable probability of mission success while managing the launch service technical capabilities, budget and schedule.**

- **Questions must be officially submitted to:**

Aly Mendoza-Hill
Mission Manager
NASA Launch Services Program Code VA-C
Kennedy Space Center, FL 32899
Phone: 321-861-5914
Email: Alicia.Mendoza-Hill@nasa.gov

LSP is ready to respond to your mission specific questions.

Back Up

Evaluation

- **Launch Service Technical Evaluation:**
  - **Overall Assessment: - Given the ground rules in the AO, is the proposed launch vehicle (LV) concept feasible for this application? (Yes or No)**
  - **Comments:_____**
    _____
    _____
- **LV Performance: Area of concern (Yes or No)**
  - **Proposed LV configuration: _____**
  - **Proposed Launch Date: _____**
  - **Launch Period (MM/DD/YYYY to MM/DD/YYYY): _____/____/_____ to _____/____/_____**
  - **Launch Window (On any given day of the launch period Minutes:Seconds): _____ : _____ .**

Evaluation

- **LV Performance: Area of concern (cont)**
  - **Orbit requirements: Apogee: _____ km Perigee: _____ km Inclination: _____deg.**
  - **High Energy requirements: C^3: _____ km^2/sec^2 DLA: _____deg RLA: _____deg**
  - **Proposed LV Performance: _____**
  - **Mass (including reserves) Dry Mass: _____ kg Wet Mass: _____ kg**
  - **Dry Mass Margin: _____ kg _____ %**
  - **Wet Mass Margin _____ kg _____ %**
  - **Formulas:**
  - **Mass Margin kg = LV Performance – S/C Mass (including reserves)**
  - **Mass Margin % = [(Mass Margin kg) S/C Mass (including reserves)kg] X 100**
  - **LV Performance Comments/issues/concerns:**

Evaluation

- **Launch Service Cost Assessment: Area of concern (Yes or No)**
  - **Is there additional funding for any mission unique modifications/ services? (Yes or No)**
- **LV Integration: Area of concern (Yes or No)**
  - **Does the proposer have experience in LV integration? (Yes or No)**
- **LV to Spacecraft Interface: Area of concern (Yes or No)**
  - **Proposed Payload Fairing (PLF) _____**
  - **Spacecraft (S/C) Dimensions: Radial:_____ m Height _____ m**
  - **Any intrusions outside of the PLF usable Static volume? (Yes or No)**
  - **Mechanical Interface:**
  - **Standard Adapter: _____ Custom Adaptor: _____**
  - **Electrical Interface:**
  - **Standard _____ Pin(s) Connector(s): (Yes or No)**

Evaluation

- **LV to Spacecraft Interface: Area of concern (Yes or No)**
- **Mission Unique requirements:**
  - **Instrument T-0 GN^2 Purge: (Yes or No)**
  - **T-0 S/C Battery Cooling: (Yes or No)**
  - **Planetary Protection Requirements: (Yes or No)**
  - **Multiple Spacecraft Deployment: (Yes or No)**
  - **Telemetry Requirement thru Launch: (Yes or No)**
  - **Contamination Control Requirements: PLF: (Yes or No) LV adapter: (Yes or No)**
  - **Cleanliness Level: _____ other: _____**
  - **Unique Facility Requirements: (Yes or No)**
    - **Pad: _____**
    - **S/C Processing Facility: _____**
  - **S/C Environmental Test Plans**
    - **Environmental Test Plan/Flow described: (Yes or No)**
    - **Test Levels provided: (Yes or No)**
    - **Test Schedule provided: (Yes or No)**
    - **Comments/issues/concerns: _____**

Evaluation

- **Spacecraft Schedule: Area of concern (Yes or No)**
  - **Adequate timing of: Launch Service Integration Start Time: (Yes or No)**
  - **S/C Environmental Test Program: (Yes or No)**
  - **Delivery of Verified S/C Model @ L-9 months: (Yes or No)**
  - **S/C ship date: (Yes or No)**
  - **S/C to LV integrated Operations: (Yes or No)**
- **Missions with Radiological material Area of concern (Yes or No)**
  - **List the Radiological Sources:**

    _____
  - **Are unique facilities required to store/process the Radiological Sources? (Yes or No)**
  - **Any LV modifications required for additional safety or Launch approval? (Yes or No)**

LSP Organizational Structure

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